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NEW HAMPSHIRE ESTUARIES PROJECT

Regulation and Management of New Hampshire Estuaries: A Base Programs Analysis

October 2000

Regulation and Management of New Hampshire Estuaries

A Base Programs Analysis

A Report to the New Hampshire Estuaries Project

Submitted by:
New Hampshire Department of Fish and Game
and
Great Bay National Estuarine Research Reserve

Prepared by Carl Paulsen

October, 1999

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Executive Summary

egulation and Management of New Hampshire's Estuaries: A Base Program Analysis reviews the management framework of New Hampshire's estuaries. The report was prepared by Carl Paulsen and submitted by NH Department of Fish and Game and the Great Bay National Estuarine Research Reserve to the NH Estuaries Project. This review and the Technical Characterization of Estuarine and Coastal New Hampshire (summarized in Chapter 2: State of the Estuaries) prepared by the UNH Jackson Estuarine

Enforcement is another weak link in the regulatory framework of the estuaries. The sheer number of septic systems renders system maintenance and performance requirements unenforceable, and the state has not developed an alternative approach for ensuring proper maintenance and repair. Although the NH DES Site Specific Program has significantly improved its monitoring commitment since 1999, program staff limitations have inhibited monitoring of NH Department of Transportation projects for stormwater and erosion control. Local regulations are also only partially enforced. Enforcement officials are often not fully aware of permit requirements. In some cases, permit conditions are never monitored and there are no local programs to ensure long-term monitoring and maintenance of stormwater and erosion control measures.

The NHEP's focus on New Hampshire, while nearly one third of the drainage area lies in Maine, may be an important limitation. As a result of the single state focus, only a limited examination of policies in the state of Maine was included in the BPA report.

Recommendations are listed below for each policy area addressed in the BPA. The recommendations are followed by the number of the Action Plan (eg., Action LND-21) in the *NHEP Management Plan* addressing that recommendation. See the BPA for more detailed explanations of the recommendations.

Non-point Source Pollution

The most important non-point source problems in the estuaries of New Hampshire are stormwater runoff, septic system problems, and construction runoff and erosion. A wide variety of other non-point source contributors such as agriculture, boating, solid waste management, toxic/hazardous wastes, and underground storage tanks add to the cumulative effects of non-point source pollution. The coastal basin has the highest priority for dedication of resources within the state's new watershed approach to non-point source pollution.

- Improve regulatory approach and/or state funding of non-point source programs Non-point source pollution is incremental, and difficult or impossible to identify. New Hampshire's pollution policy of 'anti-degradation' relies on being able to attribute the cause of pollution to a single responsible person or organization. While funding is not a panacea, the state appears to have provided little funding to address non-point source pollution. Recent increases in shoreline and sanitary surveys and related activities seem to reflect the recent influx of funds through the NHEP, rather than a sustained increase in state support. [Action WQ-16]
- Continue to evaluate and revise Best Management Practices New Hampshire relies heavily on BMPs for control of non-point source pollution, yet many BMPs are out-dated or inadequate. The state is beginning to examine stormwater BMPs for appropriateness for New Hampshire conditions and effectiveness in protecting water quality. Other BMPs also need review and revision. Most importantly, the state needs to shift focus from flood and volume control to overall water resource management. Since BMPs are the foundation of the state's non-point source management efforts, this research should receive substantial focus and resources. Results from this research should be incorporated into the Green Book and widely circulated, and the Green Book should be updated regularly. [Action WQ-10]

- Improve local regulation of stormwater and erosion control Local governments should adopt standards for erosion control and long-term stormwater management. Current coverage among Zone A municipalities is limited, and requirements are highly variable. By adopting the standards of the Green Book by reference, as the state recommends, municipalities can avoid having to update their ordinances frequently. Pooper-scooper laws, hazardous waste collection programs, storm drain stenciling, and other programs foster improved runoff quality, but are rarely used. [Actions WQ-9, WQ-10, WQ-19]
- Explore ways to improve outreach efforts for local officials Low participation by volunteer local officials in educational and training workshops has probably slowed progress in developing strong resource protection regulations. [Actions LND-5]
- Work to improve local regulation of development project impacts Local regulation, monitoring and enforcement is needed to supplement the state program, while state support of the Site Specific Program needs to be improved. (Actions LND-2, LND-4, LND-6B, LND-6E, LND-7, LND-8A, LND-8B, LND-9A, LND-9B)
- Improve education of shoreland property owners Given the potential for water quality and habitat impacts, activities within close proximity to surface waters should receive special attention. Education of shorefront property owners regarding laws and responsibilities (e.g., appropriate landscaping activities) is important. [Actions LND-14 LND-16, EDU-4, WQ-13]
- Increase land protection through acquisition or conservation easements One of the most effective means for protecting water quality and important habitat is to limit development in proximity to sensitive resources. [Actions LND-26, LND-27, LND-28, LND-29, LND-35, LND-36]
- NHEP should work with the state to allow the use of Clean Water State
 Revolving Loan Fund (SRF) money for activities identified as priorities through
 the Management Plan The state's restriction of Clean Water Act SRF money to
 landfill closure and wastewater treatment facility construction and upgrade limits the
 effectiveness and benefits of these funds in the Seacoast watersheds. [Action WQ-16]

Point Source Pollution

A relatively extensive and well coordinated set of state and federal regulations address point sources of pollution. The federal Clean Water Act and state Water Pollution and Waste Disposal Act require permits for point sources, and a reasonable amount of technical and financial assistance is available for construction, system upgrade, and operation and maintenance. Staffing limits may cause some delays and/or inadequacies in permitting and oversight.

- Develop a coordinated program and funds to identify and resolve illicit connections, infiltration and inflow, leaky collection systems, and similar problems - These activities are currently implemented haphazardly as funds are available. Since pathogens are one of the primary water quality concerns for the estuaries, greater commitment to resolving the known factors is needed. [Actions WQ-4A, WQ-4B, WQ-4C, WQ-7]
- Improve local regulations to prevent contamination of stormwater runoff Regulations aimed at preventing non-point source pollution are key to eliminating urban stormwater runoff problems. [Actions WQ-8, WQ-9, WQ-10, LND-23, WQ-18, LND-5, LND-22]

- Continue investigations into stormwater management technology for improving runoff quality - Research should continue to focus on potential solutions for contamination from stormwater runoff systems. [Actions WQ-8, LND-1, LND-2, LND-3]
- Improve training of WWTF operators Concerns about the adequacy of the state's existing training programs warrant evaluation and improvement of the programs. [Action WQ-3]

Habitat Alteration

Despite recent development, a significant portion of the estuarine watershed remains undeveloped, or lightly developed. Some estuary shoreland areas also remain relatively undeveloped. State regulations protect certain shoreland areas, and shoreland protection is well coordinated among state agencies. These regulations restrict land use in shoreland areas near large surface water bodies, but smaller water bodies are left unprotected. Limited state budgets effectively leave primary implementation and enforcement to municipalities. Local governments, however, are often reluctant to implement their own land use controls in shoreland areas, and may be even more reluctant to enforce them. Only seven of the 19 Zone A towns have adopted local shoreland protection districts.

Shoreland Development and Riparian Buffers

- Improve implementation and enforcement of Comprehensive Shoreland Protection Act (CSPA) The NH DES Shoreland Protection Program, in cooperation with the NH Coastal Program and Regional Planning Commissions, should strengthen efforts to implement and enforce the CSPA through education and outreach to Planning Boards and Code Enforcement Officers (CEOs). Budget increases or alternative funding sources are also needed. Municipalities should be encouraged to develop shoreland protection ordinances that apply to smaller streams.[Actions LND-14, LND-16, LND-17]
- Use real estate transfers for outreach about shoreland protection Real estate transfer presents an opportunity to inform new landowners of their responsibilities as waterfront property owners. [Actions WQ-13, EDU-4]

Wetland Loss and Alteration

- Develop wetlands mitigation policy NH DES should develop and adopt a formal wetland mitigation policy and increase the use of mitigation through the state permit process. [Actions LND-7, LND-24]
- Track impacts to wetlands from permitted and non-permitted activities Cumulative impacts of permitted activities are not currently monitored but should be, and estimates of non-permitted (e.g. illegal) filling should be developed.
- Protect vernal pools NH DES, in cooperation with local officials, Conservation
 Commissions, and Regional Planning Commissions, should develop a program for
 protecting vernal pools. [Actions LND-32, LND-26, LND-28, LND-33, LND-34, LND-35,
 LND-36]

River and Estuary Protection

- Develop a more comprehensive approach to water habitat protection and improve coordination of surface water programs The new approach should include addressing issues around consumption of ground and surface waters.
- Improve coordination of NH DOT projects with agencies that protect natural resources Existing practices of meeting with state and federal agency officials to review projects should be expanded and formalized. NH DOT should be more environmentally accountable. [Actions RST-5, RST-6]

Open Space and Habitat Protection

- **Revive Land Conservation and Investment Program (LCIP)** The state should revive the LCIP and seek new funding mechanisms to ensure priority conservation sites are protected. Federal agency and private sector programs could be used to leverage a highly effective land conservation program. [Action LND-26]
- Encourage local governments to earmark all of the Current Use change tax penalty for land protection efforts. [Actions LND-28, LND-35]

Living Resource Management

Most living resources in the NHEP study area are healthy. Some shellfish populations and several species of anadromous fish face problems. Management is primarily at the state level, spread among several agencies. The NH Fish and Game Department has lead responsibility for fish and wildlife, while the Natural Heritage Inventory Program of the NH Department of Resources and Economic Development (NH DRED) handles most aspects of plant protection. The NH Department of Health and Human Services plays a role in harvesting of species where public health is a concern. Municipalities have little authority to manage living resources, and the federal government generally has regulatory authority only in the cases of threatened or endangered species and wild species commerce.

Finfish Management

• Ensure NH Fish and Game budgets and staff remain sufficient to manage fisheries regardless of fishing effort - This includes maintaining an active role in federal and interjurisdictional fisheries management to ensure regulations support New Hampshire fisheries goals and improving fisheries resource inventories. Gaps exist in the stock assessments and species information on which adequate management depends.

Shellfish Management

- Develop a shellfish program that meets the requirements of the NSSP and provides for adequate management of shellfish resources This includes taking the necessary steps to gain FDA approval of the state's shellfish program. Financing strategies should ensure the shellfish program is self-sustaining. [Actions SHL-1, SHL-4]
- Improve shellfish management coordination State and federal shellfish sanitation programs need to improve communication and coordination. [Action SHL-1]
- Identify and mitigate pollution sources Existing pollution sources are probably significant enough to prevent recreational harvesting or commercial aquaculture in some areas. Mitigation of these sources will have wide-spread benefits for the estuaries. Federal, state, and

local governments should focus more resources on identifying and mitigating pollution sources. [Actions SHL-2, SHL-5; WQ-1, WQ-3, WQ-4C, WQ-5, WQ-6, WQ-7, WQ-14]

- Educate audiences about illegal shellfish harvesting Such efforts might involve state, local, and non-governmental partnerships. [Actions SHL-9B, SHL-10, SHL-13, SHL-14]
- Improve shellfish resource inventories Gaps exist in the stock assessments and species information on which adequate management depends. [Action SHL-7]

Endangered Species

- Improve and sustain staffing and resources for protection of rare species The staffing level at the Natural Heritage Inventory Program probably limits the effectiveness of the program. Several of the staff are provided by non-state organizations supported by non-state funds. The rare animal program is similarly hampered. Revenue from a conservation license plate might provide an appropriate budget source. [Actions LND-32, LND-34]
- Improve rare species inventories Conservation Commissions and UNH students have provided valuable assistance in assessing natural resources at the local level. [Actions LND-32, LND-33, LND-34]

Marine Aquaculture

- Determine state commitment to aquaculture development and develop formal state policy Since regulations and programs affecting aquaculture involve several agencies, such a policy should be developed through a coordinated, multi-agency effort (including NHFG, NH DHHS, NH DAMF, NH DES, et al.). [Actions SHL-15, SHL-1]
- Provide funding and staff consistent with level of commitment to aquaculture development - Current staff and funding may be insufficient to handle expanded aquaculture. [Action SHL-4]

Local Management Framework

Municipalities in New Hampshire play a significant role in environmental management through local land-use controls. Limited state budgets elevate the importance of local regulations. A number of tools are available for local resource management, from standard zoning and land- use regulations to resource protection overlays, cluster development, and growth management ordinances. All municipalities in NHEP Zone A have developed Master Plans and have adopted zoning ordinances and land-use regulations. Specific provisions, such as stormwater management or shoreland protection, vary widely from town to town. The level of sophistication and resources with which individual towns manage development and enforce regulations also varies.

- Improve resource protection regulations Regulations are quite variable across the estuarine region, leaving some major gaps. [Shoreland: Actions LND-14, LND-16; Wetlands: LND-8A, LND-20, LND-22, LND-25, 25C; Stormwater: LND-22, WQ-9, WQ-10]
- Increase outreach to local officials on importance of resource protection regulations The NH Coastal Program in conjunction with the regional planning commissions should increase efforts to educate local officials on the importance of resource protection, and assist them in improving local land-use planning and controls. This

- outreach should be brought directly to town officials rather than provided through regional workshops. [Actions LND- 5, LND-25C, LND-20, LND-14, LND-8A, WQ-10]
- Improve development review and permit procedures Strategies for improving permit review include increasing staff and budgets, increasing the levels of review, and increasing the use of Conservation Commissions for review. All towns should consider a technical review committee, where individuals with expertise help assess development proposals and permits. [Action LND-6F]
- Ensure adequate enforcement of land-use regulations in all towns Enforcement of local land-use regulations appears to be limited by lack of coordination between planning boards and building inspectors. Building inspectors and code enforcement officers should be present during planning board meetings to ensure planning board recommendations and conditions are fully understood. Procedures should be implemented for recording and verifying field changes to development projects.
- Improve outreach for developers and landowners All agencies involved in resource protection should work to educate landowners and the development community on regulations and requirements. [Actions LND-4, LND-8A, LND-16, EDU-4, WQ-13, WQ-18]
- **Develop long term monitoring of permit conditions** All towns should develop programs for long-term inspection of erosion and stormwater control measures to ensure proper functioning. Seacoast towns currently have no mechanism for monitoring these structures, with property owners left to maintain them and decide whether or not they are functioning properly.
- All construction permits should receive more than one level of local review Permits for single-family residential construction on pre-existing lots that do not receive
 planning board review should nonetheless at least receive one other review for consistency
 with resource setbacks and other requirements.
- **Review variance practices** Towns should examine their zoning board of appeals practices to ensure the requirements of state law are being met.
- Reconsider reliance of NH DES Shoreland Protection Program and other state
 programs on local governments for enforcement of state regulations Limited local
 budgets and staff mean that state programs like the shoreland protection program are
 often not well implemented or enforced at the local level. Local governments also may not
 have sufficient motivation to thoroughly enforce state regulations, since pollution and
 other resource impacts often cross boundaries. [Action LND-14, LND-16]
- Consider watershed-based planning agreements Communities within individual watersheds should meet as a group to develop common goals and practices that will meet an agreed upon resource protection goal. Minimum resource protection standards developed in this way could help reduce impacts that cross boundaries. [Action LND-6A]
- Examine land-use regulations in the Zone B towns Zone B towns tend to be smaller, have less staff and resources available, and may have substantial impacts of water quality in the estuary watersheds. The NHEP should work with NH OSP and the regional planning commissions to review land-use regulations in Zone B towns. [Action LND-6B]
- Increase the number of circuit-rider planners to improve assistance to towns without planning staff Circuit-rider planners provided by the regional planning commissions play a crucial role in implementing local land-use planning and controls, particularly when small towns are confronted with large development projects.

CHAPTER 1 Introduction

Purpose of the Report

espite improvements in water quality resulting from more than twenty years of implementation of the Clean Water Act, the estuaries of New Hampshire continue to suffer degradation. Nowhere is this degradation more keenly felt than among the shellfishing community. Vast beds of once productive shellfish habitat remain off limits to recreational and commercial harvesters. Nonpoint source pollution has been identified as the largest culprit.

Concerns over persistent water quality problems and the impacts of these problems on local communities prompted the state to seek assistance from the National Estuary Program (NEP). The NEP provides an important complement to the Coastal Zone Management Program for focused study and problem resolution in estuaries. The NEP was created by the 1987 amendments to the Clean Water Act to strengthen protection of "estuaries of national significance." The NEP provides support for developing Comprehensive Conservation and Management Plans (CCMPs) derived from baseline information on the current status of the target estuary.

The purpose of this report is to provide background on existing policies and management efforts aimed at protecting the estuaries of the state. The report is one of the first steps in the process of developing a Comprehensive Conservation and Management Plan for the estuaries. It is intended as a status report for policies and programs regarding estuary protection to complement the ecological status report contained in the technical characterization conducted by the Jackson Estuarine Laboratory. In conjunction with the technical characterization, it provides a baseline of data and information from which future actions can be developed and against which future progress may be measured.

This report is designed to provide a snapshot of the local, state and federal management framework for the estuaries of the state. Natural resource management, land use regulation, research, education and funding are all important pieces of this framework, and each is reviewed in relation to specific problems of the estuaries. The report first summarizes the issues and potential issues confronting the estuaries and then reviews the existing policies and programs aimed at dealing with these issues.

Project Area

The estuaries of New Hampshire are influenced by activities within a 1087 square mile drainage basin, two thirds of which lie within New Hampshire (the remainder lie within Maine). The estuaries contain roughly 230 miles of shoreline, all within the state's eighteen mile coastline along the Gulf of Maine. Activities anywhere within the drainage basin can impact the estuaries, so the jurisdiction of the NHEP has been defined to include the entire drainage area within the state.

In recognition of the greater importance of activities in close proximity to the estuaries, however, the NHEP has placed higher emphasis on those communities that border directly on the estuaries. Thus, the NHEP defines a Zone A which includes the 17 municipalities in Rockingham and Strafford Counties that have land bordering on tidal waters plus Rochester and Somersworth, and a Zone B including the remaining New Hampshire municipalities in the drainage basin. Figure 1-1 above shows the project area. Several towns, including Wolfeboro, Alton, Derry, Hampstead and South Hampton, contain only tiny portions of the drainage basin and have been largely left out of the project. In addition, areas in Maine are not incorporated into the NHEP, though actions there contribute to estuarine quality.

How to Use the Report

The report is organized around the problems most widely recognized as important to the estuaries. Chapters are devoted to categories of problems such as nonpoint source pollution, point source pollution, living resources and habitat loss. In recognition of the importance of local land use management to the health of the estuaries, a separate chapter examines the local management framework. Within each chapter, separate sections address specific problems related to that category.

Each problem is presented with background information about the relevance of the issue for the estuaries and summaries of management, regulatory and enforcement, funding, education and outreach programs dedicated to that issue. In many cases, these programs address several different issues. To the extent possible, this report makes note of each issue for which any given program is relevant. Funding for specific programs or projects may also apply to several issues, and no attempt has been made to separate out the proportion of these funds allocated to specific individual issues. Program funds dedicated to the estuaries or estuary watersheds are often not available because budgets are only determined for the entire state. Again, the best information available has been presented.

Every chapter includes recommendations which address the issues identified in the report. These recommendations cover a wide-range of management options and are directed not only to the NHEP but to others who may be working in the coastal region. Almost every recommendation is followed by a letter and number code (e.g. LND-4) which refers to the Action Plan in the NHEP Management Plan which address that recommendation. These actions are not explained here but can be found in detail in the Management Plan.

The final chapter of the report provides a review of how local land use decisions are made. The policies and procedures for local decision making influence every issue in which local governments are involved, and since a significant amount of responsibility is left to local governments in New Hampshire, these policies and procedures are vital to protection of the estuaries. To the extent possible, generalizations about these policies and procedures are provided. Ultimately, careful evaluations of individual municipalities may be necessary to supplement this review.

Report Limitations

While every attempt has been made to be comprehensive, this report has certain limitations. Since priorities had not yet been developed at the onset of this project, the full range of potential issues needed to be reviewed, albeit somewhat less thoroughly than had priorities been thoroughly established before commencement of the BPA. Conversations with knowledgeable agency staff and individuals led to an informal prioritization that was used to help guide the level of detail of the analysis in this report (see Figure 2 below).

PRIORITY PROBLEMS

High Stormwater Discharge (both quality and quantity)

Shoreline Development Failed Septic Systems

Wetland and Habitat Losses

Fish and Shellfish Management (especially monitoring)

Medium POTW and Industrial Discharges (including leaks and

infiltration)

Construction Site Runoff

Atmospheric Deposition (e.g. from acid rain, etc.)

Contaminated Sediments
Combined Sewer Overflows
Boating (and Marina) Discharges

Freshwater Inflows

Landfill Leaks

Groundwater Pollution

Low Animal Feedlots

Agricultural Runoff

Dredging Mining Silviculture Sea Level Rise

Transportation impacts were also mentioned as an important problem.

Certain data, most notably funding and program budgets, was particularly difficult to obtain and is limited (though inferences about budgets could be made based on staff size and comments obtained through interviews). As a result, the search for solutions and recommendations should not stop at those made in this report.

In addition, because of limitations of the project scope, the major focus of the report is on Zone A. This focus should not be interpreted to suggest that Zone B has no significant role in the estuaries. In fact, further study of this part of the watershed may be warranted. Similarly, the lack of emphasis on management policies and programs in Maine does not mean that actions there have no impact on the estuaries. Future efforts should also consider the Maine portion of the watershed, a sentiment expressed by several individuals involved with the project.

CHAPTER 2

Methodology

he Base Program Analysis is conducted using two main tasks. First, an inventory of the management framework is used to describe the federal, state and local institutions and laws already in existence. This inventory becomes a baseline of policies and programs that provides a snapshot of the state of the estuaries. Following the inventory, an analysis of the effectiveness of this framework is used as a basis for understanding the strengths and weaknesses of the existing estuary protection. These two prongs then form the basis of recommendations for action plans contained in the Comprehensive Conservation and Management Plan (CCMP).

The inventory for this report involved developing a list of agencies and organizations involved in all aspects of protection of New Hampshire's estuaries and summarizing the policies and programs in place to address estuary protection. The primary sources of information about institutions were agency staff and written policy summaries such as non-point source program documents developed by the state, supplemented by personal interviews.

Once an appropriate list of agencies, organizations, policies and programs was completed, several analyses were used to evaluate the effectiveness of the current management framework. The primary analysis tool was a focused interview in which participants answered questions regarding regulatory authorities, staffing, budgets, enforcement, program coordination, etc. Participants included agency staff, academics, environmental advocates, and others. Additional analyses included detailed discussions with a variety of individuals, comparisons with other states and other programs, and selected analyses of records.

Effectiveness of the programs was determined on the basis of the surveys and discussions conducted for the project. Consideration was given to the legal scope of the programs that address the priority problems, their management strengths and weaknesses (such as program coordination), staff and resource availability, enforcement and the breadth of programs dedicated to specific problems. The evaluations in this report are not intended as evaluations of the effectiveness of specific agencies or staff, but rather a general evaluation of the broader institutional framework in place to address specific problems.

The approach of this report involved examining policies as identified by the US Environmental Protection Agency in its National Estuary Program Guidance document for Base Program Analyses. At the time of this report, resolution of the scope of priority problems was not completed. As a result, the Base Program Analysis has been left broad, encompassing the universe of potential issues as identified by EPA. This broad scope limited the detail of analysis to some extent, as a trade-off had to be made to cover its breadth.

Detailed evaluations and recommendations related to specific policies are provided in each section of the report. Since this level of detail may be unwieldy for certain purposes, the report also provides more general recommendations at the end of each chapter. The Executive Summary provides an even more general summary of findings and recommendations.

Estuary Issues

ater quality and natural resource related issues in New Hampshire's estuaries are fairly wide ranging and vary considerably in terms of severity. Water quality issues include pathogen contamination, sedimentation, toxic contamination, changes in hydrology that affect salinity of areas of the estuaries and many more. These issues are, in turn, caused by a number of problems resulting mostly from human activity. While there are many unknowns about the problems that face the estuaries, past research and the technical characterization of the estuaries done for the NHEP have identified some specific issues and helped determine information gaps. The following are illustrations of some of the findings:

Microbial Contamination

Bacterial contamination in the estuaries, which causes health risks, shellfish harvest restrictions, and the potential for broader ecological problems, appears to be the result of stormwater runoff, waste water treatment plant (WWTP) effluent (aggravated by stormwater infiltration problems), combined sewer overflows and inadequate septic systems (Jones, 1997). Bird defectation may also be a significant pathogen source in New Hampshire (birds were found to contribute up to 40% in one case on Cape Cod (Horseley and Witten, 1996)).

While state and federal programs monitor and regulate WWTP operations, local officials acknowledge that infiltration still results in sewage overflows in most towns with sewer systems. Stormwater runoff carrying pet wastes and other fecal contamination, especially from impervious surfaces like roadways and parking lots, probably contributes to microbial contamination. Septic system failure has been identified as another important source, and stormwater flushing of detention ponds/basins that have held and perhaps incubated bacteria may also contribute to the problem (Ted Diers, pers. comm.).

Toxic Contaminants and Heavy Metals

The most common contaminants in the NH estuaries, at least currently known, include chromium, lead, mercury, copper, zinc, and PCBs. In particular, PCBs have been found in lobster tomalley and bluefish in levels of concern for public and ecosystem health, but it is unclear whether these levels result from problems endemic to NH estuaries or are of broader regional concern. In addition, mussels have shown high metal concentrations, particularly lead (though chromium, mercury, cadmium, nickel and zinc have also been a concern).

These contaminants may have resulted from past sources and current activities including defense facilities, municipal discharges, stormwater runoff, contaminated groundwater and dredging. The problem appears to be particularly acute in sediments of the estuaries, and some

researchers believe this may reflect historic rather than current contamination. Runoff from impervious surfaces is a particular concern, especially for metals, petroleum products, salts and volatile organic compounds, and boaters may release significant amounts of petroleum products.

These contaminant issues will become increasingly important where development pressures are high - such as in coastal New Hampshire. Increases in these pollutants from industrial sources, road and parking lot runoff, pesticide use, oil spills and residential expansion can become a problem because of the durability of these kinds of contaminants. Leaking underground storage tanks represent a substantial source of hazardous pollutants nationwide (EPA estimates up to one-third of all tanks leak), and may be a problem in coastal NH as well.

Nutrient Pollution

Nutrient loading is a natural process in all ecosystems, and is a problem only when it becomes excessive. One of the primary problems of nutrient pollution is eutrophication, a complex process that leads to problems such as low oxygen, algae blooms, and fish die-offs. Symptoms of eutrophication appear to be rare in NH estuaries (draft NHEP Technical Characterization), though the full extent of the problem for the estuaries is unclear. Certain related problems may exist, including elevated temperatures in Great Bay (Short, 1992), and the problem may increase substantially as development continues.

The predominant sources appear to be WWTFs and atmospheric deposition, with land based non-point source loading also significant and possibly higher than point sources. WWTFs provide a constant source of low level loading of nutrients and occasional surges from stormwater infiltration. Atmospheric deposition of nitrogen from sources like industrial pollution and automobile exhaust may also be a large source of these pollutants. Non-specific land sources (nonpoint sources) include scattered failing septic systems, fertilization including lawn applications, and farm runoff from concentrated animal operations among others.

There has been some concern expressed by local officials about nutrient and other pollution inputs from atmospheric deposition. A common perception, real or imagined, is that prevailing air currents bring in large amounts of pollution from mid-west industries. Thus, some focus on external sources exists.

Sedimentation

Sedimentation and turbidity in Great Bay appear to be small problems at present. Turbidity is highest during the larger tidal flows, particularly during ebb flow (Short, 1992), suggesting that the problem is at least in part related to tidal disturbance of settled material. Wind and storm events contribute to resuspension of sediments, which causes turbidity and contaminant concerns (Langan, pers. comm.). Concern, however, has been expressed over the effects of historic sedimentation from land use practices. One local official believes that past agricultural activities led to substantial sediment loads which significantly reduced water depth in Great Bay. In addition, he explains, the decreased depth and (presumably related) increased water temperature lead to reduced populations of cod and other groundfish that had historically been common in the bay.

Turbidity and sediment pollution in rivers and estuary waters are typically concerns as they impact ecological variables like water temperature, productivity and viability of specific populations of a variety of organisms. Sediments washed into wetland areas can choke out important vegetation communities, thereby diminishing the functions and values of those

wetlands or even effectively killing them. Dams on major tributaries to the Great Bay probably reduce sedimentation loading by allowing settling to occur.

Hydrologic Changes

Changes in flow patterns of tidal waters and inflows of freshwater are both existing and potential problems in the estuaries. Tidal restrictions, particularly at road crossings, have degraded salt marshes by limiting tidal flushing and decreasing salinity. Species like Phragmites grass and purple loosestrife are encouraged while the normal Spartina grasses are out-competed. These changes can substantially alter food chains and impact the productivity of salt marshes. Redistributions of freshwater can occur through pumping and discharge by industries and municipalities, stormwater collection systems and other activities.

Living Resources

Two primary concerns with living resources in the estuaries are species declines and invasions of non-endemic species. Numerous declines in living resources have been documented in the NH estuaries. Shellfish populations have declined from 100 years ago, and many finfish populations have also decreased. Recent rebounds by some species, most obviously striped bass, suggest that management can have a dramatic effect in a relatively shore period of time. In some cases, problems stem from overharvesting outside of the estuaries (striped bass, winter flounder, and perhaps shad) and solutions depend on federal or interstate management programs. Shellfish declines are likely the result of predation and harvesting, disease and lack of suitable substrate on which to colonize (Jones, 1997). Similarly, changes in populations of saltmarsh vegetation and macroalgae are a concern.

Populations of certain other species, particularly terrestrial ones, have apparently increased in recent years. Invasive species are an additional concern, particularly where they severely out-compete native species. Phragmites and purple loosestrife, noted above, are examples of such invasions, as are green crabs.

Habitat Loss

Habitat loss (both terrestrial and aquatic) is a fairly widespread issue in the NHEP study area, though the nature of the problem makes it difficult to quantify. Of particular concern for the estuaries is loss or degradation of shellfish habitat and fragmentation of large tracts of terrestrial habitat. With strong economic growth in the region, the issue is likely to persevere.

Priority Problems

A wide variety of activities and problems contribute to the environmental issues discussed above. Addressing all problems with equal detail would be a vast undertaking beyond the scope of this report. Nonetheless, a priority list of these problems had not yet been developed for the NHEP at the time of this report. As a result, an informal prioritization was developed to help narrow the focus somewhat.

Discussions with a variety of agency staff, scientists and individuals from different backgrounds were used to develop a preliminary list of priority problem areas for the estuaries to help guide research for this report. Individuals rated a list of issues as high, medium and low priority. From these discussions, priorities were determined as follows:

High Stormwater Discharge (both quality and quantity)

Shoreline Development Septic System Leaks

Fish and Shellfish Management (especially monitoring)

Medium WWTFs and Industrial Discharges (including leaks and

infiltration)

Construction Site Runoff

Atmospheric Deposition (e.g. from acid rain, etc.)

Contaminated Sediments
Combined Sewer Overflows
Boating and Marina Discharges

Freshwater Inflows Landfill Leaks

Groundwater Pollution

Low Animal Feedlots

Agricultural Runoff

Dredging Mining Silviculture Sea Level Rise

Within this list, WWTF discharges, construction site runoff, atmospheric deposition and contaminated sediments ranked just below high priority problems. Also, when asked what other problems should be considered, habitat loss, particularly on land, was commonly mentioned as a very important problem for the estuaries. Of particular concern were incremental losses of wetlands, vernal pools and forests. The loss of open space and transportation impacts were also mentioned as important problems. In addition, several people mentioned that low priority issues (such as agriculture) may be very important for particular streams (as hot spots) and thus may be important to consider in those limited cases and for those towns.

These priorities align fairly closely with similar prioritizations done informally by the NH DES in preparation for the 1996 update of the state's non-point source program under the federal Clean Water Act. Thus, this list is assumed to reflect estuary priorities reasonably well and should provide suitable guidance for the research for this Base Programs Analysis.

Non-Point Source Pollution

Overview

on-point source pollution is pollution whose source either does not emanate from a single location or is difficult or impossible to locate. It is associated with agriculture, forestry, stormwater runoff, septic systems, construction and many other activities.

Contaminants include toxics, hydrocarbons (petroleum products), pesticides, organic material (whose decomposition uses up oxygen), sediments and turbidity, pathogens and others. In reality, all pollution emanates from specific, discrete sources. In the case of the above activities, however, specific sources are difficult or impossible to identify and are frequently widespread. Regulation of these activities is often difficult and enforcement impractical. As a result, nonpoint source (NPS) management frequently focuses on developing practices that help reduce contamination (so called best management practices, or BMPs) rather than on direct regulatory controls.

EPA has estimated that 60% of all pollution nationwide is caused by non-point sources. In New Hampshire, non-point sources are also a substantial concern, and may be the primary cause of non-attainment of water quality standards. Non-point sources such as stormwater runoff, faulty septic systems, cumulative impacts of development, construction related erosion and others have been identified as important threats to estuary water quality in New Hampshire. The Oyster River Nonpoint Source Pollution Assessment project, conducted by the Jackson Estuarine Laboratory and the NH Coastal Program, found elevated concentrations of bacteria over broad areas in certain parts of the watershed, high levels of bacteria in tributaries where no identifiable source exists and high levels correlated with rainfall and runoff (Jones, 1997), suggesting non-point source origins. In addition, soils near septic systems have been found to be contaminated (Jones, et. al., 1996 and 1995), suggesting septic systems play a role in water quality degradation.

Federal control of nonpoint source pollution stems from programs under the Clean Water Act (CWA) and Coastal Zone Management Act (CZMA) and is focused almost entirely on non-regulatory approaches. In 1987, the Clean Water Act was amended to include Section 319, Nonpoint Source Management Programs. Under the CWA Section 319, states are required to develop non-point source programs in order to receive certain Clean Water Act funds. Then, in 1990, the Coastal Zone Management Act required states to develop Coastal Nonpoint Pollution Control Programs under Section 6217. Under this program, the state's receipt of Section 319 and CZMA Section 309 funds is conditioned upon having an approved coastal non-point source program in place.

New Hampshire first developed its CWA nonpoint source program in 1989, and the program has been reviewed and revised several times. The current aim of the program is to develop an individual watershed focus, with priority watersheds identified through the Unified Watershed

Assessment process. Priority watersheds are to receive attention first, along with the major focus of program resources.

The state's Section 319 program manages nonpoint source pollution through education, local involvement in problem solving, development and implementation of best management practices (BMPs), reduction of identified pollution sources, and recycling. Within each watershed, the program addresses the following priorities:

- 1. Runoff
- 2. Subsurface Systems
- 3. Hydromodification
- 4. Road Maintenance
- 5. Junkyards
- 6. Construction
- 7. Marinas
- 8. Unlined Landfills
- 9. Land Disposal of Biosolids and Septage
- 10. Agriculture (Hobby and Commercial)
- 11. Silviculture
- 12. Resource Extraction
- 13. Storage Tanks (Above and Below Ground)
- 14. Golf Courses and Landscaping

New Hampshire developed its Coastal Nonpoint Pollution Control Program in 1996 and has received conditional approval from EPA and NOAA. This program consists primarily of a compilation of existing regulatory, management, and technical assistance programs, with some modifications to address issues not adequately covered by those programs. Conditions on the approval, which reflect aspects of the program that were inadequate (but not so much so as to warrant rejection of the program), must be addressed in the next few years.

New Hampshire's CWA and CZMA programs are coordinated and overlap to some extent. The same coastal watersheds will be studied for development of management plans. The Coastal Nonpoint Pollution Control Program is focused on urban development and its impacts, septic systems, agriculture, forestry, roads, marinas and boating, hydromodification and wetlands. DES, under its CWA program will provide technical and financial assistance.

In addition to federal and state nonpoint source initiatives, local governments have authority under state law to establish zoning ordinances and development regulations that give them the opportunity to exert a substantial amount of control over nonpoint source pollution. Zoning, subdivision regulations and site plan review procedures may include requirements for stormwater and erosion control and for septic design, siting and installation, and may address prohibited land uses, open space requirements and more. Through the use of zoning overlays, shoreline habitats, wetlands and other important natural resources may be given additional protection from development. Open space acquisition or protection can also provide buffers for estuary and other surface water protection.

Local governments are assisted in their efforts by a variety of other agencies and organizations. Regional Planning Commissions provide assistance in the preparation of Master Plans and land use regulations, and Conservation Districts assist in evaluation of erosion control and stormwater management efforts. The lack of municipal expertise in planning and design review that exists in many seacoast towns makes these entities indispensable to successful local nonpoint source pollution control.

Stormwater Runoff

Development inevitably affects runoff patterns. Buildings, parking lots and roads prevent percolation of rain and snowmelt into the soils and increase the rate of flow of water off the site. Increased runoff and the increased speed of runoff contribute to changes in the rate at which rainfall enters surface waters like streams and bays. Peak stormwater flows are increased and dry weather flows are decreased (due to reduced groundwater flows from reduced infiltration). These changes can turn perennial streams into seasonal streams and can have substantial impacts on the ecology of surface water systems, particularly estuary areas where the ecosystem and its productivity are tied to salinity and other aspects of water chemistry.

In addition, the runoff carries contaminants that it picks up enroute to surface waters. Runoff may be exposed to oil, toxics, litter, animal wastes and associated pathogens, metals, nutrients and sediments picked up from the ground over which the runoff traveled. Where development has led to impervious surfaces, these contaminants have less chance to be "filtered" by soils and vegetation, and more of them reach water bodies more quickly. Exposed surfaces from construction activities are eroded, leading to soil loss and sedimentation and turbidity of surface waters. Studies have consistently shown that impervious surface coverage of as little as 10% of a watershed can have significant ecological impacts (Horner, et. al., 1994).

Solutions to these problems are tied to programs aimed at preventing contamination of stormwater and to policies to control and treat the runoff. Limits on impervious surfaces for development can help control timing of runoff and may promote some filtration through contact with soils and vegetation. Stormwater control requirements and nonpoint source pollution programs are also vital to reducing stormwater related degradation.

In addition, runoff from urban areas is frequently collected through catch basins and sent directly to surface waters. Policies regarding operation and maintenance of stormwater collection systems are also important tools. Recent research in Manchester, NH has examined the use of catch basin filters to improve the quality of stormwater drainage systems, and the results will apply to coastal towns with these systems. Urban stormwater collection systems are sometimes regulated as point sources under the Clean Water Act, and as such they are primarily addressed in the following chapter on point sources.

Institutional Infrastructure

Table 4-1 Protection Program Summary

Program	Agency	Description					
FEDERAL PROGRAMS							
Clean Water Act Nonpoint Source Program (§319)	EPA	Requires states to develop source pollution protection programs in order to qualify for certain federal funds. Program contains requirements overseen by EPA.					
Clean Water Act Stormwater NPDES permits	EPA	NPDES (point source) permits required for stormwater discharge pipes for large municipalities.					
Clean Water Act §404 Permits	US Army Corps of Engineers	Permits for dredge and fill of wetlands protects stormwater and erosion control functions of wetlands.					
Coastal Zone Management Act §6217	NOAA Office of Ocean and Coastal Resource Management	Requires states to develop source control programs for coastal regions in order to qualify for certain federal funds.					
Comprehensive Environmental Response Compensation and Liability Act (CERCLA)	EPA	Creates a response mechanism for hazardous substance spills and clean-up and establishes liability for clean-up costs.					
Resource Conservation and Recovery Act (RCRA)	EPA	Hazardous and solid waste management requirements that include handling and disposal standards.					
Stormwater and Erosion Control Programs	USDA Natural Resources Conservation Service	Technical assistance and outreach for stormwater management, particularly for farms.					
Clean Water Act Revolving Loan Fund	EPA	Funds for state activities to protect and enhance water quality.					
	STATE PROGRAMS						
Nonpoint Source Management Plan	NH Dept of Environmental Services	State's CWA nonpoint source plan which includes measures for stormwater.					
Coastal Nonpoint Source Management Plan	OSP NH Coastal Program	Nonpoint source pollution control management plan under CZMA §6217					
Alteration of Terrain	DES Site Specific Program	Permit program for construction, forestry, and other site disturbance activities that includes requirements for BMPs.					
Comprehensive Shoreland Protection Act	DES Shoreland Protection Program	Extends requirements of Site Specific program to smaller disturbances and requires buffers and setbacks in certain shoreland areas.					
Dredge and Fill in Wetlands	DES Wetlands Bureau	Permits for dredge and fill of wetlands protects stormwater and erosion control functions of wetlands.					
Timber Harvest Regulations	DRED Forest and Land Division, NH Dept. of Revenue Administration	Regulations that require setbacks/buffers and use of BMPs.					
Rivers Management and Protection Act	DES Rivers Management and Protection Program	Includes restrictions on activities that contribute to contamination of stormwatto					

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Federal Programs

Management Framework

Federal management of runoff is handled by EPA and the National Oceanic and Atmospheric Administration (NOAA) and is focused on review and coordination of the state non-point source programs discussed above. The review process is used to ensure the programs address the requirements established by Congress under the Clean Water Act and the Coastal Zone Management Act. These requirements include measures to address stormwater runoff and its contamination. Periodic reviews and revisions of the programs are used to monitor progress on the issues identified through the program development process (New Hampshire is currently going through a review and revision of its CWA nonpoint source program).

Regulatory Framework

Direct regulatory control of stormwater runoff at the federal level is limited to the degree to which stormwater is collected and routed to a discharge pipe. As this runoff then becomes a point source, it is discussed under point source control in Chapter 5. Similarly, the problem of Combined Sewer Overflows is left to the discussion of point source controls as they are managed as point sources. Nonetheless, contaminants that are carried by urban runoff are generated through nonpoint sources.

Several federal laws administered by EPA, such as CERCLA, RCRA and the Clean Water Act, serve to reduce the potential for contamination of stormwater runoff. CERCLA requires those responsible for hazardous substances to notify the National Response Center of releases of hazardous substances and respond to those releases. It also provides measures for establishing liability for costs of cleanup. RCRA regulates hazardous and solid waste management, establishes handling and disposal standards and requires states to develop plans for dealing with these issues. These programs will be discussed in greater detail in later sections of this chapter.

Section 404 of the Clean Water Act protects wetlands from impacts of development through permitting requirements, and this protection helps preserve the stormwater and erosion control functions of wetlands. The U.S. Army Corps of Engineers (ACOE) is the agency responsible for permitting, although the ACOE solicits comments on the permits from EPA, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (under NOAA). This program is discussed further under the wetlands section of Chapter 6.

Other provisions of the CWA address disposal of sewage sludge from municipal wastewater treatment facilities. EPA is also responsible for regulating domestic sewage sludge application, including reporting requirements and a tracking system to monitor where sludge came from and where it was applied, what it contains, etc. These and other laws help mitigate some of the potential pollution exacerbated by stormwater runoff, and will be discussed at greater length in later sections of this chapter.

Non-Regulatory Framework

A variety of non-regulatory federal programs exist to lessen problems associated with stormwater runoff. Education and outreach regarding proper used oil disposal and similar practices indirectly address some problems of contamination. Motor oil recycling through the Resource Conservation and Recovery Act also helps control the contamination of stormwater runoff. These efforts, however, are limited.

The USDA Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service) provides outreach and technical assistance for reduction of stormwater related pollution,

including training sessions and educational materials for stormwater and erosion control on farms. In the coastal area where farms are few, NRCS helps landowners and municipalities reduce soil erosion and prevent nonpoint source pollution. The agency also provides soil surveys which are used in biosolids application plans and in local stormwater and erosion control management through the subdivision and site plan review processes (discussed later). NRCS also provides other technical and educational materials such as fact sheets. These programs are well coordinated with state and local programs through both formal and informal mechanisms.

Most of the funding for New Hampshire's non-point source efforts comes from the Clean Water Act and the Coastal Zone Management Act. The Clean Water Act provides funds under §319. The CZMA provides funds primarily through §309 enhancement grants, used for demonstration projects and to encourage policy changes, and §306 money for research and construction projects. New Hampshire received \$644,000 in 1997 for §306 and §309 grants, the lowest dollar amount of the 26 coastal states (most of this money has come from §306).

Money from the Clean Water State Revolving Loan Fund (CWSRF) may be used to fund nonpoint pollution problems identified as a priority under federal or state nonpoint source programs. New Hampshire has a potential pool of \$10 million or more annually, but this money has thus far been restricted to supporting municipal wastewater treatment facilities and closure and capping of old landfills. In the seacoast area, where other problems may be more important to surface water quality, there should be increased flexibility to use these funds for other activities. In particular, future funds should be available for nonpoint source pollution programs, particularly when priority landfill closures have been completed.

The National Flood Insurance Program, implemented by the Federal Emergency Management Agency (FEMA), provides low-cost flood insurance for properties within flood prone areas. In order to receive this benefit, however, municipalities must delineate floodplains and develop appropriate ordinances to control development of these areas. This program, therefore, provides an incentive for municipalities to improve their regulation of these areas that provide important protections from runoff. On the other hand, the program has long been viewed among conservation organizations as subsidizing coastal development because the full costs of living in flood prone areas are not borne by the people living there. To the extent that this is true, shoreland areas important for controlling stormwater runoff may inadvertently be inappropriately developed.

State Programs

Management Framework

State management of stormwater runoff is handled through the state's Nonpoint Source Management Plan. The goal of this plan is to abate pollution such that receiving waters meet their water quality and use standards. This is done through public education, implementation of best management practices (BMPs), pollutant source reduction and recycling as well as water quality monitoring programs. Certain regulations also apply for issues such as control of toxics. The DES Water Division is the lead agency for the Nonpoint Source Management Plan, with the Subsurface Bureau and the Site Specific program in the Wastewater Engineering Bureau providing most of the coordination of the programs.

The state's Watershed Approach to Abate Pollution, a part of the state's nonpoint source program under the Clean Water Act, approaches water quality management through watershed level investigation of problems and solutions. The watersheds within the coastal basin cover the entire jurisdiction of the NHEP. These watersheds have been given a high priority for the

program and have been among the first to be studied. The primary goal of the program for the coastal basin is remediation of bacteria contamination that limits shellfish harvesting. The program coordinates its efforts with local governments and private organizations. Also, through its role in subdivision review and regulation, the DES Subsurface Bureau becomes the oversight agency regarding a substantial portion of development in the state.

Regulatory Framework

Much of the state's legal authority to control stormwater runoff and the pollution problems associated with it hinges on the anti-degradation provision of the water quality protection laws administered by the Department of Environmental Services (DES). The state's water pollution law, RSA 485-A, establishes a water quality classification scheme for surface waters based on chemical, biological and physical characteristics and makes it unlawful to discharge any sewage, industrial or other wastes in a manner that would result in degradation below the classification criteria (RSA 485-A:12). The law then provides DES with the authority to require polluters to correct water quality problems if their actions cause a body of water to fall below its classification standards.

This provision makes use of established water quality standards to define what constitutes a violation, and both point and nonpoint sources of pollution are subject to enforcement. The anti-degradation provision, along with specific fines and civil penalties where provided for, acts as the regulatory hammer that hangs over numerous protection measures in NH law. For instance, where law requires adherence to specific practices or measures, frequently the only enforcement option is this anti-degradation provision. While perhaps not a primary tool for the control of non-point source pollution, this provision is widely cited in the state's non-point source programs as an important non-point source authority.

The Alteration of Terrain portion of the Water Pollution and Waste Disposal Act (RSA 485-A:17) is the state's primary regulatory program for stormwater and erosion control. DES administers these provisions under the "Site Specific" program. Construction, forestry and other activities bordering on surface waters or that disturb significant amounts of land (defined in the regulations as those disturbing 100,000 square feet (2.3 acres) or more, or 50,000 square feet (1.1 acres) within the protected shoreland under the Comprehensive Shoreland Protection Act) are required to obtain a permit through the Site Specific program. This program requires development plans that conform to BMPs, including short and long term design features like vegetated filter strips, grassed swales, detention ponds, infiltration basins, constructed wetlands and others.

These BMPs are set out in a document titled *Stormwater Management and Erosion Control Handbook for Urban and Developing Areas in New Hampshire*, commonly called the "Green Book." This manual, developed by the Rockingham County Conservation District and others, is the standard for Best Management Practices (BMPs) in the state and is incorporated into various state and local regulations. It is to be used to guide the design of developments to minimize stormwater-related impacts.

This and other state BMP manuals were developed at a time when runoff timing and erosion were the primary problems being addressed, and issues of contaminants were only distant concerns. Recent research has indicated that these practices may provide little in the way of protections against contaminants (except nutrients, which appear to be fairly well processed by vegetative cover alone). Site Specific personnel are currently conducting a literature review on the effectiveness of NH's stormwater BMPs in the specific context of New Hampshire's soils, climate and hydrology. In addition, CWA §319 funds have supported a project to field test the

effectiveness of certain stormwater and erosion control systems and to recommend improvements to stormwater BMPs. Findings from these projects will be used to improve the rules (Env Ws 415) that implement the Alteration of Terrain provisions.

Forestry operations are granted automatic Alteration of Terrain permits when they file "Intent to Cut" forms required by state tax law under RSA 79, which also require use of NH Forestry BMPs. Agriculture is exempt from Alteration of Terrain provisions except when water quality is degraded. State agencies may also be given exemptions if they develop practices that adequately substitute for the requirements of the program. NHDOT, the most important of these agencies, is currently allowed to operate without Alteration of Terrain permits, though the Site Specific program has retained authority to regulate NHDOT activities should it deem necessary. This exemption is allowed in part because NHDOT has developed its own internal processes for dealing with stormwater and erosion control (discussed at greater length below), and in part because the Site Specific program has insufficient staff to handle these additional projects.

The Comprehensive Shoreland Protection Act of 1991 (RSA 483-B) also contains provisions that protect against stormwater runoff and associated problems. This act establishes a protected shoreland within 250 feet of certain surface waters and limits activities within that area. Among other things, the CSPA requires stormwater runoff and erosion and sedimentation controls for construction operations consistent with the BMPs set out under the *Green Book*, reduces the threshold for Site Specific permits to 50,000 square feet, prohibits lawn fertilizers and certain high risk land uses that could result in contaminated runoff, requires new buildings to be set back 50 feet or more, and requires maintenance of a vegetated buffer. Agriculture is exempt from the provisions of this act provided it is done in accordance with state BMPs for agriculture. Municipalities are encouraged to develop their own ordinances for shoreland protection, and they receive support from the state for doing so. This law and local implementation will be discussed in greater depth in Chapter 6.

Several other laws supplement these protections by addressing specific activities that may impact stormwater runoff quality. Wetlands improve water quality through stormwater and erosion control functions, and as such, their protection is important for the overall management of stormwater runoff and water quality. Wetlands protection is handled through the dredge and fill laws of RSA 482-A, specifics of which are covered in Chapter 6. State law regarding fertilizer and manure management, use of pesticides and conservation of soils on farms adds further protection against contaminated runoff. Similarly, timber harvesting laws restricting harvests within 150 feet of a river and limiting or prohibiting piling of slash add some protection against the damaging impacts of runoff.

Lastly, the Rivers Management and Protection Act regulates activities in or near designated rivers to protect water quality and river hydrology. For instance, the act prohibits solid waste landfills within the 500 year and requires vegetative screening and a 100 foot setback from the 500 year floodplain if sited within a quarter mile of the river. In addition, local advisory committees are charged with developing a management plan for the river and its surrounding river corridor that addresses recreational and non-recreational uses, existing land use, protection of resources such as fish habitat, wetlands and open space, dams, bridges and more.

Non-Regulatory Framework

Since much of the state's control of stormwater management relies on voluntary controls and unenforceable or difficult to enforce policies, education and outreach are vital to the success of these programs. As a result, there are numerous education, technical assistance and training materials and programs offered by each of the state agencies involved in managing stormwater related issues. These programs are also well coordinated with federal and non-governmental agencies and programs.

The NH Office of State Planning (OSP) is one of the primary state agencies involved in outreach and technical assistance. Numerous programs exist to aid local governments in managing resources. In the coastal area (roughly equivalent to the NHEP Zone A), these programs are implemented by the NH Coastal Program. Under a grant through §308 of the CZMA, the Coastal Program developed a series of meetings with local land use boards in Zone A for the purpose of ensuring that the boards are well informed about land use policies available to them to reduce nonpoint source pollution. A bulletin called *A Quick Guide to Controlling Nonpoint Pollution Through Municipal Programs* was developed to reinforce the content of the meetings. Zone B appears to be less thoroughly served, as the CZMA funding is not directed to that area.

The state's Municipal Water Protection Assistance Program, established under the enabling legislation for OSP (RSA 4-C), provides technical assistance to local land use planning boards with respect to protecting local water resources. Assistance includes consultation with planning board members and Regional Planning Commissions (RPCs) and assistance with ordinance development. These programs are coordinated with DES, the RPCs and the conservation districts and are mostly delivered by the RPCs and conservation districts. Thus far, model ordinances have been developed for erosion and stormwater management (prepared by the NH Association of Conservation Districts and the Water Quality and Urban Conservation Committee, called the *Model Stormwater Management and Erosion Control Regulation*), shoreland protection, and model health ordinances regarding on-site septic disposal systems. Model ordinances for wetland districts and aquifer protection districts are also being developed. Finally, the Coastal Program publishes a newsletter called *Tidelines* that is distributed to local land use boards and their members, libraries, and interested citizens.

Similar assistance is available through Technical Assistance Grants from the Coastal Program office. These grants are made available to the RPCs (Rockingham Planning Commission and Strafford Regional Planning Commission). This assistance extends the ability of the RPCs to provide professional planning services to their member communities. Examples of such technical assistance include: community master plan updates and assistance with drafting and revising local development ordinances and regulations.

The DES Site Specific program provides a document called *Best Management Practices for Urban Stormwater Runoff*, a supplement to the Green Book that contains information on permanent stormwater control measures. This document is less well known and less well distributed than the Green Book, yet it is an important reference for stormwater management. The publication *State Alteration of Terrain Permit Requirements for Sand and Gravel Pits* explains how Site Specific regulations apply to gravel operations. In addition, DES provides the fact sheet *Impacts of Development on Stormwater Runoff* and the guidebook *Guidelines for the Preparation of Site Specific Applications* to explain the necessity of stormwater controls during and after construction. Finally, the forestry BMP manual *Erosion Control on Timber Harvesting Operations in New Hampshire* is available and has been incorporated into the regulations.

Finally, in order to address concerns about the quality of urban stormwater runoff, the DES Surface Water Quality Bureau is studying the use of catch basin filters to control the quality of stormwater discharge from municipal collection systems. These systems may help alleviate contamination that makes its way past all other NPS pollution control efforts to the storm drains. In addition, studies have suggested that, in some cases, catch basins and other stormwater control structures may increase contamination by pathogens. Funding from the CZMA has been used to study this problem further. While this effort focuses on point source level solutions, it is directed at non-point stormwater runoff problems.

Local and Regional Programs

Management Framework

New Hampshire relies heavily on local governments to regulate activities that will contribute to polluted runoff. Under state law (RSA 674:35-50), municipalities have authority to regulate subdivision of land and development activities. Typically, control of stormwater runoff and erosion and sedimentation are important features of such regulations. Development activities too small to be covered by the Site Specific program discussed above are regulated through these zoning and development regulations. These regulations, however, are voluntary and are not widely implemented.

Subdivision regulations and site plan review have traditionally focused on engineering concerns relative to public services such as roads, utilities and layout. These authorities may also be used to ensure drainage from the site is consistent with the goal of water quality protection. Stormwater control plans, design and performance requirements, impact analyses and compliance with best management practices are all options for protecting water quality from the impacts of subdivision and commercial development. Standards for BMPs are contained in the Green Book, which the Office of State Planning recommends be incorporated into local regulations.

Communities are also authorized and encouraged to develop buffer zones and/or setbacks around surface waters and wetlands for additional protection from stormwater runoff pollution. These provisions ensure a vegetated corridor is maintained between development and water bodies in which the rate of stormwater flow can be slowed and a certain amount of filtration through percolation into soils may occur. The use of these kinds of provisions will be discussed in a later chapter in relation to their habitat protection value, but they are equally important as stormwater runoff controls.

Regulatory Framework

Regulation of stormwater runoff in the municipalities of Zone A is varied, with some towns essentially meeting the objectives of the recommended ordinance and others having no stated provisions. Roughly six of the 19 municipalities (32%) have ordinances that require stormwater control plans and cite or refer to the Green Book for design guidance (See Table 4-2 below). Several of these municipalities require maintenance of stormwater control structures, and that requirement is tied to the deed so future owners will also be responsible for maintenance. Though its stormwater requirements are limited, Newmarket also requires annual reports on maintenance to the Code Enforcement Officer.

Ten of the 19 municipalities either require stormwater plans or require at least some means for addressing stormwater runoff concerns. Some of these towns will hire contract engineers at the builder's expense to review plans for these measures - frequently drawing from the Conservation Districts for this review. This approach probably ensures at least partial compliance with

measures in the Green Book. These provisions, however, usually amount to indirect controls and are likely to be of limited effectiveness. Three towns, Durham, Newington and Rollinsford have essentially no stormwater runoff control provisions. In most cases, stormwater management is focused on providing flood control rather than resource protection, so required measures may in fact speed the flow of runoff to surface waters and reduce natural treatment.

The level of implementation of these local regulations has obvious implications for their effectiveness. While thoroughly assessing the implementation of local regulations was beyond the scope of this report, some general observations came out of research and conversations with local officials. Chapter 8 addresses the issues of implementation and enforcement at the local level in detail.

Finally, though required in some cases, maintenance of stormwater control features, particularly on private sites, is difficult to monitor and enforce. No municipalities enforce long term monitoring of private stormwater controls except where they tie into public systems. Performance bonds only provide incentive over the finite life of the bond, and towns may have few other ways to ensure long term maintenance is done. As a result, even the limited stormwater programs that do exist are probably implemented and enforced very irregularly.

Runoff from commercial gravel excavations is regulated through RSA 155-E, Local Regulation of Excavations. Though it is a state law, it is implemented primarily at the local level. This law requires commercial operations to obtain permits from local Planning Boards before beginning excavation (highway construction activities, building construction digging, agriculture, silviculture, and landscaping activities are all exempt, along with grandfathered operations). Applications are also to be sent to Conservation Commissions for review. Implementation and enforcement of this program is done at the local level.

Under this law, excavation is prohibited within 75 feet of great ponds, navigable rivers and 10 acre or larger bodies of standing water, within 25 feet of other surface waters, prime wetlands as defined under wetlands law, or other wetlands five acres or larger, and where it would damage the public welfare or known aquifers. Gravel operations that result in continued siltation of surface waters may also be prohibited. Reclamation plans are required for permits, and must include re-seeding or planting, re-establishment of natural slopes appropriate for the native soil type, drainage returned to natural patterns, and other measures. In addition, reclamation bonds are required and must be completed within 12 months of closure or permit expiration.

Lastly, municipalities have authority (under RSA 674:21) to charge impact fees to offset the impacts of development. These fees must be put into a dedicated fund and used to fund expansion of specified services for which they are levied. They are used infrequently, typically for roads and other such infrastructure, but it appears they could be used for construction of such services as stormwater control features.

Non-Regulatory Framework

Regional Planning Commissions () in both Rockingham and Counties also play a pivotal role in planning and resource management. The RPCs provide planning assistance to local governments through circuit riding planners and through resource documentation, GIS land use and natural resource data and regional planning studies. The Rockingham RPC recently initiated a Scenic Byway Corridor Study for routes 1A and 1B, and the Strafford RPC has been involved in a study of the route 16 corridor and has digitized Rollinsford tax maps. Other related projects exist.

Regulatory Framework

Table 4-2 Local Stormwater Control Provisions

Town	Plans Required	Provisions Similar to State Model	Impervious Surface Limits	References Green Book	Other Requirements
Dover					May require 50 ft buffer for surface waters and impact report.
Durham			20-50%		Landscaping requirements.
Exeter	may require		10-75%		Local design specifications listed.
Greenland	•				Uses some Green Book definitions. Snow storage plan required.
Hampton					Design for 50 year storm.
Hampton Falls	•			•	Design systems for 10 yr/24 hour storm.
Madbury					Post-development runoff not to exceed pre-development.
New Castle	may require			~	Maintenance of control measures required through deed.
Newfields	✓		25%	/	
Newington					Roads must comply with NHDOT standards.
Newmarket					Require oil/grease separators when near specified surface waters.
North Hampton	may require			~	Green Book required when determined necessary. Snow storage plans required.
Portsmouth					Impervious surfaces minimized as practical for the use. May require 50 ft buffers for surface waters and wetlands.
Rochester	may require		16-75%		Requires impact study. No specific standards listed for control measures.
Rollinsford					
Rye	~			~	Lists standards in regulations. Hydrologic analysis required.
Seabrook					Design for 25 year storm, include oil and water separators where PB determines necessary.
Somersworth					Best Available Technology to minimize off-site runoff.
Stratham	V	V		V	May require study.

The Rockingham County Conservation District (RCCD) operates a training site in the town of Brentwood where measures recommended in the Green Book can be examined. Proper installation and operation are demonstrated. In addition, the RCCD and the Strafford County Conservation District hold workshops to train local officials, road agents, engineers and contractors in these techniques.

Non-Governmental Programs

Non-governmental programs dedicated to erosion problems are focused on research and outreach. Several agencies are involved, including UNH Cooperative Extension, Jackson Estuarine Laboratory, the Complex Systems Research Center at UNH, the University of New Hampshire/Maine Sea Grant program, CICEET (the Cooperative Institute for Coastal Estuarine Environmental Technology) and the Gulf of Maine Council. Programs include water quality

monitoring, land use mapping, nonpoint source pollution assessments, technical reports, video productions, school curricula, and more. In general, these programs are implemented in close cooperation with state and regional agencies.

Non-profits environmental groups are only indirectly involved in non-point source issues (including stormwater runoff), primarily through land protection efforts. The Society for the Protection of New Hampshire Forests (SPNHF), for example, has been involved with outreach to Great Bay landowners promoting protection of shoreland areas, and NH Audubon has been working with communities to identify land for protection. The Seacoast Science Center at Odiorne Point State Park provides educational programs on a variety of topics related to the natural history of the NH coast.

Evaluation

State and federal programs are probably adequate to address nonpoint source pollution provided they are fully implemented. Legal authorities are reasonably well developed, and state and federal programs are well coordinated. Unfortunately, there are problems with implementation. Limited staff for the state's Site Specific program means that there is inadequate monitoring of state requirements. Similarly, voluntary controls at the local level are not widely implemented and enforced. Existing outreach efforts are strong but may need to be expanded and re-directed in order to maximize their effectiveness. Finally, because of limitations in the use of state revolving funds, financial support may not be as extensive as it perhaps should be.

1. Good program management and coordination

Non-point source pollution control in New Hampshire is, in general, well managed and coordinated. Recent changes in the structure of the Department of Environmental Services, the primary state agency for non-point source pollution control, have simplified procedures and improved the interface with the public. In general, local officials have found agency staff available and helpful, though these officials seem aware of staffing and funding limits of state programs and may, as a result, accept and appreciate whatever help they receive. In addition, the ongoing review of state nonpoint source programs under the CWA and CZMA prevents those programs from becoming out-dated.

2. Gaps exist in the regulatory framework

A broad array of regulatory programs provides a good foundation for water quality protection, though some gaps do exist. The most obvious of these is the limitation on project size covered by the Site Specific program. Projects under the 50,000 and 100,000 square foot thresholds are regulated only under local ordinances of the municipalities in which they occur. These ordinances are spotty and enforcement is variable.

The combination of the Rivers Management and Protection Act (RMPA) and Comprehensive Shoreland Protection Act provides a good legal framework for protection of shoreland areas that provide protection against runoff impacts, but they rely almost entirely on local implementation and voluntary compliance (see Chapter 6 for more on these programs). Local implementation of these laws, however, is very limited. In order for these programs to work well at the local level, education and outreach efforts focused on local officials will need to be improved. Implementation would benefit substantially from tying funding or other state and federal assistance to local implementation of these programs.

Under the RMPA, management plans may spur better local regulation and/or control of land use in the shoreland areas, but the law itself is primarily non-regulatory

and provides no funding. In addition, the regulations apply only to the protected segments of which only two exist in the NHEP area, so activities outside of those segments are unaffected.

Finally, state law that provides authority to require clean-up of surface water contamination episodes has a weakness in that it provides authority only when the degradation trigger is met. Incremental degradation is essentially unenforceable and only those instances of specific identifiable degradation beyond the threshold are covered by the law. NPS problems are typically incremental and difficult to identify, so the current anti-degradation policy is unlikely to be very effective at reducing non-point source pollution. DES admits a reluctance to take enforcement actions except as a last resort, and since it is the lead agency on water pollution, improvements in this program are unlikely to have much impact unless that reluctance changes.

3. Limited staff and funding for non-point source programs, particularly the Site Specific program

The primary problem with the Site Specific program itself is insufficient staff. Only 60% of one staff is devoted to projects the seacoast area, and the staff are unable to monitor and coordinate with NHDOT projects because of these limits. The program would be more effective if it had an active education and technical assistance effort and was more involved in NHDOT projects. Despite NHDOT procedures to protect against erosion and stormwater related problems, concerns have been expressed that compliance with specific plan requirements is frequently inadequate. Other programs, most notably the Shoreland Protection Program and the Rivers Management and Protection Program suffer similar limits.

4. Recommended BMPs are designed primarily for flood control, not contaminant control

One of the biggest weakness of stormwater control programs in the NHEP area is that regulations have traditionally focused on flood control and control of the volume and timing of runoff, not on the quality of runoff water. Flood control appears to be reasonably well addressed through existing requirements, but recommended BMPs have not adequately addressed the issue of contaminants.

This problem is perpetuated at the local level, where management continues to focus primarily on volume control and erosion and sedimentation control. Where stormwater collection systems exist, their primary goal is to route stormwater to rivers to speed its removal. Sediment traps remove sediments provided they are regularly cleaned. Other contaminants picked up along the way to the catch basins are carried directly to the receiving water and discharged untreated. These limitations also weaken other programs such as wetlands and the CSPA and apply to local regulations since they all depend on specific measures contained in state recommended BMPs. State staff are aware of this problem and are beginning to work on solutions.

5. Local stormwater management and implementation is limited and inconsistent

Implementation and enforcement of control protections are primarily accomplished at the local level, at least in part because state funding of programs is limited. Local regulations regarding stormwater control are not required and are therefore inconsistently implemented. Substantial gaps in local ordinances exist. Some municipalities have fairly strong regulations while other have virtually none. In addition, enforcement of local regulations varies widely among the municipalities, and enforcement of state programs is, at least from anecdotal evidence, rather weak. In the

latter case, one of the primary causes is often lack of training of code enforcement officers.

In many cases local officials are volunteers and have limited time to devote to their responsibilities. While training is often available, these time constraints mean the officials aren't able to participate. This problem has been fairly common for recent training and educational workshops, where attendance tends to be by the same few individuals. Thus the overall level of technical training among local decision makers in management (as well as other issues) is limited. A survey of local land use officials (Paulsen, 1998) found that officials are likely to respond better to outreach efforts if those efforts are brought directly to them than if provided through regional workshops.

6. Zone B communities are not as well served by outreach and technical assistance programs as Zone A communities:

Substantially more funds are available for outreach and assistance programs in the coastal municipalities than in the NHEP Zone B communities because of the existence of the Coastal Program and its CZMA funding. While the greatest contribution to estuary problems comes from the towns bordering on tidal waters, communities in Zone B may well contribute significantly to potential solutions to estuary problems, particularly regarding local land use practices. These communities should not be overlooked in outreach efforts.

Recommendations for Stormwater Runoff

- 1. Improve education and outreach efforts to local land use officials regarding RMPA, CSPA and stormwater protection ordinances. In particular, the state's Shoreland Protection Program should focus more of its efforts on local officials, and should leverage those efforts with ongoing outreach efforts in the coastal area. [LND-5, 20]
- 2. Improve staff and funding levels of the Site Specific program and increase the outreach resources of the Shoreland Protection Program. [LND-14,16]
- 3. Restructure BMPs to address timing and contaminants of stormwater runoff to eliminate the goal of speeding stormwater to receiving waters and shift more focus to preventing and/or remediating contamination. [WQ-10; LND-9a,9b]
- 4. Improve outreach to local land use officials regarding the importance of stormwater control and the requirements of the CSPA with the goal of increasing the use of local land use regulations and improving enforcement. [LND-14, 16]
- 5. Increase outreach efforts in NHEP Zone B communities focused on local nonpoint source pollution control options. [LND-5,21]

Septic Systems

Septic systems are intentionally designed to discharge bacteria, nitrogen and other contaminants into the ground where they are treated through natural processes before polluting ground or surface water. The basic design includes a tank where solids are separated from liquids (a small amount of treatment occurs here) and a leach field where effluent is sent for final treatment. In the leach field, partially treated effluent is dispersed over the leaching area where it filters down into the soil. The soil and leaching area treat the effluent through soil adsorption and biological activity so that, in a well functioning system, most or all contaminants are removed before the effluent reaches ground or surface waters. Provided there is adequate separation between the leaching area and surface or groundwater, this primitive is sufficient to prevent pollution of those waters.

Several problems may prevent adequate treatment, however. For instance, when systems are located too close to water bodies, treatment during the leaching process may be inadequate, and contamination may occur. Also, if solids that build up in the tank are not pumped regularly, they may spill over into the leach field and plug the leaching area so that effluent isn't treated. In these cases, effluent may back up onto the land surface where it can be carried directly to water bodies through stormwater runoff.

Even well functioning systems do not fully treat effluent, and nutrient concentrations may be 40-60 mg nitrogen and 15-20 mg phosphorus per liter when they reach the groundwater (Horsley & Witten, 1996). Pathogens also remain. Research indicates bacteria and viruses may be found 1,000 feet from systems and survive six weeks or more (Gerba, 1985). Effluent receives some additional treatment as it is carried by the groundwater

Statewide, 75% of new residential development is served by septic systems. In the coastal area, septic systems surround most of the estuarine waters (JEL Draft). Septics are numerous around Little Harbor in Rye, parts of New Castle, Great and Little Bays, and the Squamscott and Oyster Rivers. There are also large numbers of septics along portions of the Piscataqua, Cochecho and Salmon Falls Rivers (Ibid.).

These systems have been identified as a likely source of bacterial contamination that has lead to closure of shellfish beds and non-attainment of water quality standards in New Hampshire. Though little causal evidence exists implicating septic systems in the contamination of coastal NH waters, circumstantial evidence suggests they play an important role in the contamination of estuary waters (Jones, et al., 1996, 1995, Jones and Langan, 1993).

Older systems are a particular problem, since as they age they are more likely to fail. Recent shoreline surveys suggest potential contamination from throughout the estuary watersheds. Maintenance is frequently ignored because of the cost of pumping out the tanks every few years. In addition, systems installed prior to 1967 were regulated under a different set of standards that were less strict than current standards. The evidence suggests that, while the extent is unknown, septic systems pose a potential threat to surface waters particularly when sited close to water bodies. This threat is probably greatest for old systems. Recent shoreline surveys conducted as a part of the NH Estuaries Project should provide more information on the role of septics in the bacterial contamination problems of the estuaries.

Institutional Infrastructure

Table 4-3 Septic System Program Summary

Program	Agency	Description
	FEDERAL PROGRAMS	S
National Plumbing Standards	EPA	Requirements for water conserving plumbing fixtures in new construction. Reduced water use reduces demand on systems.
Clean Water Act research and demonstration programs	EPA	Septic system design and demonstration projects.
Federal Mortgage Assistance		Requirement for certification of proper system function as a condition of mortgage loans.
Clean Water Act Nonpoint source program	EPA	Funding that can be used for state nonpoint source programs.
Coastal Zone Management Act	NOAA Office of Ocean and Coastal Resource Mgmt	Funding that can be used for state nonpoint source programs.
Clean Water Act Water Quality Standards	EPA	Funding for state revolving loan funds that can be used for septic system upgrades when they are identified as a problem in state nonpoint source pollution programs.
	STATE PROGRAMS	
Subsurface Program	NH Dept of Environmental Services Water Division	Review of design and installation of septic systems, certification of designers and installers, and investigation of water quality problems. Also includes operation and maintenance requirements and use of water conserving fixtures.
Comprehensive Shoreland Protection Act	DES Shoreland Protection Program	Strengthens setback requirements near surface waters covered under the act.
Groundwater Protection Act (RSA 485-C)	DES Subsurface Bureau	Standards for discharge of specific contaminants from commercial septic systems. DES also has authority to inspect systems for potential contamination and to develop BMPs.
Pollution Prevention Outreach	DES Subsurface Program	Outreach materials provided to new system owners real estate agents and developers.
Nonpoint Source Program	DES Water Division	Funds from nonpoint source program for outreach and other efforts.
NH Coastal Program	Office of State Planning	Funds from nonpoint source program for outreach and other efforts.
	LOCAL AND REGIONAL PRO	GRAMS
Land Use Regulations (RSA 674)	Municipal governments	May contain additional septic system requirements such as local inspection of installation, increased surface water setbacks etc.
Resource protection overlay districts	Municipal governments	May contain increased setback requirements.
Planning Assistance	Regional Planning Commissions	Assistance for master plan and ordinance development and for project review.

Federal Programs

Management Framework

The federal government has no significant role in management of septic systems.

Regulatory Framework

The federal government leaves regulation of septic systems to state and local governments, but several programs indirectly address septic system issues. National plumbing standards that require water-conserving fixtures may help reduce demand on systems and improve performance. The Clean Water Act directs EPA to study alternative designs and fund demonstration projects, and federal mortgage assistance programs require homeowners to certify that a system is operating properly and/or that building sites will accommodate adequate septic systems before loans will be provided. Of course, faulty septics will also make it more difficult for states to meet their water quality standards, meaning that tighter controls on other contaminant sources (e.g. point sources) may be required. Nonetheless, there are no direct federal controls on sub-surface disposal systems.

Non-Regulatory Framework

The only non-regulatory federal program with a role in septic systems is the Clean Water Act State Revolving Loan Fund (CWA SRF). The CWA allows SRFs to be used for point and non-point source pollution problems that are identified by the state through its nonpoint source programs (and certain ones identified by the federal government). Since septics have been identified as an important nonpoint source problem under both the statewide and coastal nonpoint source programs, these funds could be used to help address the problem.

State Programs

Management Framework

Oversight and regulation of all aspects of septic systems is handled by the New Hampshire Department of Environmental Services (DES) Subsurface Systems Bureau. The Subsurface program involves review of design and installation of septic systems, certification of designers and installers, and investigation of water quality problems. The Subsurface Systems Bureau reviews and issues subdivision permits that govern 80-85% of all development in the state (the remaining 15-20% is mostly located in sewered areas). This permit is considered a "master" permit in that all other permits required for subdivisions (including site specific, wetlands, etc.) are coordinated by this Bureau through the subdivision permit.

The Subsurface Systems Bureau inspects all on-site systems prior to backfilling to ensure compliance with approved plans. The program has 6 regional offices. The Portsmouth office serves roughly the NHEP area. In 1994, 4,500 such inspections were done throughout the state by six inspectors. This amounts to an average of roughly 4 per inspector per day or more. While capable of performing the required inspections, there is recognition within the Bureau that those inspections are not as thorough as they should be under ideal circumstances.

The Subsurface Systems Bureau has a budget of \$1.1 million for the entire state. Permit fees and other such revenue returns \$800,000 to the state, so the net program cost is roughly \$300,000. One inspector, and perhaps roughly one sixth of the program resources, serves the coastal region.

Regulatory Framework

The state water pollution law under RSA 485-A (Water Pollution and Waste Disposal) provides strong authority for regulating septic systems. Permits are required for all systems, and design and installation must be carried out by certified professionals. System plans must be locally approved prior to state permitting, and certain requirements regarding design, siting and construction must be met. Sites must be chosen so as to maintain functioning systems indefinitely.

Septic systems must be sited at least 75 feet from wetlands and surface waters. Where the Comprehensive Shoreland Protection Act applies, setbacks must be 125 feet except where soils are suitable for a 75 foot setback. Septic setbacks also exist near wells and other sensitive areas and for areas with steep slopes. Soil based lot sizes are required, and test pits are required for verification of soil information. State regulations also require systems to be sited six feet above bedrock or impermeable substratum unless there is an approved community water supply (in which case they must be sited 4 feet above bedrock) and four feet above the seasonal high water table.

The state, through joint efforts of DES and OSP, has recently begun to re-examine setback requirements from surface waters and wetlands. The agencies are concerned that, on small parcels, the requirement of 75 or 125 feet may limit lots to poor siting options relative to soil types and other considerations. They also feel that the water quality rationale for the setbacks is not well grounded in science. The Subsurface Bureau may recommend smaller setbacks at least for certain situations.

A variety of other provisions in the state's septic system regulations focus on prevention of failure. To reduce the load on the systems, water conservation provisions of the 1984 BOCA (Building Officials and Code Administrators, International Basic Building Code) plumbing code were adopted into the subsurface regulations. Nitrogen removal is required where nitrogen-sensitive waters may be affected by nitrogen loading from groundwater. RSA 485-A prohibits distribution and sale of products containing more than trace amounts of phosphorus except for dishwashing detergents and lead exposure hazard control.

State law also requires owners and operators of septic systems to operate and maintain systems so as to prevent a nuisance, potential health hazard or failure of the system. Maintenance rules require annual inspection and pumping when tanks are full. Grease and bulky wastes are prohibited from systems to prevent clogging of leach fields, and toxic and hazardous materials are also prohibited. Failed systems must be repaired or replaced. Replacement of failed systems is exempt from lot size requirements unless loading will increase (e.g. number of bedrooms increases) or the residence is converted from seasonal to permanent use.

Monitoring and enforcement of these provisions are difficult, and much of this responsibility is left to local officials. State inspectors (of which there is only one in the NHEP area) are only able to inspect installations and repairs, and the Subsurface Bureau of DES feels that monitoring for failed systems would be prohibitively expensive. State law regarding nuisances (RSA 147) authorizes the local Health Officer to inspect complaints, make regulations and order discontinuance of nuisances. Shoreline surveys done in conjunction with shellfish management (discussed later) can help identify those systems already contributing to contamination, but the vast majority of monitoring is done through complaints by neighbors and the general public.

Two provisions of state law were designed to help with monitoring and enforcement. Water Pollution Control law (RSA 485-A:39) states that, prior to sale of waterfront property within 200 feet of Great Ponds and tidal waters, owner must hire a licensed designer to perform a "Site

Assessment Study" to determine if the site meets the current state septic system standards. In addition, RSA 477:4-C requires disclosure of system age, size, type and history of malfunctions when any property with a building is sold (if unknown, the disclosure may state that fact).

Finally, the state's Groundwater Protection Act (RSA 485-C) provides protections for groundwater under a few simple programs. Groundwater sources are classified under three categories (two higher value categories for potential drinking water use and one for general use). Standards are set for discharge of specific contaminants from commercial septic systems (domestic wastewater is exempt). DES has authority to inspect potential contaminant sources and to develop BMPs for specific sources listed through the Act. These sources include automobile service shops and junk yards, furniture stripping operations, photo processing shops, metal shops, manufacturing facilities, roads and highways, septic systems, salt storage yards and many other types of operations. Unfortunately, this Act provides little in the way of specific actions for controlling groundwater contamination from any of the sources including septic systems.

Non-Regulatory Framework

While management of septic systems is primarily regulatory, there are several education and outreach efforts under way. DES and UNH Cooperative Extension have developed pollution prevention resources such as Septic Systems, How They Work and How to Keep Them Working, Care and Maintenance of Your Septic System and others. New system owners receive You and Your Septic System: A Homeowner's Guide to Septic System Maintenance from DES. Radio spots and newsletter articles have also been produced. DES also provides education and outreach for designers and installers, real estate agents and developers and local health officers. The Great Bay National Estuarine Research Reserve managed by NH Fish and Game has provided informational mailings to Great Bay shorefront property owners, and the NH Coastal Program has begun an outreach effort targeted at municipal land use boards in Zone A.

The primary sources of funding for septic system programs are nonpoint source funds under the Clean Water Act and the Coastal Zone Management Act. Funds from the Great Bay Estuarine Research Reserve and UNH Cooperative Extension, particularly for education and outreach, have supplemented these limited funds and budgets. Another potential source of funds for dealing with septic system pollution is the Clean Water Revolving Loan Fund. As discussed earlier, these funds may be used for any nonpoint source pollution problems that are identified by the state through its nonpoint source programs. Since septics have been identified as an important nonpoint source problem under both the state's nonpoint source programs, these funds could be used to help address the problem.

New Hampshire has thus far chosen to dedicate these to municipal wastewater treatment systems and landfill closures, and is restricted by state law from providing these funds to any entity other than municipalities. Concerns over the risk of lending to individuals, the administration of such a program and other issues have kept a narrow focus for the disbursement of NH SRF. This focus may be warranted, since the projects currently funded may result in substantial water quality improvements. Nonetheless, these funds are a potential source for financial assistance for septic system repair or replacement. Other states have used the SRF repayment money (the money SRF recipients pay back into the fund that makes it "revolve") for low interest loans for septic systems, as the following case study shows.

Local and Regional Programs

Management Framework

Local governments may choose to supplement state requirements with their own septic system ordinances. These may include a variety of requirements such as soil based lot sizes, additional setbacks (particularly from aquifers or wellhead protection districts which aren't covered by state law) and siting requirements, local review of design and installation, witnessing of perc tests and regular inspections. Local provisions that are weaker than state requirements, as some in the seacoast appear to be, do not supercede the stronger ones.

Regulatory Framework

Two of the 19 Zone A towns (Hampton and Newington) provide no additional oversight and/or regulation at the local level. Regulations vary widely and the local role is often limited in scope. Among some of the towns or cities with few or no provisions, there are few septic systems remaining and the trend is toward further sewering (Seabrook, for example, is in the process of hooking up its residents at no cost).

No communities inspect existing septic systems for proper functioning, relying instead on self-regulation and monitoring by abutters. The frequently cited rationale is that failed septic systems are such a nuisance that owners will have substantial motivation to repair or replace them, and that abutters will be compelled to report failures that they discover. These assumptions are also made by the state.

Several local officials in different municipalities expressed concern about the inability to require upgraded septic systems when seasonal homes such as fish camps are converted to permanent residences. Old systems on these properties are not adequate to handle the increased loads resulting from expanded use. Since these camps are located on rivers or water bodies, many septic systems in close proximity to surface waters may be sub-standard.

In several locations in the coastal area, conversion of seasonal homes such as fish camps to full-time residences occurs without septic system upgrades. Spur Road along the Bellamy River in Dover is one such case, and the town feels there is little it can do to protect the river. In these cases, old systems that were designed for seasonal use (usually in summer when the ground is not frozen) are suddenly subject to significant increases in loading, and they frequently fail. State law requires upgrades for all expansions and conversions to permanent residences, and these conversions should be addressed through the standard building permit process if that process is followed. Unfortunately, records of previous use were often not kept, so conversions can occur without a town's knowledge. Officials from other towns mentioned the same problem, suggesting the problem may be fairly widespread.

Non-Regulatory Framework

No programs were reviewed under this section.

Non-Governmental Programs

No programs were encountered in this review.

Evaluation

1. State has a strong regulatory framework

New Hampshire's regulatory framework for septic systems, particularly the requirements for certification of both designers and installers, is strong. The state feels that new systems are adequately regulated, though a shortage of inspectors suggests that installation may not be thoroughly monitored.

2. Monitoring and enforcement of maintenance requirements is weak

The primary problems with septic systems involve maintenance of existing systems, particularly those installed under less protective regulations from the late 1960s and earlier. Systems installed prior to 1967 are now 30 years old and far more prone to problems. Inconclusive research findings on the level of septic system problems and the hot spot nature of the findings that do exist are consistent with a problem that emanates from selected sites with old systems.

Although state law requires annual inspections and regular maintenance of septic systems, the state has no way of ensuring this maintenance occurs. The sheer number of systems in use makes it impossible for the state, or for any local government, to monitor and inspect every system for proper operation. Thus the program relies on voluntary compliance with inspection and maintenance requirements. Pollution from may be regulated under several other provisions of law, but only after failure occurs and when it is detected or reported.

State law could be modified to address these concerns, though the program might be costly and politically challenging. System owners - tracked through a database developed through the permitting process - could be required to submit proof of maintenance on a pre-determined schedule and be subject to fines if not in compliance. Such an approach would probably be limited to new or upgraded systems. Since septic problems are most likely to occur in close proximity to surface waters, this and other programs (such as inspection or monitoring programs) could focus on waterfront property owners.

3. No mechanism exists for monitoring and enforcement of failed systems iBoth state and local officials rely on self reporting and/or abutter complaints to identify failed systems because failed systems are so offensive. This assumption ignores the fact that the cost of repairing or replacing septic systems can be substantial. Owners may well have incentive to ignore problems as long as possible. In addition, research in a New Hampshire lake in 1985 found homeowners unaware of existing septic system

problems though phosphorus loading from the systems was occurring (Flanders, 1986).

Low or no cost financing for repair or replacement of failed systems, combined with an outreach program introducing the assistance, could go a long way to resolving the problem of contamination by failed septics. State revolving loan funds (SRFs) are available to communities for installing or upgrading their wastewater treatment systems, and similar support should be available to homeowners. An effort is currently welnes yet shenent, to

discrepancies between what the state requires and what the local government requires. While no such specific problems have been noted regarding septic inspections, some local officials expressed an interest in being present for the state inspections.

Case Study:

Funding for Septic Repair and Upgrade

Several states have used Clean Water SRF money to provide low cost loans to homeowners for repair or replacement of failed septic systems. Federal requirements for the CWSRFs allow use of the money for non-point source pollution issues if those issues have been identified as problems through the state Nonpoint Source Management Plan or as part of an approved NEP Comprehensive Conservation and Management Plan. Several states including Maine, Delaware, Massachusetts, Pennsylvania, Virginia and Washington have done just that.

In Delaware, loans of up to \$10,000 are available directly from the state CWSRF (EPA, 1997). Repayment is at 3% for a term of up to 20 years (a \$10,000, 20 year loan would cost \$55 per month). The state performs a financial capability analysis on each applicant, and the loan is secured through a property lien. More than 100 systems have been repaired under this program in the two years it has been available. Vermont and Rhode Island have used portions of repayment funds to provide loans to individuals for on-site septic disposal systems (Luciano, pers. comm.). Since repayment funds have fewer federal strings attached, they are more attractive to individual applicants.

New Hampshire has certain specific concerns about the use of the SRF money for individual loans that have deterred it from trying such a program. Other states with similar concerns have developed creative solutions. Maine provides low interest loans for septic system repair through the Maine Housing Authority's program for home repair. The portion of the loan that is devoted to septic system repair or replacement is provided at a 1% interest rate while the remainder of the loan is made at the current Housing Authority rate (currently about 5-6%). Loans in this case are serviced by local banks much in the way the New Hampshire Housing Authority provides loans for first time home purchases.

Ohio has used its "linked deposit" program to provide similar loans (in this case for a variety of non-point source issues) through banks (EPA, 1997). In this program, funds equal to the amount of projects are placed in a Certificate of Deposit at a discounted interest rate, and the savings to the bank are used to subsidize a low interest rate for the loans to individuals (roughly 3%). A state letter of project approval is required as part of the application process with the bank. Repayment funds provide the interest on the CD plus principal. This program requires substantial capital to start (Ohio's program is \$4.5 million) but should be fairly low cost to administer.

Certain changes in New Hampshire's program would be required. For instance, funds are currently limited to municipal wastewater treatment facilities and landfill closure. Similarly, changes in the NH Housing Authority programs (to allow loans for home repair) or in the state's policies regarding bank deposits might be required to establish programs similar to the ones described above. Other solutions may be available within the current state framework. Creative programs like these could provide substantial water quality benefits at low or no cost to the state.

Such a program would not necessarily be costly. These funds are typically capitalized with roughly \$1 million and disbursed as a revolving loan fund. Delaware has a \$10,000 cap on each loan, provided at 3% interest, which can then be used for a significant number of system upgrades or replacements. Since older failing systems have been identified as a significant non-point source problem for the estuaries, this approach would be an important and relatively painless first step toward resolution.

5. The prohibition on products containing phosphorus may be inadequate

New Hampshire bans the use of phosphorus in cleaning products with the exception of dishwashing detergents and lead abatement materials. But because of the extensive use of dishwashers, phosphorus loading from detergents could still be fairly high. Also, phosphorus containing detergents for lead abatement (such as Tri-Sodium Phosphate) are readily obtained through hardware and paint stores, and there is no educational effort aimed at this market.

6. Requirements for upgrading septic systems for expanded use or conversion from seasonal to permanent residences are not working

Probably due to the lack of historic information on the uses of specific pieces of property, some number of seasonal properties are converted to permanent residences without the required septic system upgrades. These conversions are a particular problem when they occur on properties (such as the conversion of old fish camps). Funding for system repair or upgrade and an aggressive education and outreach program, as discussed above, might resolve at least some of this problem.

7. Limited staff and funding

Although not yet identified as a problem, the limited number of staff inspectors means that each inspector is responsible for a large number of inspections. There appears to be some recognition in DES that this may be a problem. In addition, with such a limited program, it is unlikely that ongoing monitoring could occur.

Recommendations for Septic Systems

- 1. The state should develop new mechanisms for monitoring and enforcing septic system maintenance, particularly for shoreland properties. [WQ-13]
- 2. The state should develop incentives for septic system repair and upgrade, especially financial incentives. Clean Water SRF money is available and should be considered as a source for low-cost loans for these activities. Alternative funding sources such as a user fee (most likely associated with an appropriate products such as toilets, toilet paper, etc.) should also be considered. [WQ-14]
- 3. Outreach materials should be developed and distributed by both the state and local communities regarding new assistance programs for repair or upgrade. In addition, recent outreach efforts targeting landowners along Great Bay should be extended to other water bodies in the NHEP study area. [WQ-13]
- 4. State inspectors should contact local code enforcement officials upon scheduling of septic system inspections to improve coordination with local requirements.

Construction Runoff and Erosion

The predominant water quality problem from construction activities involves sedimentation, though contaminants such as nutrients and toxics (petroleum products, pesticides, construction related chemicals, etc.) may also end up in the runoff. This problem, though not wholly separate from the overall problem of stormwater runoff, is treated separately in this report because it is generally a short-term problem that is managed somewhat differently than stormwater runoff.

The Natural Resources Conservation Service estimates erosion rates from land development of 30-40 tons of soil per acre or more per year whereas undisturbed lands would erode at a rate of about 1 ton per year (USEPA, 1993). In addition to the land based damages caused by losses of soil, these eroded sediments may directly cause reduced light penetration in water bodies (which can substantially reduce productivity and degrade habitat for inhabitants), result in dogging of gills and suffocation, etc. (Western Regional Environmental Education Council, 1987). Changed clarity may also change the thermal characteristics of the water and complicate eutrophication processes within the estuaries. Sediment particles can also adsorb (stick to) and transport nutrients and numerous other contaminants when carried by runoff. When deposited, they may significantly change current patterns and flushing (Horsley & Witten, 1996). Sediments washed into wetland areas can choke out important vegetation communities, thereby diminishing the functions and values of those wetlands or even effectively killing them.

New Hampshire reports that sedimentation from construction activities is a problem, particularly on sites where erosion and sedimentation controls are improperly used. In 1994, the Site Specific program issued 27 letters of deficiency and four administrative orders on projects that failed to meet their erosion and sediment control plans. Similarly, highway construction in the southwest portion of the state has caused nutrient loading and algal blooms up to one mile away from the site. The NHDES Surface Water Quality Bureau recently did an assessment of nonpoint source pollution in the coastal basin to identify pollutant reduction opportunities. Among the findings were several specific recommendations regarding construction of roads, highways and bridges, including investigating storm drains.

Studies of the estuaries suggest turbidity and sedimentation are not currently serious problems (draft). Much of the sediments carried by rivers is trapped behind dams (at least in the Great Bay estuary), and most of the turbidity and suspended solids that occur in Great Bay appear to be caused by re-suspension of existing sediments by wind. Most existing sediments were probably deposited in the late 1800s and early 1900s, particularly from logging and farming activities that are no longer occurring. Nonetheless, erosion remains a potential problem of concern to the NHEP.

Institutional Infrastructure

Table 4-4 Erosion Control Program Summary

Program	Agency	Description
	FEDERAL PROGRAMS	
Clean Water Act §402 NPDES permit program	EPA	Permits required for construction sites disturbing five acres or more. Permits contain requirements for erosion control measures.
Clean Water Act §404 Wetland permits.	US Army Corps of Engineers, EPA	Requires corrective action for erosion problems that impact wetlands.
Rivers and Harbors Act	US Army Corps of Engineers	Regulates dredging and disposal of dredge spoil.
Coastal Zone Management Act	NOAA Office of Ocean and Coastal Resource Mgmt	Funding that can be used for state nonpoint source programs.
Clean Water Act Nonpoint Source Program	EPA	Funding for state nonpoint source pollution programs.
	STATE PROGRAMS	
Alteration of Terrain (RSA 485-A)	DES Site Specific Program	Requirement for use of BMPs for runoff and erosion control on site disturbances of 100,000 square feet Program includes some outreach.
Comprehensive Shoreland Protection Act	DES Shoreland Protection Program	Reduces requirement for BMPs to site disturbance of 50,000 square feet near specified surface waters
Wetland Protection	DES Wetlands Bureau	Protection for wetlands through permit requirements. Mitigation may be required.
Gravel Excavation Regulations	DES Water Division	Requirement for permitting of gravel excavation through local planning boards. Contains some erosion control provisions including surface water setbacks.
Road and Bridge project review	NH Dept. of Transportation	Internal review process through which erosion control measures are specified. Additional oversight provided through informal impact review process that incorporates NHFG, DES Wetlands Bureau, USACOE, USFWS and EPA.
Intent to Cut tax forms	NH Dept. of Revenue Administration, DRED Forest and Land Division	Forestry operations required to file "intent to cut" forms which require familiarity with and use of forestry BMPs.
	LOCAL AND REGIONAL PROC	GRAMS
Land Use Regulations (RSA 674)	Municipal governments	Municipalities may require erosion and stormwater control measures through land use regulations, particularly for subdivisions and site planning for land use change.
Planning Assistance	nning Assistance Regional Planning Commissions	
NON-GOVERNMENTAL PROGRAMS		
Transportation Outreach	UNH Technology Transfer Center, NH Assn. of Conservation Districts	"Quick Guides" act as BMPs for road maintenance Supplied to road agents.

Federal Programs

Management Framework

The primary federal management responsibility for erosion derives from oversight of state nonpoint source programs. Under the CWA and the CZMA, state nonpoint source programs are required to address erosion problems. EPA (responsible for CWA NPS programs) and NOAA (responsible for CZMA NPS programs) review and provide guidance on state programs to ensure they meet federal requirements. In addition, several permitting programs (CWA and Rivers and

Harbors Act, discussed below) handled by EPA provide some federal control over actions involving erosion, though the regulatory role is limited. Other agencies, such as the Natural Resources Conservation Service (NRCS), are involved in a few non-regulatory programs. As discussed earlier, most runoff issues, including erosion and sediment control, are handled at the state and local level.

Regulatory Framework

The federal government has little in the way of direct controls on erosion. Construction sites disturbing more than five acres (217,800 square feet) are required to obtain a Clean Water Act NPDES permit from the EPA. These permits require use of stormwater and erosion control measures that represent current best management practices. Wetlands laws under the CWA provide authority to require corrective action for soil erosion problems that impact wetlands. Finally, dredge and fill regulations under the CWA and the Rivers and Harbors Act discuss disposal sites for dredged material designed to reduce erosion impacts.

Non-Regulatory Framework

Funding support is provided under the CWA (§319) and CZMA (§6217) nonpoint source programs. States are responsible for delegating use of the funds. The USDA Natural Resources Conservation Service provides a variety of erosion prevention and control programs including research and outreach. NRCS provides assistance to towns and landowners dealing with erosion problems and also provides a number of educational fliers regarding stormwater and erosion control.

State Programs

Management Framework

Construction on sites of over 100,000 square feet, or over 50,000 square feet in the protected shoreland under the Comprehensive Shoreland Protection Act, is managed through the Site Specific program of the Department of Environmental Services. These projects are required to follow best management practices and are monitored by the Site Specific program staff. The Site Specific program dedicates roughly 60% of one staff member's time to the 17 coastal region municipalities and has an office in the Pease International Tradeport. The NH Coastal Program also provides assistance to the Site Specific program and to municipalities through a variety of activities under the state's Coastal Nonpoint Pollution Control Program.

Regulatory Framework

At the state level, much of the regulation of construction runoff and erosion is handled through the Alteration of Terrain provisions of the state's water pollution laws (RSA 485-A:17). This law requires individuals proposing activities that result in the significant alteration of terrain (including dredging, excavation, mining, transportation of forest products, etc.) to submit plans for the project and obtain a permit from the NHDES Site Specific program. Activities altering 100,000 square feet or more (2.3 acres) of soil are considered "significant" alteration, and are subject to the permit requirement. The Comprehensive Shoreland Protection Act of 1991 (CSPA) extends these requirements to soil disturbances as small as 50,000 within the 250 foot protected shoreland (see Chapter 6 for more on the CSPA) of qualifying water bodies. Other provisions of the CSPA add indirect protections against erosion and sedimentation problems through setbacks and vegetated buffer requirements.

The Site Specific program requires construction plans that conform to Best Management Practices (BMPs) for erosion and sedimentation control including short and long term design features like vegetated filter strips, grassed swales, detention ponds, infiltration basins, constructed wetlands and others. These BMPs are set out under the BMP manual *Stormwater Management and Erosion Control Handbook for Urban and Developing Areas in New Hampshire* (the "Green Book"). Agriculture is exempt from these requirements (provided water quality is not degraded) and state agencies may be exempted from the requirements of the law provided they adopt equivalent protection measures. Similarly, for estry operations are automatically permitted when they file "Intent to Cut" forms required by state tax law (RSA 79), which also require use of NH Forestry BMPs.

The Site Specific program has generally allowed NH Department of Transportation (NHDOT) to be exempt from the alteration of terrain provisions, though they retain the authority to regulate NHDOT activities. The exemption is allowed in part because NHDOT has developed its own internal processes for dealing with stormwater and erosion control, and in part because the Site Specific program has insufficient staff to handle these additional projects.

Most road and highway design and construction work is performed by contractors with oversight by the NHDOT. NHDOT has developed a standard process for project design and review which requires specific stormwater and erosion control measures, based on various BMP manuals, to be developed and implemented by its contractors. Forty agency engineers work on highway and bridge design, with guidance provided by NHDOT's Manual on Drainage Design for Highways and Standard Specifications for Road and Bridge Construction and several other manuals including the "Green Book" and EPA's Stormwater Management handbook. Contractor's plans must show the location of stockpiles, refueling areas and truck washing areas, and may require setbacks from sensitive areas such as brooks or wetlands.

DOT's projects also go through an internal review intended to function as an environmental impact analysis. The agency meets regularly with NHF&G, the DES Wetlands Bureau, the U.S. ACOE, U.S. FWS and EPA to review projects and issues that may arise. Public hearings and information meetings are held with local officials on proposed highway routes. Staff from the DES Site Specific program get involved when they receive complaints about erosion problems.

Additional DOT policies include reseeding, re-vegetating, re-loaming and in some cases spreading crushed stone to slow runoff and erosion problems. The agency is shifting to the use of seeding mixes that don't require fertilizer. De-icing involves spreading specified amounts of salt or sand depending on conditions, with a policy of applying only enough salt to restore safe travel. Safety is the primary concern of the department, but they track applications, calibrate machinery and have studied alternative de-icing options for reducing application rates. Finally, DOT claims it cleans catch basins and sediment traps twice per year, in spring and fall.

State wetlands law (RSA 482-A, Dredge and Fill in Wetlands) applies to DOT and requires that roads must be designed and sited to protect areas that protect water quality. The avoidance, minimization and mitigation approach used for other projects also applies to road and highway projects. While it discourages siting in such a way that disturbs integrity of water bodies, the permitting process nonetheless allows placing of roads through wetlands when other alternatives are not readily available. Also, since there is no provision for maintaining buffers around wetlands (other than through the CSPA and Tidal Buffer Zone requirements around tidal wetlands), runoff control is only as good as the constructed features provided (which may be limited to silt fences and hay bales). Wetlands law also provide DES with authority to require corrective action for any soil erosion problems that impact wetlands.

Runoff from commercial gravel excavations is regulated through state law regarding local regulation of excavations (RSA 155-E), which requires commercial operations to obtain permits from local Planning Boards before beginning excavation. Highway construction activities, building construction digging, agriculture, silviculture, and landscaping activities are all exempt, along with grandfathered operations. These regulations are implemented at the local level but permitted through the state's Site Specific program.

Under these regulations, excavation is prohibited within 75 feet of great pond, navigable rivers and 10+ acre bodies of standing water, within 25 feet of other surface waters, prime wetlands, or other wetlands 5 acres or larger, and where it would damage the public welfare or known aquifers. Operations that result in continued siltation of surface waters may also be prohibited. Reclamation plans are required for permits, and must include re-seeding or planting, re-establishment of natural slopes appropriate for the native soil type, drainage returned to natural patterns, and other measures. Reclamation bonds are required and activities must be completed within 12 months of closure.

As with all activities that might contribute to point and non-point source pollution, state water quality law provides DES with authority to require any person to correct water quality problems if they cause a water body to not meet its classification standards (as established under the act).

EPA and others have expressed concern that existing BMPs for stormwater and erosion control may be inadequate, so Site Specific personnel are currently conducting a literature review on the effectiveness of NH's stormwater BMPs in the specific context of New Hampshire's soils, climate and hydrology. Results will be incorporated into Site Specific regulations. In addition, CWA §319 funds have supported a project to specifically evaluate the effectiveness of certain stormwater and erosion control systems and to recommend improvements to stormwater BMPs. Findings from this project will also be used to improve the rules governing the Site Specific program.

Non-Regulatory Framework

The DES Site Specific program's outreach entails a small number of fact sheets and BMP manuals (for example, Soil Erosion and Sediment Control on Construction Sites). These efforts are limited, but as the only significant targets of the program involve commercial operations (those likely to fall under the regulations), education and technical training are much more important. The state currently has no formal training offered to, or required of, contractors, though development plans, including stormwater and erosion control measures, must be submitted by a licensed professional engineer. Beyond these basic programs, the Site Specific program has inadequate funds to do more.

Training of DOT site engineers occurs through the DOT Bureau of Construction schools. These schools are 1-2 week training sessions each year regarding a wide range of specific topics. Pollution control is one part of the curriculum.

Technical assistance is available to local officials through the NH Coastal Program and the Regional Planning Commissions. The Office of State Planning provides a model ordinance for stormwater management and erosion control in the publication *Model Stormwater Management and Erosion Control Regulation* (developed by the NH Association of Conservation Districts and the Water Quality and Urban Conservation Committee) that is suitable for adoption or for modification by municipalities. Support is available for ordinance development and revision, circuit rider assistance, GIS assistance and more. This assistance stems from Technical Assistance grants made available under CZMA funding.

The primary funding for erosion related issues comes from the Site Specific Program and NH DOT budgets and CWA and CZMA nonpoint source grants. The state aids highway construction through the State Aid to Highways program which funds 2/3 of project costs, and the Block Grant Aid program (both under RSA 235). Also, State Aid to Bridges is available to municipalities. Bridges must comply with American Association of State Highway Transportation Officials design standards to be eligible. In addition, local projects receiving state aid are required to meet state highway and road standards. Nonpoint source grants have funded projects such as studies of shoreline erosion, evaluations of the effectiveness of erosion control BMPs and more.

State tax law requires forestry operations (except those for private firewood use) to file an "Intent to Cut" form with the local community (RSA 79:10 and RSA 227-J:5). This form requires compliance with forestry BMPs and triggers inspections by Division of Forests and Lands forest rangers. Submission of the form serves as a de-facto permit for the Alteration of Terrain program, meaning no erosion control management plan need be submitted. The state developed the manual "Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire" to help control nonpoint source pollution from forestry operations.

Local and Regional Programs

Management Framework

Construction activity under the 50,000 and 100,000 square feet state limits is handled at the local level through subdivision regulations and site plan review under RSA 674 and related provisions of state law. Communities are authorized to develop ordinances to regulate erosion and stormwater control on construction sites including municipal roads. Most towns in the NHEP area address erosion control in their regulations, although few do so with comprehensive requirements.

The state provides a standard for erosion control ordinances through the publication *Model Stormwater Management and Erosion Control Regulation* developed by the NH Association of Conservation Districts and the Water Quality and Urban Conservation Committee. This model calls for erosion and sediment control plans for disturbances over 20,000 square feet, subdivision of four or more lots, street or road construction, or disturbance of critical areas. Measures are to conform to standards of the "Green Book" and exposed areas are to be stabilized within 30 days. Other provisions also apply. In particular, the state recommends towns adopt the standards of the Green Book by referencing the manual so that they don't have to change their land use regulations to keep current with changes in the field of erosion control. Future changes to the Green Book are automatically incorporated into the regulations.

Regulatory Framework

Erosion control requirements vary substantially among the NHEP Zone A municipalities. Eleven of the 19 Zone A municipalities require developers to submit erosion and sedimentation control plans and seven of 19 have requirements that approximate the state model ordinance (see Table 4-5). North Hampton specifically requires erosion and sediment control plans for street or road construction. Ten of the towns reference the Green Book for erosion control standards and one (Greenland) cites some measures from it. A few municipalities (Dover, Durham, Newington, Newmarket and Seabrook) have little or no regulation directly related to erosion and sediment control. Twelve of 19 Zone A towns have adopted controls on commercial gravel excavation.

In addition to these basic provisions, some towns have adopted other specific erosion control targets into their regulations. For instance, at least six towns within the entire NHEP

jurisdiction (Exeter, East Kingston, Newfields, Kensington, Raymond, and Danville) have incorporated a requirement of 80% reduction in Total Suspended Solids. Other provisions include the use of buffers around surface waters specifically for erosion control (Dover and Portsmouth) and the attachment of maintenance requirements to the deed so that future property owners will be responsible for maintenance (including Exeter, Hampton Falls, New Castle and North Hampton).

Vegetated buffer zones around wetlands and shorelands, floodplain ordinances and gravel excavation regulations are likewise valuable for controlling erosion related problems. According to the Rockingham Planning Commission, many communities prohibit the use of road salt in critical resource areas.

Table 4-5 Local Erosion and Sediment Control Programs

Town	Plan Required	Provisions Similar to State Model	Soil Exposure Limits	References Green Book	Other Requirements
Dover					May require 50 ft erosion control buffers.
Durham					Landscaping requirements.
Exeter		<i>'</i>	•		Maintenance required through deed. Site roads to avoid grading and filling Landscaping required for dust control.
Greenland	✓				Uses some specs from Green Book.
Hampton	•				Disturbed areas shall be kept to a minimum.
Hampton Falls	/	v		'	Maintenance required through deed.
Madbury	<i>'</i>				General requirements for minimizing disturbance, using appropriate buffers, etc. Plan and impact study required for some subdivisions.
New Castle	✓	✓		✓	Maintenance required through deed.
Newfields	✓	✓	•	'	Performance standards apply, retain sediments on site.
Newington					
Newmarket					"Reasonable controls" required for disturbances smaller than state site specific program.
North Hampton	V	✓		'	Maintenance required through deed
Portsmouth	may be required				May require 50 ft erosion buffer around wetlands and surface waters.
Rochester	/			'	Large subdivisions must submit plan.
Rollinsford				'	References SCCD standards (Green Book).
Rye	~	•		•	Plan required for all "major" developments.
Seabrook					Requires measures to prevent erosion and sedimentation.
Somersworth				~	Disturbed areas must be reclaimed, landscape plan required.
Stratham	V	V		V	

Some communities also prohibit snow dumping in these areas. According to a NH Coastal Program survey, all municipalities have cleaning programs for culverts, inlets and catch basins. The degree to which these programs are carried out varies. An informal survey of a few coastal municipalities, discussed in the Chapter 5, suggests that most cleaning programs are done as time and funds allow, and may be done infrequently at best.

As stated earlier, the level of implementation of these local regulations has obvious implications for their effectiveness. While thoroughly assessing the implementation of local regulations is beyond the scope of this report, some general observations came out of research and conversations with local officials. Chapter 8 addresses the issues of implementation and enforcement at the local level in some detail.

Non-Regulatory Framework

Local technical assistance is available through the Regional Planning Commissions. Assistance is available for ordinance development and revision, circuit rider assistance, GIS mapping and more. This assistance stems from Technical Assistance grants made available under CZMA funding. Many municipalities also obtain assistance reviewing development plans from the County Conservation Districts. Other support is also available. The Strafford County Conservation District, for example, evaluated land in Dover to assist land use planning including soil testing showing important information regarding suitability for future development. Technical assistance programs are generally provided in close coordination with state agencies that rely heavily on these regional agencies for implementation of non-regulatory efforts.

Several programs mentioned earlier under the runoff section of this chapter apply equally to erosion control. The Rockingham County Conservation District (RCCD) training site in the town of Brentwood provides a demonstration of erosion control measures recommended in the Green Book. Proper installation and operation are demonstrated. In addition, the RCCD and the Strafford County Conservation District hold workshops to train local officials, road agents, engineers and contractors in these techniques.

Non-Governmental Programs

Several agencies are involved research and outreach efforts as discussed under stormwater runoff above. These include UNH Cooperative Extension, Jackson Estuarine Laboratory, the Complex Systems Research Center at UNH, the University of New Hampshire/Maine Sea Grant program, CICEET (the Cooperative Institute for Coastal Estuarine Environmental Technology) and the Gulf of Maine Council. Programs include water quality monitoring, land use mapping, nonpoint source pollution assessments, technical reports, video productions, school curricula, and more. In general, these programs are implemented in close cooperation with state and regional agencies.

A variety of other groups, some governmental and some not, have developed a series of outreach materials addressing road construction. The UNH Technology Transfer Center, the NH Association of Conservation Districts, USDA NRCS and UNH Cooperative Extension have produced a series of "Quick Guides" that act as a BMP manual for road maintenance. They are geared primarily toward local road agents and are distributed through the Association of NH Road Agents. In addition, the Technology Transfer Center trains local highway crews and publishes a quarterly newsletter, *Road Business*, in which technologies and techniques are discussed. The Technology Transfer Center also provides training and education programs on

road construction and maintenance. These multi-group efforts are fairly typical of outreach and education programs in New Hampshire.

Evaluation

1. Limited staff and funding for Site Specific Program

Currently only part of one staff's time is dedicated to handling development permits in the coastal area (though apparently coverage in the coastal area is better than elsewhere in the state). Staff have acknowledged that not all projects are inspected, thus it is unknown how thoroughly state requirements are being met. Increased resources would allow more thorough monitoring of development activities, improved outreach and education and an increased ability to keep pace with changes in technology for addressing erosion problems.

2. Best Management Practices are often out of date or inadequate

BMPs for erosion control and stormwater management have recently been reviewed and updated, but concern remains that they are out of date or inadequate. The problem is probably related to the lack of staff and resources available to the state agencies involved. Since state and local programs rely so heavily on BMPs for their success, more effort is needed to keep them current (particularly given recent concerns over some BMPs that may be increasing rather than decreasing contamination).

3. Good program coordination among state, regional and local agencies and non-governmental organizations

Perhaps because of limited resources, state, regional and local agencies are generally well coordinated (among themselves and with non-governmental organizations) in their efforts regarding erosion control. Multi-agency and organization projects are common with resources well leveraged to maximize accomplishments.

4. Limited state and local regulation of construction activities below the state disturbance thresholds

The most obvious limitation of the state program is that only those construction activities that disturb more than 100,000 square feet of soil (50,000 square feet in the protected shoreland) are regulated. Though the state has recognized this limitation and recommended that local communities develop design standards for disturbances of 20,000 square feet or more, it has thus far chosen not to address the problem at the state level. Local communities are authorized to regulate these smaller disturbances, but in practice, such regulation is limited. This reluctance to take state jurisdiction over smaller projects is in part due to the limited funds available for the program.

5. Limited oversight of NH DOT projects

The Site Specific program has only limited involvement in road projects, yet there is considerable concern among some state officials that DOT policies are not being fully implemented. Since internal DOT expertise is focused primarily on road and bridge engineering and construction, erosion and stormwater control are not as carefully monitored or enforced. In practice DOT policies don't appear to be as effective as they would be if held to state regulations.

Recommendations for Erosion and Sediment Control

- 1. Improve staff and funding levels of the Site Specific program and increase the outreach resources of the Shoreland Protection Program. [LND-14,16]
- 2. Restructure BMPs to address timing and contaminants of stormwater runoff to eliminate the goal of speeding stormwater to receiving waters and shift more focus to preventing and/or remediating contamination. [WQ-10; LND-9A, 9B]
- 3. The state should work with local governments to develop stronger provisions for erosion and sediment control for all construction and road building activities. State assistance (for example for road construction) could be made contingent on existence of adequate and erosion control ordinances. In addition, education and outreach could be improved with an increased focus of the Shoreland Protection Program on local officials. Such efforts should be coordinated with ongoing outreach efforts in the coastal area. [WQ-9]
- 4. Increase DES Site Specific Program oversight of projects.

Agriculture

Agricultural operations involve numerous activities that contribute to nonpoint source pollution. In certain parts of the country, it is considered the single most important nonpoint pollution problem. Tilling exposes vast areas of soil to erosion, frequently on an annual basis, and the lack of winter cover crops in seasonal areas like New England can exacerbate the problem. Manure spreading and other fertilization activities can add to nutrient and pathogen loading, and pesticide applications can contribute to toxics loading. Years of recognition of these kinds of problems has lead to development of best management practices and other approaches for reducing these water quality problems.

Coastal New Hampshire currently has little agriculture. The number of farms and farm size in Rockingham and Strafford Counties are small, and according to U.S. Census data, both the number of farms and the number of animals on those farms declined substantially between 1982 and 1992. This trend may have been occurring for the last 25 years (Jones, 1997). Even the few farms that do remain are small in size, typically containing fewer than 25 animals. Only 30 animal operations in the entire Zone A and B regions are large enough to fall within the large animal facility criteria under the Coastal Zone Management Act nonpoint source program requirements. On the other hand, there is evidence that small scale horse farms are increasing (Ibid.).

The problems that have been identified in the coastal area are primarily related to animal operations. Pathogens, nutrients and other problems on dairy and horse farms are known to have contaminated surface waters. Manure from a farm in Stratham has led to high bacteria and nutrient loading and pathogen, BOD and low dissolved oxygen concentrations downstream. A 1995 sanitary survey of Great Bay identified two farms with potential contamination problems.

Recent development pressures suggest that agriculture in the coastal area will continue to decline. As a result, agriculture will likely account for a small and decreasing amount of nonpoint source pollution. Nonetheless, a discussion of programs is included because of the historic role of agriculture in non-point source pollution, both nationwide and in the coastal New Hampshire area, and because of the potential for substantial contamination should an accident occur. In

addition, these programs may help address future problems associated with small scale "hobby farms" that may replace some of the more typical agricultural operations. These operations represent a potential for high impact for their size because they are less visible and operators may have less training in preventing nonpoint source pollution. Lingering concern over pesticides and bioaccumulation also suggest that activities continue to be monitored and regulated.

Institutional Infrastructure

Table 4-6 Agricultural Program Summary

Program	Agency	Description	
	FEDERAL PROGRAMS		
Clean Water Act §402 NPDES permit program	EPA	Permits required for construction sites disturbing five acres or more. Permits contain requirements for erosion control measures.	
Environmental Quality Incentive Program, conservation technical assistance, Conservation Reserve Program, crop supports, etc.	USDA Natural Resources Conservation Service	Programs providing support for erosion and sediment control on farmland and financial incentives for land conservation practices.	
Federal Insecticide, Fungicide, and Rodenticide Act	USDA	Regulates use of pesticides and includes authority to ban highly toxic types.	
Highly Erodible Land Conservation Compliance program	USDA	Allows USDA staff to report/enforce erosion deficiencies identified while performing unrelated duties.	
	STATE PROGRAMS		
Pesticide Control Program (RSA 430)	NH Dept. of Agriculture	Establishes BMPs for pesticide use, certification of users, education and technical assistance programs and a framework for restricting specific pesticides.	
Manure Compost and Fertilizer Program (RSA 431)	NH Dept. of Agriculture	Establishes BMPs for nutrient management and sludge spreading.	
Alteration of Terrain (RSA 485-A)	DES Site Specific Program	Permitting requirements may apply if erosion problems are identified.	
Comprehensive Shoreland Protection Act (RSA 483-B)	DES Water Division	Setbacks and vegetation cutting limits may apply to agriculture if operations are found to adversely impact water quality.	
Soil Conservation and Farmland Preservation (RSA 432)	NH Dept. of Agriculture	Authority for negotiating strategies with farmers for addressing water quality concerns. Also established conservation districts and distributes funding for erosion control and research.	
Nonpoint Source Program	NH DES Water Division	Clean Water Act funds are sometimes used for mitigation of agriculture problems.	
	LOCAL AND REGIONAL PRO	GRAMS	
Land Use Regulations (RSA 674)	Municipal governments	May contain setback and vegetated buffer requirements, particularly through resource protection overlay districts. May also include bans on land application of sludge.	
Manure composting program	Rockingham County Conservation District	Composting demonstration program and outreach to animal operations.	
Local Health Inspections	Municipal governments	Local health inspector is authorized to monitor and enforce agricultural BMPs, pesticide application, etc.	
	NON-GOVERNMENTAL PROC	GRAMS	
Soil nutrient testing	UNH Cooperative Extension	Testing us used in development of site specific sludge and nutrient application rates.	

Federal Programs

Management Framework

Federal management of agriculture is done primarily through the US Department of Agriculture, but many of the programs do not apply to small NH farms. EPA administers pesticide laws and also addresses a small portion of agricultural activities when they require Clean Water Act permitting. The Natural Resources Conservation Service and UNH Cooperative Extension provide non-regulatory support, which makes up the majority of the federal role in the NHEP area. These agencies are authorized to monitor operations for appropriate soil conservation and nutrient management activities.

Regulatory Framework

The primary regulatory mechanisms for agriculture include pesticide laws (contained in the Federal Insecticide, Fungicide and Rodenticide Act, or FIFRA) and the point source provisions of the Clean Water Act. In the latter case, concentrated animal operations, including dairy processing and feedlots, may be considered point sources and regulated under NPDES permits discussed in Chapter 5. Though there are several dairy operations in coastal New Hampshire, none currently fall under the NPDES program for permitting purposes.

provides federal oversight of all pesticide applications. EPA is authorized to study the
effects of pesticides and register them, require labeling for contents and proper handling,
and require users to register when purchasing pesticides. Pesticides may be banned from
use, as occurred with DDT in the 1970s. These requirements provide a minimum layer of
control of toxic agricultural substances which state law may then supplement.

Non-Regulatory Framework

The majority of federal programs involve non-regulatory approaches such as education, technical assistance and funding and financial assistance for conservation efforts. Other financial programs, such as crop supports, are tied to nonpoint pollution requirements that involve soil conservation, runoff control, wetlands protection and such. For instance, conservation plans are required of all dairy farms receiving federal aid. The federal aid tied to these plans is incentive enough to result in a high level of implementation of this program according to a technical committee composed of coastal farmers (NH Coastal Program, 1997).

Most federal programs are contained in the federal "Farm Bill" that is reauthorized every five years. The NRCS

nonpoint

cultivating wetlands. This latter approach provides a kind of reverse incentive program for nonpoint source pollution control.

Additional Farm Bill programs include the Wildlife Habitat Incentives Program (WHIP) and the Wetlands Reserve Program. WHIP provides private landowners with assistance and cost sharing for development and protection of wildlife habitat. The Wetlands Reserve Program provides funds for restoration of degraded wetlands. This latter program pays landowners to permanently restore drained cropland and to restore degraded wetlands.

Education, outreach and technical assistance are available through the Natural Resource Conservation Service in close cooperation with the UNH Cooperative Extension, the County Conservation Districts and others. Programs such as Conservation Technical Assistance, the National Cooperative Soil Survey Program, the Farmland Protection Program and others provide such services as erosion control and soil conservation and support for farmland protection through purchase of conservation easements. NRCS staff assist farmers and land owners with erosion control, pond design, stream protection and streambank stabilization, animal waste control and other problems. The Conservation of Private Grazing Land program authorizes NRCS to provide technical and educational assistance to owners of grazing land.

Technical and financial support for farms is also available through the Farm Service Agency under such programs as the Conservation Reserve Program. This program encourages farmers to convert highly erodible land to permanent vegetative cover through plantings of native grasses, trees, filter strips and buffers, etc. Many of these programs are more widely implemented in western agricultural areas than in the northeast.

State Programs

Management Framework

At the state level, the NH Department of Agriculture implements most of the relevant agriculture programs. Manure management and pesticide regulation are handled through this department, supplemented by monitoring and enforcement by local health officials. The state DES and NH Coastal Program provide additional support through nonpoint source programs, research, education and outreach, etc.

Regulatory Framework

In New Hampshire, agriculture is managed and regulated primarily under two programs; the Manure Compost and Fertilizer Program and the Pesticide Control Program. Under the Manure, Compost and Fertilizer Handling Program, created by RSA 431:33-35, the NH Department of Agriculture established BMPs for agricultural operations that define appropriate handling of manure, compost and fertilizers. The two BMPs, developed in 1993, include the *Manual of Best Management Practices for Agriculture in New Hampshire* and the 1993 *Best Management Wetlands Practices for Agriculture*. The NHDA is authorized to investigate operations for consistency with these BMPs in response to complaints, and to require plans for compliance if appropriate. In addition, agriculture operations may be required to apply for a Site Specific permit under the Alteration of Terrain program (RSA 485-A:17) if water quality degradation is demonstrated to occur.

The agriculture BMPs establish acceptable practices for several aspects of agricultural operations. These include control of runoff, minimization of concentrations of manure (except in storage areas), appropriate storage when field application is not suitable, use of cover crops and filter strips, avoidance of field applications when soil is frozen, and others. They also address grazing through controlling livestock access to surface water. These requirements are voluntary to the extent that the operations don't cause water quality degradation, and mandatory implementation occurs only when a complaint about compliance is registered.

In addition, land application of sludge and septage from wastewater treatment (both from on-site sources and from municipal facilities) is managed through Best Management Practices and through administrative rules. Authority to regulate these activities derives from the water pollution and manure handling laws under RSA 485-A and RSA 431. Permits and nutrient management plans are required for application of septage or sludge. A groundwater management permit under 485-C may also be required. The plans are required to assess appropriate rates of application so that application is consistent with the capacity of crops to uptake the nutrients. The goal is to avoid excess nutrients that are susceptible to runoff. In addition, plans address the timing of application to avoid frozen soils or other circumstances where runoff would be increased.

Pesticide application is fairly tightly regulated under state law. The program includes BMPs developed by UNH Cooperative Extension (A Guide for the Pesticide Uimhec45 TD -0.01 Tc 0.rage p for thed no number of the Program These regradaInt quatly e foe rates of) Tj 0-14.44 TD -0.0160 Tc 0.ough Best MExtensi72re

Local and Regional Programs

Management Framework

At the local level, agriculture may be managed through various aspects of zoning regulations. Farming practices are frequently prohibited in all but designated districts because of public health and nuisance concerns. In protected districts like wetlands and shorelands, agricultural activities are typically exempted from land use restrictions unless found to be impacting water quality or not in compliance with BMPs. In general, communities are inclined to avoid regulation of agriculture in part because of the value placed on the rural economy and a range of amenity values associated with rural areas (such as open space, wildlife habitat, etc.). Lastly, local health officials are authorized to monitor and enforce state laws regarding agriculture BMPs, pesticide application, etc.

Regulatory Framework

As discussed above, aside from zoning restriction on the location of agriculture operations, local regulation of agriculture is nearly absent. Dover, Durham, Newmarket and Portsmouth shoreland protection provisions make no mention of agricultural exemptions, suggesting that setbacks and vegetated buffers would apply. Durham's shoreland protection district specifically prohibits fertilizers, animal feedlots and tilling within 75 feet of the high water mark on the shoreline. Finally, Greenland and Rollinsford have adopted biosolids ordinances in response to specific proposals for biosolids application (in both cases, public concern about land application of sludge was high). Strafford in Zone B has also recently begun to consider a biosolids ordinance in response to a proposed application (according to a NH Public Radio story from October 28, 1997).

Non-Regulatory Framework

The Rockingham County Conservation District has also initiated a manure composting program at several sites in the county. This latter program was supplemented with an outreach effort to educate animal owners about pollution from manure, state regulations, and benefits of manure composting, in the hopes of encouraging participation in the compost program. Compost is available to local residents

Non-Governmental Programs

UNH Cooperative Extension provides soil nutrient tests used in developing sludge and septage application plans and information and assistance about nonpoint source pollution. Cooperative Extension also assisted with development of BMPs for biosolids management that led to the NH rules governing septage and sludge application.

Evaluation

1. Management and regulatory programs are probably well suited to the scale of agriculture

The NH agriculture program relies heavily on administrative and programmatic approaches to environmental protection. Problem resolution is handled through a hierarchy of voluntary compliance followed by legal enforcement if satisfactory compliance is not achieved. This approach is ideal for maintaining strong relationships with the regulated community and maximizing voluntary compliance, and probably works well in an area where agriculture is essentially small-scale.

2. Funding and assistance programs are adequate

The wide variety of funding and assistance programs are probably adequate for the small scale of agriculture in the estuary area.

3. Program coordination and cooperation are strong

New Hampshire has developed substantial working relationships among its agencies and organizations to minimize costs, and has leveraged its efforts quite well. Cooperative efforts are commonplace. Both state and federal law encourage cooperation through program management structures (for instance, specifically requiring cooperative efforts among federal and regional agencies to encourage the use of conservation buffers under the USDA Buffer Initiative). The broad level of involvement probably improves the chances of success of any one project. Overall, this approach is probably ideal for the majority of agriculture issues in the seacoast area.

4. Surface water setbacks for cultivation, pesticide application and nutrient management are weak

Surface water setbacks for agricultural activities are fairly weak in the state and should be strengthened. For example, the 25 foot setback for pesticide applications probably does not adequately protect rivers and lakes from contamination. Several of these setbacks, including pesticide application and land spreading of sludge and biosolids, are in the midst of rules changes and should be reviewed for their adequacy and improved.

5. Voluntary BMPs create a weakness in water quality protection

The biggest weakness with NH's agriculture programs is that BMPs are voluntary until water quality degradation occurs. This means that regulatory intervention can only occur retroactively. Nonetheless, since agriculture is not a large source of problems in the estuaries, and since hot spots have generally been discovered and addressed reasonably well on a case-by-case basis, there is probably little need for additional action at this time.

Recommendations for Agriculture

- 1. Improve surface water setbacks for all agriculture activities, such as pesticide application, tilling and land spreading of manure and sludge.
- 2. Agricultural BMPs should be mandatory and coupled with local enforcement by health inspectors.

Forestry

Forestry operations frequently disturb significant amounts of land and cause potential erosion and sedimentation problems. Nationally, erosion and sedimentation from forestry may exceed that from severely eroding agricultural lands (US EPA, 1993). Sedimentation can destroy feeding and spawning habitat and may suffocate fish and other water organisms. Temperature increases from sedimentation and loss of vegetative cover may impact temperature sensitive species like trout and may reduce dissolved oxygen levels.

Runoff timing may change, with stormwater reaching streams or rivers more quickly. Fluctuations in flow may increase, and may contribute to turning perennial streams into seasonal streams. Contaminants, particularly from the heavy machinery used in logging operations, will also be increased, as will nutrients released from the disturbed soils.

Forestry operations are uncommon in the coastal area, with 78 operations in Zone A and 343 in all watersheds of the estuaries (Coastal NPS Program). Ninety five percent of the cuts occur on less than 50 acres. Thus, it is presumed that forestry activities are not a substantial source of nonpoint pollution in the NHEP area.

Institutional Infrastructure

See Table 4-7 for a summary of programs related to forestry operations.

Federal Programs

Management Framework

National Forests are managed through the US Forest Service in the Department of Agriculture under a multiple use program that requires consideration of forestry and recreational uses. There are no National Forests within the Piscataqua and Coastal Basins that make up the New Hampshire Estuary Project area. Additional programs that affect forestry, such as wetlands regulation, are carried out through the agencies responsible for those programs.

Regulatory Framework

There are no federal programs that directly regulate forestry in the coastal area. Federal wetlands policy under the Clean Water Act applies to forestry activities in wetlands, though regulation is primarily handled through the state. In addition, federal pesticide regulations under the Federal Insecticide, Fungicide and Act, as discussed under the agriculture section above, apply to forestry operations where pesticides are used.

Institutional Framework

Table 4-7 Forestry Program Summary

Program	Agency	Description
	FEDERAL PROGRAMS	
Clean Water Act §404 Wetlands permitting	US Army Corps of Engineers, EPA	Permits required for dredge and fill (including forest cutting) activities in wetlands.
Federal Insecticide, Fungicide, and Rodenticide Act	USDA	Regulates use of pesticides of all types and includes authority to ban highly toxic types.
	STATE PROGRAMS	
Forestry Law (RSA 227-I, 227-J)	DRED Forest and Lands Division	Cutting and slash piling limits in proximity to surface water bodies. BMPs and other forest management provisions.
Intent to Cut tax provisions (RSA 79)	NH Dept. of Revenue Administration	Requires all forestry operations to file "Intent to Cut" forms with local community. Form requires compliance with forestry BMPs.
Pesticide Control Program (RSA 430)	NH Dept. of Agriculture, DRED Forest and Lands Division	Establishes BMPs for pesticide use, certification of users, education and technical assistance programs and a framework for restricting specific pesticides.
Manure Compost and Fertilizer Program (RSA 431)	NH Dept. of Agriculture	Establishes BMPs for nutrient management and sludge spreading.
Comprehensive Shoreland Protection Act (RSA 483-B)	DES Water Division	Vegetation cutting limits in proximity to surface waters (within 125 feet, 50% cutting limit in any 20 year period).
Dredge and Fill in Wetlands	NH DES Wetlands Bureau	Permits required for dredge and fill in wetlands including forestry operations.
	LOCAL AND REGIONAL PROG	GRAMS
Land Use Regulations (RSA 674)	Municipal governments	May contain vegetated buffer requirements, particularly through resource protection overlay districts. Municipalities also responsible for enforcement of some state regulations.
	NON-GOVERNMENTAL PROG	RAMS
Education and outreach	SPNHF, NH Timberland Owners Association, Timber Harvesting Council, UNH Thompson School of Applied Science	A variety of forestry and BMP education and outreach programs.

Non-Regulatory Framework

The participates in education and outreach activities focused on forest operations in cooperation with NH DES, UNH Cooperative Extension and others. Federal cost share funds are available through the Forestry Incentives Program (administered by the NRCS) for tree planting, timber stand improvement, site preparation for natural revegetation and more. These funds are available for counties designated as having eligible private timber acreage.

State Programs

Management Framework

At the state level, forest management is handled by the Division of Forests and Lands in the Department of Resources and Economic Development (DRED). There are currently two rangers in Rockingham and Strafford Counties who are responsible for the bulk of the forestry program in the NHEP area. Statewide, rangers monitor 400 sites each, though perhaps somewhat fewer in the coastal area. Pesticides and fertilizers, where used, are managed by the NH Department of Agriculture (NHDA) as discussed for agriculture above. As with federal management, those agencies responsible for wetlands protection, shoreland protection and other programs that address forestry are handled by those respective agencies in coordination with the Division of Forest and Lands. For example, forest rangers help the DES Shoreland Protection Program assess forested shorelands and implement the tree cutting limits of the CSPA.

Regulatory Framework

State Tax law requires all forestry operations (except those of less than 20 cords for the owner's use) to file an "Intent to Cut" form with the local community (RSA 79:10 and RSA 227-J:5). This form requires compliance with forestry BMPs and triggers inspections by Division of Forests and Lands forest rangers. Submission of the form serves as a de-facto permit for the Alteration of Terrain program, meaning no erosion control management plan need be submitted. The state developed the manual "Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire" to help control nonpoint source pollution from forestry operations.

The forestry BMP manual recommends establishment of streamside management areas, or SMAs, in the shoreland area bordering streams in which silviculture activities should be restricted. Among the SMA practices covered are limiting and re-vegetating exposed soils and minimizing or eliminating the use of log landings and skid roads. Though not as effective as buffer zones, these guidelines should help reduce any major erosion and runoff related problems. Other BMPs include pre-harvest planning, siting and minimization of roads, and planning for retiring roads. Operational practices in the manual include stabilizing exposed soils, keeping roads and skid trails out of streamside areas, wet season use of roads, use and maintenance of erosion control measures, and revegetation.

Specific regulations under forestry laws (RSA 227-J) attempt to address water quality protection through cutting limits and slash piling regulations. No more than 50% of basal area may be cut within 150 feet of great ponds, 4th order streams and bodies of water greater than 10 acres, and within 50 feet of other perennial streams and associated standing bodies of water, over a 12 month period (though exemptions may be allowed). "Healthy stands" in these areas must be left intact. Slash may not be piled in perennial streams or standing bodies of water nor within 50 feet of great ponds or 25 feet of 4th order or higher streams. Piles within 50-150 feet of great ponds may not exceed 4 feet in height. The law also states that municipalities shall enforce these provisions, and DRED relies heavily on them to do so. Violations of the basal area limits are assessed individually for each 200 feet of shoreline frontage in which violations occur.

The Comprehensive Shoreland Protection Act provides stronger restrictions on forestry activities near surface waters, and supersedes many of the provisions of RSA 227-J. In the interest of maintaining a vegetated buffer, the act provides for a 50% basal area cut limit and a 50% limit on the number of saplings cut within 150 feet of the shoreline of tidal waters, 4th order and higher streams and large (10 + acres) bodies of surface water, over any 20 year period.

Within 50 feet of the shoreline, stumps and roots must remain in the ground. In addition, the Act states that a "healthy, well distributed stand of trees, saplings, shrubs and ground covers" must be left intact. Clearing for buildings and removal of dead, diseased, noxious and unsafe vegetation are allowed without factoring into the cutting limits.

Forestry operations that occur in wetlands are regulated under provisions of RSA 482-A, Fill and Dredge in Wetlands, and are subject to permitting requirements under that law. Regulations state that roads, skid trails, etc. should be located sufficiently distant from surface waters to avoid sedimentation, and that design and siting should conform to the Forestry BMPs. "Minimum impact" projects are automatically permitted upon notification of the Wetlands Bureau of DES, but they are required to follow the state Forestry BMP manual.

Finally, the state's pesticides laws (RSA 430) and nutrient management laws (RSA 431) regulate the use of pesticides and nutrient supplements on forestry operations. The NH Department of Agriculture is responsible for regulating these activities. Use of pesticides requires a license, and applicators are required to go through certain education programs. BMPs for pesticide applications apply (see agriculture section above).

Related authorities such as those allowing DES to require polluters to restore water quality (RSA 485-A:12, discussed above) apply to forestry operations and form the primary regulatory control for pollution from forestry operations. DRED is empowered to issue Cease and Desist orders if it determines that operations have resulted in, or are likely to result in, pollution of surface waters.

Non-Regulatory Framework

Education activities form the bulk of the state's efforts to control potential environmental problems from forestry. Workshops in forestry law and are conducted jointly by UNH Cooperative Extension, USDA Natural Resources Conservation Service and NH Department of Environmental Services. Other education and outreach is done by these organizations and the Timber Harvesting Council, the Thompson School of Applied Science at UNH, the Timberland Owners Association, DRED and the Society for the Protection of New Hampshire Forests. The state licensing program includes a continuing education requirement that must be fulfilled every two years. In addition, there is a voluntary program for professional certification, the NH Professional Loggers Program, which requires completion of a four-course curriculum and continuing education credits.

Local and Regional Programs

Management Framework

As with most other resource protection issues, local authority to regulate forestry exists in the powers of local land use controls. These controls are little used to regulate forestry activities. Direct controls are typically limited to buffer provisions for wetland and shoreland protection that limit or prohibit cutting of vegetation. State forestry laws also state that municipalities shall enforce cutting limits and slash restrictions in shoreland areas, and DRED relies heavily on them to do so.

Regulatory Framework

At the local level, ten communities restrict cutting of vegetation along shorelines. Dover, Durham, Exeter, Madbury, Newfields, Newmarket, Somersworth and Stratham limit timber and vegetation cutting in their Shoreland Protection Districts, and Portsmouth prohibits clearcutting in its Inland Wetlands Protection District. Rye prohibits cutting of trees larger than 4.5 inches in diameter within 50 feet of marshes and ponds. State law under Title LXIV, however, prohibits "unreasonable" restriction of forestry activities, limiting local control over forestry.

Non-Regulatory Framework

No programs were reviewed under this section.

Non-Governmental Programs

Non-governmental organizations including the Timber Harvesting Council, the Thompson School of Applied Science at UNH, the Timberland Owners Association and the Society for the Protection of New Hampshire Forests are involved in some statewide education and outreach efforts.

Evaluation

Forestry BMPs have not been recently updated and may be weak, particularly with respect to re-vegetation

Regulatory authorities are limited, and are particularly lacking in re-vegetation provisions. The state allows natural re-vegetation, and BMPs recommend soil stabilization and re-vegetation in streamside areas. In discussions with EPA and NOAA regarding the role of these re-vegetation provisions in the state's CZMA nonpoint source program, the state argued that specific re-vegetation requirements were unnecessary because natural re-vegetation occurs so quickly. EPA and NOAA ultimately conceded and gave the state conditional approval of the program without re-vegetation provisions. Similarly, there appears to have been little in the way of recent evaluation and updating of forestry BMPs.

2. Implementation, monitoring and enforcement of BMPs is weak

With such a heavy reliance on BMPs for forestry regulation and management, implementation, monitoring and enforcement are crucial to avoiding contamination problems. Outreach efforts should ensure all operators are educated in BMPs, and distribution of the state BMP manual should be thorough. In the face of limited monitoring and enforcement, there appears to be a need for more extensive evaluation of forestry operations to determine the level of compliance with BMPs and the basal area and slash laws.

Recommendations for Forestry

- 1. Forestry BMPs should be evaluated for effectiveness, particularly regarding re-vegetation requirements.
- 2. BMP manuals should be distributed with each Intent to Cut tax form in order to improve distribution and implementation of BMPs.
- 3. The state should evaluate forestry operations to determine the level of compliance with BMPs.

Boating and Marinas

Though they are identifiable as discrete pollution sources, New Hampshire has chosen to consider boating and marinas as nonpoint sources of pollution. Marinas and boats act as direct dischargers of petroleum products, metals, toxic organics, nutrients, and pathogens into water bodies. Marinas that do not have pump-out facilities or bathrooms serve to encourage discharge of human wastes from vessels.

Marina construction poses numerous problems for the containment of contaminants caused by the construction process, and siting can be critical to reducing pollution and damage to wetlands and water bodies. Their location - often in protected bays or coves - usually means that reduced flushing compounds the problems for that particular water body. Boat maintenance activities, both in the water and on nearby land, are another source of nutrients, sediments, metals and other contaminants. Finally, operation of boats can cause increased turbidity, disruption of sediments, shoreline erosion, reduced water clarity and increased water temperature.

During the 1980s boating in the state became an increasingly popular activity. As of 1993, there were about 3,500 boats registered for tidal waters, 10% of which were charter or commercial (draft). The wait for obtaining a mooring under the Harbor Management Plan may be as long as 20 years. Currently there are eight marinas and three yachting/boating clubs in the coastal region. Three of the state's launch sites located at Odiorne, Rye Harbor and Hampton average 225 launches per day during summer months. Additional state launch sites include NH Fish and Game ramps at Adams Point and the Squamscott River at Route 108, and one NHDOT site at Hilton Park in Dover.

Institutional Infrastructure

Table 4-8 Boating and Marinas Summary

Program	Agency	Description
FEDERAL PROGRAMS		
Clean Water Act (§312)	EPA, US Coast Guard	Prohibits discharge of marine sanitation devices within three miles of shore and allows states to prohibit sewage discharge if it is necessary to meet water quality standards.
Ocean Dumping Ban Act	NOAA OCRM, US Coast Guard	Regulations restricting ocean dumping of sewage and solid waste.
Marine Plastics Pollution Research and Control Act	US Coast Guard	Prohibition on all ocean dumping of plastic debris within 200 miles of the US coast.
Clean Vessel Act	US Fish and Wildlife Service	Provided funds for construction, operation and maintenance of vessel pump-out facilities.
Comprehensive Environmental Response Compensation and Liability Act (CERCLA)	EPA	Creates a response mechanism for hazardous substance spills and clean-up and establishes liability for clean-up costs.
Clean Water Act Revolving Loan Fund	EPA	Funds for state activities to protect and enhance water quality. May include boating and marina related efforts.
	STATE PROGRAMS	
Dredge and Fill in Wetlands (RSA 482-A)	DES Wetlands Bureau	Permits for dredge and fill of wetlands may include conditions to limit impacts of marina construction and/or renovation projects.
CWA and CZMA nonpoint source management programs	NH Dept of Environmental Services, NH Coastal Program	State's nonpoint source programs which have produced BMPs and outreach on vessel and marina operation and maintenance.
Alteration of Terrain, CSPA	DES Site Specific Program	Permit program for construction and other site disturbances of 50,000 square feet or more in shoreland areas. BMPs must be followed.
Control of Marine Pollution and Aquatic Growth (RSA 487)	Dept. of Environmental Services	Prohibits sewage discharge in NH waters and requires that on-board sanitation devices be configured to prohibit discharge.
Boating and Water Safety on New Hampshire Public Waters (RSA 270-D)	NH Dept of Safety	Limits vessels to headway speed within 150 feet of any shoreline.
Oil Spillage in Public Waters (RSA 146-A)	NH DES	Prohibits all discharge of fuel and oil into surface and groundwater, including pumping of oil contaminated bilge water.
	LOCAL AND REGIONAL PROG	GRAMS
Land Use Regulations (RSA 674)	Municipal governments	May contain stormwater and erosion control, building setbacks, and siting considerations.
Planning Assistance	Regional Planning Commissions	Assistance for master plan and ordinance development and for project review.
Planning Assistance	County Conservation Districts	Assistance with subdivision and site plan review.

Federal Programs

Management Framework

Federal responsibility for marinas and boating lies with the EPA and the US Coast Guard. EPA regulates waste discharges form marine sanitation devices through the Clean Water Act, and the Coast Guard enforces those laws. The Coast Guard is also responsible for enforcing laws banning ocean dumping of wastes.

Regulatory Framework

Section 312 of the Clean Water Act prohibits discharge of sewage from marine sanitation devices (MSDs) within three miles of shore and requires that on-board systems meet certain minimum requirements for treatment and holding capacity (not all vessels are required to have MSDs). Violations are subject to fines of \$2,000 per offense. The CWA also allows states to prohibit discharge of sewage from boats if it is necessary to meet water quality standards.

In addition, the Ocean Dumping Ban Act prohibits all ocean dumping of sewage and solid waste except where emergency measures require it to protect human health. Dumping of fill materials from Corps dredging operations is allowed provided it does not significantly degrade the marine environment or endanger human health (the National Marine Fisheries Service is authorized to comment on proposed dredge spoil sites for protection of fish habitat). Furthermore, in 1987 the US enacted the Marine Plastics Pollution Research and Control Act that prohibits dumping of plastic debris within 200 miles of the coast (the U.S. Exclusive Economic Zone). This act also prohibits US vessels from dumping plastics anywhere in the world, and is implemented and enforced by the US Coast Guard.

Finally, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) provides an emergency response mechanism for hazardous substance spills and establishes liability for clean-up costs.

Non-Regulatory Framework

The Clean Vessel Act of 1992 provided funds for up to 75% of the costs of vessel pump-out facilities and septage handling. NH DES applied for CVA funds to construct pump-out facilities at the Rye Harbor marina and at the mouth of the Piscataqua River, to develop a mobile pump-out vessel and to develop further education and outreach materials. Additional funds are limited, though nonpoint source grants under the Clean Water Act and the Coastal Zone Management Act and CWA SRF money could be used for various aspects of boating and marina related problems.

State Programs

Management Framework

New Hampshire policy regarding boating and marinas focuses on siting and installation of new marinas and facilities, operation of existing marinas, operation of marine sanitation devices and boat operation. The state has developed BMPs for marina operation, including practices for vessel cleaning and maintenance, hazardous and other waste management, bilge pumping and more. Various programs focus on reducing dumping of waste oil, antifreeze or other byproducts of vessel maintenance.

In NH, the DES is the lead agency for regulating boating and marinas, with the Wetlands Bureau responsible for permitting new and expanded facilities under the wetlands laws of RSA 482-A and the surface water quality program responsible for provisions related to marine sanitation devices. In addition, the Parks and Recreation Division of the Department of Resources and Economic Development is responsible for operation of state launch sites. The NH Port Authority handles moorings.

Regulatory Framework

Wetlands laws under RSA 482-A require permitting of water dependent structures such as docks, piers and marinas. Administrative rules require that marinas not degrade the environment, and that dredge projects not impede tidal flushing (which would presumably include marinas). Plans are required for stormwater runoff control and treatment, pump-out location, boat maintenance locations and disposal of oil and other wastes. Vegetated filter strips or other runoff treatment structures are required between hull maintenance areas and water. Siting and design requirements attempt to protect habitat and minimize disturbance to important habitat including shoreline communities. A minimum of 25 feet of contiguous shoreline is required for each slip. Since marinas would entail a land use change, they would be subject to local land use board review under RSA 674. If no local permit is required, a letter from the local land use board must be received by the Wetlands Bureau before a permit can be issued.

These wetlands provisions apply to new facilities with 10 or more slips, tie-ups or mooring sites, and to facilities that service boats for hire, involve maintenance or repair adjacent to the water and public or commercial ramps. Existing facilities are regulated only when they are significantly expanded or modified (defined as affecting five or more slips). Such expansions constitute a major docking system for the purposes of regulations, and they must receive approval of the Governor and Council.

Though state law is silent on the issue, the Wetlands Bureau has traditionally required either pump-out facilities or public restrooms at new marinas. Pump-out facilities currently exist at Great Bay Marine and Wentworth Marina, and a facility is being installed at Hampton Marina. A pump-out facility is also being installed at the Department of Resources and Economic Development dock in Rye Harbor, where water is frequently contaminated with pathogens (JEL draft). In comparison, Maine law requires pump-out facilities for all marinas providing 18 or more slips for vessels 24 feet or longer.

NH marine pollution law (RSA 487, Control of Marine pollution and Aquatic Growth) states that sewage discharge in NH waters is prohibited, and that boats with on-board facilities must have those facilities configured so that they are unable to dump into the waters. Federal law under the Clean Water Act prevents states from regulating design, manufacture, installation or use of marine sanitation devices unless the state has received delegated authority (in order to do so, the state must be designated "no discharge" by EPA).

Since NH has not pursued delegation, the state is barred from implementing its no-discharge laws under RSA 487 in its tidal waters (the Coast Guard is theoretically responsible for enforcement of the federal laws). Obviously, however, the state could enforce discharges if they result in degradation of water quality under RSA 485-A:12 (this is not likely to occur as a result of individual boat discharges, so this statute is probably of little value for marine discharges). Pumping of bilge water is covered by the oil spillage and discharge provisions of state law (RSA 146-A, and RSA 271) prohibits all dumping in harbors.

Finally, RSA 270-D requires vessels to maintain headway speed (6 miles per hour or the slowest speed under which a boat can maintain steerage) when within 150 feet of shore. This provision is intended to reduce impacts of erosion and re-suspension of sediments. Enforcement is key to this provision's success, however, and it is limited.

Non-Regulatory Framework

The state CWA Nonpoint Source Program, housed in DES, has developed fact sheets about public health concerns of sewage dumping and information about proper waste disposal from boats and marinas. The NH Coastal Program has distributed information about pump-out facilities and distributed signs to marinas regarding pumping of marine sanitation devices. Local organizations often assist in these education and outreach activities.

Local and Regional Programs

Management Framework

Municipalities may adopt zoning restrictions and site plan requirements for marinas under RSA 674. Provisions may include requirements for pump-out facilities, siting and design requirements, local permitting and others. General provisions under site plan review, including stormwater management and erosion control, would apply to marinas as they entail a land use change, and local review does occur.

Regulatory Framework

Four municipalities address marinas in their land use regulations. Exeter and New Castle have incorporated requirements for pump-out stations for marinas and for minimizing alteration of water areas through design. Rollinsford and Newfields require additional levels of local review for marina projects which provides these towns with an opportunity to require additional protections as necessary.

Non-Regulatory Framework

Non-Regulatory efforts aimed at boating and marinas consists largely of assisting with state outreach efforts, particularly facilitating distribution of fact sheets and other informational materials. Regional Planning Commissions assist member communities in planning efforts that involve boating and marina issues, particularly where local goals involve improved access points and creation of land use controls aimed at marina development. County Conservation Districts also provide consulting services to assist with evaluating development proposals.

Non-Governmental Programs

No programs were encountered in this review.

Evaluation

1. The extent of pollution from boating and marinas is not well known and needs more evaluation.

The extent of pollution from boating and inshore discharges from is not well documented and should be studied further. Findings from such efforts are important for determining policy priorities. In addition, BMPs for marinas, while useful, are strictly voluntary. Depending on the extent of the problems associated with boating and marinas, BMPs should be supplemented with enforceable provisions or tied to regulatory requirements such that those not in compliance are subject to additional requirements or limitations (much in the way agriculture is required to comply with BMPs).

2. The Clean Water Act prevents the state from regulating in the estuaries, yet federal enforcement is inadequate.

Because of the restriction on state regulation of marine sanitation devices, state law on sewage discharges from vessels is largely unimplemented. The state's role is therefore limited to acting in cases where water quality degradation occurs. In practice, however, it is unlikely that such degradation could be proven from any given discharge. Enforcement of federal laws is limited and not focused on inshore tidal waters; thus it too is unlikely to have much impact on estuary water quality. Ironically, the CWA appears to be impeding state management of boat waste discharges.

3. Local regulation of marinas is limited.

Only four towns have any mention of marinas in their ordinances, and only two require pump-out facilities or specific design features. Though perhaps best regulated at the state or federal level, those towns most likely to face marina development should consider their interests and concerns and develop appropriate ordinances to supplement other regulations discussed above.

Recommendations for Boating and Marinas

- 1. The state should further study the water quality problems associated with boating and marinas and develop policies to address the findings as appropriate.
 - Depending on the extent of the problem, the state should consider expanding its regulatory requirements and/or seeking delegated authority for marine sanitation devices in order to enforce its statutory ban on sewage discharges under RSA 487 (or seek an alternative solution if available).
- 2. Outreach to local governments regarding options for regulating marinas at the local level should be incorporated into existing local land use outreach efforts.

Navigation Dredging

Navigation dredging refers to channel dredging, harbor maintenance, hard structure stabilization of shorelines using jetties, groins, breakwaters and related projects. These projects are done primarily to ensure safe navigation for commercial, recreational, tourism and fishing uses. Regular dredging of the Piscataqua River promotes safe navigation, and a dredge project in the Cocheco River has been proposed to promote tourism for Dover's riverfront area. The Hampton Seabrook entrance is scheduled to be dredged because it is so shallow that navigation (especially by commercial fishing boats) is limited by tide height.

Dredge and fill projects stir up sediments and the contaminants that have settled into the sediments, and change circulation and flushing patterns. These changes can in turn affect the rate of assimilation of future contaminants. They may also contribute to erosion in adjacent or nearby areas through changes in sediment transport and deposition. As a rule, these activities are not viewed as a significant problem, and the benefits are seen as extensive. Nonetheless, concern among the general public is often fairly high regarding contaminants, particularly when it takes place around the Portsmouth Naval Shipyard.

These projects are divided into two types; federal navigation projects, such as channel dredging and jetties for inlet stabilization, that are exempt from the standard permit procedures, and state and private projects that don't involve public navigation and that must go through federal and state permit procedures. The latter include harbor dredging, shoreline stabilization and related projects that are usually initiated and/or funded by the state. Maintenance dredging of the Piscataqua River is considered a federal navigation responsibility and is done as needed and with federal funds. State funded projects include the Hampton Seabrook and Cocheco River projects. A channel and harbor project proposed for Little Harbor is predominantly federal.

Other impacts from dredge projects occur when spoils are disposed. Dredge spoils from dredging of Rye Harbor done in 1941 and 1962 were placed in salt marsh landward of the harbor (Jones, 1997). These activities transformed several acres of salt marsh into upland and damaged more than 10 additional acres of the marsh. Current regulations address both the dredge and fill aspects of such projects, and it is unlikely that these impacts would happen under current procedures.

Institutional Infrastructure

Table 4-9 Navigation Dredging Summary

Program	Agency	Description
	FEDERAL PROGRAMS	
Clean Water Act (§404)	US Army Corps of Engineers, EPA	Regulation of dredge and fill in wetlands through permits.
Rivers and Harbors Act (§10)	US Army Corps of Engineers	Regulates dredge and fill activities within navigable waters up to high tide.
Fish and Wildlife Coordination Act	US Fish and Wildlife Service	Provides USFWS with authority to comment on federal actions that affect fish and wildlife or their habitat.
National Environmental Policy Act	EPA	Established an environmental impact review process for federal or federally permitted actions. Includes mechanisms for comments by non-federal agencies and the public.
Magnuson Fisheries Conservation and Management Act	National Marine Fisheries Service	Provides NMFS with comment authority for all federal actions and permits that impact marine fisheries.
Marine Mammal Protection Act	NOAA	May restrict dredge operations to protect marine mammals.
Coastal Zone Management Act	NOAA OCRM	Provides a mechanism for states to influence federal projects to keep them consistent with coastal and estuarine goals.
	STATE PROGRAMS	
Dredge and Fill in Wetlands (RSA 482-A)	DES Wetlands Bureau	Non-federal dredge projects within state waters must obtain wetlands permits. Permit conditions may limit project impacts.
Water Quality Protection Program	NH Dept of Environmental ServiceS	Federal projects must obtain state water quality certification before work begins.
Coastal Nonpoint Source Program	NH Coastal Program	Federal projects such a dredging must obtain a determination from the state addressing the consistency of the project with the state coastal program. Inconsistencies must be resolved.

Federal Programs

Management

The US Army Corps of Engineers (USACOE) is the lead federal agency for dredge and fill projects. Clean Water Act §404 projects require permits, which are issued by the USACOE with input from EPA, the National Marine Fisheries Service (NMFS), the US Fish and Wildlife Service (USFWS) and others. Harbor dredging, hard structure stabilization, beach re-nourishment and other "coastal protection projects" that come under the River and Harbors Act are also managed and regulated by the USACOE.

Projects involving navigation are carried out by the . These projects, which include channel dredging, jetty construction and others designed to maintain safe navigation, do not require permitting as do state and private projects, but they must undergo a similar internal process and a NEPA environmental impact review. Other agencies (e.g. NMFS and the USFWS) submit comments regarding fisheries and other concerns raised by the projects. NMFS also monitors endangered species interactions and establishes practices and schedules to reduce potential conflicts with various species of marine mammals and turtles.

Regulatory Framework

Construction, dredging and fill disposal in navigable waters of the U.S. are regulated through Clean Water Act §404 permits and/or through §10 permits under the Rivers and Harbors Act. Section 404 of the CWA regulates disposal of dredge and fill material in virtually all waters including wetlands, while §10 of the Rivers and Harbors Act regulates the dredging process in waters up to mean high tide. Permits are issued by the US Army Corps of Engineers in coordination with other federal agencies. In practice, these permit programs are conducted jointly with specific requirements dependent on the type of project and the specific statute that covers it.

Aspects of dredge and fill projects are also regulated under the Fish and Wildlife Coordination Act, the Magnuson Fisheries Conservation and Management Act, the Marine Mammals Protection Act and the National Environmental Policy Act (NEPA). Under these laws, the USFWS and NMFS are authorized to participate in the permitting process to ensure fisheries concerns are incorporated. The MMPA provides procedures for avoiding or minimizing marine mammal interactions, while the MFCMA and FWCA provide input for fish habitat concerns. Projects must also meet NEPA environmental impact review requirements, including public hearings and public comment review. Maintenance dredging is exempt from NEPA and permitting requirements unless dredging procedures for a given project change.

Federal projects for the purpose of maintaining safe navigation are coordinated by the USACOE and are exempt from state and federal permit procedures. These projects undergo an internal review that is intended to be equivalent to typical permit review, and they must also receive state certification as to their impact on water quality in the affected waters. In addition, they undergo public review through the NEPA process as do all federal projects.

Dumping of dredge spoil is handled on a case by case basis. New Hampshire has no designated disposal site so spoils are generally dumped at sea in federal waters beyond the three mile limit. Occasionally sites offshore of beaches may be used for clean sand disposal, and certain materials from Piscataqua dredging are at times dumped in deeper portions of the river.

Finally, the consistency provision of the Coastal Zone Management Act requires federal actions to be consistent with approved state Coastal Zone Management Plans, which New Hampshire has developed. This authority has been successfully used to incorporate NH requirements into several federal projects including a South Berwick hydroelectric facility and a recently proposed gas pipeline that would run through the coastal region and through the estuaries of the state.

Non-Regulatory Framework

Non programs were reviewed under this section.

State Programs

Management Framework

All non-federal navigation projects must also undergo state review. The NH Port Authority is the sponsoring agency for these projects and is responsible for coordinating the permit and review procedures. The DES Wetlands Bureau reviews and issues state dredge and fill permits for these projects. State review of federal navigation projects is limited to NEPA comments.

Regulatory Framework

The state's dredge and fill laws under RSA 482-A contain provisions regarding harbor or channel dredging and construction of "coastal protection projects." Where these projects occur within state waters, they must be permitted by the DES Wetlands Bureau. Regulations address issues such as construction, scheduling to minimize fisheries impacts, avoidance and minimization and more. Federal projects such as channel dredging and other navigation projects must receive state water quality certification under the state clean water provisions of RSA 485-A, and must meet CZMA consistency with the state Coastal Program. As discussed above, however, these projects are not otherwise permitted through the state dredge and fill program.

Non-Regulatory Framework

No programs were reviewed under this section.

Local and Regional Programs

The role of local governments in permitting of dredge and fill in wetlands is discussed in Chapter 6. For dredge and fill in public waters, local governments have virtually no role. Aside from requesting projects, they are limited to commenting on permits through the various public input procedures, primarily under the environmental review process of NEPA.

Non-Governmental Programs

No programs were encountered in this review.

Evaluation

Navigation dredge and fill activities were not closely evaluated for this report. Legal authority is probably adequate to protect water quality and problems do not appear to be significant (NHEP Technical Characterization Report). The procedures are fairly sophisticated and generally well understood by those involved.

Solid Waste Management

Junkyards and landfills are significant sources of such contaminants as metals, oil and grease, nutrients, organics and toxics. Contamination occurs fairly readily in some active landfills because the exposed surface allows rainwater to percolate through the materials readily. This water leaches contaminants and carries them into the soils and groundwater, and the groundwater may then carry the contaminants to drinking water supplies or surface water bodies.

New landfills are tightly regulated, so they are not seen as a substantial problem in the coastal area. Old landfills that are properly closed are covered with a layer of clay or other low permeability material to reduce or prevent percolation and contamination. Surrounding groundwater quality is usually monitored through test wells. In New Hampshire, there are 5-10 unlined landfills that remain to be closed and an estimated 50 that are in various stages of closure.

There are currently 37 landfills within the two basins that make up the NHEP area. Of these, seven are active. Only one of the active landfills, the Turnkey landfill in Rochester, is lined, and it receives almost half of all solid waste disposed in New Hampshire (Economic and Labor Market Information Bureau, 1997). Twenty eight landfills have leachate monitoring systems in place (including all active landfills except the ash pile portion of the Nottingham landfill), and 12 of the

30 inactive landfills have been closed in accordance with state requirements (another inactive site, the Coakley landfill discussed below, is scheduled to be closed in 1997). Landfills in Epping, Greenland, New Durham, Northwood, Nottingham, Portsmouth, Seabrook and Strafford remain inactive and are neither lined nor monitored. Most or all of these have not yet been properly closed and thus are significant potential sources of contamination.

Contamination from two coastal area landfills was discovered through the use of monitoring wells required by state and federal law. Remediation of one of these, the Madbury Metals site, apparently resolved the problem before it could reach public water supplies down gradient in Dover. In another case, contamination at the Coakley landfill led to its designation as a superfund site. Closure of this site has been slowed due to requirements of CERCLA, but is expected to be completed during 1997.

A 1991 DES inventory of automobile junkyards found that they frequently are sited in low-lying areas near rivers or streams. This proximity to surface waters makes them a particular concern, and since New Hampshire has traditionally not regulated landfills except through water quality provisions, they are an unknown but significant potential source of contamination.

Institutional Infrastructure

Table 4-10 Solid Waste Management Summary

Program	Agency	Description
	FEDERAL PROGRAM	s
Resource Conservation and Recovery Act (RCRA)	EPA	Hazardous and solid waste requirements that include handling and disposal standards.
Comprehensive Environmental Response Compensation and Liability Act (CERCLA)	EPA	Creates a response mechanism for hazardous substance spills and clean-up and establishes liability for clean-up costs.
Clean Water Act	EPA	Clean Water Act funds, primarily in support of the State Revolving Loan Fund, help with landfill closures.
	STATE PROGRAMS	
Solid Waste Management Program (RSA 149-M)	DES Waste Division	Regulation of construction and operation of landfills. Requires permits for proposed landfills and specifies certain design standards (e.g. liners and leachate collection systems). Also requires towns to develop solid waste management plans and provide for household hazardous waste disposal.
Groundwater Protection Act (RSA 485-C)	NH Dept of Environmental Services	Requires "groundwater release detection permit" and protection from contamination. Prohibits junkyards in Class GAA wellhead protection areas.
Comprehensive Shoreland Protection Act	DES Shoreland Protection Program	Prohibits siting of junkyards and landfill within 250 feet of rivers covered by the law.
Source Reduction	Office of State Planning	Source reduction efforts focus on recycling through the Governor's Recycling Program, a recycling market development program and community planning assistance. The state has a 40% recycling goal by 2000.
	LOCAL AND REGIONAL PRO	GRAMS
Land Use Regulations	Municipal Governments	Towns have broad authority to regulate junkyards, and several towns in the coastal area have prohibited them.
Recycling/Source Reduction Programs	Local Governments	Towns may require recycling and/or may provide curbside collection or drop-off centers. They can also charge volume-based garbage fees as an incentive to reduce volume.

Federal Programs

Management Framework

EPA is the primary federal agency for landfills and other waste disposal sites. Regulation and management occurs under the terms of the Resource Conservation and Recovery Act (RCRA). EPA establishes minimum standards for design, construction and operation and maintenance, and runs a permitting program for construction of new landfills. The agency also oversees closure of existing landfills, and coordinates clean-up activities when appropriate under the Superfund provisions of the Comprehensive Environmental Response and Compensation and Liability Act.

Regulatory Framework

Federal regulation of landfills is covered by the Resource Conservation and Recovery Act (RCRA). This law governs hazardous waste disposal, solid waste disposal, recycling and research and development efforts. Landfills must be constructed using new technologies such as impermeable liners and leachate collection systems to prevent groundwater and soil contamination. Practices such as daily additions of soil and monitoring of groundwater for contamination help reduce the possible impacts of landfills. States are authorized to adopt state programs for hazardous and solid waste management and may be delegated permit authority. New Hampshire has received delegation for its solid waste management program and is therefore responsible for implementation.

Non-Regulatory Framework

Federal programs under CERCLA and CWA help with closure and clean-up of old landfills. Section 319 funds and CWA money through the Clean Water Revolving Loan Fund support closure efforts while CERCLA helps ensure clean-up in the event of contamination.

State Programs

Management Framework

Federal law allows states to be delegated authority over solid waste disposal if they develop adequate regulatory programs. New Hampshire has developed a program that meets federal requirements and as a result has lead authority for landfills. The DES Waste Division handles solid waste disposal in NH, while the Office of State Planning handles the state's recycling program. DES sets solid waste goals and management policies and is responsible for technical assistance for municipalities and private facility operators. New Hampshire also has authority to regulate junkyards, though there is essentially no program to do so (the NH DOT has authority to permit junkyards in proximity to roads, though this authority is generally limited to aesthetic concerns).

Regulatory Framework

State law under the Solid Waste Program (RSA 149-M) regulates construction and operation of landfills. Under this program, disposal of solid waste is prohibited except at approved sites, and proposed landfills must first be permitted. Towns must develop solid waste management plans and must include provisions for dealing with batteries, motor oil and other toxic components of the waste stream. The state also has a municipal solid waste recycling goal of 15% by weight.

Permits for landfills include design and operation requirements such as liners and leachate collection systems, monitoring wells, venting, air quality monitoring, daily cover requirements, and exclusion of hazardous materials. Proper landfill closure requires capping, runoff control, revegetation and monitoring for a minimum of 30 years after closure. Solid waste containers must be labeled with the identity of the owner, which may provide additional incentive for legal, responsible disposal. These requirements are similar to federal requirements and are essentially consistent with the current state of landfill regulation in the U.S.

The state's groundwater protection laws also apply to landfills. Under the Groundwater Protection Act (RSA 485-C), new landfills, and existing landfills in wellhead protection areas, must obtain a groundwater release detection permit. DES and local health officers are authorized to issue cease and desist orders for violations of this act.

New Hampshire currently has few programs for regulating junkyards. New or expanded auto junkyards are prohibited within 250 feet of the shorelines under the jurisdiction of the CSPA, and the Groundwater Protection Act (RSA 485-C) prohibits new junkyards in Class GAA wellhead protection areas and requires groundwater release detection permits and monitoring for existing ones. In addition, under RSA 236, the NH DOT and municipalities are authorized to regulate junkyards. Sites must meet minimum setbacks from highways and roads. These setbacks are designed around aesthetic concerns, though permitting of junkyards near roads may take into account public health concerns.

The NH attorney general has determined that the state has authority under RSA 149-M to establish regulations for siting and operation of junkyards. Thus far, however, budget problems have prevented the development of these regulations. There are plans to address junkyards in future rulemakings, though the timetable for doing so is unknown.

Non-Regulatory Framework

Landfill closures are funded by state guaranteed bonds which provide municipalities with lower interest rates for the costs of closing landfills. State Clean Water SRF money is available for landfill closure, and several landfills in the coastal area (Dover, Hampton, and the Coakley landfill in North Hampton) have been or are being closed with these funds. Clean Water SRF funds are currently used strictly for landfill closures and municipal wastewater treatment facilities, so substantial funds should be available for closures.

Source reduction efforts, aimed at reducing demand for landfills, are focused on recycling. The state has a statutory goal of 40% recycling by the year 2000. Programs designed to meet this goal include community planning assistance, the Governor's Recycling Program, and an EPA funded position dedicated to developing and maintaining recycled materials markets (the Recycling Market Development Office). The Governor's Recycling Program was started in 1989 and provides technical assistance and monitoring of recycling efforts in the state. Finally, the NH Materials Exchange provides a statewide listing of overstocked items, materials no longer of use to particular industries, etc. to facilitate reuse instead of disposal. These programs are well coordinated, with numerous state and private agencies involved.

Local and Regional Programs

Management Framework

Local governments are authorized under the planning and land use regulation provisions of RSA 236 to regulate junkyards. Typically, municipalities restrict siting of junkyards through aquifer and other resource protection districts, though some have banned certain waste disposal sites townwide.

Institutional Infrastructure

Table 4-11 Local Landfill and Junkyard Prohibitions

Town	Within Shoreland Protection Zones	Within Aquifer Protection Zones	Townwide
Dover		V	
Durham		✓	V
Exeter	✓	✓	
Greenland		✓	
Hampton		✓	
Hampton Falls			
Madbury	✓		
New Castle			
Newfields		✓	
Newington			✓
Newmarket			
North Hampton		✓	
Portsmouth			
Rochester			
Rollinsford		✓	
Rye			
Seabrook			✓
Somersworth		✓	
Stratham	V	~	

Regulatory Framework

Thirteen municipalities in the coastal area (Zone A) limit junkyards in at least portions of the town. Only three of seven towns with protection districts (Exeter, Madbury and Stratham) prohibit junkyards in those areas. Three other Zone A towns, Durham, Newington and Seabrook, prohibit junkyards anywhere within the town boundaries. In each case, solid waste disposal is also prohibited. Six municipalities have no local provisions regarding junkyards. Table 4-11 summarizes regulations in Zone A towns regarding siting of solid waste disposal and junkyards.

Non-Regulatory Framework

Volume based trash fees (also called user fees) have been found to be extremely useful community-based source reduction tools. Seattle, for example, has reduced its waste collection costs and increased its recycling participation through these types of fees. Only seven towns in the area have instituted volume based trash fees. The Dover program is the most common approach. This program requires use of official town trash bags and/or tags (for larger items), and bags are priced according to size (Table 4-12 lists those towns with user fees for trash collection).

Much of the recycling effort must come from the municipalities themselves. Nineteen communities in the area currently provide curbside recycling (see table above). Statewide, recycling is currently estimated at 22%, considerably below the 40% goal. The Northeast Resource Recovery Association (NRRA) is a coalition of municipalities, individuals and businesses that provides technical assistance through cooperative local efforts. Most waste

disposal informational and educational efforts are done at the local level. Dover, for instance, provides a detailed flier with instructions for all types of waste disposal including hazardous wastes.

Non-Governmental Programs

Institutional Infrastructure

Table 4-12 Local Source Reduction Efforts

Town	Mandatory Recycling	Offer Curbside Recycling	Volume-Based User Fees
Barrington	✓		
Brentwood			
Brookfield	✓		
Candia	✓		
Chester	✓		
Dover		V	✓
Durham	✓	~	
Exeter		V	✓
Farmington			· ·
Fremont		V	
Hampstead		V	
Hampton		V	
Hampton Falls	V	<i>V</i>	
Kensington		V	· ·
Kingston		V	
Lee	V		
Madbury		~	
Milton	V		
New Durham	V		
Newfields		~	
Newmarket		V	· ·
Portsmouth		V	
Rochester		V	
Rye	V		
Seabrook	V	V	
Somersworth		V	<i>V</i>
Strafford	V	V	
Stratham		V	
Wakefield	V		
	Data from Office of	State Planning, 1997	

Evaluation

1. A large need remains for closure of old landfills, though substantial funds are being earmarked for completing closures

Landfill closures remain incomplete, and while most have groundwater monitoring systems in place, a significant number are unmonitored. Because the state continues to dedicate much of the Clean Water Act SRF money to landfill closures, this situation is probably adequately addressed.

2. Inadequate state regulation and oversight of junkyards

New Hampshire currently has little direct regulatory control over junkyards. Although municipalities have authority, use of this authority is generally limited to aquifer protection zones. In Zone A, about 50% of the municipalities restrict junkyards this way. A few others prohibit junkyards entirely. Few towns restrict junkyards in close proximity to surface waters where potential for contamination is fairly high.

3. Limited source reduction and recycling efforts

Although solid waste disposal is well regulated in the state, there are few source reduction programs in place. Though technical assistance and coordination of programs is quite good, actual recycling is lagging behind state goals. At a current estimated recycling rate of 22%, the state is unlikely to reach its recycling goal of 40% by 2000. This is in part due to the fact that the program is voluntary and there are few penalties for not recycling. Volume based trash fees tend to increase recycling participation but are only used in seven area communities (only four of the 19 Zone A towns). Broader materials coverage, for instance for plastics and plastic wraps other than HDPE and PET, and packaging reduction programs would help slow the filling of landfills.

Recommendations for Solid Waste

- 1. Continue current efforts to close old landfills.
- 2. The state should move forward on developing BMPs and regulations for junkyards, including siting around aquifers and surface waters. At the same time, municipalities should consider similar regulations regarding junkyard siting. [LND-12,17]
- 3. The state should develop a source reduction program including efforts focused on producers as well as consumers. Such a program should include support to municipalities for composting and improved recycling efforts.

Landscaping

Impacts from landscaping activities are diffuse and difficult to characterize. Activities of concern include lawn and garden maintenance (by virtue of the sheer number of homeowners involved) and golf course maintenance (because greens maintenance can be intensive). There is little in the way of direct information regarding the impacts of these activities on surface or ground water resources in New Hampshire, though monitoring of a few golf courses showed no detectable degradation (, 1986). The state includes golf courses and landscaping under the Clean Water Act Nonpoint Source program in part because they are known to have impacts that can persist and can significantly degrade water quality.

Institutional Infrastructure

Table 4-13 contains a summary of programs addressing landscaping and related impacts.

Federal Programs

Management Framework

Federal involvement in nonpoint source pollution from landscaping stems from the nonpoint source programs under the Clean Water Act. Under this authority, EPA reviews state nonpoint source programs and approves or rejects them on the basis of their ability to accomplish identified nonpoint source goals. Approved programs are required for receipt of specific Clean Water Act funds, and these funds provide the incentive for states to work with EPA to address nonpoint source issues.

Regulatory Framework

The only regulatory role of the federal government in landscaping controls arises from the Clean Water Act and pesticide requirements under FIFRA. Under the Clean Water Act, when golf courses are required to obtain a federal wetlands permit (§404 permits), they may also be required to obtain a state water quality certification and monitor pesticide applications. FIFRA requirements include labeling of pesticides regarding their proper use and require users to register their activities.

Non-Regulatory Framework

No programs were reviewed under this section.

Institutional Infrasructure

Table 4-13 Landscaping Program Summary

Program	Agency	Description
	FEDERAL PROGRAMS	S
Federal Insecticide, Fungicide and Rodenticide Act	EPA	Regulates use of pesticides and includes authority to ban highly toxic types. Also requires registration of users.
Clean Water Act	EPA	Nonpoint Source Program funds may be used to support efforts focused on landscaping.
	STATE PROGRAMS	
Pesticide Control Program (RSA 430)	NH Dept. of Agriculture	Establishes BMPs for pesticide use, certification of users, education and technical assistance programs and a framework for restricting specific pesticides.
Manure Compost and Fertilizer Program (RSA 431)	NH Dept. of Agriculture	Establishes BMPs for nutrient management and sludge spreading.
Comprehensive Shoreland Protection Act	DES Shoreland Protection Program	Prohibits fertilizer use within 25 feet of protected shorelines and limits other fertilizers in the 250 foot protected shoreland area.
Alteration of Terrain (RSA 485-A)	DES Site Specific Program	Use of BMPs required for site disturbances of 100,000 square feet or 50,000 square feet in protected shoreland areas.
	LOCAL AND REGIONAL PRO	OGRAMS
Land Use Regulations	Municipal governments	Towns may require landscaping for site disturbances, and golf course development would likely trigger site plan review requirements.

State Programs

Management Framework

Management of landscaping activities is handled primarily through state and local programs. The NH Department of Agriculture houses the Manure Compost and Fertilizer Program and the Pesticide Control Program which cover nonpoint source issues related to landscaping. Additional oversight of landscaping occurs under the Shoreland Protection program and the Site Specific program (in the latter case, DES would rarely be involved, as the program handles disturbances of 50,000 square feet in the protected shoreland and 100,000 square feet elsewhere).

Regulatory Framework

Pesticide applications by professional landscapers and those done on golf courses are regulated through the state's pesticide program (RSA 430) discussed in relation to agriculture above. Septage and sludge (biosolids) management rules (Env-Ws 800) regulate land application of these materials (again discussed in detail under agriculture above). These regulations are designed to minimize surface and groundwater contamination through BMPs and planning requirements. BMP manuals are available for pesticide application, biosolids application, and lawn maintenance.

The other primary state law regulating landscaping is the Comprehensive Shoreland Protection Act. This law prohibits the use of fertilizers within 25 feet of the shoreline with the exception of lime. Within the remainder of the protected shoreland area - to 250 feet from the shoreline - only low phosphate and slow release nitrogen fertilizers are allowed. Enforcement is left, to a large degree, to local code enforcement officials and building inspectors. The Alteration of Terrain requirements under the Site Specific program require permits and use of Best Management Practices for large scale disturbances of soil. Such disturbances in the context of landscaping are unlikely to occur.

Non-Regulatory Framework

Education and outreach under the shoreland protection program at DES include informational fliers sent to shoreland homeowners. Among these is one specifically devoted to lawn care in the protected shoreland.

Local and Regional Programs

At the local level, municipalities may regulate landscaping activities under zoning and subdivision regulations. In practice, little such regulation occurs. In the entire Zone A area, only Durham, Greenland and Rochester have any landscaping provisions. Durham prohibits use of fertilizers and pesticides within 75 feet of all perennial surface waters, and Greenland and Rollinsford have biosolids ordinances that require Planning Board approval of a plan and setbacks from surface waters and well sites. Somersworth requires site plan review to ensure project compliance with the state CSPA, but this is primarily to ensure adequate setbacks and land use activities. Site plan review would likely be required for large scale landscaping disturbances if done in the context of development of a golf course.

Non-Governmental Programs

No programs were encountered in this review.

Evaluation

1. Programs are generally adequate, though increased outreach might help reduce pollution caused by landscaping

Landscaping is a difficult activity to regulate and manage, yet it may have significant impacts on surface water quality. Its diffuse nature suggests that education and outreach programs would be the most cost effective strategies. While some outreach programs currently exist, additional efforts could improve management.

2. State needs improved BMPs and outreach to Golf Courses

The state recognizes a need to address golf course landscaping through BMPs and Integrated Pest Management, and to find creative ways to train and disseminate information

Recommendations for Landscaping

- The state should continue to focus outreach efforts regarding landscaping on landowners in shoreland areas. Real estate transfers present an opportunity to inform new landowners of their responsibilities as waterfront property owners. [EDU-4, WQ-13]
- 2. The state should move forward with developing and implementing for golf courses.

Toxics and Underground Storage Tanks

The primary toxic sources around the estuaries include landfills, the Pease Air Force Base and the Portsmouth Naval Shipyard. Underground storage tanks create a risk of contamination that may go unnoticed for long periods and cause significant problems. Transportation of toxics, associated spills and improper disposal of used motor oil and other household hazardous wastes provide an additional threat.

Institutional Infrastructure

Table 4-14 contains a summary of related programs.

Federal Programs

Management Framework

EPA is the lead federal agency for regulation of toxics and related hazards. Federal law allows states to be delegated authority for hazardous waste management, and NH has received this delegation. Thus, with DES acting as the primary agency, EPA primarily provides oversight.

Regulatory Framework

The federal Resource Conservation and Recovery Act (RCRA) was designed to provide a framework for management of hazardous and solid waste and underground storage tanks. EPA maintains a list of hazardous wastes to which regulations apply and establishes standards for handling and disposal. States may develop hazardous waste management plans that meet federal requirements and be delegated lead management authority (NH has done so). Regulation of underground storage tanks (USTs) is handled similarly, with states provided the opportunity to obtain delegated authority.

Under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), spills of hazardous substances must be reported to the National Response Center and to the NH DES. In tidal waters, spills must also be reported to NH Department of Health and Human Services and NH Fish and Game. Responsible parties are also required to assist in clean-up activities and are liable for clean-up costs and damages up to \$50 million. Local, regional and national contingency plans under the act help guide spill response. High priority sites (Superfund sites) may be designated by EPA and provided with extensive federal support for clean-up. In the Coastal Basin, seven Superfund sites exist in various states of closure.

Non-Regulatory Framework

No programs were reviewed under this section.

Institutional Infrastructure

Table 4-14 Summary of Toxics and Underground Storage Tanks

Program	Agency	Description
	FEDERAL PROC	GRAMS
Resource Conservation and Recovery Act	EPA	Includes regulations for underground storage tanks and provides states with the option to receive delegated authority.
Comprehensive Environmental Response Compensation and Liability Act (CERCLA)	EPA	Creates a response mechanism for hazardous substance spills and clean-up and establishes liability for clean-up costs.
	STATE PROGI	RAMS
Hazardous Waste Management Program (RSA 147-A)	DES Waste Division	Requires a permit for all hazardous waste facilities, requires notification of local governments and establishes liability for clean-up costs. BMPs may be required.
Hazardous Waste Cleanup Fund (RSA 147-B)	DES Waste Division	A fund to receive fees and fines and be used for clean-up costs.
Highway Safety	NH Department of Safety	Regulations for transportation of hazardous materials and wastes, based largely on federal policies.
Underground Storage Facilities	DES	Non-residential tanks that are 10% underground must be registered with state. Requirements include leak detection, monitoring and containment procedures. Also addresses removal requirements. Owners must demonstrate financial responsibility for accidents.
Groundwater Protection Act	DES Subsurface Bureau	Contains standards for discharge and a classification scheme for groundwater sources.
Wellhead Protection Program	DES Subsurface Bureau	Program for identifying and protecting water supplies in wellhead protection areas. Includes BMPS for activities in wellhead protection areas and provisions for land conservation for protection of groundwater supplies.
	LOCAL AND REGIONA	L PROGRAMS
Land Use Regulations	Municipal governments	Towns may adopt aquifer protection zones in which land uses are restricted to protect groundwater sources.

State Programs

Management Framework

The NH DES Waste Division is the lead state agency for regulation and management of toxics and underground storage tanks in the state. The DES Water Division supplements state management through ground and surface water regulatory authority. NH also has a Wellhead Protection program developed in accordance with the federal Safe Drinking Water Act amendments of 1986. This program provides BMPs and technical support, financial assistance, training and demonstration projects to protect water supplies within wellhead protection areas.

Regulatory Framework

The majority of the state's hazardous waste management authority derives from the Hazardous Waste Management program under RSA 147-A. This statute requires a permit for disposal of hazardous wastes or for construction and operation of hazardous waste facilities. Local governments must be notified of applications for such facilities. The term "disposal" includes discharges, spills, leaks or placement into or onto water or land.

Permit recipients may be liable for cleanup if they are in violation of their permit. Fees are collected from generators, handlers and facilities, and fines are designated for a Hazardous Waste Cleanup Fund established under RSA 147-B. Finally, DES has authority to inspect potential contaminant sources and develop BMPs for those identified through the Act. Potential sources thus far identified include automobile service shops and junk yards, furniture stripping operations, photo processing shops, metal working shops, manufacturing facilities, roads and highways, septic systems, salt storage yards and many other types of operations.

Fees from motor oil imports are used for improving used oil collection. Transportation of hazardous materials and wastes is regulated under RSA 21-P. The NH Department of Safety is responsible for enforcing these regulations. In addressing transportation concerns, the state has adopted numerous federal regulations for its rules.

Underground storage tanks (USTs), including any system in which 10% or more is situated under the ground surface, are regulated under RSA 146-C (Underground Storage Facilities). This law requires all non-residential USTs of 110 gallons or more of motor fuels or 1,100 gallons of oil, to be registered, and owners must demonstrate financial responsibility for mishaps. Regulations contain leak detection, monitoring, and containment procedures and address removal of tanks. The Oil Discharge and Disposal Cleanup Fund from oil imports may be used to assist cleanup activities.

Finally, the state Groundwater Protection Act (RSA 485-C) provides protections for groundwater under a few simple programs. Standards are set for discharge of specific contaminants (domestic wastewater is exempt from these provisions), and groundwater release detection permits may be required for certain activities like hazardous waste facilities, landfills and others. Junkyards and certain other uses are prohibited in high value (Class GAA) wellhead protection areas.

Non-Regulatory Framework

NH has a Wellhead Protection program developed in accordance with the federal Safe Drinking Water Act amendments of 1986. This program includes BMPs, technical support, financial assistance, training and demonstration projects to protect water supplies within wellhead protection areas. Under the Wellhead Protection Program, the Society for the Protection of New Hampshire Forests has proposed a project to identify existing undeveloped wellhead areas in need

of protection and work with water suppliers to acquire the lands or conservation interest in the lands for their protection.

Though aquifer protection zones are relatively common in coastal towns, there are currently no standards in New Hampshire for how these ordinances should be written. The Office of State Planning is in the process of developing a model to assist towns in developing these kinds of districts, though they may be of limited use in the NHEP area since towns with zones in place may be unlikely to tamper with their ordinances (there is fear that the process of revisiting existing ordinances may expose them to weakening or loss).

Local and Regional Programs

At the local level, a few towns regulate activities involving toxic materials. Twelve towns in Zone A (63%) have aquifer protection overlay districts geared toward restricting land uses that would impair groundwater resources and maximizing on-site recharge. Typically, these districts limit land use to activities such as conservation, recreation, forestry and agriculture (with some limitations and using Best Management Practices) and limit or prohibit storage of toxics and hazardous wastes, use of de-icing chemicals, septic systems, solid waste disposal, industrial activities, and other activities. Limits to impervious surfaces and recharge requirements are also commonly included. Exeter and New Castle have applied hazardous material restrictions to the entire town, and Durham and Newington have prohibited junk yards within town.

Six of 12 towns have prohibitions against underground storage tanks (USTs) in their aquifer protection zones. In North Hampton this prohibition only applies to residential tanks that would not be regulated under state law. Greenland prohibits bulk storage of fossil fuels in all parts of the town, and Rollinsford prohibits USTs anywhere in town without Planning Board approval. Table 4-15 below shows a summary of zoning provisions regarding toxics and USTs in Zone A municipalities.

Non-Regulatory Framework

No programs were reviewed under this section.

Table 4-15 Municipal Underground Storage Tank and Hazardous Materials Programs

Town	Shoreland Protection Zone	Aquifer Protection Zone	Townwide	Hazardous Waste Collection*
Dover		x, y		
Durham	х	x, y		
Exeter	Х	х	X	Annual
Greenland		х	у	
Hampton		x, y		
Hampton Falls				
Madbury				
New Castle				
Newfields		х		
Newington				
Newmarket		у		
North Hampton		x, y		
Portsmouth				Annual
Rochester		х		
Rollinsford		x, y	у	
Rye				
Seabrook				
Somersworth		Х		
Stratham	х	х		

^{*} Data is incomplete

Non-Governmental Programs

The Society for the Protection of New Hampshire Forests is working with the state on land conservation as a form of sourcewater protection.

Evaluation

1. Regulatory programs are reasonably strong

Programs for toxics and USTs and for protection of surface and groundwater from toxic contaminants are, in general, strong. Regulations are probably adequate, and, with the exception of a model for aquifer protection ordinances, education and technical assistance are fairly thorough. Regulation and oversight of junkyards, as noted earlier, is limited and inadequate, and these sites are potential toxic contaminants.

2. Communication regarding toxic clean-up and Superfund activities is weak

Costly and time-consuming cleanup under the Superfund program should be supported with local outreach and education. Local officials have expressed exasperation over the time it has taken for closure of the Coakley landfill. This appears to be at least in part because communications and outreach regarding the reasons for such delays has been limited or non-existent.

3. The recent emphasis on land acquisition or protection in wellhead protection areas fills a gap in management of groundwater protection

The new DES Sourcewater Protection Program and recent NGO efforts to cooperate in acquisition of aquifer recharge areas fills a previous void in protection of groundwater and provides an important complement for other programs.

x Hazardous waste storage, recycling or disposal

y USTs

Recommendations for Toxics and USTs

- The state should move forward on developing BMPs and regulations for junkyards, including siting around aquifers and surface waters. At the same time, municipalities should consider similar regulations regarding junkyard siting. [LND-17,12]
- 2. Federal personnel should work more closely with communities to respond to concerns and help them understand the lengthy procedures involved in toxic clean-ups and Superfund sites.

Summary Recommendations

There are a number of broad-based issues that apply to most or all nonpoint source pollution problems. Recommendations below apply generally to nonpoint source pollution policy in the seacoast.

- Improve regulatory approach and/or state funding of non-point source programs. The state's anti-degradation policy, which forms the backbone of much of NH's nonpoint source pollution policies, is poorly suited to dealing with nonpoint source pollution. Nonpoint source pollution is incremental and difficult or impossible to identify. Anti-degradation, on the other hand, relies on being able to attribute the cause of pollution to a single responsible person or organization. While funding is not a panacea, NH has provided what appears to be little funding to deal with nonpoint source pollution. Staffs and budgets have steadily declined over recent years, and existing authorities, such as those under the Comprehensive Shoreland Protection Act, are not fully carried out. A lack of state efforts to monitor shoreland areas through shoreline surveys and similar programs has contributed to the continuation of contamination problems. Recent increases in shoreline and sanitary surveys and related activities seem to reflect the recent influx of funds through the NHEP rather than a sustained increase in state support. [WQ-16]
- Continue to evaluate and revise Best Management Practices New Hampshire relies heavily on BMPs for control of nonpoint source pollution, yet many BMPs are out-dated or inadequate. The state is beginning to examine its stormwater BMPs for appropriateness for New Hampshire conditions and for effectiveness at water quality protection. Other BMPs also need review and revision. Most importantly, the state needs to shift focus from flood and volume control to overall water resource management (quality and timing). This research should receive substantial focus and resources since BMPs are the foundation of the state's nonpoint source management efforts. Results from this research should be incorporated into the Green Book and be widely circulated. [WQ-9]
- Regularly update the Green Book The state should regularly review and update the Green Book to keep it current with the latest understanding of stormwater and erosion controls. Current efforts to do an update are valuable, but because of the widespread reliance on the Green Book for nonpoint source pollution control, this resource should be as current as possible. In addition, regular updates will ensure outdated and/or unnecessary measures are removed. These updates will also help ensure that stormwater and erosion control are current at the local level. [WQ-9]
- Improve local regulation of stormwater and erosion control Local governments should adopt standards for erosion control and long term stormwater management. Current coverage among Zone A municipalities is limited, and requirements are highly variable. By adopting the standards of the Green Book by reference, as the state

recommends, municipalities can avoid having to revisit their ordinances frequently to update them. In addition, pooper-scooper laws, hazardous waste collection programs, storm drain stenciling and other programs foster improved runoff quality but are rarely used. [WQ-8, 19]

- Explore ways to improve outreach efforts for local officials Low participation by volunteer local officials in educational and training workshops has probably slowed progress in development of strong resource protection regulations. This problem is complex but, given the important role of local governments in managing natural resources, crucial to the overall success of non-point source management. [LND-25]
- Work to improve local regulation of development project impacts Local regulation
 of stormwater management and erosion and sedimentation control is spotty and
 incomplete, while monitoring of large projects is somewhat limited. Local regulation,
 monitoring and enforcement is needed to supplement the state program, while state
 funding of the Site Specific Program needs to be improved.
- Improve education of property owners Given the potential for water quality impacts, activities within close proximity to surface waters should receive special attention. Education of shorefront property owners regarding laws and responsibilities (e.g. appropriate landscaping activities) is important. [LND-14; EDU-4]
- Increase land protection through acquisition or conservation easements One of the most effective means for protecting water quality is to limit development in proximity to sensitive resources. This can be accomplished through acquisition of land directly or of development rights through conservation easements and other means. This approach and current efforts toward that end will be discussed at greater length in Chapter 6. [LND-26,27,28,29]
- NHEP should work with the state to allow the use of Clean Water SRF money for activities identified as priorities through the CCMP The state's restriction of Clean Water Act SRF money to landfill closure and wastewater treatment facility construction and upgrade limits the effectiveness of these funds to maximize their benefit in the seacoast water sheds. [WQ-16]

Point Source Pollution

Overview

oint source pollution refers to pollution that is discharged at the end of a pipe. It is usually thought of in connection with industry and municipal wastewater treatment facility (WWTF) outfalls, though the term may also apply to specific, identifiable pollution sources such as drainage ditches. Images of brown, foamy water spouting from pipes in the 1960s and 70s brought substantial attention to the problem, spurring on the passage of the Clean Water Act. These were obvious targets for cleaning up the nation's polluted surface waters because they were so highly visible.

The early versions of the Clean Water Act focused substantial resources and regulations on the problems of industrial and municipal point source pollution, and results have been dramatic. These programs were responsible for substantial improvements in the water quality of the nation's surface waters. Nonetheless, problems with these pollution sources remain. At least some of the water quality problems in the estuaries, including pathogen contamination and nutrient loading, are caused by discharges from wastewater treatment facilities (WWTFs), primarily through combined sewer overflows, and other point sources.

As WWTFs have improved, contamination from stormwater discharge from urban and developing areas has come under increasing scrutiny as a source of pathogenic and nutrient contamination. Studies looking into the storm-related increases in contaminants have shown a high correlation between rainfall events and elevated bacteria levels in urban areas. Results of a recent study suggest that bacteria may actually re-grow in some stormwater runoff control systems between storms and get flushed out during storms, causing contamination. Other contaminants that have been found in significant quantities from stormwater runoff include aluminum, copper, lead and zinc. Oil, grease, trichloroethylene and propylene glycol (from plane de-icing at Pease) have been monitored under NPDES permits because of high levels.

Stormwater runoff systems collect and discharge a variety of contaminants from diffuse, nonpoint sources. Thus, while the pollution itself is nonpoint in origin, it is discharged to surface waters as a point source. EPA considers urban runoff nonpoint source except under certain conditions discussed below (for large cities and systems that have been found to cause water quality degradation). While management is primarily handled through nonpoint source programs, systems may come under the point source permitting requirements of the NPDES program.

Table 5-1 Point Source Pollution Control Summary

Institutional Infrastructure

Program	Agency	Description
	FEDERAL PROGRAMS	3
Clean Water Act NPDES Permit Program	EPA, USFWS, NMFS	Permitting of point source discharges of pollution. Includes discharge limits, technology requirements and water quality standards.
NEPA Environmental Assessments	EPA	Environmental review process of federal actions such as NPDES permits.
Coastal Zone Management Act	NOAA Office of Ocean and Coastal Resource Management	Consistency review procedures require federal actions such as NPDES permits to be consistent with approved state Coastal Zone Management Programs.
Fish and Wildlife Coordination Act	US Fish and Wildlife Service	Authority to comment on federal actions, such as NPDES permits, that affect fish and wildlife habitat.
Clean Water Act Revolving Loan Fund	EPA	Funds for state activities to protect and enhance water quality.
National Pre-treatment Program	EPA	Requirements for pre-treatment for industrial effluent sent to wastewater treatment facilities.
	STATE PROGRAMS	
Water Pollution and Waste Disposal Act (RSA 485-A)	NH Dept of Environ Svcs	Water quality protection through establishment of water quality standards and a water body classification scheme.
Wastewater Engineering Technical Assistance	NH DES.	Training for operators of wastewater treatment facilities.
State Revolving Loan Fund		Federal funding with a state match for water quality protection. NH allocates these funds to landfill closure and wastewater treatment facility upgrade and construction.
	LOCAL AND REGIONAL PRO	GRAMS
Wastewater Treatment Facility operation	Municipal governments	Operating procedures and industrial pre-treatment agreements help determine the performance of local WWTFs.
Storm drain maintenance	Municipal governments	Maintenance activities help keep contaminants from being flushed into the estuaries.
Sewage Collection System operation	Municipal governments	Investigation of inflow and infiltration and separation of combined sewer overflows reduces contamination problems.
	NON-GOVERNMENTAL PROG	GRAMS
Outreach activities	New England Water Environment Association	Activities including annual conference focus on preservation of water quality and water resources through advancement of technology and design, information dissemination, etc.

Management of point sources of pollution starts at the federal level, with minimum requirements established through the Clean Water Act. Point source generators are required to obtain permits for discharges which specify allowable discharge levels of contaminants, and penalties exist for violations of those permits. In New Hampshire, the state adds certain requirements to address its specific water quality standards, and those requirements are incorporated into the federal permit. Additional enforcement authority exists for the state. Finally, local governments may provide comments on permit applications, and they are provided certain powers to protect discharges from wastewater treatment facilities through pre-treatment requirements for industrial users. Table 5-1 above summarizes the range of programs available for point source discharges.

Federal Programs

Management Framework

Point sources of pollution are regulated by the Environmental Protection Agency through the National Pollutant Discharge Elimination System (NPDES). This program was established under the Clean Water Act (originally the Federal Water Pollution Control Act of 1972), and entails regulation and monitoring of municipal and industrial point source discharges of pollutants. Permits are issued to polluters that discharge from pipes into surface water. These permits are coordinated with state pollution control programs and are designed to help states meet their water quality standards as designated under the Clean Water Act.

The National Oceanic and Atmospheric Administration (NOAA) and the Secretary of Commerce play an additional role to the extent that consistency provisions of the Coastal Zone Management Act are used by the state to influence NPDES permits. In addition, the U.S. Fish and Wildlife Service derives some management authority from the Fish and Wildlife Coordination Act, which requires federal actions to be reviewed for impacts to fish and wildlife and their habitat.

Regulatory Framework

Under the NPDES program, wastewater discharges from point sources are required to obtain a NPDES permit. These permits establish limits on the quantity and/or concentration of pollutants discharged through the use of technology based effluent limitations and receiving water quality standards. The specific requirements depend on the type of discharge, and may involve the use of Best Practible Control Technology (BPT), Best Conventional Pollution Control Technology (BCT), Best Available Economically Achievable Treatment Technology (BAT) or similar technology based on a "best professional judgement" approach. Individual point sources may be required to operate specific pollution control technologies while also meeting receiving water quality standards. This two pronged approach allows treatment of effluent to a specific standard while also protecting the receiving waters from incremental degradation from high numbers of point source discharges.

Permit holders are required to monitor discharges for specific pollutants and report these data monthly to EPA and the state. Inspections are conducted regularly by the NH DES (in the seacoast area, at least annually) and in limited situations by the EPA. In the event of a system upset or bypass, where untreated sewage is released, the operator must notify the EPA, the NHDES and, in the coastal area, the Department of Health and Human Services and the New Hampshire Fish and Game Department. In addition, every two years states are required to submit a report on the status of the quality of ground and surface water quality. These "305(b)" reports summarize overall quality and attainment of designated uses, as well as highlighting specific cases where water quality is impaired.

EPA is authorized to enforce the requirements of NPDES permits through administrative compliance orders or civil and criminal penalties of up to \$27,500 per day and imprisonment. In addition, citizens who use the affected water body may bring enforcement actions against polluters. Regulators have recognized that 100% compliance 100% of the time is not always possible to achieve because of uncertainties in the waste stream, so permit violations are pursued on the basis of "significant non-compliance" rather than on the basis of each violation. Significant non-compliance refers to repeated exceedences of permit limits within a specified time period. For example, two 40% exceedences in 6 months of BOD, TSS, oil and grease and similar contaminants means significant non-compliance. For metals, toxics, residual chlorine and others,

two 20% exceedences in six months means significant non-compliance. In both cases, four exceedences of any size within six months is considered significant non-compliance.

Section 303 of the CWA requires states to establish water quality standards that provide the basis of permit requirements. These standards involve designating uses for each water body (for example, shellfish harvesting, drinking water or swimming), establishing pollutant criteria to protect those uses (in either narrative or numeric format), and devising an anti-degradation program to ensure water quality and designated uses are maintained. New Hampshire has established Water Quality Standards under the state's Water Pollution and Waste Disposal Act (RSA 485-A), discussed below.

Through the NPDES program, the Clean Water Act requires wastewater treatment facilities (WWTFs) to provide a minimum of "secondary" treatment. This entails screening, sedimentation and skimming followed by biological and/or chemical treatment to remove additional organic material and provide other water quality improvements. These facilities are required to meet specific discharge standards, including coliform bacteria, solids, BOD and other compounds, and must ensure low residual chlorine (used for disinfection against pathogens). As a rule, WWTFs are not required to meet "tertiary" treatment standards unless discharges violate Water Quality Standards. None of the facilities in the coastal area treat beyond the secondary level, though the Rochester WWTF is being upgraded to tertiary in order to meet Water Quality Standards.

In addition to the NPDES permit program, the CWA contains a National Pretreatment Program designed to assist municipal WWTFs. This program requires industrial discharges into municipal WWTFs to be pretreated for pollutants that might interfere with the treatment process or pass through the system untreated creating a hazard. Certain industries that have been Table 5-2 NPDES Permits for WWTFs identified through the CWA are required to meet pre-treatment standards established in the regulations. Pre-treatment agreements are developed between the towns and the industries and the industries are required to monitor their discharges. Municipalities then enforce these agreements.

Table 5-2 Permitted Wastewater Treatment Facilities

Town	Receiving Waters	
Dover	Piscataqua River	
Durham	Oyster River	
Epping	Lamprey River	
Exeter	Squamscott River	
Farmington	Cocheco River	
Hampton	Tide Mill Creek (Hampton Harbor)	
Newfields	Squamscott River	
Newington	Piscataqua River	
Newmarket	Lamprey River	
Portsmouth	Piscataqua River	
Rochester	Cocheco River	
Rollinsford	Salmon Falls River	
Somersworth	Salmon Falls River	
Berwick, ME	Salmon Falls River	
Kittery, ME	Piscataqua River	
South Berwick, ME	Salmon Falls River	

There are currently 16 permitted municipal wastewater treatment facilities (WWTFs) in the watersheds of New Hampshire estuaries. Thirteen are in New Hampshire municipalities, and three in Maine discharge into the Piscataqua Basin. Table 5-2 provides a listing of existing permitted wastewater treatment facilities.

NPDES permits are also required for certain industrial activities (primarily for specifically identified manufacturing industries as defined in the regulations). Within the NHEP area, there are eight industrial NPDES permits and three power plant permits (three additional industrial plants in Maine discharge into surface waters that influence NH estuaries), for a total of 11 such permits in the state. (See Table 5-3 below.)

Table 5-3 Industrial NPDES Permits

Town	Company	Receiving Waters
Rochester	Tillotson Healthcare Corp.	Salmon Falls River
Seabrook	KJ Quinn & Co., Inc.	Cains Brook
	Millipore of New Hampshire, Inc.	Taylor River
	Morton International	Cains Brook
	Seabrook Station	Atlantic Ocean
Rye	Wallis Sands	Atlantic Ocean
Gonic	Kane Gonic Brick Corp.	Cocheco River
Hampton	Enviro Systems	Taylor River
Newington	Pease Development Corporation	Piscataqua River
	PSNH Newington Station	Piscataqua River
	PSNH Schiller Station	Piscataqua River

From: Jones, 1997

Finally, NPDES permits are required for urban stormwater systems that either serve 100,000 residents or have been found to significantly degrade surface water quality. There are no such permits currently required in the watersheds of the estuaries, but draft rules under consideration at EPA may change that status. Under the proposal, all "urbanized areas" as defined by the 1990 Census (areas with populations of greater than 1,000 per square mile) would be required to obtain a NPDES permit (Brolin, pers. comm.). Permits would go through a two part process in which a status and management review would identify weaknesses that would then be addressed through the permitting process.

Stormwater NPDES permits are also required for construction that disturbs five acres or more. These permits are designed around Best Management Practices and may include control technologies like catch basin filters, etc. Stormwater permits (both industrial and municipal) require that non-storm sewer discharge be prevented from entering the stormwater systems.

The total number of storm sewer outfalls is unknown because few towns have complete inventories of their systems (Jones, 1997). Two drainage streams in Newington, used by the Pease International Tradeport (and formerly by the Pease Air Force Base), are permitted under the NPDES program. Simplex Wire and Cable Co., also in Newington, also has a stormwater NPDES permit.

In addition to the NPDES permit program, three other federal laws provide protection for estuaries through oversight programs. NPDES permits are considered federal actions that require an environmental review under NEPA. The Fish and Wildlife Coordination Act requires that all federal actions that affect fish and wildlife must consider US Fish and Wildlife Service (USFWS) comments. NPDES permits constitute a federal action requiring this input. In addition, the consistency provision

of the Coastal Zone Management Act requires federal actions to be consistent with state Coastal Zone Management Plans. Because it has developed such a plan, New Hampshire is given this authority. The consistency authority has been successfully used to incorporate NH requirements into several federal projects including a South Berwick hydroelectric facility and a recently proposed gas pipeline that would run through the coastal region of the state. It is also used to ensure NPDES permit decisions are consistent with the state coastal region policies.

Non-Regulatory Framework

State Revolving Loan Funds under the Clean Water Act may be used for financing municipal wastewater treatment plants. These federal funds provide low interest loans for construction, improvement or expansion of municipal WWTFs. States must match this with a 20% contribution. Federal funds are also being earmarked for estuarine environmental technology through CICEET (Cooperative Institute for Coastal and Estuarine Environmental Technology), some amount of which may be applied to monitoring and/or improving performance of WWTFs and other point sources.

State Programs

Management Framework

Management of point sources in New Hampshire is handled through the Wastewater Engineering Bureau of the Dept of Environmental Services Water Division and consists primarily of regulatory and technical assistance programs. Much of the state's legal authority to control point source pollution hinges on the anti-degradation provision of the state's water quality protection laws. This program is intended to mirror the federal program discussed above. The state establishes a water quality classification scheme for surface waters based on chemical, biological and physical characteristics and makes it unlawful to discharge any sewage, industrial or other wastes in a manner that would result in degradation below the classification criteria. The law then provides DES with the authority to require polluters to correct water quality problems if they cause a body of water to fall below the standards for its classification.

Regulatory Framework

New Hampshire has developed water quality standards which define the state's water classification scheme and are used to define what constitutes a violation of both NPDES permits and the state's water pollution control laws. The standards include $E.\ coli$ (fecal coliform and enterococci for tidal waters), dissolved oxygen, benthic deposits, oil and grease, color, turbidity, slicks, odors and floating solids, temperature, phosphorus, radioactivity and pH. The state also incorporates EPA water quality standards for contaminants such as nitrates, pesticides, metals, and others. Authority exists for New Hampshire to incorporate standards for the National Shellfish Sanitation Program (NSSP) as well. Certain standards (e.g. for fecal coliform bacteria) are more stringent for systems discharging into tidal waters than fresh waters.

The state designates two water quality classes, Class A (the highest quality waters) and Class B. Under state law, no discharges of sewage or wastes are allowed into Class A waters and only discharges designed to maintain or enhance water quality are allowed into Outstanding Resource Waters (defined by the state as "waters of national forests and waters designated as 'natural' under RSA 483:7-a,1"). Discharges of sewage or wastes are allowed in Class B waters only if they meet treatment standards such that they will not degrade water quality below the standards for that Class.

Under the Clean Water Act (CWA), EPA may delegate its NPDES permit authority to states that meet certain minimum requirements. New Hampshire has not obtained NPDES permitting authority, and has not sought it since before 1989, at least in part because doing so would be costly and might require charging fees of municipalities (which may be illegal under NH law). As a result, permits receive both state and federal review, and NH may add separate requirements to permits to meet its goals.

In practice, EPA incorporates any additional New Hampshire conditions into its permits, and New Hampshire adopts the federal NPDES permits as it own. Federal regulations have no enforceable effluent standards for bacteria, but the state includes bacteria standards under its regulations. In addition, whereas state and federal regulations allow "mixing zones" around outfalls in which effluent standards may be exceeded, the state does not allow them for bacteria and pH. (For pH, effluent standards may be exceeded if proof is given that such conditions will not affect the pH of the receiving waters.) The state allows temporary exceedences in standards due to combined sewer overflows (CSOs) or very low water levels subject to certain limits. New Hampshire also reserves 10% of the discharge capacity for future use and as a hedge against exceedences, in effect lowering the permitted discharge levels. This policy provides a margin of safety that serves to add protection for the receiving waters.

Inspection and enforcement responsibilities are shared with EPA. NH has one inspector for the coastal area who inspects each NPDES permit at least once each year (supported partially through the NH Coastal Program of the Office of State Planning). Enforcement actions are coordinated between EPA and NH DES and occur in response to significant non-compliance and certain bypass or overflow situations.

At the state level, industrial discharges are regulated similarly to WWTF discharges. None may occur in Class A waters and Outstanding Resource Waters, and permits for discharges into Class B waters require treatment for a wide range of possible contaminants such that quality does not degrade below the standards for Class B waters. In practice, federal permits are adopted by the state, with conditions added only when necessary to meet New Hampshire's additional criteria discussed above. In addition, all WWTF operators must be certified by the state.

Stormwater control from large construction sites is regulated through the Site Specific program at DES. Permits are required for disturbances of 100,000 square feet (50,000 square feet in the protected shoreland), and permitees are required to follow BMPs. Unlike under federal law, these sites are not treated like point sources, so the program is discussed in Chapter 4.

Non-Regulatory Framework

Non-regulatory programs at the state level include training and certification for WWTF operators and financial support for facility construction and upgrades. Training programs are offered through the state's Operator Training Center in Franklin two times per year. Certification exams are also offered twice each year. The state also offers technical assistance on a case-by-case basis through the Wastewater Engineering Bureau of DES. WWTF operators can obtain help by calling the bureau directly.

Two sources of funds are available to communities for construction or upgrade of wastewater treatment facilities. State Revolving Loan Funds under the Clean Water Act may be used for financing municipal wastewater treatment plants. These funds provide low interest loans for construction, improvement or expansion of municipal WWTFs. States must match this with a 20% contribution. New Hampshire currently requires that all SRF money be used for municipal wastewater treatment systems or landfill closures. Within the NHEP focus area, SRF money is being used for municipal wastewater treatment projects in Rochester, Hampton, Exeter, Pease,

Farmington, Portsmouth and Newmarket (McMennamin, pers. comm.). Total funding for these projects is roughly \$35-40 million. The Rochester project alone is about \$20 million. The State Aid Grant Program also provides support for WWTF construction or upgrade. These funds may meet 20-30% of facility costs and are provided as grants.

The NH DES also sponsors a Pollution Prevention (P2) program that helps businesses evaluate their waste stream and develop strategies for reducing pollution. This program offers on-site assessments, sponsors an annual conference, and disseminates information on other resources available for businesses aiming to reduce polluting activities.

Local and Regional Programs

Management Framework

The local role in point source discharges is limited to management of wastewater treatment facilities and stormwater collection systems and to imposition of regulations and ordinances geared toward reducing nonpoint sources of contaminants that impact stormwater runoff. These latter ordinances and regulations are discussed in Chapter 4. Municipalities also have a certain level of control over industries that discharge into their wastewater treatment facilities through the CWA industrial pre-treatment program discussed below.

Regulatory Framework

Municipalities have no regulatory control over point source discharges. They may comment on NPDES permit applications through public comment procedures, but permit regulations leave little room for changes, and this authority is no broader than the rights of any citizen to comment through the public input process.

Non-Regulatory Framework

The local role in point source management is limited to operation and maintenance of WWTFs and stormwater collection systems. Municipalities have resources available through State Revolving Loan Funds and other sources to install, upgrade or repair public wastewater treatment facilities. In addition, through industrial pre-treatment programs required by the Clean Water Act, communities can monitor and control inputs into their systems that might cause system upsets or failure.

Old sewage collection systems that are combined with stormwater drainage systems pose one of the largest remaining problems for WWTF discharges. In such combined systems, water from storm events is directed to WWTFs through the sewage collection system, and the excess water can cause the treatment process to overflow or be bypassed. The result of these "combined sewage overflows" (CSOs) may be discharge of untreated sewage. Some communities in the coastal region have worked on identifying and correcting CSOs or similar inflow and infiltration problems. Table 5-4 summarizes some of these types of actions taken by the communities that have WWTFs. Information for the table was supplied by the towns during interviews conducted for this report.

Local communities have essentially no control over industrial discharges except when they are routed to WWTFs. In this case, pre-treatment agreements required by the Clean Water Act give municipalities a certain level of control over what comes into their systems. These agreements outline limits for specific pollutants in the waste stream of industries that discharge to WWTFs instead of directly to surface waters. The primary focus of these agreements is to limit or prohibit

introduction of pollutants that either can not be treated through the WWTF or which would interfere with the treatment process.

Table 5-4 Local Point Source Management

Municipality	WWTF	Storm Drain Maintenance
Dover	Proposed 6 year, \$0.5 million /yr, I&I study and repair project. Plant upgraded to secondary, operated by OMI.	Done as time is available and when problems are reported. No maintenance plan.
Durham	Oyster River Watershed study found problems. System upgraded to secondary treatment	Inspect annually or as time is available.
Exeter	CSO elimination	Inspect annually or as time is available.
Hampton	I&I study done by consultant, no significant problems found.	Catch basins cleaned 1-2 times per year
Newfields	Recent study of system, no problems found. System installed 1983.	
Newington	No studies. I&I not seen as a problem. System installed 1980-81. 160-170k GPD on 290k GPD capacity system.	
Newmarket	CSO elimination; system recently upgraded to secondary treatment	
Portsmouth	CSO elimination	
Rochester	New advanced treatment system	
Rollinsford	System improvements	
Seabrook	New system for entire town, 1997	
Somersworth	System improvements	

Local policy regarding urban runoff is primarily focused on design, operation and maintenance of storm runoff collection systems and pollution prevention aimed at improving water quality of the runoff. Researchers have only recently begun to look at techniques and technologies for improving the quality of runoff from stormwater systems, so municipalities have few controls to apply. Interviews and follow-up discussions with a variety of local officials suggest that most maintenance is done haphazardly as time permits (see Table 5-4 above).

Specific problems with storm water collection systems are generally addressed fairly quickly, but long-term preventive maintenance is limited. In some cases the lack of long term maintenance is a result of insufficient staff, but there appears to be some indication that maintenance is not perceived as important. Municipalities may also require installation of erosion and stormwater controls for new developments, and these controls will improve runoff quality and reduce storm system pollutant discharges. These controls are discussed at length in Chapter 4.

Additional local policies that can influence the quality of urban stormwater runoff include prohibitions on dumping of motor oil, pooper scooper laws and street and parking lot cleaning. A study of the Oyster River watershed (Jones, 1997) found parking lot vacuum cleaning to reduce bacterial contamination. State law prohibits dumping of motor oil and other petroleum products, but such regulations at the local level tend to be more effective, particularly when education is also conducted. Non-regulatory programs, such as storm drain stenciling (for instance, Dover's Yellow Fish Road storm drain stenciling program), sewer systems education and awareness programs, are generally lacking in the coastal area.

Non-Governmental Programs

Non-governmental programs focused on point source pollution are limited in the seacoast region. The New England Water Environment Association focuses on preservation of water quality and water resources through advancement of technology and design, information dissemination, etc. NEWEA also holds an annual conference in the New England area in which at least a portion of the focus includes wastewater treatment programs. NEWEA also works closely with state agencies involved in wastewater treatment. The new estuary technology center at UNH, CICEET (the CI Center for E Estuarine Technology), is likely to become a substantial source of research and technical assistance in the future, though its funding priorities may well keep it focused on nonpoint source pollution rather than point source pollution. This center is currently funded by the federal government.

Evaluation

As a rule, point sources of pollution are well managed and regulated. The infrastructure for management has existed for a relatively long time, and extensive progress has been made on reducing this form of pollution. Current point source problems in the seacoast region appear to be primarily the result of specific aspects of WWTFs and stormwater discharges, although there appear to be a few industrial "hot spots." While WWTFs may exceed effluent standards under certain circumstances (e.g. during large storms), water quality impacts are not frequently documented. Nonetheless, despite improvements through system upgrades, the NHEP Technical Characterization (JEL draft) has identified WWTFs as an important source of contaminants.

Temporary discharges in excess of permit limits occur for a variety of reasons; power outages, operator error, introduction of materials that disrupt the treatment process, and as a result of combined sewer overflows (CSOs). The latter appears to be most common in the seacoast. CSOs result when stormwater enters old sewer collection lines through a direct connection with storm drains or cross connections with storm sewers. The addition of substantial amounts of stormwater sometimes leads to system overload, and raw or poorly treated sewage may be discharged directly to receiving waters. These bypasses or upsets may occur several times each year in coastal communities and result in shellfish bed closures downstream.

There are three known combined storm and sewer systems that create CSOs in the Coastal and Piscataqua Basins. Two in Portsmouth discharge into the South Mill Pond. Repair costs for these are estimated at \$10 million, and as a result, Portsmouth has tried to reclassify the pond so it would not have to attain the 70 coliforms per 100 ml standard (Jones, 1997). The city is trying to negotiate a solution with EPA and the state. Exeter has one remaining CSO which dumps into Clemson Pond and ultimately into the Squamscott River. The Exeter CSO is currently being studied, and the town has submitted a control plan in compliance with federal requirements.

Leaky sewer lines also cause bacterial contamination, and several have been found throughout the estuary system. A study of the Oyster River watershed found a specific case of contamination around a sewer line crossing a mud flat (Jones and Langan, 1994). Another leaky line was found in Dover in mid 1997 (Landry, pers. comm.). The city has been notified of the problem and intends to repair it.

Temporal data suggest that contamination resulting from WWTFs has been significantly reduced since 1988 (Jones, 1997). Various system upgrades, corrections of CSOs (such as ones in Newmarket and Exeter) and studies of leaks and infiltration have improved system performance throughout the coastal area. Clean Water SRF money has been used in New Hampshire to fund new and upgraded sewer systems and landfill closures, so resources for dealing with these

problems have been made available. Water quality has also improved since the late 1980s, when much of the system improvements occurred.

Aside from the Portsmouth Naval Shipyard, there has been relatively little industrial activity in the coastal area. Impacts from past activities (e.g. tanneries on the Cocheco River that were responsible for Chromium in the Great Bay system) appear to be more important than present discharges (JEL draft). Toxics like chromium in estuary sediments may in some cases exist at fairly high levels and may be a concern through re-suspension. While a concern, these contaminants should not be seriously exacerbated by current industrial point source discharges.

1. Strong regulatory program, particularly the NH withholding of 10% of allowable discharge

New Hampshire has made significant progress in cleaning up its point source discharges, though CSOs and leaking pipes continue to contribute significantly to contamination and degradation of the estuaries. Most problems are being studied and solutions are under way. The Portsmouth CSO remains a problem spot for the estuaries.

2. Inadequate state and federal staffing for permitting and enforcement

EPA has one staff person to write and review all permits for the state, and staff from other programs are sometimes recruited to help write the permits. It is uncertain to what extent these limited resources are affecting the permitting process or the level of protection the NPDES permits are designed to provide, as such a study was beyond the scope of the Base Programs Analysis.

Funding at the state level is also a problem. The NH OSP Coastal Program has devoted some of its limited federal grant funds to support a state inspector for the seacoast area to ensure thorough monitoring and inspection of systems discharging into tidal or near tidal waters. State funding should be sufficient to provide adequate staff through the existing Wastewater engineering, rather than diverting grant funds from other potential project areas.

3. Insufficient resources for identifying and repairing sewage collection system leaks

Funding needs to be developed to support community efforts to identify and repair sewage collection systems. Joint efforts at the local and state level will be needed because these problems can be difficult to locate and costly to repair. Lingering problems with toxic contaminants also suggest more needs to be done to determine sources and solutions.

4. WWTF training programs need improvement

While the state provides training for WWTF operators, most training admittedly occurs through outside sources and on the job experience. This lack of training probably contributes to occasional problems attributable to WWTFs. Additional support and training should be provided.

Recommendations

1. Develop a coordinated program and funds to identify and resolve CSOs, infiltration and inflow, leaky collection systems, and similar problems. These activities are currently being done in a haphazard fashion as funds are available. Since pathogens are one of the primary water quality concerns for the

estuaries, greater commitment to resolving the known factors is needed. In addition, since these problems can be difficult to locate and/or costly to repair, joint efforts at the state and local level will be needed. Obviously, these efforts should be well coordinated with nonpoint source reduction efforts so that the most effective use of funds is achieved and the most important problems are addressed first. For instance, sewage collection system upgrade might be most effective in Dover, while in Hampton, a focus on septics might provide greater water quality improvements. A portion of Clean Water Act SRFs should be made available to assist with repair of sewage collection systems (as well as replacement of septic systems as discussed in Chapter 4). [WQ-3a, 3b, 3c, 6]

- 2. Improve local regulations to prevent contamination of stormwater runoff. Regulations aimed at preventing nonpoint source pollution are key to eliminating urban stormwater runoff problems. More specific nonpoint source recommendations are made in Chapter 4. [WQ-8]
- 3. Continue investigations into stormwater management technology for improving runoff quality. Research such as the recent project examining the use of catch basin filters (discussed elsewhere in this report) should continue to focus on potential solutions for contamination from stormwater runoff systems. [WQ-7]
- 4. Improve training of WWTF operators. Sufficient concern about the adequacy of the state's existing training programs exists to warrant evaluation and improvement of the programs. [WQ-10]

Habitat Alteration

Overview

his chapter focuses on land and habitat protection within and around the estuaries. Land and habitat protection can provide numerous benefits for the estuaries of the state, including nonpoint source pollution reduction, wildlife enhancement and protection of water quality as well as the long recognized but less tangible benefits of open space. The most important lands to protect, from the standpoint of water quality and habitat, usually include wetlands and shoreland areas. In addition, instream habitat and estuarine habitat protection are vital for healthy estuary resources.

Current estimates of land use in the Great Bay and Hampton Harbor watersheds show that significant areas remain undeveloped or lightly developed. Table 6-1 below provides a breakdown of coastal land use patterns presented in the draft NHEP Technical Characterization. This data shows significant portions of each watershed remain forested or undeveloped, while developed portions make up roughly one quarter of the land area.

Habitat protection in the coastal area involves a variety of habitat acquisition initiatives and regulatory programs for protection of shorelands, wetlands and rivers. A wide range of agencies and non-governmental organizations are involved in the regulation and management of habitat. Recent efforts aimed at acquiring habitat or conservation easements have been primarily the result of either private or private-public partnerships, although the state has a history of fairly strong land protection.

Table 6-1 Land Use in the Great Bay and Hampton Harbor Watersheds

	Great Bay Estuary		Hampton Harbor Estuary	
Land Use Category	Acres	Percent of total	Acres	Percent of total
Forested/Open	271,080	59	19,341	77
Residential	50,877	11	4,163	17
Commercial/Mixed	11,345	2	1,130	4
Industrial	3,118	1	282	1
Recreational	12,216	3	128	1
Agricultural/Mining	17,243	4	89	0
Not Classified	96,958	21	0	0

From: Draft Technical Characterization

Shoreline Development and Riparian Buffers

The esthetic value of shorefront property is well understood and reflected in the high property values found there. The attractiveness of waterfront property is also what makes it especially vulnerable to development. Though the New Hampshire coast is only 17 miles wide, the tidal shoreline is 230 miles long (from the draft NHEP Technical Characterization. The vast majority of shorefront property is privately held (Short, 1992). An analysis of land use done as part of a critical lands mapping effort by the NHEP identified development potential of shoreland within 300 feet of tidal waters (see Table 6-2). Of the total, 35% is developed and 28% is developable. Considering the population of Rockingham and Strafford counties is expected to grow by 55% and 23%, respectively, between 1996 and 2020 (OSP, 1997), demand for shorefront property will likely increase substantially during that time.

Table 6-2 Shoreland Development Potential

Land Character	Percent of Total Land Area
Developed	35
(large wetlands or utility rights-of-way)	21
Permanent Conservation Land	16
	28

Shorelines are valuable transition habitats, vital to many animal and plant species, and they provide important buffers from contaminated runoff. Runoff contaminated by development of these areas travels to surface waters relatively unrestricted and untreated. Maintaining an undeveloped buffer around surface water bodies is an important means for reducing pollution of those waters and improving habitat.

Protection of shorelands is a high priority, but most communities want to balance protection with development opportunities. A key issue involves determination of an adequate buffer or setback for protecting surface waters. While specific buffer information is not well established (see note below), it may be intuitive that certain development activities are lower impact than others and that different uses need different buffers or setbacks. New Hampshire has developed a Shoreland Protection Program to try to balance development interest with the need for protection through different setbacks for lower impact (residential, etc.) and higher impact activities (hazardous waste processing, solid waste management, etc.).

$Institutional\ Infrastructure$

Table 6-3 Shoreland Protection Program Summary

Program	Agency	Description	
	FEDERAL PROGRAMS		
National Flood Insurance Program	Federal Emergency Management Agency	Federal flood insurance for structures in flood zones, with requirements for floodplain zoning and technical assistance programs.	
Coastal Zone Management Act	NOAA Office of Ocean and Coastal Resource Management	Funding for nonpoint source protection and Consistency provisions which require federal actions to be consistent with approved state Coastal Zone Management Programs.	
Wild and Scenic Rivers Act	National Park Service	Program for river and river corridor protection, including restrictions on flow impediments and funding for river corridor management.	
Land Conservation	Great Bay National Estuarine Research Reserve, USFWS	Land acquisition and protection around Great Bay.	
Clean Water Act	EPA	Funding for State Revolving Loan funds	
	STATE PROGRAMS		
Shoreland Protection Program	NH Dept of Environ Svcs	Land use restrictions in shoreland area	
Dredge and Fill in Wetlands	NH Dept of Environ Svcs	Protection for the 100 foot Tidal Buffer Zone around estuary waters	
Current Use Program	NH Department of Revenue Administration	Provides a reduced tax rate for land in which development will not occur.	
NHCP Technical Assistance Grants	NH Coastal Program	CZMA funds for technical assistance fo local land use regulations.	
Wetlands Training Workshops	NH DES, NH Assn of Conservation Commissions	Training in delineation, investigation of violations, etc.	
	LOCAL AND REGIONAL PROGRAMS	•	
Planning Assistance	Regional Planning Commissions	Assistance for ordinance development and planning initiatives for local governments.	
Local Land Use Regulations	Local Land Use Boards	Development and implementation of local land use regulations including shoreland protection districts.	
	NON-GOVERNMENTAL PROGRAMS		
Land Conservation	Great Bay Resource Protection Partnership	Partnership of public and private agencies focusing on land protection around Great Bay.	

Note: A study of buffers by the NH Audubon Society, *Buffers for Wetlands and Surface Waters: A guidebook for New Hampshire Municipalities*, found substantial data regarding buffer requirements for different water quality and habitat needs but was unable to provide generic recommendations for buffer widths (except for water quality purposes). Buffers for habitat protection must be evaluated on a site-specific basis.

Federal Programs

Management Framework

Limited federal management of shoreland areas occurs through the Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP). The NFIP provides federally subsidized flood insurance for properties within flood hazard areas. It was created in response to the fact that private insurers were not willing to insure buildings in flood prone areas. By offering federally subsidized insurance, at least part of the costs of dealing with flood damage could be covered by the people living in flood prone areas. In support of this program, FEMA provides assistance with mapping of flood hazard areas and development of local floodplain ordinances. Local ordinances must be in place before federal insurance is available.

Two other federal programs provide state agencies and local communities with the authority to influence federal actions (projects, permits, etc.) that could impact shoreland areas. The Coastal Zone Management Act, managed by the Office of Ocean and Coastal Resource Management under NOAA and the Wild and Scenic Rivers Act managed by the National Park Service increase local control over development projects and other activities. These programs operate in close association with their state or local counterparts.

Regulatory Framework

The federal government provides little in the way of direct protection for shoreland areas and riparian buffers. Certain laws, however, may provide some indirect protections. The Coastal Zone Management Act (CZMA) provides coastal states with funding for management projects provided the states develop a management plan (a CZMP) that meets federal guidelines. Management plans must also include nonpoint source pollution control programs (discussed in the Chapter 4).

In addition to funding access, states with approved CZMPs are given substantial influence over federal development activities through the consistency provisions of the act. Federal actions or permits must be consistent with enforceable provisions of state CZMPs. Inconsistencies must be resolved or projects may be prohibited. This authority could be used to influence federal projects that impact important estuarine and land habitat resources. New Hampshire has received contingent approval of its coastal nonpoint source program and has successfully used its authority several times.

The Wild and Scenic River Protection Act provides similar protection from federal licensing, assistance or construction projects which would alter the free flowing character of the river. This act is primarily focused on protecting flows, but it does provide a certain amount of additional protection from activities within river corridors. In addition, designation provides access to federal funding and improves local access to non-governmental grant funds that could be used for habitat protection. Portions of the Lamprey River have been designated into this program.

Non-Regulatory Framework

FEMA provides assistance for local floodplain ordinance development in support of the National Flood Insurance Program. There are also considerable efforts underway in the seacoast to purchase property or development rights for habitat protection. Federal agencies, such as the Great Bay National Estuarine Research Reserve, the U.S. Fish and Wildlife Service and others, in concert with local communities, state agencies, non-profit organizations and citizen action groups have used these approaches to protect specific critical lands, including sites along surface waters. These efforts appear to be more successful outside of the immediate shoreland areas, perhaps

because shorefront property values are higher and owners are less likely to give up their use of those properties. These programs are discussed in more detail in the section on Open Space and Habitat Acquisition below.

Finally, federal funding for Clean Water and Drinking Water SRFs can be used for land acquisition provided the state allows it. As discussed under the septic system section of the Nonpoint source chapter, however, the state restricts use of the Clean Water SRF to landfill closures and wastewater treatment facility construction and upgrade. State Drinking Water SRF funds may be used for land protection, and the legislature is considering a \$1.5 million grant program for land protection around drinking water sources.

State Programs

Management Framework

Management of the Shoreland Protection Program, under the Comprehensive Shoreland Protection Act (CSPA), is handled by staff in the Biology Bureau of the DES. The program includes education and enforcement efforts, with permitting requirements handled by other agencies or offices. As a result of limited resources, the state originally chose to focus its efforts on education and outreach, relying primarily on local communities for enforcement. Nonetheless, despite this stated focus, a majority of staff time (an estimated 70-75%) was being devoted to enforcement.

The CSPA program has an authorized budget of \$82,000 per year. Until recently, however, the program was made up of one staff for the state with a budget of \$46,000. The sole staff was responsible for all aspects of the program from education and outreach to enforcement. In mid-1997, the budget and staff were increased to the authorized amount, and the staff includes one education and outreach staff and one enforcement staff.

Many aspects of the program are handled through cooperation with staff from other agencies. As a result, coordination among agencies related to the Shoreland Protection Program has been quite high. The DES Subsurface Bureau assists with enforcement, and DRED Division of Forests and Lands assists with vegetation cutting provisions, including evaluating whether or not limits have been exceeded. The Site Specific program of DES also helps implement erosion and stormwater control provisions, coordinating permits and enforcing requirements. In addition, numerous other agencies, particularly OSP, have assisted with workshop presentations and other outreach efforts. Non-state agencies such as the USDA Natural Resources Conservation Service also assist with various aspects of the program (for instance, evaluating restoration plans).

Another program, the state's Rivers Management and Protection Program, provides some additional opportunities for shoreland protection along rivers incorporated into the program. This program has one staff for the entire state who's job includes coordinating implementation and enforcement of the provisions of the Rivers Management and Protection Act and assisting communities along designated rivers with development and implementation of River Corridor Management Plans. Two rivers in the NHEP area, the Lamprey and Exeter Rivers, have been designated into this program.

Some degree of shoreland protection also comes from the state's wetland protection program. This program, managed by the Wetlands Bureau of DES, contains provisions for protection of a buffer zone around tidal waters. The program is managed through the existing wetlands permitting program.

Regulatory Framework

The primary state program for protection of shoreland areas is the Shoreland Protection Program established under the Comprehensive Shoreland Protection Act of 1991 (CSPA). This Act was an attempt to provide specific protection for lands bordering on surface waters. In recognition of the value of buffers along surface waters to protect water quality, and of the high demand for developing those same areas, the state legislature approved the CSPA as a program for limiting the impacts of development along shorelines.

The CSPA restricts activities in a zone along shorelines and establishes standards designed to minimize impacts for those actions that are allowed. The Act creates a protected shoreland around specified surface waters in which certain high impact activities are prohibited and provides minimum setbacks for all structures. It effectively creates greater setbacks for higher impact development than for lower impact activities such as residential development. It provides protection from nonpoint source pollution, but it also provides protection of habitat and open space through its setback provisions.

The law requires setbacks for primary structures, maintenance of vegetated buffers within specific distances of surface waters, and minimum lot sizes and shoreline frontages for properties with on-site septic systems. Each of these provisions serves to enhance habitat and open space protection, as well as benefiting the esthetic value of the shoreland. In addition, land use restrictions ensure that development that does occur will be minimally disruptive to water quality and land based habitat. A summary of the provisions of the act follows.

The Comprehensive Shoreland Protection Act:

- Applies to year round 4th order or higher streams (see Table 6-4 below), fresh water bodies
 greater than 10 acres (natural and impounded), estuaries and coastal waters
- Requires use of erosion and siltation control for any construction or development activities
- Requires site specific permits under RSA 485-A:17 for disturbances of 50,000 ft²
- Prohibits use of fertilizers except lime and wood ash on lawns and residential properties
- Requires state approval of all subdivisions through the DES Subsurface Bureau
- Prohibits establishment or expansion of salt storage, automobile junk yards and solid or hazardous waste facilities
- Requires primary structures to be set back from the shoreline at least 50 feet (unless the community adopts a narrower setback)
- Where one already exists, requires maintenance of a natural woodland buffer consisting of a diversity of tree sapling shrub and ground cover species
- Limits cutting of trees to 50% of the existing basal area within 20 years (excluding clearing for construction purposes) while maintaining a healthy, well distributed stand of trees and other vegetation.
- Requires roots and stumps to be left in the ground within 50 feet of the shoreline, except by permit from the DES Wetlands Bureau.
- Limits clearing of saplings to 50% of the total number within a 20 year period, again excluding clearing for construction.

- Allows removal of dead, diseased, unsafe, noxious or fallen trees, saplings, shrubs and groundcovers without counting toward the 50% limits, though dead and living trees that provide dens and nesting places are encouraged to be preserved
- Requires minimum lot sizes based on soil types where on-site septic systems are used
- Minimum of 150 feet of shoreland frontage for lots with on-site disposal systems
- · Allows an exemption for areas already urbanized
- Exempts agriculture provided BMPs are followed

The CSPA only applies to 4th order and higher streams, which significantly limits the effectiveness of the law. There are only a handful of such streams and rivers in the NHEP area. Table 6-4 below lists the streams under jurisdiction of the act and the specific sections of the rivers to which it applies.

Maine has a similar shoreland protection program that provides a useful comparison. The two programs start with a 250 foot protected zone around selected surface waters in which certain land use restrictions apply. The Maine program divides this zone into several districts geared toward different types of uses (residential, commercial, etc.) with land use restrictions differing among the districts. This program applies to all surface waters except ponds and wetlands less than 10 acres (the perennial stream buffer is 75 feet), has stronger structure setbacks and agriculture restrictions (in particular, manure storage setbacks), and tighter density limits. Land use is restricted to residential development except within areas where commercial or industrial development has already occurred. Finally, all cutting of vegetation is prohibited within 50 feet of the shoreline.

Table 6-4 Fourth Order and Higher Streams

River	Reach				
Bean River	From Pawtuckaway Pond outlet to juncture with North River.				
Bellamy River	From Bellamy Reservoir outlet to tidal limit in Dover.				
Cocheco River	From Isinglass River to tidal limit in Dover.				
Exeter River	From Great Brook juncture to tidal limit in Exeter.				
Isinglass River	From juncture of Nippo Brook in Barrington to junction with Cocheco River.				
Lamprey River	From juncture with North Branch River to tidal limit in Newmarket.				
North River	From juncture of Bean River to Lamprey River juncture.				
Salmon Falls River	From outlet of Milton Pond to tidal limit in Rollinsford.				

Enforcement of the CSPA lies primarily with the Commissioner of the Department of Environmental Services. Municipalities are authorized to enforce the provisions through cease and desist orders, injunctions and penalties. Municipalities are entitled to fines and civil penalties issued in pursuit of the provisions of the act. These fines can amount to \$20,000 per day for each case, and presumably act as at least some incentive for enforcing the Act, even if the towns do not have their own shoreland ordinances.

DES has initiated only a handful of enforcement actions in the first few years of the program (see Table 6-5). In 1995, the program issued eight letters of deficiency and four administrative orders, while in 1996 it issued 13 letters of deficiency, seven administrative orders and four administrative fines. There have been no referrals to the Department of Justice or civil penalties during these years. There appears to be an increase in enforcement actions in recent years, which may, at least in part, be the result of increased awareness of the program and increased reporting of violations by abutters and the general public. Increased shoreland development may also account for the increase in enforcement actions. Typical violations include building too close to the water's edge, erosion and sedimentation and clearcutting in the protected buffer (Braile, 1997).

The costs and logistics of the state Shoreland Protection Program are formidable, so the state has chosen to rely heavily on local implementation and enforcement. Local governments are encouraged by the state to adopt local shoreland protection programs to supplement the state program. Doing so allows the state to defer to local control over land use and reduces its financial commitment. To aid in local implementation, the Office of State Planning developed a model ordinance for municipalities that sets the standard for local programs. Communities that adopt shoreland protection ordinances may be certified, at which time they become primarily responsible for enforcement.

Table 6-5 Enforcement of Comprehensive Shoreland Protection Act

Enforcement Action	1995	1996	1997*
Total Cases	75	102	95
Violations	8	20	20
Letters of Deficiency	8	13	
Administrative Orders	4	7	
Administrative Fines	0	4	
Referrals to Department of Justice	0	0	
Unresolved Cases	9	8	35

Data from DES Biology Bureau and Braile, 1997 * Through August 11, 1997

Given the state's policy of relying on voluntary compliance through education and outreach efforts and the limited resources devoted to the program, local enforcement is currently the key to the success of the Act. Local enforcement is frequently less strict than state enforcement, perhaps because at the local level it often involves neighbors or friends of the officials who are doing the enforcing. The following case study highlights a few of the problems that exist when local governments are called on to deal with shoreland protection issues.

Case Study:

Implementation of the New Hampshire CSPA

A Durham resident on Great Bay recently discovered that new neighbors had clearcut shrub vegetation along about one-third of their shoreland frontage, an estimated length of substantially more than 100 feet. The clearing extended right to the water's edge, with machinery tracks extending to or into the water along the shoreline. Believing it to be a violation of the Durham shoreland protection ordinance, the resident contacted the new owners and reported the activity to the Durham planning board. The owners had hired a forester who had claimed the cutting was legal because it was intended to reclaim an old field that had been left to grow over.

Upon notification, Durham officials investigated and determined that the activity was legal. Closer examination by one planning board member, however, revealed that, although the clearing may have been allowed under state law, the Durham ordinance was more strict and would prohibit the activity. State law allows an exemption for removing "dangerous" and "noxious" vegetation (these terms are not defined in the legislation), and what was cut was evidently sumac and poison ivy. This vegetation would presumably be considered noxious or dangerous and would qualify for the exemption (again, since state law is unclear on the definition, such determination would be left for the courts to decide if the activity were challenged). The Durham ordinance, however, does not allow for such an exemption, and thus the activity was a violation.

Specifically, the Durham ordinance allows the cutting of understory and ground cover on up to 50% of the shorefront provided that where it is removed, a well-distributed stand remains (the ordinance specifically prohibits any cutting of trees over 6 inches DBH, though the shrubs in this case were below that size). In addition, clearing is permitted for providing an access point to the water (for a path), and up to 10% may be cleared for use of boat dock, ramp or other facility. The ordinance does not allow clearing for the purpose of maintaining viewsheds, though it does allow maintenance of pre-existing clearings, since no cutting would occur. In this case, clearing was evidently done to maintain a view of the water and to provide an opening for horses.

The Durham zoning administrator and the chair of the Conservation Commission both feel that there was no problem with the cut. They specifically note that the owners had hired a forester to do the cutting and that the forester had confirmed that the activity was legal. In addition, they point out that though cut, there was no tilling of the soil (prohibited by the ordinance within 75 feet of the shoreline) nor removal of the stumps and root systems, so erosion would be minimized. The resident who initiated the investigation, on the other hand, was given the impression by local officials and by the town manager that a violation had occurred and that a letter to that effect would be sent to the owners.

The town has not acted further on the case, and no letter of deficiency has been sent. The abutter was told by one Town Council member that, though there was a violation of the town's ordinances, there was no problem because the neighbors had money, and therefore good taste. The resident has expressed concern that, though the impact from this one project may have been slight for the entire estuary system of Great Bay, it represents both a loophole in state law and a case of inadequate enforcement for existing laws.

Several issues are highlighted by this case. First, the case points to a provision in the state law (the exemption for cutting of dead, diseased, noxious or unsafe vegetation) that could result in substantial clearings of shorelands in opposition to the intent to prevent erosion and stormwater runoff. This issue is confounded somewhat by the intent of the exemption, which is clearly to protect the welfare of property owners (though not necessarily their aesthetic sensibilities).

(Continued on next page)

Second, it highlights the level of interpretation built into decisions regarding enforcement of zoning ordinances, even when those ordinances appear at first glance to be carefully constructed. Some level of interpretation is necessary in order to deal with individual circumstances that cannot be foreseen when ordinances are developed. On the other hand, and thirdly, interpretation should not subvert the intent of the ordinance. The intent of the ordinance, and the state law, is to prevent pollution including erosion. A site visit almost a year after the cut showed machinery tracks, disturbed soil and erosion clearly visible throughout the cut area, all the way to the water's edge.

There is some uncertainty as to the severity or nature of the violation, though a strict interpretation of the Durham ordinance suggests there was in fact a violation. What should be done about it is perhaps even less clear; enforce in a case where at least some of the intent is followed, or risk setting a precedent that the ordinance will not be enforced.

The Rivers Management and Protection Act of 1988 (RSA 483) provides another regulatory framework for shoreland protection. Rivers designated under this act receive certain protections not offered to other rivers of the state. The act sets up a river corridor one quarter of a mile wide on each side of the river and provides specific protections such as a prohibition against new dams or other flow impediments, prohibitions on inter-basin transfers, restrictions on solid waste disposal facilities in the river corridor, and other provisions depending on the river's classification (e.g. "Natural," "Rural," "Rural-Community," or "Community"). Instream flow rules that would limit consumption during low water periods are in the process of being developed.

River Corridor Management Plans are required for designated rivers, and must stipulate permitted and prohibited uses, wetland, floodplain and habitat protections, setbacks, and other management considerations for the rivers and corridors. A local river advisory committee made up of residents and local officials develops the plan and is authorized to comment on actions requiring state and federal permits. There are currently two designated rivers within the NHEP area; the Lamprey River (from the Epping/Lee town line to the Newmarket/Durham town line) and the Exeter River (from the route 102 bridge in Chester to the confluence with Great Brook in Exeter).

Lastly, the state provides an additional level of protection for land on the border of tidal waters through the Tidal Buffer Zone provision of wetland protection laws. This provision establishes a 100 foot buffer around tidal waters in which activities are restricted. Development activities in these areas must first apply for a wetlands permit, and all such actions are treated as "major" projects which receive the maximum scrutiny under the state wetlands program. The state may place conditions on permits and require mitigation.

Non-Regulatory Framework

The state Shoreland Protection Program provides education and outreach in the form of fact sheets and workshops for municipal officials. Fact sheets include backgrounders on the act and the lands covered by the Act, shoreline erosion, lawn care and others. The program also provides workshops on the Act and its implementation and enforcement to aid in local implementation. In addition, numerous other agencies, particularly OSP, have assisted with workshop presentations and other outreach efforts. Staff of the program have found education to be extremely important for success, as public support for the program is noticeably improved when people are aware of how the act works. Finally, as already mentioned, the office of State Planning has developed a model ordinance for towns that wish to adopt their own shoreland protection districts.

The Current Use Tax Program established under RSA 79-A (see Open Space programs below) provides an incentive to keep land in an undeveloped state through reduced taxes. The

program may be applied to property within the shoreland area, though it is limited to parcels of 10 acres or more (except for wetlands and active agriculture lands). The program is quite popular, and despite the acreage limitations should help encourage at least some property owners to protect shoreland areas.

The Current Use program also provides a limited source of funding for purchase of shoreland areas as buffers for surface waters. Land taken out of the program is subject to a land use change tax penalty, and that tax is returned to the local community. Communities can then use the money for purchase of land or easements.

There are considerable efforts underway in the seacoast to purchase property or development rights for habitat protection. State agencies have helped local communities, federal agencies, non-profit organizations and citizen action groups use these approaches to protect specific critical lands, including sites along surface waters. These programs are discussed in more detail in the section on Open Space and Habitat Acquisition below.

Local and Regional Programs

Management Framework

At the local level, shoreland protection is primarily implemented by planning boards and building inspectors or code enforcement officers through local zoning and land use regulations. In towns that have adopted shoreland protection ordinances, projects are reviewed for compliance with local setbacks or other shoreland protection provisions. In towns that have no such provisions, planning boards are supposed to inform applicants or developers of state requirements, and may enforce the state requirements at the local level. Inspectors or Code Enforcement Officers then verify that all aspects of projects, including shoreland protection requirements, are met. Some towns incorporate additional levels of review, either by planning board members or town planners or engineers, discussed in Chapter 8.

Regulatory Framework

State law encourages towns to adopt shoreland protection districts, but few in the seacoast area have done so. Of the 19 Zone A towns, only seven have adopted shoreland protection districts, and none have been approved under the state program. These towns, Dover, Durham, Exeter, Madbury, Newmarket, Newfields and Stratham all border the north and east shores of Great Bay, and as such are clearly important for protecting that estuary system.

Somersworth has adopted the state law by reference and Portsmouth has a limited shoreland protection district around a few specified water bodies (Sagamore Creek and Little Harbor). Although Rollinsford has no shoreland protection ordinance, it owns property along a stretch of the Salmon Falls River in which development is restricted. Rochester also has no shoreland protection district, though it has a 100 foot solid waste setback from the 100 year floodplain of the Cocheco and Isinglass rivers (or 200 feet from the thread of such rivers, whichever is greater) and may require building setbacks of 30 feet from water bodies. Absent from the list are Greenland, Hampton, Hampton Falls, New Castle, Newington, North Hampton and Seabrook, all towns that border on the estuaries.

Rye, with its smaller and predominantly wetland based estuary systems, has fairly strong wetlands regulations and protection programs that provide some of the protection that a shoreland district would provide. Rye includes streams and ponds in its wetlands protection district and provides a 100 foot buffer in which land uses are restricted and septic systems are prohibited. Rye also has a 50 foot vegetated buffer in which no trees over 4.5 inches DBH may be

cut. Table 6-6 contains a summary of local shoreland protection provisions in the 19 Zone A towns.

Many of the towns that have not adopted shoreland protection ordinances have also expressed a reluctance to enforce the provisions of the state program. This reluctance probably stems from some combination of three factors; a lack of resources for enforcement, a belief that the state will enforce the program, and general resistance to land use restriction. In any case, scant participation by the coastal towns along with limited state enforcement means that shorelands in the immediate vicinity of the estuaries of the state receive only limited protection.

As a comparison, of the 450 municipalities in Maine, approximately 380 (85%) have adopted shoreland protection ordinances (the remaining 70 have the state imposed model ordinance in place). The difference may be partially due to the length of time the law has been in place. The higher participation in Maine's shoreland protection program likely represents a higher willingness to enforce as well.

Local ordinances vary from town to town, they tend to be quite different from the state requirements, and none of them have been approved by the state. A complete listing of provisions can be found in Appendix F and a summary is provided in table 6-5. Each of the ordinances predates the state law, so differences are not surprising. The state's model ordinance has been described by local officials as cumbersome and confusing, but it provides a strong framework on which towns can develop their own ordinances. Table 6-7 shows a comparison of the local ordinances with the state model.

Most local ordinances tend to have less stringent provisions than the state model. District limits for each of the towns are less inclusive than the 250 foot zone of the state model, with the exception of a portion of Exeter's district around the Squamscott River and its major tributaries, and Madbury's district around the Bellamy Reservoir, both of which extend to 300 feet. Restricted uses are also less inclusive in each of the districts except Exeter, which incorporates additional restrictions such as feedlots, alteration of terrain and vegetation and several potentially contaminating commercial uses. (The Durham ordinance is less restrictive in some provisions and more so in others.) Finally, none of the vegetated buffer and tree cutting limits, taken together, is as strong as the state law. Interestingly, the Durham ordinance, as discussed above, prohibits clearcutting and does not make an exception for clearing of "dead, diseased, unsafe, noxious or fallen" vegetation as the state law does.

Table 6-6 Local Shoreland Protection Regulations

		/						/ /		
LOWL	Oistici	ists Districtive	O'struct	Bulging	set set set se	'st	Applications (4)	7edepte	inger	idus Densirius
Dover	3	50-250'	All waters	50-100'		3		3		3
Durham	3	75-150'	All waters	75-125'	150'	3		3		3
Exeter	3	150-300'	All waters	100-150'	100-150'	3		3	3	
Greenland										
Hampton										
Hampton Falls										
	3	50-300'	All waters	50-300'				3		
New Castle										
	3	100-150'	All waters	100-150'				3		
Newmarket	3	125'	Selected waters (also refs state act)	125'	125' (Class A waters)	3	3	3		3
North Hampton			,							
Portsmouth	3	100'	Selected waters	100'		3		May require		
Rochester				30'		3				
		250'	Part of Salmon Falls River	250'	(250')	3				
Rye		100'		100'	100'	3		3		
	3	250'	Selected waters (by ref to state act)	50'	75-125'	3	3	3	3	3
	3	100-150'	All waters	100-150'	100'	3		3		

None of the seven Shoreland Protection Districts contain erosion and sediment control provisions, and those provisions listed under other portions of the land use regulations are less restrictive than the model shoreland ordinance recommendation. Other provisions in these ordinances, such as the primary structure setbacks and restrictions on alteration of terrain, act as indirect controls on erosion and sedimentation.

Septic setbacks for Durham and Exeter exceed those in the state law, while those in Dover, Madbury, Newfields and Stratham are narrower than the state setbacks. Newmarket requires a 125 foot setback from Class A surface waters including the Piscassic River and Follet's Brook, but no other septic setbacks. The provisions in the state CSPA and model ordinance, however, merely mimic setbacks covered by DES administrative rules for septic systems, so those provisions are presumably enforced through the required state process (see the discussion on septic systems in Chapter 4). Because the state process is closely monitored, the weaker local setback provisions may not result in weakened protection. In addition, the state is re-examining septic setbacks and may decrease them (Latawiecz, pers. comm.).

Certain characteristics of the local shoreland protection districts are stronger than the state model. Among these is the fact that the local shoreland districts apply to all or most perennial streams regardless of their size. In some cases, the district provisions apply to all perennial

streams (usually defined by those that appear on the USGS 7.5 quads), though setbacks are smaller than for larger rivers. The state law, on the other hand, applies only to fourth order streams or larger. In the watersheds of the Great Bay and Hampton Seabrook estuaries, only eight river segments qualify as fourth order or larger (see Table 6-3 above). Thus the jurisdiction of the state law is substantially more limited than the local regulations.

Table 6-7 - Comparison of Local and State Shoreland Protection Ordinances

	Dover	Durham	Exeter	Madbury	Newfields	Newmarket	Stratham
District Limits			0				
Restrictions E&SCs		0	~				
Septic Setbacks		~	~				
Structure Setback	~	~	~	~	~	~	~
Vegetated Buffer						0	
Density Limits						~	

3 = equal or stronger provisions
 0 = some provisions stronger, some weaker
 Some provisions taken from underlying zoning.

Finally, primary structure setbacks for each of the seven municipalities are greater than under state law. Each of the local shoreland districts prohibits structures within the limits of the district. With district limits of 75-300 feet from the shoreline, structure setbacks are considerably larger than the state program, which requires only a 50 foot setback. These setbacks are also more in keeping with the 100 foot buffer recommendation from the recent buffer guidebook (Chase, et. al., 1995) than the state setback. These setbacks may benefit water quality more effectively than the state ordinance, and are important for controlling erosion and sedimentation, maintaining wildlife habitat and limiting pollution.

These local ordinances clearly provide valuable shoreland protection assuming they are adequately implemented and enforced. Evidence suggests, however, that enforcement is weak in some communities. In those without local ordinances, enforcement is especially weak. This problem, discussed at greater length in Chapter 8, is indicative of an important gap in the management framework for shoreland protection.

Non-Regulatory Programs

Open space protection by developers and transfer of development rights are sources of land acquisition or protection that can be used to protect shoreland areas. Some towns such as Exeter have been effective at using these kinds of tools for land protection while others have been less so.

Non-Governmental Programs

A cooperative effort between the Audubon Society of New Hampshire, UNH Cooperative Extension, the Office of State Planning and the USDA Natural Resources Conservation Service lead to development of a guidance manual on the use of buffers to protect wetlands and surface waters. This manual, *Buffers for Wetlands and Surface Waters: A Guidebook for New Hampshire*

Municipalities (Chase, et. al., 1995), provides information and scientific rationale for the use of vegetated buffers to protect wetlands and surface waters. While the CSPA was designed to provide many of the benefits of vegetated buffers, this document provides the information necessary to help towns develop programs to protect their specific resources.

There is also considerable involvement of non-governmental organizations in efforts to purchase property or development rights for habitat protection. These approaches have been used to protect specific critical lands, including sites along surface waters, although they appear to be more successful outside of the immediate shoreland areas. These programs are discussed in more detail in the section on Open Space and Habitat Acquisition below.

Evaluation

1. Strong overall management framework, though some weaknesses exist

There are several well-designed programs in place to protect critical areas, but they are not as effective as they could be. Despite a few shortcomings, the state Shoreland Protection Program is generally a good tool for minimizing impacts to these areas, and it is well coordinated with other departments. Federal programs are limited but complement state programs fairly well. In both cases, however, implementation is incomplete.

In addition to enforcement, there are several provisions that in their current form weaken the Act. The restriction applying the CSPA to 4th order or larger streams substantially limits the surface waters protected by the Act, particularly in the seacoast region. The seven local shoreland districts, on the other hand, protect numerous stream segments not covered by the state law, and the Maine law that served as the model for the New Hampshire law also applies to at least some perennial streams.

Several other provisions of the CSPA limit its effectiveness. "Urbanized areas" can currently be exempted from the act, but there should be some framework for water quality protection in those areas. The provision allowing removal of dead, diseased, unsafe or noxious vegetation within the vegetated buffer should be addressed to deal more adequately with the problem of clearcutting of large tracts of vegetation under that category. Re-vegetation plans might help address that problem. Provisions that allow unlimited soil disturbance and vegetation cutting for building construction also allow an open-ended loophole for substantial disturbances against the intent of the Act.

At the federal level, the has been viewed as encouraging development of flood prone areas through the low cost insurance provided. The original intent of the NFIP program was to trade the subsidized insurance for a reduction or elimination of future development in flood hazard areas. In practice, however, the policy has had little effect on development in those areas, yet the insurance has remained available. The net result is that the program lowers the "cost" of living in flood prone areas, increasing demand for those properties. This problem is particularly common on barrier beaches and on certain rivers outside of New Hampshire, but it is likely to have reduced the potential benefits of the program even here in New Hampshire.

2. CSPA is complicated to implement at the local level

The CSPA is a very complicated law for communities to implement. The variety of requirements within different setbacks and the complex structure of restrictions and prohibitions, particularly those involving vegetation cutting limits, contribute to a low level of implementation at the local level. Pre-existing ordinances in the coastal region are more simple, structured around a single setback in which all restrictions and prohibitions apply. While perhaps less protective in some ways, the improved enforceability of these districts may translate into greater protection.

3. Good program coordination

Limited resources have forced the state's Shoreland Protection Program to be creative in finding ways to implement the Comprehensive Shoreland Protection Act. Necessity has mean't that the staff of the program needed to coordinate well with other agencies to implement and enforce the requirements through other programs. The level of coordination is high, although implementation also appears to be somewhat limited by tight resources in those other agencies.

4. Very limited budgets and funding, particularly for the Shoreland Protection and Site Specific programs

The Shoreland Protection Program has also been less effective than it could be because of limited state resources for implementation. Though authorized for two staff, budgets had until recently only provided one staff for the entire state. That staff member was responsible for providing education and technical assistance as well as enforcement. The state has recently increased the staff to two, but even that level may well be inadequate to provide the wide range of oversight, outreach and enforcement necessary for such an extensive program addressing land use. (In comparison, the state wetlands program, which is also understaffed, has one permitting staff and one enforcement staff devoted to the coastal region alone.)

5. Limited local participation

In lieu of state enforcement, DES has relied on municipalities for notification of violations and enforcement. Most municipalities, however, are also not enforcing the provisions of the Act. In some cases, local officials believe the state is enforcing the Act, while in other cases, local resources for monitoring and enforcement are limited. There is also resistance to further regulation of shoreland land use, at least in some communities, in part because property values and taxes there are high, and that sentiment appears to influence the level of enforcement done at the local level.

At the local level, implementation of protection is limited. Few towns have established protected shoreland districts, and those that have done so frequently have limited protections within the district. In some cases of existing local programs, provisions are stronger than the state law, but overall coverage in the estuary areas is low. Enforcement records and anecdotal evidence suggest that local governments are not playing an adequate role in assisting the state with implementation and enforcement.

6. Limitations in the Current Use program make it less effective in areas

The limitation of the Current Use tax program to parcels of 10 acres or more unless they are wetlands or active agriculture lands means that the current use program does nothing to provide an incentive not to subdivide non-wetland and non-agriculture parcels of less than 10 acres. While subdivision of these properties is monitored through the requirements of the , an additional incentive for smaller shoreline property owners could help reduce shoreline development and its associated water quality problems.

Recommendations For Shoreland Development and Riparian Buffers

- 1. The DES Shoreland Protection Program, in cooperation with the NH Coastal Program, should focus efforts on improving implementation and enforcement of Comprehensive Shoreland Protection Act. Efforts should focus on improving enforcement through education and outreach to Planning Boards and Code Enforcement Officers (CEOs). Budget increases or alternative funding sources are also needed. [LND-14]
- 2. The CSPA should be revised to cover smaller streams (such all perennial or 2nd and 3rd order streams), although the political feasibility of such a change is currently very low. Alternatively, municipalities should be encouraged to develop shoreland protection ordinances that apply to these smaller streams. [LND-12]
- 3. The Shoreland Protection Program and OSP should develop outreach projects in cooperation with the Regional Planning Commissions to demystify the CSPA. Many municipal officials have difficulty implementing the act because of its many facets. Tools such as a check-list for Planning Boards and CEOs might help improve enforcement. In addition, OSP and the state CSPA program should consider developing a more simplified model ordinance and/or encouraging towns to adopt simplified shoreland protection programs. [LND-12, 14]
- 4. The state should take advantage of real estate transfers for outreach efforts about shoreland protection. Real estate transfer presents an opportunity to inform new landowners of their responsibilities as waterfront property owners. The state could develop an informational package including resources for technical or other assistance. This approach has been suggested for similar information regarding operation and maintenance of septic systems, so a comprehensive package regarding all aspects of concern for shoreland areas might be an effective outreach and education tool. [WQ-13]

Wetland Loss and Alteration

Wetlands provide a wide range of benefits, from flood control and water quality protection to wildlife habitat and fisheries enhancement. In the U.S. as a whole, it has been estimated that some 75% of commercial fisheries depend on wetlands (Chambers, 1992). In addition, wetlands provide a substantial and growing recreational and aesthetic benefit. While specific values vary from wetland to wetland and are hard to evaluate, wetlands in general clearly deserve protection. Most policies regarding wetlands try to address the varying values, focusing the tightest restrictions on the most valuable wetlands.

Since colonial times, New Hampshire has lost an estimated 9% of its wetlands (Dahl, 1990). This historic loss rate is considerably below the overall losses for the nation of about 50%. The coastal zone, however, appears to be particularly vulnerable to wetlands losses. In a study of all New Hampshire wetlands permits from 1995, 50% of the impacted acres were located in Strafford and Rockingham Counties (Chase, 1997).

New Hampshire has regulated development in wetlands since 1969 through a permitting process handled by DES. New Hampshire's program predates most other wetlands programs. Substantial early losses of wetlands nationwide and an increasing understanding of the importance of wetlands led to increased federal protection in the late 1970s and 1980s. Despite these protections, however, wetlands continue to be lost through incremental filling and disturbances allowed through the permitting processes.

Salt marshes appear to be most threatened by marine development (docks, dredging, etc.), shoreline development and tidal restrictions caused by roads and other projects that cross the marshes. Historically, filling in the Hampton-Seabrook marshes for housing and placement of Rye Harbor dredge spoils on salt marshes in Rye have led to substantial losses (such projects would not be allowed under current policy). Disruption of circulation patterns and direct impacts from piers, docks and other water dependent structures are known to degrade salt marshes, though there is limited specific information on the problem (Jones, 1997).

Development on the upland edge of marshes impacts salt marshes through contaminated runoff and other habitat disturbances. Structures located close to the marsh edge may also block migration of the marshes in response to sea level rise, thereby reducing total acreage. Finally, tidal restrictions such as those caused by road crossings can have a dramatic effect on salt marshes, shifting them toward fresh water systems and changing vegetation substantially.

${\it Institutional\ Infrastructure}$

Table 6-8 Wetland Protection Program Summary

Program	Agency	Description
	FEDERAL PROGRAMS	
Clean Water Act 404	USACOE, EPA, USFWS, NMFS	Permitting of dredge and fill in wetlands.
Fish and Wildlife Coordination Act, Magnuson fisheries Conservation and Management Act	USFWS, NMFS	Wetlands permit review and consultation authority.
NEPA Environmental Assessments	EPA	Environmental review process of federal actions such as wetland permits.
Coastal Zone Management Act	NOAA Office of Ocean and Coastal Resource Management	Consistency review procedures require federal actions such as wetland permits to be consistent with approved state Coastal Zone Management Programs.
Land and Water Conservation Fund	National Park Service, USFWS, Forest Service	Program for funding of land conservation including acquisition.
Migratory Bird Conservation Fund	USFWS	For purchase of land to protect migratory birds.
Swampbuster, Wetland Reserve Programs	USDA Natural Resources Conservation Service	Programs for prohibiting federal subsidies for crops grown on degraded wetlands, and paying farmers to restore wetlands on agricultural land.
	STATE PROGRAMS	
Dredge and Fill in Wetlands	NH Dept of Environ Svcs	Permit program for dredge and fill of wetlands including the 100 foot Tidal Buffer Zone
Prime Wetlands	NH DES, Local Government	Additional protection for areas designated Prime Wetlands by municipalities.
Current Use Program	NH Department of Revenue Administration	Provides a reduced tax rate for land in which development will not occur.
NHCP Competitive Grants	NH Coastal Program	CZMA funds applied by the state for projects such as salt marsh restoration.
NHCP Technical Assistance Grants	NH Coastal Program	CZMA funds for technical assistance for loca land use regulations.
Wetlands Training Workshops	NH DES, NH Assn of Conservation Commissions	Training in delineation, investigation of violations, etc.
I	OCAL AND REGIONAL PROGRAI	MS
Planning Assistance	Regional Planning Commissions	Assistance for ordinance development and planning initiatives for local governments.
Local Land Use Regulations	Local Land Use Boards	Development and implementation of local land use regulations including wetland protection districts.
Wetland Permit Review	Conservation Commissions	Review of state wetland permits with authority to delay permit issuance.
	NON-GOVERNMENTAL PROGRAM	MS
Wetland Delineations	NH Audubon Society	Assistance to municipalities for delineation of wetlands using the New Hampshire method.

Federal Programs

Management Framework

Federal wetland policy stems from Section 404 of the Clean Water Act, which requires permits for dredge and fill activities in navigable waters and wetlands. The provisions of this act are coordinated by the US Army Corps of Engineers (USACOE). Permit applications are reviewed by several federal agencies including EPA, the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service and are issued by the USACOE. Non-regulatory programs for protecting wetlands include the Wetland Reserve Program and the "Swampbuster" provisions of the Farm Bill. The Wetland Reserve Program pays landowners to permanently restore drained cropland to wetland and to restore degraded wetlands. The Swampbuster provisions prohibit federal subsidies for crops grown on drained or converted wetlands.

Regulatory Framework

Dredging and filling in wetlands is regulated through §404 of the Clean Water Act. Such actions require permits issued by the US Army Corps of Engineers (USACOE). Permit applications are evaluated for compliance with the EPA 404(b)(1) Guidelines and under a public interest review process through which the benefits and costs of the action are assessed. Public input is sought through comment periods and through public hearings if warranted. Permits are to be denied if: a) there is a practicable alternative with less adverse impact; b) they will cause a violation of state water quality standards or jeopardize endangered species; c) they have significant direct, indirect or cumulative adverse impacts on ecosystems and economic values; or d) adequate steps have not been taken to minimize the impacts of the activity.

The permit program provides EPA with the authority to veto permits approved by the Corps. In addition, the Fish and Wildlife Coordination Act and the Magnuson Fisheries Conservation and Management Act provide the US Fish and Wildlife Service, the National Marine Fisheries Service and the state Fish and Game Department with permit review and consultation authority. In 1990, a Memorandum of Agreement (MOA) between EPA and USACOE established a procedure of avoidance, minimization and mitigation through which the goal of "no net loss" of wetlands for individual permits would be realized. This MOA specifically required avoidance as the first priority, followed by minimization of impacts, and finally, compensatory mitigation. Under this policy no permit may be issued where a "practicable alternative" exists.

The federal program is of necessity coordinated with state programs. In New Hampshire, under the State Programmatic General Permit, projects impacting more than three acres of wetlands require a federal §404 permit from the USACOE. Projects between 3,000 square feet and three acres are permitted through the state wetlands program and often receive an expedited federal review (in some cases, a federal permit would be required). State approved projects under 3,000 square feet of disturbance automatically receive federal permits, though some review may occur. All projects in salt marshes are considered major and must go through the federal permit process regardless of size.

Wetland permits can also be regulated under the National Environmental Policy Act (NEPA), which requires all federal actions to be preceded by an Environmental Assessment. This assessment is used to determine whether or not a thorough review of environmental impacts and alternatives (an Environmental Impact Statement) must be prepared. Since wetland permitting constitutes a federal action, it is within the jurisdiction of NEPA and must meet those requirements. Typically, the permitting process itself is geared toward minimizing impacts, so most permits receive a "Finding of No Significant Impact."

Under federal law, wetlands include areas that are defined as "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of wetland vegetation." The 1987 Federal Manual for Identifying and Delineating Jurisdictional Wetlands interprets this definition into a field useable form. Areas meeting these criteria are subject to the requirements of the Clean Water Act. Violations are enforced by the Corps. If the Corps determines a violation has occurred, it may issue cease and desist orders, assess penalties, turn the case over to EPA or the U.S. Attorney, or issue after-the-fact permits. The course of action generally depends on the severity of the violation.

Finally, the consistency provision of the Coastal Zone Management Act requires federal actions to be consistent with state Coastal Zone Management Plans. Because it has developed such a plan, New Hampshire has been given this authority. It has been successfully used to incorporate NH requirements into several federal projects including a South Berwick hydroelectric facility and a recently proposed gas pipeline that would run through the coastal region of the state. This authority can be used to ensure federal wetland permits are consistent with NH coastal policies.

Non-Regulatory Framework

Several federal programs provide assistance for wetland protection. The Migratory Bird Conservation Fund, supplied through sale of duck stamps required of waterfowl hunters over 16 years old, provides money for purchase of wetlands (though primarily for prairie potholes and other prime waterfowl habitat). The Land and Water Conservation Fund (LWCF), from offshore oil and gas drilling fees, can also be used to acquire wetlands. LWCF funds are allocated through the US Fish and Wildlife Service, US Forest Service and the National Park Service. Executive Order 11990 prohibits federal agencies from providing assistance for new construction in wetlands unless the agency finds that there are no practicable alternatives to doing so and that the activities do everything practicable to prevent damage.

In addition, a cooperative effort between the USDA Natural Resources Conservation Service, OSP, the Audubon Society of New Hampshire and UNH Cooperative Extension led to development of a guidance manual on the use of buffers to protect wetlands and surface waters. This manual, *Buffers for Wetlands and Surface Waters: A Guidebook for New Hampshire Municipalities* (Chase, et. al., 1995), provides information and scientific rationale for the use of vegetated buffers to protect wetlands and surface waters. This document provides the information and rationale necessary to help towns develop programs to protect their specific features.

State Programs

Management Framework

State management of wetlands is handled by the Department of Environmental Services (DES) Wetlands Bureau. The NH wetlands program for the coastal area is composed of one permit staff and one enforcement staff. While these staff are capable of keeping up with permits and projects, they do so with no time to spare. Requests for assistance with local permitting issues sometimes go unanswered.

Permits for this program are reviewed, issued and enforced by staff. The Wetlands Council, a board made up of state agency officials and citizen stakeholders, handles appeals of their decisions. In the coastal zone there is one permit staff and one enforcement staff (in practice, the

enforcement staff assists with permit review). Also, the Department of Resources and Economic Development (DRED) through the Natural Heritage Inventory Program (discussed below) may review wetland permits.

New Hampshire policy also emphasizes restoration of salt marshes. Tidal restrictions were identified through a joint project between the Natural Resources Conservation Service, the DES Wetlands Bureau, the Rockingham County Conservation District, the Strafford County Conservation District, the Audubon Society of NH, Jackson Estuarine Laboratories, Wells Estuarine Research Reserve, OSP, the Great Bay Estuarine Research Reserve, and the USFWS. Findings are summarized in the report *Evaluation of Restorable Salt Marshes in New Hampshire* (USDA, 1994). Numerous projects have been conducted or are under consideration for addressing the problems found through that effort.

Regulatory Framework

New Hampshire law under RSA 482-A requires a permit for any excavation, removal, filling, dredging or construction of any structure in or on banks, flats, marshes or swamps in and adjacent to any waters of the state. Wetlands are defined as under the federal program and must be delineated in accordance with the 1987 federal wetlands manual ("minimum impact" projects may use hydrophitic vegetation and hydric soils alone for delineation purposes provided neither has been altered). As part of permit review, projects are classified as major, minor and minimum impact, and each class has different permitting requirements. Major projects, including projects impacting 20,000 ft² or more of non-tidal wetlands, any size of tidal wetlands or undeveloped areas within 100 feet of the highest observable tide line, must go through a public hearing process and receive greater scrutiny.

Minor and minimum impact projects receive a review by a DES Wetlands Bureau staff and may be permitted, permitted with conditions or denied. Permit applicants for minor and major projects must demonstrate consideration of alternatives, cumulative impacts, rare or endangered species, and other issues stipulated by the rules. Activities in violation of the provisions of RSA 482-A may be subject to cease and desist orders and fines and penalties of up to \$2,000 plus \$10,000 per day for refusal to comply.

In general, all permits contain specific requirements for erosion and sediment control tailored to the particular site. In addition, conditions may address timing of construction activities, disposition of spoils, etc. to help minimize impacts. Permit decisions may be appealed through the Wetlands Council (formerly the Wetlands Board). Repairs of existing structures are exempt from the permitting requirement if they don't require dredge, fill or work in the water or wetland. Work on manmade wet areas such as non-tidal drainage ditches and catch basins is also exempt provided no vegetation has developed.

The wetlands program was expanded in 1989 to include protection for upland areas bordering on tidal wetlands. Wetland permit requirements now apply to areas 100 feet landward from the highest observable tide line. Projects altering these areas, called the Tidal Buffer Zone, are regulated as major projects requiring the highest level of review. Since the Tidal Buffer Zone is typically upland habitat, however, property owners may not realize that these lands are protected. Thus, the practical level of protection may be probably reduced.

Another recent program allows municipalities to designate Prime Wetlands which then receive additional protection from the state. Projects impacting designated Prime Wetlands are treated as major projects requiring public hearings regardless of size, and permits may not be issued unless it is clearly demonstrated that the values for which the wetland was designated will not be degraded (the burden of proof is on the developer to demonstrate this). They also

theoretically receive additional scrutiny when activities are permitted in them. Candidates for prime wetland designation must first be evaluated using the *Method for Comparative Evaluation of Nontidal Wetlands in New Hampshire*. Wetland regulations then require mitigation for impacts to designated Prime Wetlands.

New Hampshire requires applicants to demonstrate that their actions represent the least damaging alternative. Implicit in this approach is a requirement that applicants avoid and minimize impacts, though this requirement is not explicitly stated. Mitigation for permitted projects often includes creation, restoration, enhancement and preservation. The state is also working toward formalizing a mitigation policy. Mitigation is not required for "minimum impact" and "minor" projects, and is only sometimes required for major projects.

Wetland policy applies to numerous other activities as well. Forestry activities and road siting and construction are addressed through regulations. State agencies and municipalities are supposed to site and design roads and highways so that sensitive and valuable aquatic ecosystems and areas providing water quality benefits are protected from adverse effects.

Non-Regulatory Framework

Wetlands receive an additional level of state protection through the Current Use Tax program under RSA 79-A. This program provides a tax break in exchange for a commitment not to develop land. The program is limited to parcels of 10 acres or more, but provides an exemption from the minimum size requirement for wetlands and allows a 100 foot buffer to be included under the exemption.

The NH Coastal Program has provided funds for salt marsh restoration throughout the coastal area and intends to continue doing so. Funding comes from the CZMA with a match provided by the state. The program has also funded additional wetlands staff to inspect coastal sites prior to permitting to assist in developing the most appropriate permit conditions.

As required by the federal Emergency Wetlands Resources Act of 1986, the Office of State Planning developed a New Hampshire Wetlands Priority Conservation Plan under the state outdoor recreation plan of 1989. This plan identified 838 acres of salt marsh around Great Bay, 160 acres of the Seabrook salt marsh, and salt marshes of the Hampton River Estuary as priority areas for conservation. The plan identifies federal, state and local programs that protect wetlands, but adds no specific additional protection.

A cooperative effort between OSP, the Audubon Society of New Hampshire, UNH Cooperative Extension and the USDA Natural Resources Conservation Service lead to development of a guidance manual on the use of buffers to protect wetlands and surface waters. This manual, Buffers for Wetlands and Surface Waters: A Guidebook for New Hampshire Municipalities (Chase, et. al., 1995), provides information and scientific rationale for the use of vegetated buffers to protect wetlands and surface waters. This document provides the information and rationale necessary to help towns develop programs to protect their specific features.

Finally, the DES Wetlands Bureau and the NH Association of Conservation Commissions offer training workshops in wetlands delineation, investigation of violations and other aspects of wetlands management. Thus far one workshop was held in Zone A in 1996.

Local and Regional Programs

Management Framework

At the local level, Conservation Commissions supplement the Planning Board role in land use decisions regarding wetlands. Planning Boards review project proposals for compliance with local land use regulations. State law requires local Conservation Commissions to develop wetland inventories and provides them with the authority to comment on wetland permits. Conservation Commissions can delay permits for up to 45 days for the purposes of developing comments and recommendations. The Conservation Commissions may also establish non-lapsing funds for acquiring land and open space.

Regulatory Framework

Municipalities can supplement state protections for wetlands through local land use controls and zoning overlays. Municipalities are authorized to identify important local resource areas and overlay additional regulations or protections for those areas. Overlay districts may also include buffer zones around wetlands in which land uses can be restricted for an additional measure of protection. Wetlands protection districts are constructed either by applying regulations to areas that qualify as wetlands (for example, through soil, vegetation and hydrologic features) or by identifying specific wetland tracts and applying restrictions to those specific areas.

There are no New Hampshire standards for wetland protection overlay districts, though the Office of State Planning has considered developing them. As a result, there are no standards against which to assess adequacy of these ordinances. Nonetheless, they all appear to provide at least some additional protection for wetlands. Seventeen of the 19 Zone A towns (90%) have implemented some form of wetlands protection regulations. Provisions vary somewhat, but in general, these districts prohibit or restrict development in excess of state law (see Table 6-9 below).

Fifteen of the districts explicitly prohibit dredge and fill activities within areas considered wetlands (though at least four allow conditional uses), and two (Exeter and North Hampton) restrict certain other activities (for example, landfills, storage of hazardous materials, etc.). Twelve municipalities require buffer zones around wetlands in which structures and/or disturbance of vegetation are prohibited or limited, and two other towns provide authority for the Planning Board to require setbacks or buffers in specific cases. Hampton Falls, Rochester, and Rollinsford all appear to have no buffer provisions for their wetland districts, and Greenland and Seabrook have no wetland overlays at all.

Septic system setbacks tend to mimic state regulations, which require 75 foot setbacks from Type A hydric soils and 50 foot setbacks from Type B hydric soils. Madbury and Rye require septic systems to be sited 100 feet from the upland edge of wetlands. The DES Sub-Surface program is reconsidering its setbacks and may allow closer siting in recognition that the larger setbacks may result in compromised siting relative to other considerations.

With the exception of North Hampton, which currently uses the 1987 Federal Manual for the Definition and Delineation of Jurisdictional Wetlands (USACOE, 1987), wetland districts in Zone A are primarily defined using HISS (High Intensity Soil Survey) mapping of type A and type B hydric soils or poorly and very poorly drained soil types. Portsmouth, Somersworth and Stratham rely on wetland maps on file, and final decisions in Portsmouth are based on field delineations.

Recent work among NH state agencies has focused on problems with these definitions, with the result being that new recommendations will probably be released soon. The state will likely include in its recommendations the use of field indicators of hydrology and the 1987 federal

manual as the criteria for wetlands (Latawiecz, pers. comm.). Municipalities that use HISS mapping should also require wetland boundaries on plans to be plotted by a certified soil scientist or other professional engineer certified in wetland delineation. Field verification is very important, as HISS maps may be inaccurate as wetland indicators and may not be at an accurate enough scale.

Finally, local Conservation Commissions are authorized to delay permit issuance to prepare comments and recommendations for permits. This authority provides them with substantial leverage for obtaining permit conditions to address their concerns. The commissions are also used as a resource by Planning Boards in wetland decision making, though to varying degrees depending on the town.

Non-Regulatory Framework

No local or regional non-regulatory programs were reviewed for this section.

Non-Governmental Programs

A cooperative effort between the Audubon Society of New Hampshire, OSP, UNH Cooperative Extension and the USDA Natural Resources Conservation Service lead to development of a guidance manual on the use of buffers to protect wetlands and surface waters. This manual, *Buffers for Wetlands and Surface Waters: A Guidebook for New Hampshire Municipalities* (Chase, et. al., 1995), provides information and scientific rationale for the use of vegetated buffers to protect wetlands and surface waters. This document provides the information and rationale necessary to help towns develop programs to protect their specific features.

NH Audubon has also participated in wetland restoration efforts, studies of mitigation efforts under NH wetland permits, and assisting with municipal delineation of wetlands throughout the seacoast area, particularly for Prime Wetlands.

Table 6-9 Local Wetland Protection Regulations

LOWL	Ordit	Pritting.	Definition	Dredge of Tribing	sedise to act	\$ philippous	Butters
Dover	3	(Soil Type	3	75'	75' from Type A	, v
Durham	3		Soil Type	3	75'	50-75'	
Exeter	3		HISS		50-75'		may require 50'
Greenland							,
Hampton	3	3	Soil Type	3	75'	50'	
Hampton Falls	3		Soil Type	3			
	3		Soil Type	3	100'		50'
New Castle	3	3	Hydrology, soils, vegetation	3	50-75'	25-50'	
	3		HISS	3	50-75'	50-75'	
	3		HISS	3	75'	75' from very poorly drained soils	
Newmarket	3	3	Soils	3		100' from Prime wetlands	25' from Type A soils 50' from Prime Wetlands
North Hampton	3		Federal criteria	3	75'	50-75'	75' for hazardous materials
Portsmouth	3		Specified district, confirmed by hydro, soils, vegetation	3	75' from specified sites	75-100'	75'
Rochester	3		Federal criteria	3			
	3		Soils	3			
Rye	3		Soils	3	100'	100'	100'
	3		Hydrology, soils, vegetation		may require	may require	may require
	3		Soils	3	50-100'	50-100'	may require 50'

Evaluation

1. There is a reasonably strong regulatory framework including local land use regulations

The overall regulatory framework for wetland protection is fairly strong. Oversight generally occurs at two or three levels of government, and local policies frequently allow extensive restrictions should they be necessary. There are, at the same time, several important weaknesses of both state and federal wetland programs. Neither is prohibitive of development in wetlands, even high value wetlands, and the programs have no jurisdiction over surrounding uplands. Since smaller, lower impact projects are regulated primarily by the state and the state only requires mitigation in very limited cases, wetland losses will continue.

Wetland protection districts are widely used in Zone A, and they provide towns with powerful tools for water protection. These regulations are probably well enforced because most towns have mapped their wetlands, and these maps are readily available during project review (often on the wall of the meeting room). Also, Conservation Commissions are focused on wetland protection and may help deflect a certain amount of responsibility from the Planning Board members. In addition, the value of wetland

protection is reasonably well established, so there is a willingness to enforce even strict regulations.

The most important weakness of these local wetland regulations is the almost universal reliance on soil types to define where the regulations apply. Defining wetlands based on soil type (e.g. poorly drained and very poorly drained soils or type A and type B hydric soils) alone will likely lead to errors. Inaccuracies in HISS maps referenced in many local programs would lead to protection of some uplands and no protection for some valuable wetlands. Although perhaps caught through the state and/or federal reviews, such inaccuracies limit the effectiveness of the local programs and the additional level of oversight these programs provide. Field verification using soils, hydrology and vegetation is crucial for reasonable wetland protection.

A common complaint among some towns is that wetland permit review is not as well coordinated as it would be if local site visits could be coordinated with state visits. Local officials are not able to coordinate with state staff because of schedule limits (local officials because they are usually volunteer, and state officials because their resources are limited). This problem contributes to another problem in which state and local requirements are not well coordinated and may even be contradictory. Local officials have expressed particular concern that state law is often less restrictive than local law, and when state permits are issued, local authority to require greater restrictions is undermined.

2. Limited state funding for wetland protection

As mentioned above, the NH wetlands program for the coastal area is composed of one permit staff and one enforcement staff. While these staff are capable of keeping up with permits and projects, they do so with no time to spare. They are frequently difficult to contact, though virtually always helpful to local officials when contacted. Nonetheless, the lack of any spare resources means that there are limits as to the depth of oversight that can occur.

3. The state needs a formal wetlands mitigation policy

Wetlands mitigation in the state is also problematic. A recent study of mitigation sites examined 401 wetland permits from 1995 that impacted 89 acres of wetlands (Chase, 1997). Of these, 60 permits were considered major and compensatory mitigation was required for only 12. From this mitigation, 13 acres were created or restored and 25 acres were preserved. A follow-up investigation of previously mitigated sites uncovered numerous problems with the required mitigation. Problems of hydrology, exotic vegetation, poor water quality, erosion and others were found on many sites. The study suggests that past efforts have been limited and of mixed success. A study of wetland mitigation in Texas also found a low success rate for mitigation for habitat losses, and recommended use of performance bonds and deed restrictions to improve chances for success of mitigation projects.

4. No program exists for evaluating impacts of permitting and mitigation policies

The state has no policy for tracking the impacts of its wetlands permit program, including those impacts allowed through permitting and those from activities that do not require permits. Certain drainage activities and water diversions that dry wetlands out are not addressed. In addition, there may be significant damage to wetlands through numerous small-scale activities such as planting of lawns along wetland borders that slowly encroach on wetlands. Whether or not, and how much, to regulate these activities may depend on further research into losses from these activities. NH needs a

better perspective on the total impacts of these and permitted losses in order to help with future permit decisions and policies.

5. No framework exists for protection of vernal pools

Vernal pools are considered difficult or impossible to protect under current policies. These wetlands are extremely important for a wide range of species at a critical time in their life cycles (frequently breeding time), yet they are not wetlands in the traditional sense of swamps or bogs. They are small depressions that develop springtime pools that serve as crucial temporary sites for breeding of many amphibians. These creatures in turn become an important part of larger food chains that extend well beyond the pools themselves. Because they are temporarily wet, they may not develop hydric soils or vegetation, nor would they exhibit the hydrology required for delineation. They are also frequently quite small.

Currently, the only option for protection of vernal pools is through identification and protection at the local level. Local zoning and subdivision regulations could be used to steer development away from vernal pools, particularly if Conservation Commissions identified them during natural resource or wetland inventories. Several Conservation Commissions have worked with University of New Hampshire students to develop natural resources inventories, and those students could be a valuable source of assistance in identifying vernal pools. The state could assist by providing guidance to local officials on the functions and values of vernal pools and how to protect them.

Massachusetts has a certification program that could serve as a model for New Hampshire, through which vernal pools are identified and cataloged by the state Heritage Program. Local Conservation Commissions and Planning Boards track the identified pools and builders must contact the Heritage Program when alteration is going to occur. This program draws attention to vernal pools, serves notice to developers that they are important to protect, and provides an important opportunity for state and local governments to work with the developers to try to protect at least the most important or obvious vernal pools.

The Prime Wetlands program is not living up to its potential in the seacoast

The Prime Wetlands program has not been widely used in the coastal area. The
identification and evaluation must be performed by the community seeking designation,
which can be a costly process, and there is no guarantee that the expenditures will result
in successful designation. In addition, the additional protection afforded Prime
Wetlands is minimal given the cost of identification and evaluation.

Recommendations for Wetland Loss and Alteration

- 1. DES should develop and adopt a formal wetland mitigation policy and increase the use of mitigation through the state permit process. [LND-5, 23]
- 2. The state should develop a means of tracking impacts to wetlands from permitted and non-permitted activities. Cumulative impacts of permitted activities are not currently monitored but should be, and estimates of non-permitted (e.g. illegal) filling should be developed.
- 3. DES, in cooperation with local officials, Conservation Commissions and Regional Planning Commissions, should develop a program for protecting vernal pools. Such a program should include assistance for identification (perhaps through a cooperative effort with UNH) and a mechanism for triggering notification and involvement of Planning Boards and Conservation Commissions in projects that threaten vernal pools. [LND-32]

River and Estuary Protection

Activities that significantly alter surface waters, including shoreline stabilization, channel dredging or modification, restriction of inlets and bays, dam construction and operation, jetty, pier or dock construction, etc., can have profound impacts on the character and productivity of the estuaries. Impacts include shifts in salt and fresh water regimes, changes in sediment supply and accelerated delivery of pollutants among others. Wetland and other habitat losses, fisheries declines, loss of flood control benefits and recreation impacts all may result from these activities. These shifts are also likely to have impacts beyond the embayments themselves, as many of the wildlife species impacted (e.g. fish, birds, etc.) have ranges that extend well beyond the embayments.

Dams have blocked each of the primary rivers entering the Great Bay estuary since the 18th or 19th century, contributing to declines in anadromous fisheries. New dam regulations usually require fish passage, but the dams existed prior to these regulations. These dams continue to hamper restoration, such that restocking efforts have been largely unsuccessful (Jones, 1997)

Activities that affect the flow of fresh water from rivers into the estuary, and those that affect tidal flows into and out of bays and rivers, affect salinity. Since they are systems where salt and freshwater mix and where the volume of salt water fluctuates daily with the tides, estuaries are inherently subject to fluctuating salinity. Rainfall and its runoff also impose temporal variation in salinity. The estuarine ecosystems are well adapted to such fluctuations, and normally function well in spite of, or perhaps because of, those fluctuations. Nonetheless, sustained average changes in salinity of estuaries can have substantial impacts on the ecology of the systems.

Research has indicated that reduced tidal flows resulting in reduced salinity can shift the vegetation make-up of salt marshes. Exotic species such as tall reed grass (Phragmites) and purple loosestrife frequently invade areas where tidal flushing is reduced. Phragmites is a recent invader in New England and has successfully out-competed the native spartina grass (Spartina patens) in a growing number of locations in New Hampshire estuaries. These changes often make the salt marshes less productive in terms of wildlife (though there is some evidence certain species may increase and overall diversity may increase) and may have substantial impacts on fisheries productivity. Causeways and road culverts are the primary causes of tidal restrictions that have reduced the inflow of salt water and affected salinity. These restrictions have likely played a major role in the invasion of Phragmites and purple loosestrife in New Hampshire's salt marshes. Work on restoration by opening these restrictions has led to reductions in their populations.

Several factors contribute to sustained changes in freshwater inflows. Increased development usually means increased use of both groundwater (for drinking supplies) and surface water (for industrial and commercial uses). These uses alter the timing and flow of rivers and streams. As well, increases in pavement and other forms of impervious surface area mean that fresh water run off occurs much more quickly. The result is a sudden influx of fresh water and then reduced inflow later. All of these changes potentially impact estuaries, and may well result in gradual decline in salt marshes and salt marsh productivity.

Dams have been placed on every major river entering the Great Bay and have likely been responsible for substantial changes to that ecosystem. Dams create settling pools which reduce sediment load. Reduced sediments may affect shoreline erosion caused by natural forces and/or wave action from boating. Dams may also eliminate the force of spring flushing flows which might clear out old, potentially contaminated silt and sediments.

Channelization, shoreline stabilization and changes in natural sea level are also important influences on the estuaries. Historically, only two channelization projects have occurred in the state; the Ox Bow cut on the Squamscott River in Stratham and Exeter, and the Nudds Canal in Hampton. Erosion control and shoreline stabilization are much more common and are likely to continue to be more common. These activities change current patterns and the distribution of sediments, with a number of other associated secondary impacts.

Water use can also affect salinity and water quality, though it is not traditionally considered a hot-button issue in the east. More heavily developed locations of the state have begun to feel the effects of development on water supplies. A recent report on New Hampshire Public Radio told of wells in Bedford that run dry during peak use periods in the summer. Currently, Bedford is considering pumping water from nearby aquifers to meet its needs.

In the seacoast area, Hampton has begun looking outside its borders for well sites to meet its summertime explosion in water needs. One well in North Hampton has caused an outcry against pumping in that town. Residents and town officials worry about the effects of pumping the aquifer both on the towns own development options and on the town's natural resources such as wetlands and salt marshes. These kinds of issues may also apply to surface water use, particularly for industrial development.

Institutional Inventory

A summary of programs and regulations for surface water protection is provided in Table 6-10.

Federal Programs

Management Framework

Surface water alterations are regulated at the federal level under the jurisdictions of EPA and the U.S. Army Corps of Engineers through the Clean Water Act §404 program and sections 9

Table 6-10 River and Estuary Protection Program Summary

Program	Agency	Description	
	FEDERAL PROGRAMS	<u> </u>	
Clean Water Act #404	USACOE, EPA, USFWS, NMES	Permitting of dredge and fill in wetlands.	
Rivers and Harbors Act #9, 10	USACOE, EPA	Regulates dredge and fill activities in navigable waters, including dam construction.	
Hydroelectric Licensing	FERC	Program includes operating requirements and flow requirements.	
NEPA Environmental Assessments	EPA	Environmental review process of federal actions such as hydro licenses and dredging.	
Coastal Zone Management Act	NOAA Office of Ocean and Coastal Resource Management	Consistency provisions require federal actions to be consistent with approved state Coastal Zone Management Programs.	
Wild and Scenic Rivers Act	National Park Service	Program for river and river corridor protection, including restrictions on flow impediments and funding for river corridor management.	
	STATE PROGRAMS		
Dredge and Fill in Wetlands	NH Dept of Environ Svcs	Permit program for dredge and fill of wetlands including the 100 foot Tidal Buffer Zone	
Rivers Management and Protection Act	NH DES, Local Gov't.	Additional protection for areas designated Prime Wetlands by municipalities.	
Site Specific Program	NH Department of Revenue Administration	Provides a reduced tax rate for land in which development will not occur.	
Highway and Bridge Project Review Procedures	NH DOT	Non-regulatory review procedures for highway and bridge projects aid in project design and scope.	
NH Coastal Program	OSP	Funding under CZMA used to restore salt marshes and correct tidal restrictions.	
	LOCAL AND REGIONAL PROGRAM	IS	
Wetland Permit Review	Conservation Commissions	Review of state wetland permits with authority to delay permit issuance.	
	NON-GOVERNMENTAL PROGRAM	S	
Technical Assistance	NH Rivers Council	Provides assistance to community groups that want to nominate a river or river stretch into the Rivers Managemen and protection Program.	
Salt Marsh Restoration	NH Audubon Society	Evaluation of restorable salt marshes and related projects.	

Regulatory Framework

Federal regulation of hydromodification involves several programs. Section 404 of the Clean Water Act and sections 9 and 10 of the Rivers and Harbors Act (discussed in more detail in Chapter 4) address dredge and fill activities within navigable waters, including dam construction. These programs require permit review and incorporate operational standards to address potential impacts of these activities.

In addition, hydroelectric dams and facilities undergo a licensing process coordinated by FERC which entails review of, among other things, environmental impacts such as habitat, recreation and water quality. FERC licensed hydroelectric dams are required to provide fish passage and must receive state water quality certification under §401 of the Clean Water Act. They also generally include flow requirements consistent with the USFWS interim flow policy for New England. There are four dams in the NHEP area that are regulated by FERC.

Rivers designated Wild and Scenic under federal law are protected from federal licensing, assistance and construction projects which would alter the free-flowing characteristics of the river. While limited to specific nationally significant rivers (and thus not applicable to most rivers in the coastal region), this law does provide substantial protection for those to which it does apply. Portions of the Lamprey River have been designated Wild and Scenic. Finally, New Hampshire is provided consistency review under the Coastal Zone Management Act, through which projects must remain consistent with state goals under its coastal zone management program.

Non-Regulatory Framework

Tidal restrictions were identified through a recent joint project among state, federal and private groups. Findings are summarized in the report *Evaluation of Restorable Salt Marshes in New Hampshire*. Numerous projects have been conducted or are under consideration for addressing the problems found through that effort. Numerous salt marsh restoration projects have been funded through §319 of the CWA and §306, 308 and 309 of the CZMA. These have successfully enlarged culverts and restored tidal flows and native vegetation. These projects are discussed in more detail above and in the wetlands section of this chapter.

State Programs

Management Framework

Several state programs address "hydromodifications." The wetlands program of the DES Wetlands Bureau addresses dredge and fill activities including dam construction, channelization and bank and beach stabilization. Dams and other projects may have to undergo additional review under the Alteration of Terrain (Site Specific) program depending on size. The state's river management and protection program has one staff for the entire state whose job it is to provide assistance to communities wishing to develop designation proposals and River Corridor Management Plans. This program also provides a regulatory framework for protected rivers in the state. Lastly, the NH Department of Transportation has developed an internal project review process for highway and bridge projects. Other state and federal agencies are also incorporated into project reviews.

Regulatory Framework

Several state programs address hydromodification activities. The state wetland program requires permits for activities that alter any "bank, flat, marsh or swamp in and adjacent to any waters of the state." Repair or replacement that doesn't involve dredging or filling and work in constructed drainage ditches; catch basins, etc. (provided no vegetation has grown) are exempt from the permit requirement provided that there is no expansion in capacity. Conditions on the permits typically require erosion and sedimentation controls and stipulate seasonal constraints on activities. Other conditions are also frequently used.

Wetland regulations under dredge and fill laws contain specific requirements and conditions that apply to construction of piers, breakwaters, marinas and tide gates. Among these, projects may not interfere with the normal ebb and flow of waters in tidal wetlands, nor may they result in reduced salinity that destroys normal vegetation. Road crossings that might restrict tidal exchanges are regulated under the state's dredge and fill laws and are required to address these hydrologic concerns as well. NH DOT highway projects are also regulated through the wetlands permit procedures.

The Rivers Management and Protection Act of 1989 (RMPA) established a program similar to the federal Wild and Scenic Rivers Act through which rivers can be designated for "protected" status under the Rivers Management and Protection Program (RMPP). This program restricts instream activities with the goal of protecting water quality and flow. Rivers are protected from flow restrictions or alterations, inter-basin transfers, future dams, etc. In some cases increases in existing dam capacity may even be prohibited or restricted. In addition, local advisory committees are charged with developing a management plan for designated rivers that addresses recreational and non-recreational uses, existing land use, protection of resources such as fish habitat, wetlands and open space, dams, bridges and more.

The RMPA also contains a requirement for flow protection on designated rivers. Though not yet in effect, rules to protect instream flow would create specific protected flow levels for each river. As currently drafted, the rules require a phased-in reduction in water withdrawals from RMPP rivers and from ground and surface water within 250 feet of the rivers. Conservation measures would be required if flows drop below specified levels, and commercial and industrial use would be prohibited if minimum flows are reached.

Within the coastal region, only portions of the Lamprey and Exeter Rivers have been designated under the program. The Lamprey River has been designated "rural" from the Epping/Lee town line to the Durham/Newmarket town line. The Exeter River is designated "rural" from Route 102 in Chester to Great Brook in Exeter.

The RMPA will bring additional protections for these rivers, but protection is limited. The Act does little to regulate activities in or near designated rivers. Regulatory provisions include a prohibition on solid waste landfills within 250 feet or the 500 year floodplain and requires vegetative screening of those landfills and a 100' setback from the 500 year floodplain if sited within the 1/4 mile river corridor. Other restrictions mentioned above focus on flow impediments such as dams and inter-basin transfers. The program's main focus is on bringing attention to the rivers and facilitating improved local management.

Dams are regulated at the state level through the Dam Safety Bureau of DES. Regulations beyond permitting through the Wetlands Bureau generally focus on dam safety, flood control and hydropower production. There are 339 dams in Rockingham County and 247 in Strafford County, most of which are small. There are also 38 larger dams, of which four are regulated under federal

law. Large water withdrawals, including those for hydropower, require registration with the Water Management Bureau of DES.

Finally, provisions of the Site Specific program apply to hydromodification projects. Projects that meet the requirements of the Site Specific program are reviewed under the Alteration of Terrain provisions of the water pollution and waste disposal laws of the state. These projects receive an additional amount of oversight through this Site Specific permit process.

Non-Regulatory Framework

Education and technical assistance is limited. BMPs have been developed for small dam operation and maintenance (Small Embankment-Type Dams and Their Ponds: An Operation and Maintenance Handbook by the Natural Resources Conservation Service, DES and the NH Association of Conservation Districts). Tidal restrictions that have degraded salt marshes were identified through a recent joint project among state, federal and private groups. Findings are summarized in the report Evaluation of Restorable Salt Marshes in New Hampshire. This document has led to numerous restoration projects to address the problems found through that effort. Lastly, the DES Rivers Management and Protection Program provides assistance in development of river nominations and their management plans, which may address a number of river alterations.

Local and Regional Programs

Local governments have little or no legal or policy jurisdiction over activities that result in alterations to waterways. They may submit comments on federal and state permit applications, and they may maintain ongoing contact with state and federal officials involved in wetlands and water modification regulation to ensure their concerns are heard. This latter informal approach may be quite effective in developing permit conditions since existing regulatory authority may not be fully implemented depending on the level of public concern.

Local governments may also supplement wetland and state shoreland protection through the use of local land use regulations. As discussed earlier, seven of 19 Zone A towns have shoreland protection districts, 12 have aquifer protection districts and 17 have wetlands districts. Twelve of the municipalities with wetlands districts also provide protected buffers around wetlands. These programs help maintain the natural hydrology of surface waters although they do nothing about instream flow alterations. In addition, strong erosion and stormwater control provisions can help minimize hydrologic impacts.

Non-Governmental Programs

The New Hampshire Rivers Council, a non-profit advocacy and education organization, provides assistance for communities that hope to nominate rivers or river segments into the state Rivers Management and Protection Program. Assistance includes funding for resource inventories and help with the nomination process, along with building public support for nominations.

Tidal restrictions were identified through a recent joint project among state, federal and private groups (particularly NH Audubon Society). Findings are summarized in the report *Evaluation of Restorable Salt Marshes in New Hampshire*. Numerous projects have been conducted or are under consideration for addressing the problems found through that effort.

Evaluation

1. New Hampshire's policies regarding water-based habitat are limited and fragmented.

Various agencies implement pieces of what might otherwise be a comprehensive program, and in contrast to other programs, coordination does not appear to be strong. The level of awareness of other programs and efforts is low relative to other program areas. As with many other state programs, budgets and staff are frequently inadequate to carry out mandated responsibilities, and these limits may account, in part for the limited coordination. In addition, specific weaknesses exist.

For example, the Rivers Management and Protection Act, which regulates activities that restrict the flow of protected rivers like dam building and channel modifications, only applies to specific protected rivers, of which only two exist in the NHEP area. Management plans may work to spur better local regulation and/or control of land use in the shoreland areas, but they are non-regulatory and thus are not very forceful. In addition, regulations apply only to the protected segments, so activities outside of those segments are unaffected. Upstream activities, for example, could undermine progress made on the protected segments. The program is a valuable tool to supplement river protection, but it does not play a comprehensive role in the seacoast.

2. No policies exist for managing water use or protecting minimum flows

No policy exists for managing surface or groundwater use in the state. State law requires registration of "large" water users (those using 20,000 gallons per day) but there is no program for enforcing registration and there are no requirements on those users. Although rules for protection of instream flow on RMPP rivers are under development, they have been in the development stages for almost 10 years and, should they be implemented, would only apply to two rivers in the seacoast. The 1989 state nonpoint source program recommended developing policies to require protection for minimum flows, and such protection is important for the state to meet its water quality standards (for example, wastewater treatment facilities need the dilution of specific minimum flows to meet their permit requirements).

Recent battles between coastal towns regarding Hampton's need to pump water from neighboring town aquifers highlights the potential for consumption issues to increase in the near future. New Hampshire needs to develop such policies, particularly as populations in the coastal region continue to grow.

3. Unclear policy on road crossings and culverts

It was impossible to find a clearly stated policy on road crossings over water bodies, so future road building may continue to create tidal restrictions and other problems. While the NH DOT has environmental review policies, there is a significant disconnect between that agency and the agencies usually responsible for regulating impacts to wetlands and water bodies. Many of the existing tidal restrictions occurred before the current awareness of the importance of wetlands, and current policies do address the problem in an indirect fashion. Nonetheless, awareness has not led to a formally stated policy on the problem. Old restrictions remain, identified in the publication *Evaluation of Restorable Salt Marshes in New Hampshire*, and the state should continue its work on re-opening them.

Recommendations for River and Estuary Protection

- 1. The state should develop a more comprehensive approach to water habitat protection and improve coordination of its surface water programs.
- 2. There is a significant need for the state to improve the coordination of DOT projects with the agencies that protect natural resources. Existing practices of meeting with state and federal agency officials to review projects should be expanded and formalized, and there should be increased environmental accountability of the agency.
- 3. The state should develop a formal water use policy that addresses all levels of consumption of both ground and surface waters. That policy should include protection for minimum flows and requirements for conservation, and should apply to all water sources throughout the state.

Open Space and Habitat Acquisition

Protecting land from development provides a wide range of benefits from habitat for endangered species to aesthetic enjoyment and its many indirect benefits. Land protection can also provide valuable buffers for surface waters either as an intended benefit or as a secondary benefit of habitat or open space protection. Decisions about what land to protect can be tricky. The land protection effort coordinated by the Great Bay Resource Protection Partnership has proceeded using a process of evaluating lands most threatened by development along with those most valuable from a resource perspective. This approach provides a way of prioritizing lands for acquisition so that limited resources can be used to greatest effect. A similar procedure has been conducted by the NHEP and is available to state and local governments for use in land acquisition. It will also be a valuable tool for helping Planning Boards plan development in their towns.

A considerable amount of land has been protected through federal, state, local and private efforts, though no single estimate exists. These lands include purchased tracts as well as those protected through conservation easements and land trusts.

Institutional Inventory

A summary of programs and regulations for open space and habitat protection is provided in Table 6-11.

Federal Programs

Management Framework

The federal government has many programs that protect important habitat areas or support state and local efforts to protect such areas, though only two exist in the coastal region. The U.S. Fish and Wildlife Service manages the Great Bay National Wildlife Refuge, which includes 1,054 acres on the shoreline of Great Bay in Newington (formerly a part of the Pease Airforce Base). This refuge comprises the largest undeveloped shoreline in the estuary and is one of the largest and most important tracts of open space in the NHEP area. Portions of the refuge are open to the public for education and recreation, while others are closed. The GBNWR supports research and participates in various land protection efforts.

Table 6-11 Open Space and Habitat Protection Program Summary

Program	Agency	Description	
FEDERAL PROGRAMS			
National Wildlife Refuge System	USFWS	Habitat protection for wildlife.	
National Estuarine Research Reserve System	NOAA Office of Ocean and Coastal Resources Management	Protection of estuaries for research and education.	
Wildlife Habitat Incentive Program	USDA Natural Resources Conservation Service	Environmental review process of federal actions such as hydro licenses and dredging.	
Wetland Reserve Program	USDA Natural Resources Conservation Service	Consistency provisions require federal actions to be consistent with approved state Coastal Zone Management Programs.	
Safe Drinking Water Act	EPA	Provides funds for State Revolving Loan Funds which can be used to purchase and protect land around drinking water sources.	
	STATE PROGRAMS		
State Parks	DRED Parks and Recreation Division	Administration and acquisition of state parks.	
State Forests	DRED Forest and Land Division	Administration and acquisition of state forests.	
Land Conservation Investment Program	DRED Forest and Land Division	Management (and former acquisition) of conservation lands.	
Endangered Species Conservation Program	NH Fish and Game Department	Land acquisition for endangered species habitat protection.	
Waterfowl Conservation Program	NH Fish and Game Department	Creates a fund from waterfowl stamps which can be used for waterfowl habitat conservation.	
Non-game Species Management	NH Fish and Game Department	Allows land and aquatic habitat acquisition for non-game species protection.	
Natural Heritage Inventory	DRED	Rare plant protection program which allows land acquisition for plant protection.	
Current Use Program	NH Department of Revenue Administration	Provides a reduced tax rate for land in which development will not occur.	
NON-GOVERNMENTAL PROGRAMS			
Land Conservation Investment Program	Society for the Protection of NH Forests	Staff provided for management of LCIP lands.	
Great Bay Resource Protection Partnership	Nature Conservancy, NH Audubon, SPNHF	Evaluation of restorable salt marshes and related projects.	

The National Estuarine Research Reserve program, under the National Oceanic Service of the National Oceanic and Atmospheric Administration, identifies important estuary systems and provides protection through a system of reserves. The Great Bay National Estuary Research Reserve (GBNERR) was designated in 1989 with a focus on research, education and habitat protection. The reserve has land in several locations around the Great Bay, including the SandyPoint Discovery Center in Stratham. The reserve works closely with numerous other federal, state and private agencies to improve its effectiveness. The GBNERR was involved in the recent acquisition of the Crommet Creek area through the Great Bay Resource Protection Partnership effort and is working on acquiring several other parcels along Great Bay.

The Great Bay National Estuarine Research Reserve is managed through the NH Fish and Game Department with a budget of \$172,000, of which approximately \$38,500 is dedicated to education and \$20,000 is dedicated to research. The reserve has the equivalent of three full-time staff and also trains and makes use of many volunteers for its education programs.

Other programs include support for wetlands and wildlife habitat protection. These programs are administered by the Natural Resources Conservation Service and the U.S. Fish and Wildlife Service.

Regulatory Framework

No regulatory programs were reviewed for this section.

Non-Regulatory Framework

Several other federal programs coordinated by various agencies are available to help identify and protect habitat. Two of the most significant programs are the Wildlife Habitat Incentive Program and the Wetlands Reserve Program of the Natural Resource Conservation Service. The Wildlife Habitat Incentive Program is a program to assist private landowners in developing upland and wetland wildlife habitats. The program provides habitat improvement assistance and cost-sharing on habitat development projects. The Wetlands Reserve Program pays farmers to permanently restore drained cropland. Finally, the US Fish and Wildlife Service Partners for Wildlife program enables landowners to restore wildlife habitat at little or no cost. This program provided funds for several salt marsh restoration projects mentioned in several sections of this report.

The federal government also offers numerous sources of funds that may be used to support open space and habitat acquisition. The Great Bay Resource Protection Partnership, which identified important lands for protection around the bay, was funded in part by the federal government through the North American Waterfowl Conservation Commission.

A portion of the new Drinking Water State Revolving Fund under the 1996 Safe Drinking Water Act amendments may be used for the purchase of land to protect drinking water sources. This may include wellhead protection lands or similar areas, and these lands may coincide with areas that protect surface waters as well. New Hampshire is slated to receive roughly \$13 million for FY 1997, of which 15%, or around \$1.8 million, could be used to purchase important lands. NH has chosen to direct some of this money toward source water delineations and assessments, leaving \$687,740 for capacity development, land acquisition and source water protection. Funds for land acquisition will be available in loans that will revolve within this account. Clean Water SRF money is also authorized for land acquisition but state policy has limited its use for landfill closures and wastewater treatment facilities.

State Programs

Management Framework

Several land acquisition and state land management programs exist. The Division of Forests and Lands and the Division of Parks and Recreation (both part of the NH Department of Resources and Economic Development (DRED)) manage state forests and parks respectively. Habitat protection is also afforded through land acquisition programs under the NH Fish and Game Department.

Regulatory Framework

No regulatory programs were reviewed for this section.

Non-Regulatory Framework

DRED owns 19 parcels of land in the NHEP drainage area. The largest are state parks or forests, while smaller historic sites and other miscellaneous also exist. Parcels and their locations and acreages are listed in Table 6-12. In addition, parts of Bear Brook State Park are within the coastal drainage basin, although the total acreage was unavailable.

Table 6-12 State Parks and Forests in the NHEP Study Area

		_
Park or Forest	Location	Acreage
Pawtuckaway State Park	Nottingham	5,536.1
Northwood Meadows State Park	Northwood	664.5
Odiorne State Park	Rye	331.5
Blue Job State Forest	Farmington	283.6
Urban Forestry Center	Portsmouth	182.0
Woodman State Forest	Northwood	137.8
Wentworth-Coolidge Historic Site	Portsmouth	64.5
Rye Harbor State Park	Rye	63.0
Hamptom Beach State Park	Hampton	50.0
Smith State Forest	Nottingham	48.7
Wallis Sands State Beach	Rye	30.0
Nottingham State Forest	Nottingham	14.6
White Island Historic Site	Rye	5.0
Southeast State Forest	Nottingham	4.3
Stevens Pines State Forest	Nottingham	4.0
Portsmouth fish Pier	Portsmouth	3.0
Fort Constitution Historic Site	New Castle	2.0
Jenness State Beach	Rye	1.3
North Hampton State Beach	North Hampton	1.1

The NH Fish and Game Department, also a part of DRED, is authorized to acquire land under several statutes. The Endangered Species Conservation Act under RSA 212 authorizes the acquisition of land or aquatic habitat necessary for the conservation of endangered or threatened species. RSA 214 establishes a Waterfowl Conservation Account to which migratory waterfowl stamp revenues are channeled. This fund is to be used for numerous purposes including acquisition of habitat for waterfowl conservation. Finally, under the Non-game Species Management Act (RSA 212-B), NH Fish and Game is authorized to acquire land or aquatic habitat for non-game species management. Under these programs, and with additional federal funding, Fish and Game has acquired more than 1,140 acres of land in Zone A. Table 6-13 provides a partial list of NH Fish and Game parcels.

DRED also operates the Natural Heritage Inventory Program through which the state monitors its plant resources. The program is authorized under RSA 217-A to acquire land for the protection of plant species. Thus far, however, there has been no budget for acquisition so the program has no such lands.

New Hampshire's Land Conservation Investment Program (LCIP) was established for the purpose of acquiring land or interest in lands for conservation or recreation. This unique program existed for only six years but accumulated 1,645 acres of land in the coastal area (in Dover, Durham, Exeter, Greenland, Lee, Madbury, Portsmouth, Rye and Stratham). Much of this land is along important surface waters, such as the Bellamy and Cocheco Rivers, the Squamscott River and Great Bay. Lands were chosen for their susceptibility to erosion and sedimentation and for their role in protecting water quality.

Table 6-13 NH Fish and Game Lands in the NHEP Study Area

Site	Location	Size
Adams's Point	Durham	80 acres
Bellamy River Access	Dover	17 acres
Burnham's Marsh	Nottingham	25 acres
Dole's Marsh	Deerfield	25 acres
Great Bay Access	Greenland	39 acres
Hampton Salt Marsh conservation Area	Hampton, Hampton Falls, Seabrook	272 acres
Lamontagne Wildlife Management Area	Deerfield	337 acres
Ten Rod Marsh	Farmington	15 acres
Woodman Marsh	Northwood	20 acres

Another important program for maintaining undeveloped land is the state's Current Use tax program (RSA 79-A). Under this program, landowners receive a tax break in exchange for limiting development activities on their land. The program provides an incentive to leave land in a relatively wild state by reducing the pressure to provide income from the land. Participants may chose to leave the program and develop their land, but must pay a tax penalty of 10% of the full value of the land if they do. The penalty provides a disincentive for landowners merely hoping to take advantage of lower taxes prior to development, while at the same time allowing a

landowner to change his or her mind at some future date. By being somewhat flexible, the program probably brings in more landowners who would otherwise be unwilling to sell development rights (which would restrict future opportunity to develop the land).

Lands qualifying for the program include all undeveloped lands of 10 or more acres and all wetlands or active agricultural lands of any size. In addition, wetlands included in the program are allowed a buffer up to 100 feet deep. In 1994, some 2.8 million acres of land - half of the state's total land area - were classified under the current use program (§6217 NPS Program document). Estimates of Current Use lands in the NHEP area were not available.

Table 6-14 Allocation of Current Use Tax Penalty to Conservation Funds

Town	Zone	Allocation
Durham	A	50%
Hampton Falls	А	10%
Madbury	А	50%
Newfields	А	5%
Newmarket	А	50%
North Hampton	А	100%
Portsmouth	А	100%
Rye	А	50% (\$2,000 cap)
Rollinsford	Α	100%
Chester	В	100% (\$20,000 cap)
Danville	В	100%
Kensington	В	25%
Lee	В	50%
Northwood	В	10%
Raymond	В	25%
Sandown	В	25%

Local and Regional Programs

Several options exist for habitat protection at the local level. Local governments have several opportunities for land protection under the Current Use program. For example, municipal boards play a key role in decisions on enrolling parcels in the program. Municipalities may also choose to purchase property outright, purchase conservation easements, or seek transfers of development rights from developers.

The tax penalty for taking land out of the Current Use program is returned to local governments for their use. Under the program, those funds may then be earmarked for conservation purposes. A powerful feature of this program is the possibility of dedicating the land use change penalty to a non-lapsing Conservation Fund for purchase of lands or conservation easements. This option allows the program to be quite flexible while also resulting in lasting

progress on open space protection. Many municipalities, however, assign the tax penalty to the General Fund and use it for unrelated purposes. Only nine of 19 towns in Zone A and seven of the roughly 24 towns in Zone B dedicate any portion of the tax change penalty to conservation, and that portion varies substantially (see Table 6-14 above).

Local governments may also purchase land or development rights with other funds, and may receive donations of land for conservation purposes. Many communities do this, in some cases building up substantial reserves of conservation land. Some municipalities also require permanent conservation of open space in exchange for increased density for cluster development. A summary of conservation lands in each of the Coastal Program towns was taken from the Society for the Protection of New Hampshire's Forests' (SPNHF) publication, NH's Changing Landscapes (1999). Table 6-15 is a summary of land conservation among the 19 municipalities of Zone A. Conservation land includes both public lands and private conservation lands.

Non-Governmental Programs

Private groups also purchase important conservation lands to protect them. Groups such as the Nature Conservancy and the Society for the Protection of New Hampshire Forests dedicate funds for the purchase of land or easements for land protection. Local land trust such as the Rockingham Land Trust and the Strafford Rivers Conservancy also purchase land or easements. Table 6-16 lists some of the land protected by these non-governmental or quasi-governmental organizations.

In addition, a public-private partnership known as the Great Bay Resource Protection Partnership has purchased a 488 acre parcel of Crommet Creek and has preserved a total of more than 1200 acres. This partnership is a joint effort of the NH chapter of Nature Conservancy, NH Audubon Society, the Society for the Protection of New Hampshire Forests, the Great Bay National Estuarine Research Reserve and others. The partnership developed an evaluation of potential conservation lands and seeks funds to purchase or protect priority parcels.

Table 6-15 Conservation Land and Open Space Programs in NHEP Zone A Towns

Town	Conservation Land (acres)	Percent of total land
Dover	1445.9	8.3
Durham	2903.4	21.1
Exeter	2015	15.9
Greenland	568.8	8.3
Hampton	630.4	7.3
Hampton Falls	480.5	6.1
Madbury	1294.4	17.3
New Castle	105.4	16.8
Newfields	235.6	5.2
Newington	1204.6	22.6
Newmarket	515.7	6.4
North Hampton	462.6	5.2
Portsmouth	873.5	8.6
Rochester	433.8	1.5
Rollinsford	408.6	8.7
Rye	1212	14.9
Seabrook	285.4	4.8
Somersworth	221.3	3.5
Stratham	666.4	6.9

From: NH's Changing Landscapes, Society for Protection NH's Forests, 1999

Finally, the Society for the Protection of New Hampshire Forests has provided staff to manage the Land Conservation Investment Program since the state ended its funding. Several of these private groups have also provided public education efforts to encourage land protection. For example, SPNHF and NH Audubon have held educational programs to help communities identify and protect important lands.

Table 6-16 Non-Governmental Land Protection in the NHEP Study Area

Organization	Acreage
Great Bay Resource Protection Partnership	1,200+
NH Audubon	213.5
Phillips Exeter Academy	322
Rockingham County Conservation District	217
Rockingham Land Trust	74
County Conservation District	206
Rivers Conservancy	47
UNH	2,000+
Wildlife Preserves Inc.	55

Evaluation

1. A good history of habitat and open space protection, though the state role is declining

New Hampshire was recently a leader in land acquisition for conservation through its Land Conservation Investment Program. The LCIP focused on valuable land around the estuaries as well as other parts of the state. That effort ended six years after it began but acquired significant parcels of land. Limited budgets that seem to plague the state have virtually eliminated state land acquisition efforts. NH Fish and Game must make use of a few small fund accounts to acquire land for habitat protection. Its budget, limited to revenue from licenses and fines, is insufficient to cover basic operational costs, much less provide for such additional expenditures.

New Hampshire would benefit from a renewed state habitat and open space protection program. A recent project funded through the NHEP is analyzing land use and habitat information to develop maps that will help identify important lands for protection. These maps may also be useful in helping prioritize lands for acquisition. This effort should be a part of a larger effort.

Maine has a Natural Resources Protection Act that provides an alternative to acquisition for habitat protection. Areas considered important under the act include habitat for threatened and endangered species, deer wintering areas, waterfowl nesting and feeding areas, salmon spawning areas and shorebird nesting, feeding and staging areas. Large wetlands, sand dunes and all coastal wetlands are also included. Regulations require project review and rigorous habitat protection standards for activities in these areas. This habitat approach to protection allows additional regulatory restrictions on land use that might not occur because the land is not otherwise protected.

As mentioned in several places in this report, both Clean Water and Drinking Water may be used for land acquisition. New Hampshire should maintain its option to use these funds for land acquisition. The state has restricted Clean Water SRF money to WWTF construction and landfill closure but should consider relaxing that restriction. Drinking Water SRFs are not earmarked to any significant extent for land protection, although some portion of the funds will be provided for land acquisition for source water protection.

- 2. Strong and growing private sector role in land acquisition and protection
 - There are a variety of non-governmental efforts aimed at land acquisition and protection, and those efforts appear to be growing. In addition, cooperative efforts with government agencies have expanded the local role significantly.
- 3. Well coordinated land and habitat protection efforts

The cooperative efforts of the Great Bay Resource Protection Partnership highlight the high degree of coordination between government and non-governmental organizations. Another example is the support of the Society for the Protection of New Hampshire Forests for the state's Land Conservation Investment Program. This coordination probably arises out of the lack of state funding available for land conservation, but it appears to do a thorough job of making up for the reduced state role.

4. Variable local commitment to habitat and open space protection

As shown in Tables 6-x and 6-x, the local commitment to land protection is quite variable. Land and easement purchases and dedication of the land use change tax under the Current Use program vary considerably from town to town. No analysis of local expenditures on land protection was done, so the relative dedication of resources by each town is unknown.

Recommendations for Open Space and Habitat Aquisition

- 1. The state should revive its Land Conservation Investment Program and seek new funding mechanisms to ensure priority conservation sites are protected. Existing relations federal agencies and private sector groups could be used to leverage a highly effective land conservation program. [LND-26]
- 2. Local governments should earmark all of the Current Use tax penalty for land protection efforts. This money is a penalty for taking land out of the program and should be used to offset that loss of protected land. [LND 28, 35].

Living Resource Management

Overview

he estuaries of New Hampshire are home to a diverse assortment of plant and animal species. Estuarine dependent species include commercially and recreationally important species like lobster, oysters and striped bass. There are also a considerable number of threatened, endangered and otherwise protected species that live in and around the estuaries, breed there or use them during some portion of their lives. Examples of the latter include harbor seals, bald eagles, downy foxglove and Turk's-cap lily. In addition, the highly productive salt marshes and estuary habitats provide the basis of food chains on which numerous other species depend. Management of these species is an integral part of any effort to protect the estuaries.

Generally speaking, living resources in the estuaries are healthy. Numerous wildlife populations have increased, including some populations of endangered and threatened species (bald eagle, osprey, etc.). Many local officials cite anecdotal evidence of large and growing wildlife populations in their towns. Vegetation communities such as Spartina marshes and eelgrass beds have suffered declines over the past century, and there is reason to be concerned about the increase of Phragmites in salt marshes. Declines in salt marshes have been attributed to development impacts discussed in the habitat chapter, while declines in eelgrass beds appear to be the result of wasting disease, perhaps exacerbated by development impacts.

In addition, some fisheries are substantially depleted from years of overfishing and habitat destruction. Dams on the major rivers entering the Great Bay estuary have substantially impacted anadromous fish populations, and sedimentation of spawning grounds further reduced fish populations (Jones, 1997). In recent years, some species have rebounded, while others remain depleted. Fish ladders constructed in the 1970s have allowed some species to recover (river herring and shad on some waterways), though many have not yet responded well to rebuilding efforts (Ibid.).

Shellfish show similar trends. Oyster reductions during the early half of the 1900s, primarily due to sedimentation, have been followed by apparent dramatic reductions in recent years (e.g. during the 1990s), though data is limited (Jones, 1997). While not yet specifically attributed to any cause, speculation suggests lack of substrate may be an important factor. Mussels appear to have increased in recent years and other shellfish show complex or unclear trends. Lobster populations have been fairly stable despite fairly strong commercial fishing pressure.

Various state and federal agencies are involved in species management, which is handled under numerous regulatory programs. The NH Fish and Game Department (NHFG) is the lead agency for all aspects of fish and wildlife management in the estuaries, and the Natural Heritage Inventory handles rare or endangered plants or plant communities for the state. Federal

management is handled by the National Marine Fisheries Service, the US Fish and Wildlife Service and EPA through fisheries law, the Endangered Species Act and various game and non-game programs. Endangered species are managed by state and federal agencies including the NHFG, the state Natural Heritage Inventory (a part of the Department of Resources and Economic Development along with NHFG) and the Environmental Protection Agency and National Marine Fisheries Service (NMFS). Game and non-game wildlife are also managed by both state and federal agencies; NHFG regulates hunting and manages habitat, and the US Fish and Wildlife Service (USFWS) is charged with managing fish and wildlife resources through refuge management, law enforcement and research.

Municipalities have limited authority to directly manage living resources. Towns have some authority to adopt bylaws that specifically address harvesting of wild plants, hunting and other related activities on town property. On the other hand, the most pressing living resource issues for the coastal region involve fisheries, and municipalities have little authority over them. Municipalities do, however, have a wide range of land use management techniques available that can help protect living resources and their habitat.

Protection of critical water resources through wetland, aquifer and shoreland zoning benefits living resources through both limiting pollution and expanding habitat protection. Open space requirements for subdivisions and commercial development add some measure of protection, and through the use of transfers of development rights and other land protection efforts, municipalities can identify important plants or animals and provide additional protection for their specific habitats or tracts. Similarly, given adequate resources, municipalities can purchase land or development rights to protect specific areas. Previous chapters discuss these local management options in detail in relation to issues or priorities, so they will not be addressed in this section.

Finfish Management

Though once abundant, many marine and estuarine fisheries in New Hampshire have declined since colonial times. Dams on the major rivers, destruction of spawning grounds through sedimentation, overfishing and industrial pollution have all contributed to substantial losses (Jones, 1997). In particular, anadromous species like shad, Atlantic salmon and shortnosed sturgeon have suffered substantial setbacks with only limited success resulting from installation of fish ladders and restocking efforts (Ibid.). Flounder and cod have remained in relatively poor health, at least in part due to fishing pressure.

Improved management and tightened regulation have resulted in at least some species recoveries. Fish ladders and restocking efforts appear to have helped some stocks of anadromous species (for instance, some runs of river herring) (Jones, 1997), while a commercial moratorium and strict recreational regulations have contributed to a dramatic rebuilding of striped bass populations (Ibid.). Even some groundfish species, whose fisheries have a history of strong resistance to regulation, appear to have begun to recover under strict new regulations.

Institutional Infrastructure

Table 7-1 Finfish Management Summary

Program	Agency	Description	
	FEDERAL PROGRAMS	•	
Magnuson Fisheries Conservation and Management Act	National Marine Fisheries Service, New England Fishery Management Council, US Coast Guard	Federal management program for marine fisheries in federal waters. Enforcement is handled by the Coast Guard.	
Marine Mammal Protection Act, Fish and Wildlife Coordination Act	National Marine Fisheries Service, US Fish and Wildlife Service	Allows NMFS and USFWS to provide comment on projects that	
Atlantic States coastal Fisheries Cooperative Management Act, Interjurisdictional Fisheries Act	National Marine Fisheries Service, US Fish and Wildlife Service, Atlantic States Marine Fisheries Commission (ASMFC)	Federal oversight and support for interjurisdictional fisheries management. ASMFC conducts management activities through intergovernmantal participation.	
STATE PROGRAMS			
RSA 211 – Fish, Shellfish, Lobster and Crabs	NH Fish and Game Department	Management program for marine fisheries of the state.	

Federal Programs

Management Framework

Federal fisheries management is handled by the National Marine Fisheries Service (NMFS) under the Magnuson Fisheries Conservation and Management Act of 1976 (MFCMA). The Magnuson Act established regional Fishery Management Councils (the Councils) to study fisheries and develop management plans based on their findings. The councils are made up of fishermen, state regulators, conservationists and others. The New England Fishery Management Council (NEFMC), based in Saugus, Massachusetts, manages fisheries off the entire New England Coast. Enforcement of regulations is handled by the U.S. Coast Guard.

Direct federal control over fisheries is limited to waters seaward of the three mile state jurisdiction to the 200 mile limit of the Exclusive Economic Zone. In limited cases this role has extended landward into state waters for species that migrate between state and federal waters (or species that eat migrating ones). In addition, two federal laws, the Atlantic States Coastal Fisheries Cooperative Management Act and the Interjurisdictional Fisheries Act, established a framework for federal oversight and support of management of species that migrate among the atlantic coastal states. The Atlantic States Marine Fisheries Commission (ASMFC), an interstate compact for fisheries management, has been charged with coordinating state regulations for fisheries that cross state boundaries within state waters. Many of these interjurisdictional management efforts, such as management for bluefish conservation, have been successful.

Lastly, through the Marine Mammal Protection Act and the Fish and Wildlife Coordination Act, the National Marine Fisheries Service and the US Fish and Wildlife Service have authority to comment on actions that might impact marine mammals and fishery resources. This authority provides little power to impede these actions but it does require comments submitted under these Acts to be addressed.

Regulatory Framework

Fishery management plans (FMPs) developed pursuant to the MFCMA contain regulations designed to sustain or rebuild fish populations through gear restrictions, catch limits, time and area closures and limits on numbers of participants in the fisheries. Regulations are developed by the Councils using a standard public review process and approved by the National Marine Fisheries Service. In a few cases, such as swordfish and other highly migratory species whose ranges cross the boundaries of several councils, FMPs are developed and approved by the National Marine Fisheries Service. Although there is no local office of the NEFMC, the council holds local public hearings on all FMPs and amendments to the plans.

Federal management plans are developed around the fisheries industries, and may be focused on a single species (such as swordfish) or a complex of species such as groundfish. In general, development of regulations occurs in response to circumstances of individual species and is aimed at restoring or protecting those species. These plans have resulted in mixed success, in some cases dramatically rebuilding populations (and the fisheries that depend on them) and in other cases having little effect.

The Atlantic States Marine Fisheries Commission (ASMFC) is a quasi-federal agency charged with coordinating the development of management plans for inshore species (those within the jurisdiction of states) that cross state borders. The ASMFC is structured similarly to the fishery councils and is made up of state fisheries personnel, fishermen, conservationists, etc. The commission works to ensure that state management plans and regulations for interjurisdictional fisheries are consistent with each other. In some cases, the ASMFC takes responsibility for developing management plans (such as for bluefish). States are generally responsible for enforcement.

The federal government has also passed legislation specific to individual fisheries where problems are extensive and public support for conservation is prominent. The Atlantic Striped Bass Conservation Act is one such example. This bill required the Secretaries of Commerce and Interior to issue a moratorium on striped bass fishing in any state deemed out of compliance with the interstate FMP for Striped Bass established through the ASMFC. The bill has been instrumental in the strong recovery of this species, although it has since expired. Although uncommon, such federal interventions are implemented.

Non-Regulatory Framework

No programs were reviewed under this section.

State Programs

Management Framework

Management of estuary fisheries is primarily handled by the NH Department of Fish and Game (NHFG). Certain aspects of state fisheries are managed directly through regulations required by statute (RSA 211, Marine Fisheries), while others are managed through a fisheries management process similar to the federal program discussed above. NHFG maintains a marine fisheries program office in Durham, NH, which handles all aspects of estuarine fisheries management, including most aspects of aquaculture.

The guiding statute for NHFG, RSA 206, establishes a Fish and Game Fund, financed through licenses, fines, forfeitures and other such fees as are allowed under state law. This fund provides the budget for the department. Certain federal funds for resource management may also go into the Fish and Game Fund. New Hampshire gets additional money from Wallop-Breaux (a federal program funded by a tax on fuel and gear sales), the Atlantic States Marine Fisheries Commission (for law enforcement, stock assessments, etc.), from EPA and others.

Regulatory Framework

Marine fisheries statutes under RSA 211 establish certain gear restrictions (for instance, mobile gear such as trawls are allowed, by statute, only in open ocean waters), license programs (for lobster and crab) and a framework for developing management plans for individual fisheries. Management plans are developed through the rulemaking process and are based, in part, on stock assessments done by the department. State fisheries management is coordinated with federal and interstate management through several channels (for instance, each state provides a representative for the federal fishery management councils and for the Atlantic States Marine Fisheries Commission, discussed above). Where federal management plans address species also found in the estuaries, state management tends to mirror federal, though additional regulations such as catch and size limits, area closures and gear restrictions may be incorporated to address regional issues.

Non-Regulatory Framework

No programs were reviewed under this section

Local and Regional Programs

No programs were reviewed under this section.

Non-Governmental Programs

No programs were reviewed under this section.

Evaluation

Fisheries management has been relatively successful, with few problems specifically resulting from management. In some cases, such as management for striped bass, depleted stocks have recovered substantially (in this case, the recovery has been due largely to the interjurisdictional efforts of the ASMFC and all the participating states including New Hampshire, aided by specific federal legislation to protect striped bass). Again, the majority of finfish problems are probably due to habitat and dam-related causes, though overfishing resulting from management problems at the federal level have probably contributed to weak stocks of groundfish.

1. NHFG budget basis in fees and fines may limit the resources available for fisheries management

The state's approach to funding the Fish and Game Department is different than for most other agencies, and it has strengths and weaknesses not found in funding of those agencies. Reliance on fees and grants appears to have made the department less vulnerable to recent budget cuts, and as fishing pressure increases (and by extension the number of licenses, fees, fines, etc.), there would theoretically be more resources available for management. On the other hand, when resource depletion results in fewer licenses issued, less money would be available for management when it is needed most.

With these kinds of concerns in mind, the department tries to anticipate potential shortfalls and budget accordingly, allowing the Fish and Game Fund to moderate short term variations in revenue. In addition, a substantial source of the NHFG's budget comes from federal sources such as Wallop-Breaux, which the department argues are less susceptible to annual variation.

2. NH Fish and Game staff levels may limit management effectiveness.

The NH Fish and Game Department management responsibilities are probably more limited by staff than funds. An individual staff is responsible for management of each of finfish and shellfish species. These same staff often carry additional responsibilities including working with other agencies such as the Department of Health and Human Services and the NH Coastal Program. These additional responsibilities help ensure that the collective work of estuary management is taken care of, but they appear to impinge on the direct fisheries management responsibilities of the department.

3. Federal fisheries management has, until recently, been limited by strong resistance to regulation and weaknesses in the management framework, but may not have a significant impact on estuary species.

Federal fisheries management has received substantial criticism from a wide audience for its inability to rebuild depleted groundfish fisheries. Several factors may limit the federal program. Until recently there has been no legal requirement to determine when overfishing has occurred and respond with rebuilding plans. Similarly, the regional Councils are made up in part of fishermen with no legal restrictions on conflicts of interest. Finally, the species by species approach to management has been inadequate to deal with multi-species fisheries where it is difficult or impossible to control the species caught. Some of these problems have been addressed through recent (1996) amendments to the Magnuson Act, and future performance will help determine what, if anything, should be done next. In any case, it is not clear to what extent overfishing and other problems of fisheries under federal jurisdiction will affect estuary fisheries.

Recommendations for Finfish Management

- 1. Ensure NH Fish and Game budgets and staff remain sufficient to manage fisheries regardless of fishing effort. This may require changes in the way the department is budgeted.
- 2. Maintain an active role in federal and interjurisdictional fisheries management to ensure regulations support New Hampshire fisheries goals.
- 3. Improve fisheries resource inventories. Gaps in stock assessments and species information exist, yet adequate management depends on this information.

Shellfish Management

The status of shellfish in NH estuaries is difficult to characterize. Population trends are complex and unclear, with some species showing recent increases and others showing longer term declines. Furthermore, the causes of declines are uncertain, although disease appears to be an important factor for oysters. In addition, since shellfish are filter feeders they are particularly susceptible to contamination. Thus historic pollution problems and a lack of adequate monitoring has led to significant numbers of closures of shellfish beds. Recent efforts both at addressing pollution and improving monitoring have led to re-opening of some long closed areas.

Shellfish management encompasses two general program areas; sanitation (determining the degree to which shellfish growing areas are safe for harvest) and resource management (regulating the harvest). In both the federal and state programs, these responsibilities are handled by different agencies. The management framework for shellfish is the same as for finfish management, and is covered in that section of this chapter.

Institutional Infrastructure

See Table 7-2 below for the program summary.

Federal Programs

Management Framework

At the federal level, sanitation is supervised by the US Food and Drug Administration (FDA) while resource management is handled by the National Marine Fisheries Service (NMFS). Federal resource management is done within the framework of the Magnuson Act discussed under the Finfish Management section above. Since this management is relevant for waters seaward of the three mile state territory limit, and since oceanic and estuarine shellfish populations are fairly distinct, the resource management aspect of estuary shellfish fisheries is primarily in the hands of the state.

The sanitation aspect of federal management involves cooperation with each state through the National Shellfish Sanitation Program (NSSP). The NSSP governs all sanitation aspects of the commercial shellfish industry including classification of growing waters, regulation of commercial processors, standards for enforcement, regulation of aquaculture, etc. FDA then monitors state implementation of shellfish programs and determines whether or not they are in compliance with the regulations.

Table 7-2 Shellfish Management Summary

Program	Agency	Description
	FEDERAL PROGRAM	s
Magnuson Fisheries Conservation and Management Act	National Marine Fisheries Service, New England Fishery Management Council, US Coast Guard	Federal management program for marine fisheries in federal waters. Enforcement is handled by the Coast Guard.
Marine Mammal Protection Act, Fish and Wildlife Coordination Act	National Marine Fisheries Service, US Fish and Wildlife Service	Allows NMFS and USFWS to provide comment on projects that
Atlantic States coastal Fisheries Cooperative Management Act, Interjurisdictional Fisheries Act	National Marine Fisheries Service, US Fish and Wildlife Service, Atlantic States Marine Fisheries Commission (ASMFC)	Federal oversight and support for interjurisdictional fisheries management. ASMFC conducts management activities through intergovernmental participation.
National Shellfish Sanitation Program	USDA Food and Drug Administration	This program provides the requirements for shellfish sanitation including classification of growing waters.
	STATE PROGRAMS	
RSA 211 – Fish, Shellfish, Lobster and Crabs RSA 143 – Sanitary Production and 14g and	NH Fish and Game Department	Management program for marine fisheries of the state.

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Non-Regulatory Framework

No programs were reviewed under this section.

State Programs

Management Framework

In New Hampshire, management responsibilities also lie with more than one state agency. The Department of Health and Human Services (DHHS) handles the sanitation portion of shellfish management and the Fish and Game Department (NHFG) handles resource management. The Department of Environmental Services also plays a role, though indirectly, as it is the agency responsible for water quality protection.

Regulatory Framework

Management of the resource is handled by NHFG through the provisions of RSA 211. Regulations for the various species and fisheries are derived from the marine fisheries statutes and department rulemakings. NHFG also monitors implementation, conducts research on the status of the resources and enforces regulations.

New Hampshire is unique in that its harvest is recreational — there is no commercial harvesting of wild stock for consumption (a small amount of commercial harvesting of surf clams for bait does occur in state waters). Although there is no commercial harvesting of shellfish for human consumption, there is commercial processing of out-of-state shellfish (shuckers, packers, etc.) which is regulated by DHHS. These circumstances impose some difficult management issues on the state's shellfish program.

The DHHS is responsible for the state's participation in the federal shellfish sanitation program (the NSSP). Its responsibilities include monitoring of growing waters, inspection of commercial processing, classification of shellfish waters, and compliance with all requirements of the ISSC. DHHS handles some of its responsibilities through cooperative efforts with other state agencies. For example, both NHFG and the NH Coastal Program have provided assistance with sanitary surveys for growing waters.

Under the federal shellfish program, FDA has no authority to regulate the classification of waters used for recreational harvesting, as the NSSP applies only to commercial waters. Thus, FDA has no authority to regulate the classification of NH's growing areas, which are exclusively recreational. However, the state does follow the NSSP for two reasons: the first is that the NSSP standards are the only set of standards that exist to protect public health, and the state sees no reason to protect consumers of recreationally harvested shellfish to a greater or lesser degree than consumers of commercially harvested product. The second reason is that the state does have commercial processing, and the regulation of those businesses is within the purview of FDA, and it is possible that ignoring the NSSP for (recreational) growing water classification could put these operations out of business by having them removed from the ISSC list. Thus, NH tries to follow the NSSP requirements.

Non-Regulatory Programs

New Hampshire has several efforts underway to monitor shellfish and contamination levels and seek out pollution sources. NHFG and DES are involved in the Gulfwatch program to monitor blue mussels, and the NHCP (through NHEP funding) has been involved with shoreline and sanitary surveys. Additional monitoring is done by NHFG, although the data is not consistently or frequently gathered.

Local and Regional Programs

Unlike Maine, where local governments have some authority to sell licenses and control the amount of harvesting, there is essentially no local involvement in shellfish management in New Hampshire. Local police and health officers may be involved in enforcement. Similarly, local land use boards are indirectly involved in management to the extent that local land use management plays a role in controlling pollution sources that impact shellfish. There is, however, no direct role played by local or regional authorities.

Non-Governmental Programs

Some of the shellfish monitoring in the estuaries (in particular, blue mussel monitoring) is being conducted through the Gulfwatch program. Gulfwatch is a broad based, loosely knit initiative of the Gulf of Maine Council, funded partially by the Council and implemented in New Hampshire in conjunction with the Jackson Estuarine Laboratory. Other funding comes from a variety of sources, and the NH DES provides assistance. In addition, shoreline and sanitary surveys have been conducted by the Great Bay Watch program of the UNH Cooperative Extension. Funding for this program was provided by the NHEP. Finally, under the terms of its license, the Seabrook nuclear power station has conducted a long-running survey of softshell clams in the Hampton Harbor estuary.

Evaluation

Recent improvements in management of shellfish suggest promising trends. Several shellfish beds have been re-opened to recreational harvesting, partly the result of early funding from the NHEP devoted to shoreline and sanitary surveys. Contamination problems still exist, although efforts to mitigate them are under way. Population trends are less clear, although resources are being devoted to studying both. Problems with disease appear to be an important consideration for oysters. Finally, illegal harvesting of shellfish has apparently also been a problem.

 The NH shellfish program does not meet NSSP requirements for commercial shellfish growing area status, limiting the state's commercial shellfish and shellfish aquaculture options.

NH is not considered by FDA as an official (ISSC) shellfish-producing state, which would be needed to make commercial harvesting and aquaculture viable industries in the state. To be classified as such on the NSSP list, a number of FDA's concerns with the current shellfish management program would need to be addressed.

The state's administrative rules regarding shellfish sanitation had recently expired, leaving the state with little authority to implement the NSSP. Rules have since been adopted, but because NH administrative rules are revised less frequently than the

NSSP, state rules often lag behind NSSP rules. This remains a problem for which no satisfactory solution has yet been found. Nonetheless, this issue alone is not likely to be a major impediment to NH obtaining recognition as an official shellfish producing state.

FDA seems to feel that some of NH's laws and rules lack clarity in terms of providing sufficient authority to implement certain aspects of the NSSP. It is not clear how significant a problem this would be for obtaining ISSC recognition. The state has successfully pursued some changes to clarify its framework for a shellfish sanitation program. For example, DHHS asked the legislature in 1996 to clarify that it has the authority to classify recreational waters.

Another FDA concern involves staffing levels. Until the NH Estuaries Project provided a full time shellfish person at DHHS, the agency never had a full time staff dedicated to shellfish sanitation. Shellfish duties (shucking house inspections, routine monitoring, and occasional sanitary surveys) were accomplished on a part time basis by restaurant inspectors. When NHEP funding is no longer available for that position, another source of funding will be needed. In order to meet NSSP requirements, NH must have a legitimate shellfish program with adequate staffing to ensure compliance with all aspects of the NSSP.

FDA also appears to be concerned that monitoring and enforcement are inadequate to ensure that shellfish from closed areas does not make it to markets. Thus even with an adequate shellfish sanitation program, the state might not be added to the ISSC list. This issue presumably needs to be resolved before the state obtains NSSP status.

2. Shellfish management appears to be hampered by budget limits. There are no funds for a shellfish sanitation program, causing reduced shellfish harvest opportunities and increasing the public's frustration with resource management agencies.

Funding is, as with most other state programs, an important issue. License fees and certain other funds currently go to NHFG, but that agency is only half of the shellfish management framework. Shellfish fees generate roughly \$40-50,000 per year for the department (an estimated 2,000-2,500 licenses at \$21 each). That figure is probably insufficient to support NHFG duties relating to shellfish (resource management and evaluation, assistance with water sample collection, and enforcement activities). For example, there are no consistent annual population assessments for shellfish, though they would improve management. Some species, like oysters, are more closely monitored than others, and softshell clam monitoring by Normandeau Associates, Inc. under the NPDES permit for the Seabrook nuclear station and research efforts by Jackson Estuarine Laboratory address some of the gaps.

Other funds supplement resource management budgets, but few resources are available for the sanitation aspects of shellfish management. Under shellfish rules, processor fees are now charged for certification, but these fees amounted to only \$8,600 in FY 97. Without adequate funding, DHHS cannot complete sanitary surveys or their updates, resulting in closures of shellfish areas that might otherwise be fishable. This problem has also contributed to the inability of the state to meet NSSP guidelines, effectively prohibiting development of a commercial harvest or commercial aquaculture grow-out industry. DHHS has been able to perform limited shellfish inspections (for the processors) and routine monitoring with current funding, but cannot support a full time staff person or conduct sanitary surveys without additional funding.

This limited funding and commitment to shellfish sanitation creates conflicts between managers and the public. Many recreational shellfish harvesters believe that purchasing a license aids in opening more flats, when in fact those fees go to management of the resource. With insufficient funds to carry out the sanitation side of

shellfish management, the public is unlikely to understand why more flats aren't open for harvesting.

3. Poor communication between FDA and the state regarding shellfish sanitation issues has hindered development of the state's shellfish industries.

In addition, coordination between the state shellfish program and the federal NSSP has been problematic. Communication has been strained and misunderstandings have occurred. The state feels the FDA has given them unclear and conflicting instructions on how to develop their program and FDA feels the state has not made a commitment to shellfish sanitation. These problems appear to be hindering productive dialogue on how to address the state's remaining problems.

4. Water quality problems are likely to limit commercial shellfish and shellfish aquaculture options until they are remediated.

Finally, should the state and the FDA resolve those issues regarding shellfish management discussed above, existing water quality problems are likely to continue to limit the commercial harvest and/or cultivation of shellfish. While current testing has been inadequate to meet FDA requirements, the results of those efforts nonetheless show areas of high fecal coliform. Portions of the coast would not support commercial harvest even with an adequate shellfish sanitation program. For further discussion of water quality issues, see Chapters 4 and 5.

Recommendations For Shellfish Management

- 1. New Hampshire should commit to developing a shellfish program that meets the requirements of the NSSP and provides for adequate management of shellfish resources. Particularly lacking are sanitary surveys and resource assessments. Such a program requires both a policy commitment and a commitment of funding and staff. Financing strategies should examine ways to ensure the shellfish program is self-sustaining. The benefits of such a commitment include improved resources, improved public relations, improvements to efforts to mitigate pollution sources and potential economic benefits from aquaculture and increased commercial shellfish activities. [SHL-1, 7]
- 2. The state should commit itself to taking the steps necessary to gain approval by FDA of its shellfish program. Development of a shellfish program should be followed with a concerted effort toward NSSP approval. Along with this effort should be a similar effort by FDA to clearly state what New Hampshire needs to accomplish to receive approval. [SHL-1, 11]
- 3. State and federal shellfish sanitation programs need to work hard to improve communication and coordination. Communication problems have hindered development of a shellfish sanitation program in the state. [SHL-1]
- 4. Federal, state and local governments should focus more resources on identification and mitigation of pollution sources. Existing sources are probably significant enough to prevent commercial harvesting or aquaculture in some areas, and mitigation of these sources will have wide-spread benefits for the estuaries. [SHL-2, 9; WQ-3c, 4, 5, 6]
- 5. Education efforts are needed regarding illegal shellfish harvesting. Such efforts might involve state, local and non-governmental partnerships. [SHL-5a, 5b, 8, 14, 15]

6. The state should improve shellfish resource inventories. Gaps in stock assessments and species information exist, yet adequate management depends on this information. Significant assistance is available through existing research programs, but additional stable resources would help improve the inventories. [SHL-3]

Endangered Species

New Hampshire's estuaries and the broader coastal region are home to rare and imperilled species, most of which are listed as "threatened" or "endangered" under state or federal endangered species laws. Table 7-3 below contains a partial list of these species.

These species enrich the diversity of the coastal ecosystems and provide substantial recreational benefits for residents and visitors interested in natural history. Their protection is vital because of their vulnerable status, but to be successful, habitat and associated needs must also be protected. Endangered and threatened species are often indicators of underlying environmental problems such as habitat degradation and loss. Thus endangered species programs often dovetail with other programs that result in protected habitat.

Table 7-3 Some Threatened and Endangered Species of the Coastal Region

Plants	Animals
Prolific knotweed	Bald Eagle
Salt marsh gerardia	Common tern
Eastern lilaeopsis	Common Ioon
Downy foxglove	Peregrine Falcon
Small crested sedge	Upland sandpiper
Missouri rock-cress	Piping plover
Turk's-cap lily	Eastern hognose snake
Large-spored quillwort	Four-toed salamander
Hairy brome-grass	Pied-billed grebe
Dwarf glasswort	Shortnose sturgeon (may occur)
Lined bulrush	
Marsh elder	
Shore sedge	
Robust knotweed	
Large salt marsh aster	
Stout bulrush	
Small spike-rush	
Small knotweed	

From Jones, 1997 and Short, 1992

Institutional Infrastructure

Table 7-4 Endangered Species Management Summary

Program	Agency	Description	
FEDERAL PROGRAMS			
Endangered Species Act	US Fish and Wildlife Service	Program for managing and protecting rare and threatened species. Includes strict habitat protection measures.	
National Biological Survey	US Geologic Survey	Program for species and habitat data collection and dissemination.	
STATE PROGRAMS			
Endangered Species Conservation Act (RSA 212-A)	NH Fish and Game Department	Program for management of rare wildlife species.	
Native Plant Protection Act	DRED Natural Heritage Inventory	Program for management of rare plant species.	
NON-GOVERNMENTAL PROGRAMS			
Natural Heritage Inventory Support	NH Nature Conservancy	Staff support for the state's Natural Heritage Inventory and the Native Plant Protection Act.	

Federal Programs

Management and Regulatory Framework

Species identified as threatened or endangered are listed under the Endangered Species Act (ESA) by the U.S. Fish and Wildlife Service. Under the ESA, the federal government must take measures to restore populations to numbers that will allow them to be removed from the list. The levels of recovery differ for each species, and are set forth in recovery plans that the USFWS develops in cooperation with state agencies and other experts.

Regulations on activities that could affect federally-listed species differ for plants and wildlife. The ESA imposes strong regulations for wildlife, prohibiting any activities that would impact or "jeopardize" a rare animal or its critical habitat (critical habitat is specifically designated through the recovery plan). Plants listed under the ESA receive the same level of protection only if the activity in question requires federal permits, receives federal funds, or is being undertaken by a federal agency. Projects that might affect federally listed species are reviewed and permitted by the US Fish and Wildlife Service or the National Marine Fisheries Service. Permits may be issued for certain scientific and academic activities that impact federally threatened or endangered species.

Non-Regulatory Framework

Other federal programs supplement the protections of the ESA. The National Biological Survey provides species and habitat information of value to endangered species programs. The Gulf of Maine Coastal Ecosystem Program, part of a larger effort aimed at restoring the productivity of the Gulf of Maine, has conducted a habitat evaluation that characterized important habitats around the coastal region. This effort was later used by the Great Bay Resource Protection Partnership to identify important lands for protection efforts such as land acquisition, conservation easements, etc.

State Programs

Management and Regulatory Framework

In New Hampshire, animals and plants are protected under separate laws. Wildlife are listed under the NH Endangered Species Conservation Act (RSA 212-A), which is coordinated by the Nongame and Endangered Wildlife Program within the NH Fish and Game Department (a part of the Department of Resources and Economic Development). Plants are listed under the NH Native Plant Protection Act (RSA 217-A), which is implemented by the NH Natural Heritage Inventory within the Department of Resources and Economics.

Under these two state laws, evaluation of animals and plants are done on the basis of best available scientific information. Based on these assessments, species may be listed as "threatened" or "endangered." All plant and animal species listed under the federal ESA are also listed under state laws. Lists of these species and other rare/imperilled species are available from the NH Natural Heritage Inventory.

The state endangered species program for animals (under the NH Endangered Species Conservation Act) is structured similarly to the federal ESA. Taking, possessing, transporting, exporting or selling listed species is illegal, although the state may allow certain activities for scientific purposes or for population restoration. Under the law, however, only the species – not its habitat – is protected. The Nongame and Endangered Wildlife Program coordinates protection efforts for all of the state's wildlife, whether listed or not, that are not hunted, fished or trapped.

Plants listed under the NH Native Plant Protection Act have much less protection than rare wildlife. Species are tracked by the Natural Heritage Inventory, and identification of species is done as access to private lands is obtained. The NHI currently has a database of some 4000 "occurrences" (a documented location of a listed plant).

The presence of a rare plant does not limit landowners' ability to use their land (this is explicitly stated in the law). Landowners applying for state permits, such as wetland permits from the Department of Environmental Services, are required to review options for achieving their land-use objectives while protecting a rare plant, but permit requests will not be denied solely on the basis of a rare plant occurrence. Listed plant species receive strong protection on state lands and where projects are undertaken by state agencies. In these instances, destroying rare plants or their habitats is prohibited.

Non-Regulatory Framework

Both of the state rare and imperiled species programs authorize land acquisition and/or purchase of conservation easements to help protect listed species. In addition, the Natural Heritage Inventory provides a number of fact sheets and publications with information about New Hampshire plants, rare species, and natural communities in the state. Among the publications is an overview of rare plants, animals and exemplary natural communities in Rockingham County.

Local and Regional Programs

No local or regional programs for endangered species protection were identified for this report.

Non-Governmental Programs

The NH office of the Nature Conservancy currently provides support staff for the state Natural Heritage Inventory.

Evaluation

1. Generally strong regulatory framework, though potential weaknesses exist.

The federal Endangered Species Act (ESA) provides the strongest regulations for protecting rare species, but it applies to a relatively small number of plants and animals. The act has been successful in facilitating recovery of some species (e.g. bald eagle and peregrine falcons). Nonetheless, some problems exist. Protection of commercial species (e.g. Pacific salmon) and species where protection conflicts with commercial interests (as in protection of old-growth forest for the spotted owl) is generally tempered by those interests and occasionally hampered. The law also allows for impacts to continue in cases where economic hardship exists and where that activity will not result in "jeopardy" for the species. Although "jeopardy" decisions are supposed to be based on science alone, decisions regarding Pacific salmon have suggested that the "jeopardy" decisions may be more political than scientific.

Habitats identified as critical to the survival of threatened or endangered species are provided additional protection, though incidents such as decisions regarding logging in endangered species habitat in the northwest suggest that socio-economic considerations can limit the effectiveness of habitat protection under the ESA. In the northeast, the US Fish and Wildlife Service has never denied a project because of their successful efforts to work cooperatively with project proponents. Nonetheless, these problems may diminish the effectiveness of the federal endangered species program.

New Hampshire has fairly strong legal authority to protect rare or endangered animals. The Native Plant Protection program, on the other hand, relies heavily on voluntary protection by landowners. While there are strengths and weakness to this approach (discussed below), regulatory authority is limited.

2. Limited state budgets weaken implementation and enforcement.

While budgets and staff of the state's two rare species programs were not specifically examined, it appears that program effectiveness is limited by tight budgets. Both programs rely heavily on grants for budgets, and requests for site evaluation sometimes must go unaddressed. Furthermore, the NH Natural Heritage Inventory has had to supplement its staff with ecologists "on loan" to the state from the Nature Conservancy to meet its mandated responsibilities. The resource limitations for both the Natural Heritage Inventory and the Nongame Program weaken their abilities to protect New Hampshire rare species.

3. Potential strengths and weakness of the voluntary approach to plant protection make difficult to assess the overall effectiveness of the program.

Reliance on voluntary plant protection probably improves public support for rare plant conservation, but it limits the use of strict preservation measures should they become necessary, and may weaken the information base. The voluntary approach, on the other hand, may improve protection when species are discovered since it involves

building an interest in protection among property owners who have species on their lands. Based on these considerations, the overall effectiveness of the state's approach to endangered species protection is difficult to evaluate.

Recommendations for Endangered Species

- 1. The state should improve staffing and resources for rare species protection to make it self-sustaining. The success of the state's non-regulatory approach to rare plant protection relies on extensive resource assessments and landowner contact. The current staff level probably limits the effectiveness of the program, and several of the staff are provided by non-state organizations supported by non-state funds. The rare animal program is similarly hampered by funding and should be expanded. Revenue from a conservation license plate (Massachusetts, Maine, Florida, New Jersey, and other states have adopted such a program) might provide an appropriate budget source. [LND-32, 33, 34]
- 2. The state should improve rare species inventories. Conservation Commissions and UNH students have provided valuable assistance in assessing natural resources at the local level. Coordinating these efforts might provide significant benefits to the various living resource management agencies, particularly the predominantly voluntary NHI program. [LND-32, 33, 34]

Wildlife Management

Wildlife around the estuaries is fairly abundant and many species have increased in recent years. The list of more notable species includes raccoon, red fox, gray fox, white-tailed deer, woodchuck, muskrat, chipmunk, grey squirrel, cottontail rabbit, mink, otter, beaver, fisher cat and coyote; this list is by no means complete. Discussions with many local officials highlighted a widespread belief that, in general, wildlife in the coastal region is increasing. On the other hand, populations of muskrat, mink and otter have declined in recent years based on trapping records, the cause of which may be shoreline development (Short, 1992).

Institutional Infrastructure

A summary of wildlife management programs can be found in Table 7-5.

Federal Programs

The US Fish and Wildlife Service (USFWS) is the federal agency charged with managing freshwater fish and both game and non-game wildlife resources through refuge management, law enforcement and research and education. Non-game management is primarily focused on migratory birds (warblers, orioles, hummingbirds, etc.) through the Migratory Bird Treaty Act. The goal of this act is to prevent declines in migratory birds in accordance with international agreements. Activities that threaten migratory species and impinge on those agreements must obtain a special use permit from the USFWS.

Non-regulatory protection for migratory bird species primarily focuses on protection of nesting habitat. The National Wildlife Refuge system provides important habitat protection in key nesting or stop-over areas. The Great Bay National Wildlife Refuge on the former Pease Air Force Base is one such location. In addition, the Great Bay National Estuarine Research Reserve provides significant protected habitat in the Great Bay estuary.

Table 7-5 Wildlife Management Summary

Program	Agency	Description	
	FEDERAL PROGRAM	AS	
Great Bay National Wildlife Refuge	US Fish and Wildlife Service	Research, education and refuge management for wildlife, including game and non-game species.	
Migratory Bird Treaty Act	US Fish and Wildlife Service	Prevent declines in migratory bird species through international agreements. Taking protected species prohibited without special use permit.	
STATE PROGRAMS			
Game Management	NH Fish and Game Dept.	Management of game species through time, area and gear restrictions.	
Waterfowl Conservation Program (RSA 214)	NH Fish and Game Dept.	Licensing and revenue program for migratory waterfowl management.	
Non-game Species Management Act (RSA 212)	NH Fish and Game Dept.	Program for management of non-game species, primarily through habitat protection.	

State Programs

State management of game species (including freshwater fish) is handled by the NH Department of Fish and Game and regulated through gear, time and area restrictions and bag limits. Under the NH Waterfowl Conservation Program, authorized by RSA 214, waterfowl hunters must obtain a license and state migratory waterfowl stamp in order to hunt. Revenue from the waterfowl stamp program funds habitat acquisition, protection and management and helps provide the budget for the waterfowl program under the NH Fish and Game Department. Additional regulations address release of wildlife.

Non-game species management primarily involves habitat protection. The Non-game Species Management Act (RSA 212) authorizes acquisition of land or aquatic habitat necessary for conservation of non-game species. Coastal lands protected under these programs include some 1,140 acres or more in Zone A, including the roughly 400 acre Bellamy Wildlife Management Area.

Evaluation

These programs were not thoroughly evaluated for this report, and no specific weaknesses were identified.

Marine Aquaculture

Aquaculture is a complex industry involving a wide range of issues from economics to environmental protection. Regulators and managers must consider water quality impacts, potential for release of disease and exotic organisms, conflicts with marine recreation and other water dependent activities and the impacts of such an industry on other local economies. As such, management typically involves a wide range of agencies to ensure all issues are adequately addressed.

Currently there is only limited marine aquaculture in New Hampshire. One land-based finfish operation has been licensed and is active; another finfish operation in offshore waters of the state is in the development process. The latter operation is also applying for a license for suspended mussel cultivation. A pilot project involving bottom and suspended oyster culture and two urchin gonad enhancement projects have also recently been licensed (a third urchin applicant moved its operation to Maine before starting). None of this production goes directly for human consumption (finfish raised by one operation are sold young to operations outside of the state for grow-out).

Institutional Infrastructure

Table 7-6 contains a summary of the institutional infrastructure for aquaculture.

Federal Programs

Management and Regulatory Framework

Several federal programs play a role in aquaculture. All shellfish growers are subject to the National Shellfish Sanitation Program (NSSP), designed to ensure commercial shellfish is safe for consumption. This program is discussed in greater detail above. Since New Hampshire is not NSSP approved, commercial sale of shellfish for consumption is impossible. Product may be sold for grow-out elsewhere or sent for depuration before being sold for consumption, but these restrictions have made commercial shellfish aquaculture unattractive in the state. In addition to the NSSP program, which does not apply to finfish operations, certain other federal regulations may also apply. For example, NPDES permits and other Clean Water Act permits (for dredge and fill, etc.) may be required. In some cases, state and federal regulations overlap (NPDES and state discharge permits, for instance) such that operators need only apply to the state to get approval.

Non-Regulatory Framework

Non-regulatory federal involvement in aquaculture is limited and primarily focused on research support and technical assistance through Sea Grant programs. Much of the UNH Sea

Table 7-6 Aquaculture Infrastructure Summary

Program	Agency	Description		
	FEDERAL PROGRAMS	•		
National Shellfish Sanitation Program	USDA Food and Drug Administration	This program provides the requirements for shellfish sanitation including classification of growing waters.		
Clean Water Act	EPA	Water pollution control programs (such as permitting programs).		
STATE PROGRAMS				
Fish, Shellfish, Lobsters and Crabs (RSA 211)	NH Fish and Game Dept.	NHFG delegated lead management agency for aquaculture (permitting, operation, processing and marketing).		
RSA 143 – Sanitary Production and Distribution of Food	NH Dept. of Health an Human Services	Responsibility for monitoring of shellfish sanitation, including water for aquaculture.		
LOCAL AND REGIONAL PROGRAMS				
Local land use regulations	Municipal governments	Regulations provide water quality protection from nonpoint sources.		

Grant focus appears to be on finfish aquaculture, with less support for shellfish growers. The U.S. Department of Agriculture also provides research support and technical assistance for aquaculture operations (Royal, 1993), though no such activities currently occur in New Hampshire. Federal funds have also been provided for a pilot project in the estuaries attempting to help fishermen shift from wild fisheries harvest to open-water culture of oysters.

State Programs

Management and Regulatory Framework

New Hampshire provides statutory authority for aquaculture through the marine fisheries laws of RSA 211 (RSA 211:62-e). Under that statute, the NH Fish and Game Department is delegated the lead agency for regulating and managing aquaculture. The statute charges the Executive Director of the NHFG with developing regulations regarding permitting, operation, processing, marketing and all other aspects of aquaculture. The stated goal of the statute is to "encourage the orderly development of aquaculture in the state, while ensuring that aquaculture operations do not adversely impact upon the state's aquatic and marine resources and do not pose unacceptable disease, ecological, environmental, health, safety or welfare risks to persons, the environment, aquatic species or marine species."

While the statute applies to all aquaculture activities (such as the propagation and rearing of aquatic (defined as freshwater) and marine species and including planting, growing, harvesting and transporting operations) most of the provisions are specifically directed at those for anadromous fish. Requirements established by the statute refer to anadromous species, suggesting they don't apply to other operations. This construction creates a somewhat confusing statutory environment in which aquaculture must develop.

Rules developed under the statute (Fis 807) govern licensing (required for all operations) and operation of aquaculture facilities. These rules establish licensing fees, require public hearings for licensing decisions, include some standards and restrictions and require environmental

monitoring and reporting for operations. These rules make up the majority of the state's aquaculture management program.

State aquaculture policy thus far consists of a strategic plan developed by NHFG and a Memorandum of Agreement (MOA) between NHFG and the NH Department of Agriculture (NHDA) outlining the roles of the two agencies. Under the MOA, NHFG handles permitting and regulatory activities while NHDA provides assistance with marketing and securing of startup funds. The strategic plan provides NHFG with internal guidance for licensing decisions, recommendations for improving coordination of the state's aquaculture activities and guidance and assistance for license applicants. As such, this strategic plan is more appropriately considered a guidance document than a strategic plan.

Additional state regulations and requirements may apply to aquaculture operations. Water quality certification and discharge permits may be required (primarily under the point source provisions discussed in Chapter 5) as well as wetland and/or dredge and fill permits. In proximity to the estuaries, provisions of the Comprehensive Shoreland Protection Act may apply. Leasing of public land may be required for water based operations, and public trust issues of access to the water column would require resolution. In addition, shellfish aquaculture for human consumption would require NSSP certification through the Department of Health and Human Services.

Local and Regional Programs

Certain local land use regulations may also apply to aquaculture operations, and local approval may be required. A study from 1993 found no specific local land use regulations that would pertain to aquaculture among NH coastal communities (Royal, 1993). A similar review of local regulations conducted for this report found no provisions that would apply directly to aquaculture. Nonetheless, land based operations may well face site plan review or subdivision regulations, and various provisions of local shoreland protection districts may apply depending on the location, type and size of the operation.

Non-Governmental Programs

No programs were reviewed under this section.

Evaluation

1. The state lacks a formal policy and strategic plan for aquaculture including clarification of the roles and responsibilities of all relevant agencies.

Assuming RSA 211 establishes an intent to foster aquaculture development in New Hampshire, the state needs to develop a formal policy and strategic plan for aquaculture with input from all relevant agencies. The existing strategic plan developed by the NHFG and the MOA between NHFG and NHDA are important steps in this direction. Comments regarding the plan have highlighted concern over the fact that it was not developed in a broad, multi-agency fashion. These concerns may arise out of confusion over the role of the plan; it was intended as an internal guidance document rather than a formal strategic plan. Nonetheless, the range of issues involved suggests the state should develop a multi-agency strategic plan to help clarify the state's goals and the roles of the various agencies involved.

Certain specific aquaculture issues were highlighted during interviews for this report. Industry representatives have expressed concerns regarding licensing procedures. While NHFG works to provide assistance in securing the range of necessary permits, some applicants continue to find the permit process a difficult hurdle. Permit requirements may be necessary to protect environmental and social concerns, but they can also be discouraging for potential operators. Some applicants would like to see a "one stop shopping" permit procedure where all necessary permits are rolled into one. Such an approach may be difficult to implement given the variability of requirements that may apply to different operations, so such an approach would need to be carefully evaluated.

Other concerns include a lack of formal appeals procedure for licensing decisions and time limits on agency issuance of permits. Industry representatives are concerned that some agencies appear to have no time limits for issuing permits, causing costly delays, and that they have no recourse to appeal license decisions. The former problem was not evaluated in this report, while in the latter case, NHFG points out that no licenses have been denied.

A related area in need of attention is clarification of the roles of the various state agencies. NHFG is the current lead regulatory agency, and it has the expertise and infrastructure (e.g. enforcement staff, biology expertise, boats, etc.) to manage at least some aspects of aquaculture. A memorandum of agreement with NH Department of Agriculture has helped define the role of that agency. Other aspects of aquaculture may require involvement of still other agencies (for instance, DES handles water quality issues that may well arise), and these roles are not well defined. New Hampshire will need to clarify the roles of the various agencies to ensure efficient and effective management in the face of an expanding industry, and should do so as part of a strategic planning effort.

2. The lack of NSSP approval in NH hinders shellfish aquaculture.

A substantial roadblock for shellfish aquaculture is the state's absence on the ISSC list of NSSP compliant states. This problem limits the development of commercial shellfish aquaculture. A factor in the state's failure to be approved involves the lack of commitment to a stable and adequate shellfish sanitation program. Insufficient monitoring and enforcement of water quality closures has also been cited by the FDA as a factor preventing certification. Finally, water quality problems at the root of the NSSP issue are likely to limit aquaculture development if left unresolved. These issues are discussed in greater detail above in the shellfish section, but they are applicable to shellfish aquaculture.

3. Funding is limited and probably inadequate to support expanded aquaculture and the range of potential problems that could arise.

There is currently a lack of funding and resources available for aquaculture management. NHFG handles aquaculture within its current staff and program areas, yet as discussed earlier in this chapter, these resources are already limited. As has been mentioned several times in this report, state agencies have been creative in maximizing their effectiveness within these limits. Nonetheless, aquaculture activities are clearly constrained by budgets. Any expansion in effort will require additional resources.

Most of the issues discussed above presuppose expansion of the marine aquaculture industry in the state. Physical limitations (e.g. the small coastline and estuary bathymetry) and economic and other considerations may constrain aquaculture such that it never expands beyond its current size. Nonetheless, the state should be prepared for any expansion.

Recommendations for Marine Aquaculture

- 1. The state needs to determine its level of commitment to aquaculture development and develop a formal policy consistent with that commitment. Since aquaculture involves management under several agencies, such a policy should be developed through a multi-agency effort (including NHFG, DHHS, NHDA, DES, etc.) and be well coordinated. [SHL-11, 1]
- 2. New Hampshire should commit to developing a shellfish program that meets the requirements of the NSSP and provides for adequate management of shellfish resources. Particularly lacking are sanitary surveys and resource assessments. Such a program requires both a policy commitment and a commitment of funding and staff. The benefits of such a commitment include improved resources, improved public relations, improvements to efforts to mitigate pollution sources and potential economic benefits from aquaculture and increased commercial shellfish activities. [SHL-1]
- 3. The state should provide funding and staff consistent with its level of commitment to aquaculture development. Current staff and funding is insufficient to handle expanded aquaculture.[SHL-7]

Local Management Framework

ocal land use regulation and resource management are vital parts of environmental management in New Hampshire. Limited budgets at the state level - in part due to the state's tax structure - and the sanctity of home rule in the "Live free or die" state means that communities bear a large responsibility for wise use of their resources. The wisdom or folly of such an approach, while perhaps an important question, is not an issue for discussion in this forum.

In the coastal zone, there is a wide range of resources and policy making sophistication available at the local level. There are small towns with extremely limited resources and staff that use fairly simplified land use policies and procedures, and there are much larger cities with planning and engineering staffs and elaborate policies and procedures. In some cases these communities are neighbors, so that levels of protection are spatially quite varied. The reliance on local control and the wide variety of approaches to regulation and management make an understanding of local land use policies crucial to understaning the strengths and weaknesses of estuary protection.

Specific local regulations are discussed at length in earlier chapters as they relate to the problems of the estuaries. Strengths, weaknesses and gaps are evaluated. This chapter includes a brief summary of regulations but focuses primarily on the resources available and policies and procedures used in addressing resource related decisions that will affect the estuaries.

Regulatory Overview

Under New Hampshire law (RSA 674), towns have the right to control land use through zoning, subdivision regulation and site plan review for the purpose of protecting the health, safety and general welfare of the community. This right is fairly broadly constructed, allowing the use of innovative land use controls such as cluster development, transfers of development rights and zoning for environmental characteristics (RSA 674:16, 21). In addition, towns are authorized to adopt growth management ordinances designed to control the timing of development. These authorities provide the towns with powerful tools for managing their resources and protecting the estuaries.

Prior to adoption of any of these land use controls, towns must first develop and adopt a Master Plan for the community. Master Plans include discussions of community objectives and policies, existing land use, transportation, public services, recreation and conservation. While not regulatory, these documents provide the basis on which specific land use controls are developed. Often, Master Plans will include a local water resources management and protection plan, developed through the Water Protection Assistance Program of the Office of State Planning,

which enables the town to develop interim restrictions should there be a threat to a critical water resource.

These few powers endow the towns with significant authority to protect natural resources through a wide range of approaches. Regulatory approaches include direct and indirect controls such as density limits, impervious surface limits, use zoning, resource protection overlay districts, subdivision requirements, open space requirements, and others. Through site plan review, land use changes (for instance, from residential to commercial) may be regulated in terms of their impact on drainage, open space, pollution and other issues related to the health, safety, convenience and prosperity of the town.

Towns may also create Conservation Commissions whose role includes oversight of wetlands and other natural resources, and which can pursue acquisition of open space or open space easements. While non-regulatory, Conservation Commissions can be a valuable resource for specific assistance on local management of natural resources, including review of development proposals. In addition, Conservation Commissions have authority to temporarily delay wetlands permitting to provide additional time for permit review, and may enhance a town's ability to develop the funds for open space acquisition. All towns in the NHEP study area (Zones A and B) have created Conservation Commissions, although the level of activity among them varies substantially.

Virtually all local authority is voluntary and need not be used. While granted authority to develop subdivision regulations and site plan review requirements, towns may, if they choose, ignore issues such as erosion and stormwater control, wetlands protection and development of shorelines. Since state authorities on these issues are frequently limited, certain activities remain unregulated. For instance, state law regulates land disturbances only when they involve 100,000 ft² of area (or 50,000 ft² within the protected shoreline of the Comprehensive Shoreland Protection Act). Smaller disturbances are left to the discretion of local land use boards through zoning controls. But towns may or may not have stormwater and erosion control regulations in their land use controls, leaving a potentially large gap in protection against the associated non-point source pollution problems.

Though voluntary, all municipalities within Zone A have established zoning, subdivision regulations and site plan review processes. A cursory review suggests the same is true of Zone B towns, suggesting fairly broad acceptance of the concepts of planning and local regulation of development. Nonetheless, the degree to which municipalities have put to use resource protection regulations, and the degree to which existing local land use controls are implemented and enforced bears strongly on the level of resource protection that exists. Extensive regulation is meaningless unless it is upheld by the local officials. Thus local land use control and its enforcement is a vital link in protection for New Hampshire estuaries.

Regulations examined for this report included erosion and sediment controls, stormwater management, septic provisions, resource protection overlay districts and several miscellaneous provisions. Table 8-1 below lists the kinds of regulations sought for each of the estuary issues covered by the report. In some cases, there is no local regulation, though other procedures may be used.

Table 8-1 Local Land Use Control Options

Problem/Issue	Local Land Use Controls				
Non-point Source Pollution					
Stormwater Runoff	Impervious surface limits, plan requirements, design and performance standards, specific design requirements, referral to guidance manuals, impact analyses.				
Septic Systems	Soil based lot sizes, setbacks from surface waters and wellhead protection districts, local review procedures, siting requirements, maintenance requirements, inspections, sewer hook-up requirements.				
Construction/Erosion	Plan requirements, impact analyses, design and performance standards, design requirements, referral to guidance manuals, reclamation requirements.				
	Point Source Pollution				
Wastewater Treatment Systems	Sewer hook-up requirements, prohibitions on tying residential runoff into sewer lines, industrial pre-treatment				
Industrial Discharge	Comment on NPDES permits				
Urban Runoff	Comment on NPDES permits				
	Habitat Degradation				
Shoreline Development	Shoreland Protection Districts: septic and structure setbacks, use restrictions, buffer requirements				
Wetlands	Wetland Protection Districts: land use restrictions, septic and structure setbacks, buffer requirements, local permit requirements and review, prime wetland designation				
Hydromodification	None				
Open Space	Open space plans, fee simple acquisition, acquisition of conservation easements, cluster development, transfers of development rights, open space requirements for subdivision or land use change				
Living Resources	None				
	Other				
Agriculture	Public health restrictions (e.g. livestock), shoreland or wetland district restrictions				
Forestry	Water resources buffer zone requirements				
Marinas and Boating	Siting restrictions, pumpout and sanitary facility requirements				
Biosolids/Septage	Ordinances: planning requirements, guidance manuals				
Junkyards	Specific district restrictions (e.g. shoreland prohibitions, etc.)				
USTs	Aquifer or other resource protection restrictions				
Mining/Gravel Excavation	RSA 155-E Ordinances: permit requirements, prohibitions, operational and reclamation standards				
Combined Sewer Overflows	None				

Table 8-2 summarizes the basic provisions of the Zone A local land use controls. The table indicates what towns have adopted provisions for each of the target issues, but it provides no indication of the effectiveness of specific provisions. Such an evaluation is currently being conducted in the Exeter River watershed through the Office of State Planning and the regional planning commissions, but that program was not implemented in time to be incorporated into this evaluation. The effectiveness of specific provisions as they relate to specific environmental problems is addressed in greater detail in chapters dealing with those problems, and is briefly summarized below.

Septic system controls at the local level are fairly widely used, yet specific provisions tend to vary widely. Some contain siting requirements or minimum elevations above bedrock or aquifers, while others require local permitting or inspection. State regulations are strong and provide the majority of control over installation and maintenance, while local provisions

supplement these requirements. Local requirements are often more strict with respect to set backs from surface waters and/or wetlands (discussed below).

Erosion and sediment control provisions for Zone A towns are summarized in Table 4-4. All towns except one () have adopted some form of erosion control requirements, although the level of regulation varies widely from town to town. The state provides a model ordinance for erosion control (see Appendix D) that specifies a thorough erosion control program. Seven of the municipalities have adopted ordinances that approximate the requirements of the model. Three additional towns derive significant authority to control erosion by referencing their requirements to the "Green Book," a manual for erosion and stormwater control for New Hampshire municipalities.

Stormwater runoff controls are less widely implemented than erosion controls. Only one municipality, Stratham, has implemented provisions that approximate the state model ordinance for stormwater control. Six other towns have adopted stormwater planning requirements for development projects that reference the "Green Book" measures. Table 4-? provides a summary of provisions in Zone A land use regulations.

Aquifer protection districts are in place in 12 of the 19 Zone A municipalities. Hampton Falls, Madbury, New Castle, Newington, Portsmouth, Rye and Seabrook have adopted no such districts. The districts that do exist are quite similar from town to town with the exception of impervious surface limits, which vary from 0 to 60%. Table 8-3 contains a summary of Zone A aquifer protection districts.

Wetland protection provisions for Zone A are listed in Table 6-8. Wetland protection is widely implemented in Zone A towns, with all but Greenland and Seabrook providing substantial local protection. Dredge and fill and most other uses are prohibited within wetlands, and 14 towns require buffers and/or building setbacks around wetlands. Septic systems are also typically required to be set back 75 feet or more from type A wetlands (50 feet or more from type B wetlands).

Adjust de citor Wellship Gipt Store and a store Stormated Sedicottols/ tio control WEMPP Master Long Plan Dover in progress Durham 1989 1 Exeter 1994 1 1 1 Greenland 1 1 in progress V V Hampton 1996 1 1 1 V 1 1 Hampton Falls 1994 1 1 V Madbury 1982 1 1 1 1 New Castle 1 1992 1 1 Newfields 1995 1 1 1 1 1 1 Newington 1990 1 Newmarket 1994 V 1 North Hampton 1989 1 1 1 1 1 Portsmouth 1993 1 1 1 1 1 • Rochester 1993 1 1 1 ~ Rollinsford 1988 1 Rye 1986 1 1 1 Seabrook V ~ 1 1991

Table 8-2 Land Use Regulations Summary

V

1989

1985

Somersworth

Stratham

Table 8-2 (Continued) Land Use Regulations Summary

Тоип	Open Space	Chemicals/	Gravel Excavation	Floodplain Ordinances	Impact Studies	Growth Mgmt	Biosolids Regs.	Marinas	Review Committees
Dover	~		~	~	~				V
Durham	~	~			~				
Exeter	•	~	~	~	~			~	'
Greenland	•	~	~	~	~	~	~		
Hampton				~		~			
Hampton Falls			~	~					
Madbury	'		~		~				
New Castle	'	~		~					
Newfields	'		~						
Newington		~							
Newmarket	'		~	~					
North Hampton			·	~	~				
Portsmouth	~	~	~	~					
Rochester	~		~	~	~				
Rollinsford	~	~	~				~		
Rye					✓	~			
Seabrook		~	~	~					
Somersworth	~		V	~					
Stratham	~		/	~					

Table 8-3 Zone A Aquifer Protection Regulations

Town	Ordinance in Place	Typical Land Use Restrictions	Impervious Surface Limits	Other Requirements
Dover	3	3	0-20%	Specifies allowed uses: (wells, dams, conservation, recreation, some forestry and agriculture)
Durham	3	3	25%	Nitrogen standards apply, hydrogeologic study required for large subdivisions (10+ lots).
Exeter	3	3	10%	Runoff must be diverted to vegetated infiltration area. Impact study required.
Greenland	3	3	20%	Nitrogen standards apply for large subdivisions. Hydrogeologic studies may be required. Allows some forestry, agriculture and nurseries.
Hampton	3	3	25-60%	Minimum lot size is 1/3 larger than underlying zone. Allows some commercial, industrial uses.
Hampton Falls				
Madbury				
New Castle				
Newfields	3	3	25%	3 acre minimum lot size, 2 if sewered. Special exceptions allowed after a finding of fact that groundwater will be protected. Agriculture and forestry allowed if will not contaminate.
Newington				
Newmarket	3	3	20%	
North Hampton	3	3		Conditional uses allowed for wide range of potentially hazardous uses.
Portsmouth				
Rochester	3	3	40%	Impervious surfaces may increase to 60% with adequate purification and recharge. Petroleum and gas storage may be allowed.
Rollinsford	3	3	10%	District defined around town wells.
Rye				
Seabrook				
Somersworth	3	3	10%	Drainage plan required to provide for on-site retention and oil and grease filtration of parking lot runoff.
Stratham	3	3	20%	Impervious limits may be reduced if stormwater plan is submitted. Min. lot sizes may increase based on soil type Agriculture and forestry permitted, BMPs required.

Shoreland protection districts have been established in eight of the 19 Zone A municipalities (Dover, Durham, Exeter, Madbury, Newfields, Newmarket, Somersworth and Stratham, see Table 6-6). Generally these districts don't provide as broad protections as the state program (Table 6-7), yet they apply to more water bodies and contain stricter building setbacks. Portsmouth provides protection for a limited shoreland area, and Rye provides some shoreland protection through provisions of its wetland protection ordinances (which apply to surface waters).

The absence of specific land use controls may not reflect inaction by any specific town. Circumstances may push some towns toward alternative approaches. Under state law (RSA 674:16) the legislative body of a town or city (town councils and boards of selectmen) are charged with developing ordinances, while planning boards can be authorized to develop site plan review and subdivision regulations. Since councilors and selectmen are frequently not as well versed in land management and resource protection, some towns (Durham and Exeter for example) have elected to develop fairly general zoning ordinances as guidelines, leaving the specifics to the

planning board. The Planning Board then develops more specific subdivision regulations and site plan review processes, and works out the details of permit conditions through the review process.

Implementing new zoning regulations is often difficult. New ordinances must be passed by Boards of Selectmen or City and Town Councils, and the procedure for approving these measures is generally a political process rather than a policy process. In Durham, some local officials would like to try to improve stormwater management provisions and shoreland protection provisions of zoning and subdivision regulations, but have not yet pushed for these changes for fear of losing those regulations that already exist. By opening up debate on a specific provision or ordinance, the entire provision or ordinance becomes subject to the possibility of removal. Inaction results because of the belief that a weak regulation is better than no regulation. This problem appears to be widespread and may be the root of resistance to recommendations from OSP or other state agencies.

This problem may have no easy solutions. The state has recommended adoption of model ordinances by reference so that updates to the model are automatically incorporated into local policy. This approach, however, is not widely used, probably because it removes a certain degree of local control over policy. It also puts a burden on developers to track state changes to ordinances and policies (the current local approach ensures fewer changes result because of the political issues mentioned above). Thus far only one town in Zone A has adopted a state model (the shoreland protection ordinance) by reference (Somersworth adopted it for its site plan review process).

A fairly common approach whereby communities develop their own ordinances but tie specific requirements to technical manuals (such as the "Green Book" for stormwater and erosion control) is probably a more palatable solution and should be encouraged. Such manuals and their updates could be made available through the permit process, thereby reducing the hardship for the developer.

Policies and Procedures

Equally important with land use regulations are the procedures used in implementing and enforcing them. Communities with comprehensive land use regulations may do a poor job of enforcing those regulations. Likewise, communities with limited regulations may actually do a thorough job of protecting important resources, either through aggressive land conservation or strong enforcement. Strong ordinances have the advantage of being less susceptible to the orientation of land use boards and code enforcement officers (CEOs), and as such should be a first line of defense, but the policies and practices of implementation and enforcement are vital to the picture.

This study was not comprehensive enough to provide an in depth evaluation of the policies and practices of each local board, CEO, health officer and building inspector. Such an evaluation would be quite useful, as it was evident from interviews that some towns engage in more limited permit review and code enforcement than others. This review, instead, was used to try to identify the kinds of strengths and weaknesses that exist in local land use policies.

Information for this review was derived from interviews with local officials from planning boards, conservation commissions, boards of selectmen and town councils as well as building inspectors and code enforcement officers. The NHEP Land Use/Natural Resource Regulation Project Team provided assistance, along with feedback from selected other individuals, in

developing questions geared toward determining the procedures for implementing and enforcing ordinances, and for identifying non-regulatory programs in each of the towns.

The questionnaire changed somewhat throughout the interview process in response to new information, but the guidelines for questions are listed in Appendix B. Questions 1-8 were designed with several goals in mind, including their use as warm-up questions and to provide information for a separate but related project (Needs Assessment for Local Decision Makers: A report to the Great Bay National Estuarine Research Reserve, Paulsen, 1998). Not all questions were asked of all of the participants, in part in order to keep the length of the interviews within a 30 to 45 minute time frame. Followup discussions were used to clarify points of uncertainty and to collect additional information where needed.

Briefly stated, there are two forms of government in the coastal area: city government in which mayors and town councils lead the administrative and regulatory or policy branches; and towns in which Boards of Selectmen serve both functions. In both cases, Planning Boards serve as the land use decision making bodies, with Zoning Boards hearing appeals of Planning Board decisions and deciding on zoning variance requests.

Cities, by virtue of their size and larger tax base, tend to have larger staffs including planning departments and engineering staff. All of these resources may be brought to bear on land use decisions and planning exercises. Smaller towns, on the other hand, are commonly dominated by volunteer officials. Selectmen, planning boards and zoning boards are voluntary, and paid staff are usually limited to administrative personnel. Support for land use decisions must be brought in from outside sources (see Staff and Resources section below).

Implementation of regulations begins with development review procedures. Subdivision of land for development and land use changes (for instance from residential to commercial) are required to be reviewed by planning boards for consistency with local development regulations. As with other aspects of local government, there are a wide variety of development review procedures used by towns in the seacoast region.

More sophisticated procedures in use in the 19 coastal towns involve proposals being reviewed by planning staff, building inspectors and code enforcement officers (CEOs), public works departments and/or town engineers, Conservation Commissions, and others, prior to Planning Board review. Technical review committees, used by some towns (e.g. Exeter, Dover, and others), incorporate most or all of the individuals above to ensure the proposed activity meets the requirements of zoning, subdivision and site plan review, and that the resource protection provisions are followed (e.g. setbacks are met). When projects receive such significant early review, concerns about specific projects can then be forwarded to the developer for consideration of alternatives before formal Planning Board review. Projects hopefully come out of this review process carefully scrutinized, and the building inspector or CEO, who is responsible for enforcement, is well aware of the resource protection concerns.

Enforcement may also involve several layers as well, with some towns employing CEOs, staff engineers, contract engineers or other specifically trained individuals inspecting setback requirements, site improvements and features such as erosion and stormwater control measures. Planning staff may coordinate the activities of each of the players in the review and monitoring process, and may follow with final inspections before a certificate of occupancy is issued. Exeter has developed procedures for documenting field changes and ensuring they are reviewed by the Planning Board if they are extensive. Decisions about whether or not planning boards should be involved in field changes are made by the town planner. Finally, performance bonds would be

required for all resource protection aspects of the project, particularly erosion and stormwater control mechanisms, onsite disposal or septic systems, and related improvements.

When building inspectors or CEOs are involved in review of development projects, as generally happens when those individuals are staff instead of contractors, they are more likely to be aware of setbacks, land use restrictions, etc. that are part of the approved project. When not, the disconnect between planning board approval and construction permit review creates a greater possibility that existing requirements will not be met. If the building inspector is not familiar with the provisions of the wetland or shoreland protection districts, land use restrictions within aquifer districts, or other resource protection regulations and their application to a specific project, some of those provisions may not be adequately implemented or enforced.

While this may not seem to be a large problem - inspectors and code enforcement officers do have access to approved plans and requirements from the planning boards - there are numerous reasons why enforcement may not occur. Discussions with one building inspector lead to his admission that silt fence requirements were not being enforced because there didn't appear to be any sedimentation or siltation occurring. In Zone B towns of the Exeter River watershed, similar discussions with building inspectors suggest this type of problem may be extensive (Glen Greenwood, Rockingham Planning Commission, pers. comm.). The accountability that comes along with the more involved development review procedures helps eliminate enforcement problems.

Post construction enforcement of permit conditions such as long term stormwater control and best management practices, septic system maintenance and performance, etc. is also quite important for resource protection, yet it is generally lacking. In fact, no municipalities in Zone A have any program for long term monitoring and enforcement, and several officials expressed the opinion that this may be a significant problem for the estuaries. Lack of staff and resources may explain some of this problem, but some officials explained that, though state law allows long term monitoring and enforcement (including fines for non-compliance), there are no standards for what constitutes non-compliance. Specifically, there is no guidance on how frequently maintenance should occur or to what extent it should be done.

These various procedures may be costly to implement, and may even seem repetitive, but they provide important scrutiny for the protection of natural resources. If one layer is unwilling or unable to address a concern, others exist to do so. The cost of such procedures may be reduced some through the use of county conservation districts and regional planning commissions.

Many towns don't feel they have adequate budgets to hire planning or engineering staffs and additional inspectors to provide the multi-level review that the larger towns and cities are able to provide. Most towns in Zone A work regularly with the regional planning commissions and county conservation districts to assist in planning activities and development review. While not as effective as the sophisticated procedures of some of the larger communities, these procedures do improve implementation and enforcement. This cost issue highlights a common paradox in planning and land use management. Money for planning is limited at the very time when planning is most needed. By the time development has provided the revenue for more flexible town budgets, the damage is often done.

While a thorough review of each town's procedures was beyond the scope of this project, at least one generalization came out of discussions with local officials. Those towns with larger staff resources (particularly planning and enforcement staff) tend to have more sophisticated review and enforcement procedures. Though not always true, those municipalities listed as having planning staff in Table 8-5 tend to have more sophisticated procedures.

Another potential weakness in implementation and enforcement and a potential source of water quality impacts involves permit review for single family home construction (on prior approved lots) and renovations and additions, none of which are reviewed by the planning boards. These projects are reviewed by one building inspector, often a part-time employee or contractor to the town, with little or no additional review. They may easily encroach on wetlands, protected aquifers or shorelands without being noticed. Individually these problems may be small, but they are a source of cumulative impacts of unknown proportions that should be seriously considered by the towns of the watershed.

This problem may be alleviated in part by careful mapping of natural resources, active Conservation Commissions and increasingly sophisticated procedures for review. For instance, in Rye the building inspector works closely with the Conservation Commission to ensure wetland setbacks for individual projects are adequate. Portsmouth and Exeter require all building permit applications to be reviewed by the Planning Department. Newfields requires all such applications to be reviewed by a soil scientist.

A fairly common complaint aired during discussions with local officials was that developers and land owners have no way of knowing what restrictions might apply to their land or projects until they go through the permitting process. For instance, land owners with a small perennial stream running through their property may be unsure whether or not shoreland protection applies to that stream. This problem is most common when state and local regulations differ. By that time, considerable investment may have already been made, and in some cases the property owner becomes frustrated and resistant to negotiated solutions.

Variances provide a potential end-run around ordinances that could substantially undermine resource protection. State law requires applicants to prove five conditions in order to qualify for a variance: 1) that denial of the variance would result in unnecessary hardship to the applicant; 2) that there will be no diminution in value of surrounding properties; 3) that the proposed use would not be contrary to the spirit of the ordinance; 4) that granting the variance would benefit the public interest; and 5) that granting the variance would do substantial justice. Courts have interpreted these provisions to mean that the hardship must be so great as to effectively prevent the owner from making any reasonable use of the land and that the hardship must arise from some unique condition of the parcel itself rather than from a condition unique to the individual. (Planning and Land Use Regulation: Selected Laws, 1995)

These five criteria are intended to be quite strict. A marina in Hebron wanting to expand could not be granted a variance since it was already able to make viable use of the land. (Grey Rocks Land Trust v. Town of Hebron (1992) 136 NH 239, 614 A2d 1048) In another case, an airline pilot wanting to build a garage to allow fast winter trips for unanticipated emergency flights was prevented from receiving a variance because the hardship was unique to the individual, not to the parcel. (Crossley v. Pelham (1990) 133 NH 215, 578 A2d 319) Despite the intention that these criteria be strictly interpreted, review of Zoning Board minutes suggests that ZBAs frequently rule on them merely as a formality. Applicants appear to state only that they meet each of the criteria without having to establish how. Anecdotal evidence suggests that some ZBAs may not even review the criteria as they are required to do.

While variances may be granted inappropriately, they are a problem for resource protection only insofar as they are granted for resource protection provisions such as erosion and stormwater control, resource protection setbacks, etc. A partial review of zoning board actions shows that variances are in fact granted for resource protection provisions, though the majority are for property line setbacks and similar non-resource related issues.

Table 8-4 shows the results of a review of recent zoning board actions in Seabrook, Newington, Hampton and Dover. In Hampton, 126 of 155 variance requests (80%) were granted between 1995 and mid-1997. Seven of these variances were related to resource protection ordinances. In Newington, five of 53 variance requests were granted for resource protection issues, whereas in Seabrook and Dover, no resource protection related variances were granted. Specifics about each of these cases suggest some are more problematic than others. In Durham, at least one variance was recently granted for a church enlargement where drainage swales for a parking lot would encroach on a wetland.

Dover and Exeter have established procedures to limit the number of such issues going to the zoning board by incorporating conditional uses into their ordinances. While fewer restrictions apply to conditional uses, they are reviewed by planning boards which typically have greater expertise in resource protection issues than zoning boards. Combined with intensive project review, this approach may be more effective than having the more strict zoning board decide on approval or disapproval of high impact projects.

Table 8-4 Variance Review

Town	Year	Total Variances Granted	Variances Conditionally Granted	Resource Protection Variances Granted	Total Variances Denied
Seabrook	1997	10	2	0	0
	1996	11	4	0	1
	1995	7	3	0	1
	Total	28	9	0	2
Hampton	1997	15	6	2	4
	1996	49	7	3	15
	1995	62	29	2	10
	Total	126	42	7	29
Newington	1997	4	-	1	1
	1996	31	-	2 (w/conditions)	0
	1995	14	-	2	3
	Total	49	-	5	4
Dover	1997	6	0	0	0
	1996	25	7	0	3
	1995				
	Total				

Hampton variances included a shed in a wetlands buffer (granted with condition applicant gets permission from Conservation Commission), a deck in a wetlands district (subject to approval of Wetlands Board), a project granted permits by Wetlands Board, a re-establishment of 2 lots below minimum lot size, one project to widen deck stairs in wetlands district, and a project granted on condition of Wetlands Board approval. One resource protection variance was denied on the basis of drainage problems and over-intensification.

Data for Newington does not show 3 resource related special exceptions granted. Two variances for septic setback in the wetlands district were granted with conditions on design and construction; one for laying of foundation drain pipe in wetland, granted with condition of wetlands board approval; and one for a building setback in wetland.

Weak local enforcement of state laws is also a fairly widespread problem, made significant by the fact New Hampshire tends to rely heavily on local governments for regulatory assistance (e.g. the shoreland protection program). Local officials only have direct legal authority for enforcing state regulations if those regulations are adopted by the town. Local officials may monitor activities for compliance with state laws and report problems to the appropriate agencies, but this requires additional work for staff or contractors with limited time. Local governments that want the protections of these state programs may need to adopt their own ordinances as an additional layer of protection.

This problem becomes murkier when communities expect protections provided by state laws but neighboring communities are unwilling or unable to uphold them, and the impacts from those actions cross town lines. This scenario typically occurs when upstream neighbors engage in activities that degrade water quality for downstream users, but it also occurs with habitat protection efforts, wildlife enhancement, and others. Because communities are not insular, and environmental problems aren't fenced in by political boundaries, land use decisions should consider broader regional impacts rather than immediate needs or goals of communities. This is, in fact, one of the most important arguments for strong state regulation of water quality and environmental impacts.

Furthermore, coordination among towns in the seacoast area is weak and there is little tendency to develop mutually supportive policies and practices. Most town officials don't know what regulations exist in their neighboring towns and have even less understanding of policies and enforcement practices in those towns. This lack of knowledge and coordination makes a watershed approach to local land use policy difficult or impossible and primes municipalities for cross-border conflicts.

Finally, conflicts of interest are also a potential problem at the local level. Though state law prohibits land use board members from participating in decisions that will have a "direct personal or pecuniary interest in the outcome" (RSA 673:14), there is little protection against indirect conflicts of interest. Some local officials have expressed concern that indirect conflicts of interest are a significant problem.

Staff and Resources

Staff and resource limits in all coastal towns impede enforcement to some degree. Resources to fully enforce zoning laws would undoubtedly be vast, because by their nature they would require intense scrutiny of the land area within the town. But this level of implementation and enforcement is probably not necessary and certainly not currently practical. Even with this in mind, however, staff and resources vary widely from town to town in the seacoast area.

One of the most important resources available to communities involves planning assistance. Professional planners can help towns make wise decisions regarding zoning ordinances, development review, project planning and oversight and more. Planners help land use boards ensure projects are consistent with zoning ordinances and other local regulations, and can help monitor compliance with state laws. Particularly where planning boards are composed of volunteers without training or experience in natural resources and environmental protection, planning assistance is perhaps one of the most important management tools a town has available.

In the NHEP area, planning assistance is available either through staff planners or through circuit riding planners provided by the regional planning commissions. Circuit riding planners are available on a limited basis for towns with no planning staff, though additional assistance can

usually be obtained if needed. Table 8-4 lists Zone A towns with planning staffs and those reliant on circuit riding planners.

Municipalities may get further assistance in reviewing project proposals and monitoring development activities through engineers and other professionals. As with planning staff, some municipalities have engineering staffs that assist with project review while others rely on contract engineers for those services. Soils engineers are available through the conservation districts, and are commonly used by Zone A towns that don't have staff engineers.

Table 8-5 Planning Staff in Zone A Municipalities

Municipalities with Planning Staffs	Municipalities without Planning Staffs
Dover	Greenland
Durham	Hampton
Exeter	Hampton Falls
Newington	Madbury
Portsmouth	New Castle
Rochester	Newfields
Somersworth	Newmarket
	North Hampton
	Rollinsford
	Rye
	Seabrook
	Stratham

Similarly, building inspectors and code enforcement officers (CEOs) may be full time staff or part time contractors. Full time inspectors and CEOs are generally well informed of specific project requirements. The North Hampton inspector and CEO, for example, attends planning board meetings and works to be thoroughly informed about projects. Contract inspectors and CEOs, on the other hand, tend to be less informed (though not necessarily). Recent research in the Exeter River watershed confirms that building inspectors and CEOs are not always well informed about projects and project conditions approved by planning boards (Greenwood, pers. comm.).

Finally, the rate of development can also influence how thoroughly projects are reviewed and monitored. The relatively short building season in New Hampshire means that staff and contract professionals must fit numerous projects into a limited schedule. This limit was especially evident in the diffiuculty in setting up meetings with building inspectors and CEOs during the summer. The high pressure on staff during the busy construction season increases the likelihood that regulations and requirements may be overlooked.

Virtually all local governments rely on abutting property owners and the general public for assistance in identifying violations of local ordinances. Police officers, land use board members and others do their best to monitor the goings on in their towns, but parcel by parcel monitoring is far too extensive an undertaking to be done in a thorough manner. Thus the role of the residents is very important to catch non-permitted activities.

Local officials usually rely on abutters and others to draw their attention to potential problems or violantion, since most residents can't be expected to know and understand all the

land use regulations. Land use regulations, however, frequently involve issues such as setbacks and long lists of prohibited activities, which increase the likelihood that residents don't know or understand the regulations. This may mean that residents and abutters are not as reliable for monitoring natural resource problems.

Conservation Commissions

Conservation Commissions were established under RSA 36-A for the purpose of monitoring local use and protection of natural resources. They are optional boards with authority to secure open space, manage conservation lands and recommend management and protection for wetlands and other open spaces whether under local or state ownership. The Conservation Commissions were directed by statute to inventory wetlands and other natural resources within the community and were given the power to provide comments on wetlands permits submitted to the state wetlands program. The wetlands permitting authority also allows the Conservation Commissions to request a delay in the permitting process to provide adequate time to investigate the permits. In addition, excavation regulations under RSA 155-E require that permits for gravel operations be sent to Conservation Commissions for review.

State statute (RSA 36-A:5) authorizes the use of a non-lapsing Conservation Fund to support Conservation Commission activities. The Current Use tax penalty, or portions of it, may be dedicated to the Conservation Fund for use in land or conservation easement acquisition, wetlands restoration or other appropriate activities. In addition to these statutory powers, the Conservation Commissions can be, and often are, used more generally for planning and development activities.

Table 8-6 below summarizes information about Conservation Commissions in Zone A communities gathered through interviews with members of the Conservation Commissions and other local officials. The data demonstrates the range of funding, activities and input in planning and land use management of these Conservation Commissions.

Conservation Commissions may review wetland permits and other permits impacting natural resources. They may also acquire and manage land and forests, develop trails, restore wetlands and more. Budgets vary from \$0 with no access to the Current Use Tax penalty (e.g. Greenland) to tens of thousands of dollars annually in budget and Current Use Tax penalty funds (e.g. Rye). In addition, some towns like Rye, Hampton and North Hampton successfully pursue grant money to fund specific restoration projects. Use of funds is at the discretion of the Commission, though purchases of land or easements must be approved by the city council or board of selectmen and must go through a public hearing process.

Conservation Commissions may acquire open space for the town or city through the use of conservation easements, transfers of development rights, donations or purchases and through programs like the former Land Conservation Investment Program (LCIP). Most towns have used several approaches, and the table below lists the tactics that have been used by each of the 19 municipalities. There is some concern that purchase of development rights or conservation easements may put the landowner at risk of liability if the public has access to the land. Similarly, purchasing land outright lowers the town's potential tax base. These concerns have impeded local land protection efforts in at least some cases.

Table 8-6 Zone A Conservation Commission Activities

Town	Appropriated Budget	Role in Planning Board Review	Open Space Programs	Prime Wetlands
Dover	\$0(Funds provided as needed from Planning Dept.)	Regular	LCIP, easements	N
Durham	\$2,700	Occasional	LCIP, easements, purchases	N
Exeter	\$2-3,000 (May request addtl funds for acquisition)	Regular	LCIP, easements, purchases	In process
Greenland	\$0	Occasional	LCIP, easements, gifts	N
Hampton	?	Regular		Υ
Hampton Falls	\$600-800	Wetlands only	Easements	N
Madbury	\$1,000	Occasional	LCIP, easements, purchases	N
New Castle	?			Υ
Newfields	\$500	Regular	LCIP, easements, gifts	N
Newington	\$3,000	Wetlands only	Purchases	N
Newmarket	\$300	Regular	LCIP, easements, purchases	Y
North Hampton	?	Regular	Easements, purchases, gifts	N
Portsmouth	\$1,900	Occasional	Easements, purchases	N
Rochester	\$1,000	Regular	Easements	In process
Rollinsford				
Rye	< \$20,000	Regular	LCIP, easements, purchases	N
Seabrook	\$700	Regular while member is on PB	Easements, tax delinquency	N
Somersworth	?	Regular	None	N
Stratham	\$500	Occasional	LCIP, purchases, subdiv. open space	N

^{? =} Town or Conservation Commission officials unable or unwilling to divulge this information

Because individuals who choose to serve on Conservation Commissions tend to have fairly strong natural resource skills and interest, some towns have provided an expanded role in land use decisions for the commissions. These towns have chosen to allow or solicit input from Conservation Commissions on all projects in the town. Either through Planning Board members that serve on Conservation Commissions or through other formal or informal procedures, Conservation Commissions in 10 towns play a regular role in reviewing development proposals. Most other towns will seek Conservation Commission input on a case-by-case basis under certain circumstances. Only three towns, Hampton Falls, New Castle and Newington, limit Conservation Commission input to only wetlands issues (Newington also gets input from its Conservation Commission on landscaping plans for the purpose of beautification).

Table 8-7 Allocation of Current Use Tax Penalty to Conservation Fund

Zone A Towns	% Allocation	Zone B Towns	% Allocation
Dover	0	Barrington	0
Durham	50	Brentwood	0
Exeter	0	Brookfield	0
Greenland	0	Candia	0
Hampton	0	Chester	100 (\$20,000 cap)
Hampton Falls	10	Danville	100
Madbury	50	Deerfield	0
New Castle	0	East Kingston	0
Newfields	5	Epping	0
Newington	0	Farmington	0
Newmarket	50	Fremont	0
North Hampton	100	Kensington	25
Portsmouth	100	Kingston	0
Rochester	0	Lee	50
Rollinsford	100	Middleton	0
Rye	50 (\$2,000 cap)	Milton	0
Seabrook	0	New Durham	0
Somersworth	0	Northwood	10
Stratham	0	Nottingham	0
		Raymond	25
		Sandown	25
		Strafford	0
		Wakefield	0

Note: the tax penalty varies from year to year and is therefore not available as a constant budget figure

Lastly, though many of the communities have identified important wetlands within their borders, only three (Hampton, New Castle and Newmarket) have formally designated Prime Wetlands under the state Prime Wetlands law (RSA 482-A:15). The process of designation is extensive and may be quite costly for a community. In exchange for designation, the state will not permit activities in those wetlands unless there is "clear and convincing evidence" that the activity will not diminish the values for which the wetland was designated. In short, the law provides increased, though not absolute, protection for those wetlands the town finds are of high value.

As mentioned above, towns are authorized to allocate portions of the land use change tax penalty under the Current Use program to a Conservation Fund for use by the local Conservation Commissions. As Table 8-7 above shows, this practice is widely variable among the towns of the coastal region. Within Zone A, nine of 19 towns (about half) dedicate at least a portion of the Current Use tax penalty to the Conservation Fund. Amounts range from 5% to 100%, with some budgets supplemented through the town budget process. In Zone B, seven of 23 towns (only 30%) dedicate the tax penalty to the Conservation Fund, with portions in the range of 10% to 100%.

Towns

This final section summarizes the policies and programs of several of the cities and towns in Zone A that have either proven effective for natural resource protection or may provide useful information for towns considering improving their resource management. This information came out of discussions with a variety of local officials during the interview process.

Appendix F contains a summary of additional comments received during the interviews with local officials. While there is not adequate space to incorporate each of these comments, they are included to ensure all comments are aired. Specific comments may also be useful for officials of other municipalities, so readers are encouraged to peruse this section carefully.

Dover:

Dover has a strong set of resource protection ordinances that includes a wetlands district, an aquifer protection district and a shoreland protection district (called the Conservation District). Each of these districts incorporates setbacks and buffers and limits development activities. The city initiated its resource protection districts either because the state had no program (i.e. aquifer protection) or it felt the state for a number of reasons was not doing a satifactory job implementing and enforcing the programs that did exist. Relatively weak provisions include those for erosion control and stormwater management (particularly for unsewered areas of the city), though planning procedures and the depth of project review may compensate for the lack of specificity in these provisions.

Development review is multi-layered and fairly sophisticated, particularly for commercial and subdivision projects. Proposals are reviewed by the Planning Department and other town officials (e.g. town engineer, public works, etc.) for design and consistency with ordinances. Site improvements are considered during a pre-construction meeting involving the engineering division and others, and cluster developments must show an alternative design under standard subdivision conditions to ensure they are consistent with those regulations. Site work is inspected by the engineering division and the Building Inspector, and the Planning Department coordinates all activities. Projects not requiring Planning Board review are primarily handled by the Building Inspector, and sites are field checked by the Building Inspector at the foundation footing stage to ensure setbacks and other requirements are met.

The city is currently involved in mapping its sewer system and identifying infiltration sources that have contributed to sewer overflows. The town has worked to improve its previously developed river front in the downtown area, incorporating a trail system along a portion of the river. Development along Spur Road in the Dover Point area has raised a concern about the ability of current septic system regulations to deal with use changes. Under current state law, septic systems must be upgraded when bedrooms are added or when substantial changes of use occur. When existing seasonal camps are converted to full time residences, however, there is no requirement for a septic upgrade. Such a change could lead to severe overloading of old systems that were designed either for seasonal use or were designed with inadequate capacity for treatment.

Durham:

Durham also has a fairly extensive inventory of resource protection ordinances. The town has adopted several resource protection districts, largely because the state program was either insufficient to cover areas the town wanted to cover, or the town found the state unable to adequately enforce its programs. The primary weaknesses lie in stormwater and erosion control provisions, though like Dover, staff level and review procedures may compensate for these weaknesses.

Project review involves the Planning Department and code enforcement officer as well as public works and other town staff. In addition, the town routinely hires outside consultants for engineering review at the cost of the developers. Inspection of site improvements is done by the CEO and town planner. Private projects outside of Planning Board review must present a plot plan (with wetlands and other features noted) to the building inspector. Performance bonds are required for all public improvements and landscaping plans. Building inspection costs are covered in the budget, though permit fees are designed to cover some of those costs.

The town is actively pursuing open space protection. In particular, the town is working with other organizations and agencies on protecting a corridor between Crommet Creek off of Great Bay and the Oyster River. Unspecified concerns among town government have limited the purchase of open space even though the Conservation Fund has accumulated a sizeable balance. The town has also recently upgraded its Waste Water Treatment Plant (WWTP) and identified where stormwater was entering the sewer system. Those problems identified have been largely resolved according to town officials.

Durham has a very active and effective Conservation Commission. The commission has worked to identify appropriate lands for acquisition and has been an important resource for the town on the environmental protection issues of development. The unresolved conflicts over land acquisition and changes in the shoreland protection district seem to be the commission's biggest barriers. As a result, funds for that purpose sit unused while property values increase.

Exeter:

Exeter has the most complete set of resource protection ordinances of the Zone A towns (see Appendix G). These ordinances are well constructed and follow state model ordinances quite closely. Exeter has a strong shoreline protection ordinance and numerous other resource protection features in its zoning and subdivision regulations. The ability to pass and implement these ordinances may be due, in part, to the level of build-out in the town and the fact that much of the remaining shoreline is occupied by a railroad that precludes further development.

Subdivisions, site plans and building permits are reviewed by a Technical Review Committee to help ensure they meet the town's requirements. This committee, made up of planning staff, the building inspector and CEO, the chair of the Conservation Commission and others can require impact analyses and may retain the services of a consultant at the expense of the developer.

The town uses special exceptions and conditional use permits where possible in lieu of variances to resolve situations where developers or individuals would like to do something not directly in keeping with the land use regulations. The town's rationale is that they would prefer the issues get resolved with planning staff and Planning Board input rather than having the Zoning Board of Appeals decide on a yes or no basis whether or not a specific action will be allowed.

In some cases, the ZBA may not be as technically proficient as the Planning Board and staff in resource issues. As a result, zoning boards are generally less qualified to make decisions regarding resource issues. Exeter feels their approach provides them with more control over how development occurs. It may not work as well, however, for towns without a planning staff, as that expertise is probably crucial for resolving technical issues of development plans. Regional planning commissions could provide that assistance, but they would need to devote substantial amounts of time to work through each proposal with the planning board.

Exeter currently has conservation easements on, or monitors, about 1,200 acres of land for open space. In addition, town ordinances encourage protection of open space by granting density bonuses when 50% of a parcel is permanantly conveyed to the town or Conservation Commission. In addition, Sub-division regulations require 30% of a parcel to be set aside as open space for the residents of the town, and cluster development may also be used to further encourage use of open space. As an example, 18 acres of the 67 acre Riverwoods parcel were developed, the remainder being left in conservation easements.

There may be several reasons why Exeter has a well developed resource management program. The town has a larger staff available to address resource issues than most Zone A towns. Staff involved in resource issues include a town planner, a city attorney, a town engineer technician, a building inspector and health officer and a public works department, among others.

Madbury:

Madbury has a relatively strong set of resource protection ordinances. There is little commercial development in the town, and residents seem to support maintaining that status. As a result, implementation and enforcement appear to be relatively strong. Among other things, Madbury is actively involved in open space acquisition programs. It has recently purchased about 40 acres behind Town Hall, abutting Kingman Farm, and other tracts amount to more than 100 acres owned by the town. In addition, the town has conservation easments on 123 acres upstream of the Bellamy Reservoir. The protected lands are intended to provide a wildlife corridor in the town. The town is also digitizing its tax maps and is conducting an inventory of its lands and wetlands resources. The town has a booklet describing its wetlands and their functions and values, and the town is considering conducting a thorough natural resources inventory.

Newington:

Newington has a unique physical layout that encourages protection of open space in the residential portion of the town. It is physically separated from the commercial portion of the town by the Spaulding Turnpike, and access to the residential portion of the town is limited to two roads, one of which is from the Spaulding Turnpike and is not convenient. This configuration probably contributes to the lack of commercial development in the residential areas.

This relative protection for the residential area may contribute to a perception that land use regulations are unnecessary, thus the extremely limited resource protection provisions (see Appendix ??). Some town officials have also expressed the view that resource issues are (and perhaps should be) regulated by the state. Nonetheless, the commercial side of town reflects the lack of strong regulations and demonstrates limited planning for resource protection in that part of town.

Newington has been fairly active in protection of open space. Town officials take some credit for creation of the Great Bay National Wildlife Refuge, which provides a substantial amount of open space in the town. Additional open space exists at Fox Point and at several other locations.

North Hampton:

North Hampton has a fairly strong set of resource protection ordinances, including a wetlands protection district and aquifer protection measures. The buffer provisions of the wetlands protection district provide a small measure of protection for streams and other water bodies, though the town lacks a true shoreland protection district. In addition, the building inspector is currently studying innovative land use controls as an alternative to growth management to give the town more control over development. From this effort, the town hopes to develop additional ordinances to protect resources and the character of the town.

The town's aquifer protection provisions do not appear to be written as an overlay district, and the wording suggests the prohibitions apply uniformly throughout the town. When asked, some town officials were uncertain exactly how the provisions are applied, suggesting that they may not be carefully implemented or enforced. At present, there appears to be little direct threat to the aquifers from new development (existing development on or near aquifers occurred before there was recognition of the importance of groundwater protection and before the aquifer protection ordinance was in place).

The Conservation Commission is well integrated into planning procedures and is regularly consulted during permit reviews. The Building Inspector/CEO is well versed in conservation issues, has developed thorough review procedures and is pro-active with the planning board. Support for conservation is broad-based, with public support for open space protection at 90% in one survey.

The town's Conservation Commission is very active. It is funded through the town budget and receives 100% of the current use tax penalty available for land acquisition. The commission has been actively pursuing open space protection, and the town is trying to acquire land or development rights in key areas in the two primary watersheds (the Winnicut and Little River). Another large project involves restoration of the Little River salt marsh. In addition, the Conservation Commission has coordinated several natural resource inventories, and much of that information, as well as zoning district information, is available in a digitized (GIS) database.

Stratham:

Stratham has a strong set of resource protection ordinances, including wetland, shoreland and aquifer protection districts. The Wetlands Conservation District is defined as areas with standing water or extended periods of high water tables and is delineated on town maps. This definition may exclude some wetland areas, but septic and structure setbacks apply to all type A and type B hydric soils.

The Conservation Commission in Stratham is fairly active. Members try to attend planning board meetings to keep abreast of activities in the town, and the commission is occasionally involved in permit review beyond the statutory wetland review process. The Conservation Commission is funded through the town's budget process but gets none of the current use tax penalty. Nonetheless, the town has been successful in acquiring open space and conservation easements. The town has purchased land and easements, been given donations of land and

sought easements as conditions for development. Finally, the commission is working with UNH students to perform thorough natural resource inventories in key areas of the town.

Recommendations

Specific recommendations for improvements in zoning and land use controls are made in the appropriate chapters. The following are recommendations for improving implementation and enforcement of these regulations and for improving overall management of natural resources in the towns of the estuary watersheds.

1. Improve resource protection regulations

Though covered in more detail in other chapters, this recommendation bears repeating. Regulations are quite variable across the estuaries, and important gaps exist. Shoreland protection districts are needed in Greenland, Hampton, Hampton Falls, New Castle, Newington, North Hampton, Portsmouth, Rochester, Rollinsford, Rye and Seabrook. Wetland protection provisions are needed in Greenland and Seabrook. Lastly, all towns should review and improve their stormwater runoff provisions. [Shoreland: LND-12, 14; Wetlands: LND-6a, 18, 20, 24, 24c; Stormwater: LND-20, WQ-8, 9]

2. Increase outreach to local officials on importance of resource protection regulations

The NH Coastal Program in conjunction with the regional planning commissions should increase efforts to educate local officials on the importance of resource protection and assist them in improving their land use controls. This outreach should be conducted town by town and should be brought directly to town officials rather than provided as a regional workshop (see , 1998 for a discussion of the needs of local officials with respect to such outreach activities). [LND- 25, 24c, 18, 12, 6a; WQ-9]

3. Improve development review and permit procedures

Towns like Exeter and Dover have fairly sophisticated development review procedures, while most others do not. Options for improving permit review include increasing staff and budgets, increasing the levels of review and increasing the use of Conservation Commissions for review. Members of the Conservation Commissions are frequently much more fluent in the values of natural resources and their protection than members of planning boards and boards of selectmen, and that expertise can and should be cultivated and put to use to help guide development in environmentally sensitive ways. The technical review committee approach, in which individuals with expertise help assess development proposals and permits, appears to be an effective approach and should be considered by all towns.

4. Ensure adequate enforcement of land use regulations in all towns

Enforcement of local land use regulations appears to be limited by lack of coordination between planning boards and building inspectors (perhaps also by a limited understanding of the regulations themselves). Building inspectors and code enforcement officers should be present during planning board meetings to ensure planning board recommendations and conditions are fully understood. In addition, procedures for recording and verifying field changes to development projects should be implemented.

5. Improve outreach for developers and landowners

All agencies involved in resource protection should work to educate landowners and the development community on regulations and requirements. More often than not,

developers express a willingness to make allowances for environmental goals provided they understand what those goals are before beginning a project. Landowners hoping to make improvements are often uncertain what regulations apply and how their projects impact natural resources. [LND-21]

6. Develop long term monitoring of permit conditions

All towns should develop programs for long-term inspection of erosion and stormwater control measures to ensure their proper functioning. Currently, seacoast towns have no mechanism for monitoring these structures, and property owners are left to maintain them and decide whether or not they are functioning properly. Greater oversight is needed to ensure the long-term permit requirements are being fulfilled. To assist this effort, the state should help develop standards for long term requirements.

7. All construction permits should receive more than one level of review

Permits for single family residential construction on pre-existing lots that do not receive planning board review should nonetheless be reviewed by at least one other body to ensure consistency with resource setbacks and other requirements.

8. Review variance practices

A limited review of zoning board actions suggests these boards may not be properly granting variances. Towns should examine their zoning board of appeals practices against the requirements of state law to ensure the requirements are being met. This problem applies more to non-resource related issues but nonetheless has important implications for natural resource protection.

9. The DES Shoreland Protection Program should reconsider its reliance on local governments for enforcement of state regulations

Limited local budgets and staff mean that state programs like the shoreland protection program are often not well implemented or enforced at the local level. In addition, since pollution and other resource impacts often cross boundaries, local governments may not have sufficient motivation to thoroughly enforce state regulations. [LND-14]

10. Consider watershed based planning agreements

Communities within individual watersheds (for example, the Lamprey River watershed or the Cocheco River watershed) should meet as a group to develop common goals and practices that will meet an agreed upon resource protection goal. In this way, minimum resource protection standards could help reduce impacts that cross boundaries. [LND-4a]

11. Examine land use regulations in the Zone B towns

Limited resources made it impossible to do a thorough examination of Zone B towns for this report, but regulations and management practices in these towns are also important for the estuaries. Zone B towns tend to be smaller and less sophisticated (in terms of staff and resources available), and may have substantial impacts of water quality in the estuary watersheds. The NHEP should work with OSP and the regional planning commissions to review land use regulations in Zone B towns. [LND-4b]

12. Increase the number of circuit rider planners to improve assistance to towns without planning staff

Circuit rider planners, provided by the regional planning commissions, play a crucial role in implementation of local land use controls, particularly when small towns are confronted with large development projects. An increase in the number of circuit rider planners would improve implementation of local land use regulations.

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APPENDIX A

Abbreviations and Acronyms

ACOE or USACOE

U.S. Army Corps of Engineers

BMPs

Best Management Practices

CCMP Comprehensive Conservation and Management Plan

CEO Code Enforcement Official

CERCLA Comprehensive Environmental Response Compensation and Liability

Act

CICEET

CSO Combined Sewer Overflows

CSPA Comprehensive Shoreland Protection Act

CWA Clean Water Act

CWSRF Clean Water State Revolving Fund
CZMA/CZMP Coastal Zone Management Act/Program
DES Department of Environmental Services

DHHS or NHDHHS NH Department of Health and Human Services

DRED Department of Resources and Economic Development

EPA Environmental Protection Agency
FDA Food and Drug Administration

FERC Federal Energy Regulatory Commission

GIS Geographic Information Systems

ISSC Interstate Shellfish Sanitation Commission

MFCMA Magnusson Fisheries Conservation and Management Act

MMPA Marine Mammal Protection Act
NEP National Estuary Program

NEPA National Environmental Policy Act
NHCP New Hampshire Coastal Program
NHEP New Hampshire Estuary Project

NHFG New Hampshire Fish and Game Department

NMFS National Marine Fisheries Service

NOAA National Oceanic and Atmospheric Administration

NPS Nonpoint pollution sources

NSSP National Shellfish Sanitation Program

PCBs Poly-chlorinated biphenyls

RCRA Resource Conservation and Recovery Act
RMPA Rivers Management and Protection Act

RMPP Rivers Management and Protection Program

RSA Revised Statutes Annotated

SPNHF Society for the Protection of New Hampshire Forests

USFWS United States Fish and Wildlife Service

WWTF Wastewater Treatment Facility

APPENDIX B

Program Survey Sheet

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Name of Program:
Problem(s) Addressed:
Organization (Division or office name):
Contact Person/phone #:
Program or Project:
    Description (purpose) -
    Target Audience -
    Function -
Is this Program or Project Ongoing? -
Regulatory Authorities
Geographic Jurisdiction -
Funding:
    Souce -
    Budget -
    Program Budget -
Administration:
    Structure/Process -
    Links to Cooperating Agencies -
    Staff -
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Questions

Does this organization have any offices or facilities in the Great Bay or Hampton/Seabrook area?

Does your organization have sufficient legal authority to effectively carry out its responsibilities under this program or project?

If not, what additional authorities would help?

Are there any policies or activities that the organization or office would like to adopt but doesn't because there are inadequate resources to implement them? If so, what are they?

Are there activities that the organization could do better if it had additional resources? If so, what are they and what resources would be most useful (staff, budgets, equipment, etc.)?

Do any other organizations duplicate any of your activities? If so, which ones?

Do any other organizations impede your activities or your effectiveness? If so, which ones?

Are you able to improve your effectiveness through cooperation with other organizations? How?

Does your agency have any qualitative measures of success or cost-effectiveness with respect to this program or project? (e.g. compliance rates, pollution reduced per dollar spent, etc.)

On a scale of 1 to 6, how would you rate the political climate in which your agency operates?

Government

Very Hostile	1	2	3	4	5	6	Very Supportive
Public							
Very Hostile	1	2	3	4	5	6	Very Supportive

Are there other programs or projects that we should be aware of?

New Hampshire Model Ordinances for Local Land Use Control

Septic Systems/Sewage	No Model
Soil-based lot sizes (for septic)	
Siting Requirements	
Other Requirements	
Local Inspections	
Erosion/Sediment Control (from NH Assn. of Conservation Districts and Water Quality and Urban Conservation Committee, 1997)	E&SC (and stormwater management) plan shall be required when one of the following applies: disturbance of 20,000 ft2; construction or reconstruction of street or road; subdivision of 4+ lots; disturbance of critical areas. PB may waive requirements of all or part of plan if deemed unnecessary because of size, character or natural conditions of a site. Minimum plan requirements: site description including soils from National Cooperative Soil Survey map (HISS may only be used for design purposes); temporary and permanent E&SC BMPs. Applicant bears responsibility for installation, construction, inspection and disposition of required measures. PB may require bond or other security for construction and installation of measures. Conditional approval of plan needed before activities start. Plans shall receive technical review by local conservation district or other professional consultant, at expense of applicant. PB may require routine inspections by its designated agent, and fees may be assessed of the owner for costs of inspections.
Soil Exposure Limits	Disturbed areas remaining idle for more than 30 days shall be stabilized.
Minimize disturbance	Disturbed areas shall be kept to minimum. Whenever practical, natural vegetation shall be retained, protected or supplemented. Stripping of vegetation shall be done so as to minimize erosion.
Reclamation requirements	

Design Standards	Shall meet BMPs set forth in "Green Book," RCCD, and amendments. E&SC controls in place before soil disturbance. Sediment in runoff shall be trapped and retained within the project area using approved measures. Wetland and surface waters shall be protected from sediment. Off site surface water and runoff from undisturbed areas shall be diverted away from disturbed areas where feasible or carried non-erosively through the project area. Integrity of downstream drainage systems shall be maintained. Temporary measures removed after final site stabilization. Disturbance from removal permanently stabilized within 30 days. Maintenance of measures runs with deed.
Stormwater Management (from NH Assn. of Conservation Districts and Water Quality and Urban Conservation Committee, 1997)	(E&SC and) Stormwater management plan shall be required when one of the following applies: disturbance of 20,000 ft2; construction or reconstruction of street or road; subdivision of 4+ lots; disturbance of critical areas. PB may waive requirements of all or part of plan if deemed unnecessary because of size, character or natural conditions of a site. Applicant bears responsibility for installation, construction, inspection and disposition of required measures. PB may require bond or other security for construction and installation of measures. Conditional approval of plan needed before activities start. Plans shall receive technical review by local conservation district or other professional consultant, at expense of applicant.
Specific Requirements	Priority given to preserving natural drainage systems including perennial and intermittent streams, wetlands, swales and drainage ditches for conveyance of runoff leaving the project area.
Design standards	Post-development peak runoff rate not to exceed pre-development rate for the 2-year, 24 hour storm event and for additional storm events as specified in design criteria in Green Book.Measures shall, at a minimum, meet BMPs set forth in Green BookMaintenance of measures runs with deed.
Impervious Limits	
Aquifer Protection Districts	No Model – Standards currently being developed
District Limits	
Impervious limits	
Land use restrictions	
Wetland Protection Districts	No Model – Standards currently being developed
Land Use Restrictions	
Septic setbacks	
Buffers/building setbacks	
Shoreland Protection Districts (Model ordinance, Office of State Planning, 1994)	Prevent and control water pollution, protect important fish, bird, and wildlife habitat, protection of wetlands and their important natural functions, etcPermitted Uses - Marinas with a minimum frontage of 300ft and 25ft for each addition two slips over 12, provided an EIS is submitted containing mitigation measures, measures to prevent leakage or spills of fuels, waste products or other pollutants; decks, wharves, boat ramps and swimming floats and other water dependent structures; additional water dependent structures approved as special exceptions and designed to minimize impacts.
District limits	All land located within 250 feet of the reference line (the natural mean high water of natural fresh water bodies, the water line at full pond as determined by the top of an impoundment structure, and the highest observable tide line defining the furthest landward limit of tidal flow excluding storm events).

Prohibitions: establishment or expansion of salt storage sheds, auto junk yards, solid or hazardous waste facilities; use of fertilizer except lime and/or wood ash on lawns or grass areas on residential properties; bulk storage of chemicals; bulk storage of petroleum products or hazardous materials (except residential fuel oil); sand and gravel excavation; processing of excavated materials; dumping of snow from areas outside of the district.Restrictions: water dependent structures to be approved by wetlands board; public water supply and sewage treatment facilities, hydorelectric, public within yard as ewage treatment facilities, hydorelectric, public water supply and sewage treatment facilities, phydorelectric, public water supply and sewage treatment facilities, phydorelectric, public waters and conduct other activities provided they don't cause degradation beyond the permit area; solid waste facilities may remain provided they don't cause degradation beyond the permit area; solid waste facilities may remain provided they don't cause degradation beyond the permit area; solid waste facilities may remain provided they don't cause degradation beyond the permit area; solid waste facilities may remain provided they don't cause degradation beyond the permit area; solid waste facilities may remain provided they don't cause degradation beyond the permit area; solid waste facilities may remain provided they are understance waste disposal systems must be designed in accordance with DES design rules. Leaching portions of septic systems must be set back from the reference line (shoreline) 125 feet for porous sand and gravel with a per cate faster than 2 minutes per inch, 100 feet where soils have restrictive leyers within 18 inches of natural soil surface, 75 feet for other soils. Adjacent to rivers, DES may approve greater setbacks than the 75 foot minimum. Primary structure setback 50ft from the reference line (shoreline). Accessory structures other than automobile garages may be located within 50ft provided they are		
as outlined in the "Green Book." Disturbances greater than 50,000 ft2 require site-specific permits from DES. Septic setbacks Subsurface waste disposal systems must be designed in accordance with DES design rules. Leaching portions of septic systems must be set back from the reference line (shoreline) 125 feet for porous sand and gravel with a perc rate faster than 2 minutes per inch, 100 feet where soils have restrictive layers within 18 inches of natural soil surface, 75 feet for other soils. Adjacent to rivers, DES may approve greater setbacks than the 75 foot minimum. Primary structure setback 50ft from the reference line (shoreline). Accessory structures other than automobile garages may be located within 50ft provided they are consistent with vegetated buffer. Buildings should be sited so as to minimize impact on habitat and the watershed. Structures shall be limited to 2 1/2 stories or 35ft in height measured from average ground level around the structure to the highest point on the roof excluding chimneys. Vegetated buffer requirements A natural woodland buffer shall be maintained within 150 feet of the reference line (see District Limits above) for protecting water quality. Not more than 50% of basal area of trees and a maximum of 50% of saplings may be removed for any purpose in a 20 year period. Replacement planting with native or naturalized species may be permitted to maintain the 50% level. Vegetation removed for construction of building and accessory structures, septic systems, roadways, pathways and parking areas shall be excluded from this cutting limit. Dead, diseased, unsafe noxious or fallen trees, saplings, shrubs or ground cover may be removed. Stumps within 50 feet of reference line shall be left intact.	Land Use Restrictions	junk yards, solid or hazardous waste facilities; use of fertilizer except lime and/or wood ash on lawns or grass areas on residential properties; bulk storage of chemicals; bulk storage of petroleum products or hazardous materials (except residential fuel oil); sand and gravel excavation; processing of excavated materials; dumping of snow from areas outside of the district.Restrictions: water dependent structures to be approved by wetlands board; public water supply and sewage treatment facilities, hydorelectric, public utility lines and associated structures only as permitted by DES; existing solid waste facilities may remain provided they don't cause degradation beyond the permit area; solid waste facilities may erect accessory structures and conduct other activities provided no solid waste is placed within 250 feet of the
with DES design rules.Leaching portions of septic systems must be set back from the reference line (shoreline) 125 feet for porous sand and gravel with a perc rate faster than 2 minutes per inch, 100 feet where soils have restrictive layers within 18 inches of natural soil surface, 75 feet for other soils. Adjacent to rivers, DES may approve greater setbacks than the 75 foot minimum. Primary structure setback 50ft from the reference line (shoreline). Accessory structures other than automobile garages may be located within 50ft provided they are consistent with vegetated buffer. Buildings should be sited so as to minimize impact on habitat and the watershed. Structures shall be limited to 2 1/2 stories or 35ft in height measured from average ground level around the structure to the highest point on the roof excluding chimneys. Vegetated buffer requirements A natural woodland buffer shall be maintained within 150 feet of the reference line (see District Limits above) for protecting water quality. Not more than 50% of basal area of trees and a maximum of 50% of saplings may be removed for any purpose in a 20 year period. Replacement planting with native or naturalized species may be permitted to maintain the 50% level. Vegetation removed for construction of building and accessory structures, septic systems, roadways, pathways and parking areas shall be excluded from this cutting limit. Dead, diseased, unsafe noxious or fallen trees, saplings, shrubs or ground cover may be removed. Stumps within 50 feet of reference line shall be left intact.	Erosion/Sediment Controls	as outlined in the "Green Book." Disturbances greater than 50,000 ft2
automobile garages may be located within 50ft provided they are consistent with vegetated buffer.Buildings should be sited so as to minimize impact on habitat and the watershed.Structures shall be limited to 2 1/2 stories or 35ft in height measured from average ground level around the structure to the highest point on the roof excluding chimneys. Vegetated buffer requirements A natural woodland buffer shall be maintained within 150 feet of the reference line (see District Limits above) for protecting water quality.Not more than 50% of basal area of trees and a maximum of 50% of saplings may be removed for any purpose in a 20 year period. Replacement planting with native or naturalized species may be permitted to maintain the 50% level.Vegetation removed for construction of building and accessory structures, septic systems, roadways, pathways and parking areas shall be excluded from this cutting limit. Dead, diseased, unsafe noxious or fallen trees, saplings, shrubs or ground cover may be removed. Stumps within 50 feet of reference line shall be left intact.	Septic setbacks	with DES design rules.Leaching portions of septic systems must be set back from the reference line (shoreline) 125 feet for porous sand and gravel with a perc rate faster than 2 minutes per inch, 100 feet where soils have restrictive layers within 18 inches of natural soil surface, 75 feet for other soils. Adjacent to rivers, DES may approve greater
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Impervious limits 20% for all impervious materials	Vegetated buffer requirements	reference line (see District Limits above) for protecting water quality.Not more than 50% of basal area of trees and a maximum of 50% of saplings may be removed for any purpose in a 20 year period. Replacement planting with native or naturalized species may be permitted to maintain the 50% level.Vegetation removed for construction of building and accessory structures, septic systems, roadways, pathways and parking areas shall be excluded from this cutting limit. Dead, diseased, unsafe noxious or fallen trees, saplings, shrubs or ground cover may be removed. Stumps within 50 feet of
	Impervious limits	20% for all impervious materials

Density limits	Minimum lot size for new lots using on-site septic systems will be based on soil type and shall be determined in accordance with NH Code, using the standards of the USDA SCS National Cooperative Soil Survey. Minimum frontage for lots with on-site septic systems is 150ft. Cluster development may be permitted provided density does not exceed soil based lot sizes above plus 2% for the development. 60% of total parcel shall remain permanent open space as a conservation easement. Non-conforming lots of record may be used for single family residential development. If the site won't accomodate septic provisions above, the owner shall be encouraged to acquire additional land or permanent easement to land for this purpose as far as practicable or shall be limited to 300 gallons per day of sewage loading. Modifications to existing non-conforming structures or lots that result in increases in sewage loading (such as additional bedrooms) shall require approval by DES. Non-conforming uses that are discontinued for one year or more will no longer be allowed.
Agricultural requirements	Agriculture activities and operations are exempt from the above provisions provided they are in conformance with the most recent USDA SCS and Cooperative Extension Service best management practices.
Other	No Models
Open Space	
Chemical/Toxics Control	
Excavation Regulations	
Flood Control	
Impact Studies	
Growth Management Ordinances	
Biosolids Ordinances	
Marina Requirements	
Review Committees	
Miscellaneous	
<u> </u>	

Selected Comments from Interviews

he comments summarized below are drawn from interviews conducted with local officials during July and early August, 1997. They are paraphrased and in some cases are composites (condensed) from several related comments. I have made every attempt to incorporate all of the key ideas from the interviews into my analysis and evaluation of the policies important for the estuaries of New Hampshire. These comments are included to ensure that all sentiments expressed through the interviews are available, in the event I have inadvertently left important ideas out.

Information Needs

- Workshops should supplement printed materials and focus on question and answer periods. This is where the most important information comes from.
- Reports, data, tables, etc. (all information) should be in simplified, user friendly form for the lay person.
- There is a large need to educate the public about existing laws and regulations to help them know when they see a violation (and to know what isn't a violation).
- Local officials need maps (tax base) with overlays of protected areas, critical resources, and displaying functions and values of wetlands, etc.; visual displays of what lots are in what critical areas and what regulations apply.
- All educational materials and most technical materials should be short and simple, the "Reader's Digest" version.
- Local officials need specific information on what would be required to meet environmental goals and objectives in order to help with establishing the most important regulations.
- There are two types of information: unsolicited information that the state wants to provide to the towns, and information specifically needed by a town or decision making body. In the first case, the provider must figure out what information is most relevant, who best to provide it to, and what format will be most useful. In the second case, decision makers must figure out where to find the information or who to ask for it, how to look for the information, and how to understand it. Ideally, they need efficient access to specific information of their choosing. In this case, a distribution system is needed through which users can search for information. Various state agencies and the regional planning commissions have played this role to an extent in the past, but access is still difficult according to most local officials. The internet has been proposed as a solution to this problem (see next). The success of such a system would hinge on the type of information

linked to the site, its organization (i.e. how well indexed it is), and the extent of internet access in the communities of the seacoast.

- Information about the estuaries and conservation is awkwardly organized and not generally easy to get. Managers and decision makers need a way to get relatively easy access to information, reports, etc. on specific topics (rather than having to sift through reports to find what information you need). The hierarchical approach of web page links on the internet is perfect for satisfying this need. Suggest providing links by geographical region, issue, etc. Either this or an index of the information available, much like a library on-line catalogue system.
- An electronic bulletin board for downloading data and other information (e.g. financial assistance program information, regulatory updates, etc.) with notification and summaries of what is available on the bulletin board provided through existing newsletters would be better than the internet because extraneous information would be minimized and access would be faster..
- Any information, especially GIS based, should be built starting at the town level. Maps should be relevant to town's needs at a scale useful to towns (e.g. tax maps).
- There is a huge need for education of decision makers about the values of natural resources. Since budgets hinge on tax revenue which is dependent on development, there is a reluctance to require changes to plan or to require resource protection plans for fear the developers will just go elsewhere.
- A directory of state agency staff and organization would be helpful, including a very brief summary of each of the programs and the issues they cover.
- In towns with planning staff, most board members rely on the town planner for information and questions, and in some cases, the town planner is charged with distributing information to the relevant board members. Thus the town planner is the obvious contact point.
- Several individuals mentioned aerial flyovers as a key tool for information about development trends, shoreline development, etc. These individuals suggested ortho-photos may be a useful overlay for GIS mapping.
- There are several existing educational opportunities in which environmental management training could occur. For instance, engineers must regularly take credit courses to keep their certification, and OSP sponsored training sessions for planning boards and boards of selectmen are already held. These would be useful opportunities to cover basics of environmental planning. The primary goal should be to try to minimize the number of events and the time commitment for volunteer officials.
- Virtually all local officials requested that information be presented in as short and simple a form as possible. Most don't have the time to wade through lengthy reports. Summaries should ideally be prepared by an individual trained in translating research for the public.
- Training programs by the state and by conservation organizations like Audubon, SPNHF
 and others are readily available, more so than local officials take advantage of. The
 regional planning commissions also provide very good training programs. These
 organizations also do an excellent job of providing information to the towns, and certainly
 meet specific information needs when requests are made.
- Workshops for volunteer board members would probably be best held in evenings or on weekends. For paid staff, work (business) hours are better. Scheduling should take into

consideration who the primary target is. For those meetings aimed at both volunteer boards and staffs, evenings would probably be best. Where possible, training and workshops for volunteer boards should probably be scheduled into the regular meetings, preferably during the slow times of the year such as fall and winter.

- There should be a mix of information formats, from workshops to newsletters and summary reports.
- Reg. Planning Commissions may be a good distribution source for information going to small towns.
- Non-governmental organizations are best suited for training programs (e.g. Audubon, Regional Planning Commissions, NH Municipal Association, SPNHF, etc.)
- Education efforts should specifically target developers. In many cases, developers are willing to incorporate environmental or resource concerns if they know what they are before starting a project.

Management Issues

- Zoning and planning boards protect against direct conflicts of interest in which a specific
 decision affects a specific project, but indirect conflicts of interest exist and should be fixed.
 Developers stand to gain (or lose) from general provisions decided on by the planning
 boards and boards of selectmen. A solution would be to prohibit any developer from
 serving on a board in any town in which they conduct development activities.
- State and federal governments are very helpful in dealing with emergencies and large scale problems, but are less helpful on more mundane issues.
- Towns need specific information on what would be required to meet specific environmental goals and objectives.
- Dover adopted resource protection districts either before the state adopted its measures or because the state was not managing those resources adequately. In general, adopting these measures provides the city with more control over development and its resources, allowing the city to balance the needs of both. This balance is possible in part because the town uses conditional uses and special exceptions for resource protection issues and tries to resolve problems through these approaches before permitting or building begins. Problems are resolved before commitment of too much money.
- Septic upgrade on renovation is only required when the number of bedrooms is increased. Thus, if an old fish camp is bought and renovated into a full time residence without increasing the number of "bedrooms," code enforcement officers feel they don't have the authority to require a septic upgrade. This is a problem for at least two areas in Zone A, Spur Road in Dover Point and Cedar Point in Durham.
- DES has broad authority on septics but it's not able (or willing) to enforce.
- RPC's could provide an ombudsman position who's job would be to assist the general public with septic or other issues, informing them of what they need to do, who they need to talk to, be the liaison with all of the appropriate bureaus, etc.
- Towns should promote development integrated with resources, such as waterfront development (Dover, Portsmouth, Exeter, etc. examples)

- If planning boards and staff are specific and clear with developers about what is required, and those decisions are made up front, then building inspectors can be an important part of the process and can be more effective at monitoring and enforcement.
- State should have the ability to compel dye tests of suspect septic systems to help ID septic problems.
- In some cases, the majority of resistance toward conservation or resource protection ordinances comes from land owners who feel they are heavily taxed and that restrictions on land use are an unfair additional burden.
- The LCIP and Land and Water Conservation Programs should be reinstated, whether under other names or in some other forms. Several people have specifically mentioned the LCIP as a very important program that should be revived.
- DES wetlands staff are overworked, and they are the most difficult to get a hold of (though they always eventually respond to calls or requests and are quite helpful when they do). There appears to be broad consensus that the wetlands permitting and enforcement programs are badly understaffed.
- EPA requirements attached to every permit renewal for public sewer systems is an onerous burden.
- There is some concern among developers about their liability over public use of open space and conservation easements on their property. This issue needs clarification. Developers may face liability when public has access to open space or conservation easements on their development lands. This may be acting as a disincentive for participating in these efforts.
- A staff with substantial training in environmental management is an invaluable asset regarding resource protection. That individual staff can help the town compensate for staff and funding limits for resource protection and make the most of its existing land use regulations.
- Policy should focus on entire ecosystems rather than on individual pieces. For instance, improving salmon passage in rivers and streams through fish ladders may be fruitless if food sources, water temperatures, etc. aren't also considered.
- With continued growth in the seacoast area, communities may have to look at regional
 waste water treatment, or at least regional pipelines that discharge away from estuary
 waters or in areas where water quality would be less impacted.
- State assistance for land use monitoring would be helpful, as small towns can't afford to do
 it.
- In small towns, trouble is sometimes easier to monitor. Because most people know each other, there is disincentive to skirt the law. Neighbors can be a reliable source of information for violators, and in some cases may be the only real source of information. This approach combined with a willingness to go to court if necessary is a pretty effective system for monitoring and enforcement.
- The specific guidance provided by having resource protection ordinances in place makes the job of resource protection easier. Blame lies with the ordinances rather than with the individuals enforcing them (particularly important in a small town), and the ordinance can be seen as part of a long range plan. Thus, there is less resistance.
- State wetlands laws provide only limited protection since they are limited to dredge and fill
 activities. Drainage is only minimally regulated, and hydrologic changes occurring from

pumping of groundwater are not addressed. In addition, there is little or no protection for vernal pools, and towns are not clear on what they can do to protect them.

- There is currently little protection for stream flows and fresh water inflows into the estuaries.
- Coordination with State and Federal Programs
- Subsurface and Wetlands Bureaus of DES are difficult to contact and need more staff. They tend to respond only to gross violations.
- DOT can excavate gravel in a town without the town's consent. Towns should at least be involved in plans for such excavations.
- Wetlands field visits should be coordinated with local officials (e.g. Conservation Commission members) so that both can be well aware of what the other's concerns are.
 Also, so that neither gets too far ahead of the other in the process, promising things that the other would restrict.
- State gravel excavation regulations have slope requirements steeper than some towns would like. This makes it harder to require and enforce tighter local regulations.
- State programs don't coordinate very well. Offices are not always aware of the actions of
 other offices, even if their programs might be affected. For example, closure of a landfill in
 one Zone A town meant that the town was no longer allowed to burn yard waste at the
 site, yet the town continues to receive burning permit applications from the agency
 responsible for those permits. This suggests the agency is not well informed of its own
 actions.
- State water law limiting local control over use of aquifers and groundwater may conflict with local programs to protect natural resources. Towns have little or no say over use of their groundwater resources by other towns. For instance, Hampton's use of groundwater resources from adjacent towns has created important concerns for those towns, particularly impacts to wetlands and impacts to nearby private wells. The towns affected feel there are no procedures for monitoring these impacts, and have been told that there is little that could be done under state wetlands law to protect against hydrologic impacts.
- The state has approved at least one project in Hampton that would not have been approved by the Planning Board on the basis of a state mandated water moratorium. The project could not have received permission to obtain city water service under the moratorium, but was granted a state permit for a private water supply system. The permit was in conflict with the moratorium, and was a source of some frustration for the town since it was being restricted from approving some projects and limited in restricting others.
- State offices need more consistency in dealings with towns. Phone conversations with state staff sometimes lead to statements which are in opposition with later decisions.
- UNH and other state and federal lands don't have to conform to local land use regulations.
 In the case of UNH, this can have substantial effects on the town because a substantial amount of land is involved. While UNH has been mostly helpful in resolving problems when they are discovered, they don't always inform the town of their activities. Towns now have the right to review plans for government and university actions and hold public hearings, but their input has no binding effect on the actions.

- The majority of pollution problems from development, including septic contamination, probably stem from high density development (especially along shorelines) that occurred prior to 1967, before the state began to develop tight controls on development. What is needed is less focus on new legislation for new development (there are already enough laws to handle new development) and more focus on correcting problems that arose before much of the current legislation went into effect.
- The reliance on volunteer members for land use boards and other local government boards creates substantial problems in scheduling workshops and other education and outreach programs. Most hold other jobs and have numerous obligations (they tend to be very active individuals). As a result, activities and proposals that make substantial demands on the time of local officials are likely to be met with resistance. A clear case must be made from the outset that the results of the endeavor will be very useful. In addition, scheduling is difficult, because different individuals are willing to attend such functions at different times of the week.
- Because of their limited time, volunteer boards tend to be action oriented, and may have a low tolerance for the slow pace of methodical research and management.
- Local officials expressed frustration with interviews and research surveys (this was
 experienced first-hand during this project), in part because it appears that the views
 expressed have not yet been heard. This is because repetition of similar surveys (though
 perhaps different from the researcher's perspective) suggests that the information is being
 lost or left unused.



