

1. EXECUTIVE SUMMARY

1.1 Plan Background

Due to poor water quality, Spruce Creek is listed in Maine's 2006 Integrated Water Quality Monitoring and Assessment Report (303d) as impaired under Category 5-B-1: Estuarine & Marine Water Impaired by Bacteria (TMDL required) for **nonpoint source pollutant** sources. This body of water is also identified by the Maine DEP as one of 17 **Nonpoint Source Priority Coastal Watersheds** due to bacterial contamination, low dissolved oxygen, toxic contamination, and a compromised ability to support commercial marine fisheries. Additionally, the Spruce Creek watershed is listed by the DEP as one of seven coastal watersheds most at risk from development in the state.

Development of a watershed management plan is a key step in Watershed Management, leading to restoration of a polluted or otherwise impaired waterbody. To this end, the Spruce Creek Association (SCA) has been working with the Towns of Kittery and Eliot to develop a watershed-based management plan, which will serve as a blueprint for restoring and protecting Spruce Creek. Incorporating input from stakeholders, this plan identifies the most pressing problems in the Spruce Creek estuary and establishes goals, objectives, and actions for resolving them. The management plan also contains strategies for monitoring progress and financing implementation. The Spruce Creek Watershed-Based Management Plan (WBMP) will be reexamined and revised on a regular basis to ensure that the goals, objectives, and specific actions continue to address the most pressing problems.

1.2 Plan Goals and Objectives

The goal of the Spruce Creek Watershed-Based Management Plan is to **safeguard and enhance the watershed, its water quality and its diversity of habitats and wildlife as part of a regional landscape so that present and future generations can benefit from the full potential of its natural resources**. The following objectives have been identified to achieve the long-term goals established for the watershed (for full description of these objectives, see **Section 7**):

- Protect and restore vegetated buffers, to reduce NPS pollution and improve water quality.

TMDL -

is an acronym for Total Maximum Daily Load, which represents the total amount of a pollutant (e.g., bacteria) that a waterbody can receive while still meeting water quality standards.

Nonpoint Source (NPS) Pollution -

is polluted runoff that cannot be traced to a specific origin or starting point, but accumulates from overland flow from many different watershed sources.

Nonpoint Source Priority Watersheds -

The NPS Priority Watersheds List, developed in 1998, identifies those watersheds in Maine where State and Federal agencies will coordinate activities and seek to provide assistance to local groups for the purpose of developing or implementing watershed management plans. The title is given to watersheds based on four priorities established by the State: the assessment of their value, the amount of impairment or threat to water quality and aquatic habitat, the likelihood that watershed management objectives will be met, and the amount of public support for the watershed and its management.

- Control invasive plants.
- Reduce bacteria loads / open shellfish beds.
- Treat impervious surfaces / minimize stormwater impacts.
- Increase conservation lands within Spruce Creek watershed.
- Continue water quality assessment and evaluation.
- Reduce existing heavy metal contamination.

1.3 Description of Watershed

The Spruce Creek watershed (HUC 01060003) is an ecologically and economically significant estuarine resource in southern Maine supporting a diverse array of recreational and commercial water-based activities. Spruce Creek originates in Eliot where three small, unnamed brooks converge. As it enters Kittery it becomes tidal. After passing under the I-95 and Route 1 bridges, the creek widens and flows in a south and southeasterly direction for two miles through Kittery, to the Piscataqua River, which forms the border between Maine and New Hampshire. The watershed area consists of a variety of land uses including forested, developed, agricultural and wetlands.



View of Spruce Creek from Duncan Road., off Rte. 103. (Photo: Rachel Bell, 2007)

1.4 Existing Conditions

Under the Federal Clean Water Act, all water bodies have a classification based on standards established at the state level. The freshwater portion of Spruce Creek is classified as Class B and the estuary portion SB by the State of Maine. Class B is the 3rd highest classification. The Act states that Class B waters “shall be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing, recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as habitat for fish and other aquatic life” (Classification of Maine Waters 2004). Class SB waters “must be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation and, navigation and as habitat for fish and other estuarine and marine life” (Classification of Maine Waters 2004). Per Federal guidelines, States must ensure that the habitat of B and SB waters are characterized as unimpaired. Spruce Creek does not meet its state water quality classification based on the results of the following monitoring activities:

- **2005-2007 SCA Water Quality Monitoring:** Results of water quality monitoring conducted by SCA from 2005 to 2007 have indicated a high variability in dissolved oxygen readings. The two upstream sites, sites 5 and 6 (see [Map 9, Appendix B](#)), have had **dissolved oxygen measurements of less than 85% saturation** 21% and 20% of the time, respectively.

- **2005 Maine Healthy Beaches Bacteria Monitoring:** Over the course of 11 sampling events at three sites, site 1 **exceeded the enterococci EPA limit for marine waters** 4 times and sites 2 and 3 exceeded the limit 3 and 2 times, respectively (see [Map 9, Appendix B](#)), .
- **1989-2007 Department of Marine Resources Fecal Coliform Monitoring:** In July of 2005, clam samples from Spruce Creek were found to have **very high fecal coliform concentrations**. High fecal coliform counts were found at all three sampling locations at least once during the 2005 and 2006 sampling seasons. As of February 1, 2008, all of Spruce Creek was classified as “Prohibited” for shellfish harvesting (see [Map 10, Appendix B](#)).
- **1987 Maine Department of Environmental Protection Metals Analysis:** The results MDEP metals sampling in Spruce Creek show that both **lead and mercury are found in above normal levels**. Other metals present include silver, cadmium, chromium, copper, nickel, zinc, aluminum, and iron.
- **1995-1996 MDEP and WNERR Dissolved Oxygen Study:** Results showed that Spruce Creek had **low dissolved oxygen** compared to other marine systems in the study and had mean % DO saturation values well below 100% (Kelly and Libby 1995).

1.5 Threats to Water Quality

Threats to the water quality of Spruce Creek stem from both nonpoint and point sources of pollution in the watershed.

In 2005, an **NPS Pollution Survey** was carried out to recognize and locate sources of polluted runoff (NPS pollution) in the watershed. The survey team found 197 sites of nonpoint source pollution in the watershed, and 70% of the sites included issues with nutrients. The results identified the following as the major nonpoint pollution sources:

- Nutrients (141 sites)
- Lack of vegetated buffers (60 sites)
- Trash and debris (60 sites)
- Flow restrictions (29 sites)
- Impervious surfaces (64 sites)

Other NPS pollution sources documented included: septic systems, ATV/recreational paths, trail/foot paths, construction sites/construction site debris, pet/animal waste, possible pesticide/fertilizer use, storm drains, and pipe discharges.

In the same year, Northern Ecological Associates was hired by the Maine State Planning Office to conduct an **Inventory of Habitat Restoration Opportunities**. The purpose of the survey to identify, evaluate, and document potential habitat and environmental restoration opportunities in, and directly adjacent to, specific areas along the southern Maine coast, including Spruce Creek. The following water quality degradation sources were noted in the Spruce Creek watershed:

- Cleared land (48 sites)
- Land use activity (48 sites)
- Docks/jetties/piers (34 sites)

In 2004, a **Stormwater Assessment and Retrofit Inventory** of U.S. Route 1 within the commercial area in Kittery was undertaken by Hillier & Associates, Inc. The analysis was assigned by the Maine State Planning Office to determine the extent and location of various publicly-owned stormwater inputs to the Spruce Creek watershed and to identify possible stormwater best management practice retrofit locations within the area. The inventory revealed 21 stormwater outfalls discharging pollutants.

Point sources of pollution in the watershed include four known overboard discharge sites. Two are licensed and on the Maine Departments of Environmental Protection's Priority for Removal list and two were previously undocumented until 2006.

Finally, septic systems are also a threat to the water quality of Spruce Creek since much of the watershed is not on public sewer and soils in the watershed are often not well suited to septic systems.

1.6 Water Quality Goals

The overall water quality goals are to ensure that Spruce Creek meets minimum Class B and SB standards and is useful and healthy for drinking, recreation, fish, birds, and other wildlife now and in the future.

1.7 Recommended Management Strategies

Watershed partners can review and adjust activities, regulations, and community awareness to reduce the occurrence of new sources of pollution in the Spruce Creek watershed and can also implement a variety of techniques, referred to collectively as **Best Management Practices (BMPs)**, to manage nonpoint pollution inputs. **Section 8.1** of this plan outlines recommended BMPs that can be applied to NPS problems identified in the Spruce Creek watershed.

Best Management Practices (BMPs)- are techniques, measures or structural controls implemented to reduce potential pollutant generation and/or facilitate pollutant removal in stormwater runoff. There are three general types of BMPs: structural, non-structural and housekeeping (USEPA 1999).

Thought of as the “hard” BMPs, **structural BMPs** are engineered and constructed systems used to treat stormwater at either the point of generation or the point of discharge to the stormwater system or receiving waters. Soil reinforcement techniques include the use of geotextile fabrics and rip rap. Water conveyance BMPs include culvert installation, and vegetated/riprap waterways. Water Detention BMPs include sediment pond construction, sediment traps, and construction dewatering (MDEP 2006).

Non-structural BMPs can be thought of as “soft” BMPs. These include a range of management and development practices designed to limit the conversion of rainfall to runoff and to prevent pollutants from entering runoff at the source of runoff generation. Examples of non-structural BMPs include temporary soil stabilization techniques such as mulching and vegetating loose soil at a construction site,

but may also include education to prevent the generation of pollutants in runoff (USEPA 1999). BMPs used to prevent sediment movement include sediment barriers, check dams, and dust control techniques. Permanent soil stabilization BMPs in this category include grading and slope protection, establishing vegetation and mulching, and using vegetated buffers.

A third, underutilized BMP category includes the **Managerial and Housekeeping BMPs**. Managerial BMPs involving dust control and fertilizer and pesticide management are also important. Housekeeping BMPs include street sweeping and household hazardous waste disposal (MDEQ 1998), cleaning out clogged culverts, and ensuring establishment of vegetation. Recommended BMPs in the Spruce Creek watershed fall under all three categories, yet the majority fall into the non-structural and housekeeping BMPs.

1.8 Implementation, Projected Costs and Funding

Section 9.2 of this plan outlines an Action Plan for the implementation of watershed improvement tasks and includes the responsible parties, potential funding sources, and approximate costs. Action Plan items were developed in collaboration with watershed partners including local town officials, watershed landowners, and SCA members. **Section 9.4** lists potential sources of additional funding.



Aerial view of Kittery and Portsmouth, October 2007. Spruce Creek flows through Kittery, Maine (left) before draining into the Piscataqua River Estuary (center), near the Portsmouth Naval Shipyard. Portsmouth, New Hampshire can be seen on the right side of the photo. (Photo: Phyllis Ford, 2007)