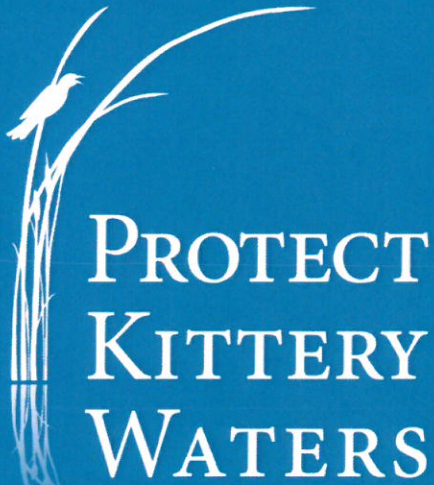


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**Spruce Creek Watershed
Improvement Project
Phase III
Project # 2013RT06**

Final Report
September 28, 2015

Grantee: Town of Kittery
Grantee Contact: Jessa Kellogg
April 2013 – July 2015
319 Funds provided by MEDEP and EPA



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1. PROJECT OVERVIEW

1.1 Project Purpose

The primary purpose of the Spruce Creek Watershed Improvement Project (SCWIP) Phase III was to continue addressing the cumulative impacts of increasing development and polluted runoff to surface waters in the Spruce Creek watershed (see Appendix A for watershed description). This project focused on addressing polluted runoff and septic system problems to reduce bacteria loading and the export of sediment/metals/nutrients, to help restore water quality, and to help open shellfish harvest areas. This was accomplished through the installation of structural Best Management Practices (BMPs) at residential and commercial properties. SCWIP Phase III also continued to raise awareness about watershed problems and foster long-term watershed stewardship through public outreach. Some of the major project outcomes include:

- Completed the Town of Kittery Septic System Database and property ranking by pollution risk.
- The installation of 17 BMPs to control polluted runoff (14 residential and 3 commercial).
- Over 145 volunteer hours logged.
- The maintenance of the Save Kittery Waters website.
- The continuation of the Save Kittery Waters Pledge program, which received pledges from 31 local citizens to implement 332 watershed-friendly practices on their properties.
- Presentations or educational exhibits at over 10 events, including two “septic socials”.

1.2 Project Highlights and Difficulties

Overall, Phase III of the SCWIP was a success. Major highlights of the project include the completion of the tasks outlined in the grant agreement, as well as tasks beyond the scope of the plan. The Town of Kittery invested above and beyond the original match requirements for this project. At the end of this project, roughly 300 watershed citizens and visitors were exposed to the work being completed through this grant.

Despite the successes of this project, there were some difficulties that complicated and delayed the completion of some of the original tasks. For instance, many of the BMPs installed during this project were on commercial property. The “go-ahead” for work to be completed on these properties often had to go through many levels of approval. The long timeframe associated with this type of work was not anticipated and prevented the installation of some of the BMPs originally planned on commercial properties. Another major difficulty of this project was the transition of multiple new positions in the Town, Maine DEP, and FB Environmental.

1.3 Key Personnel

The key personnel involved in this project served on the Steering Committee and met multiple times throughout the project to ensure the requirements for each task were met. Members of the Steering Committee included:

1. Mary Ann Conroy – Commissioner of Public Works (previous)
2. Norman Albert – Commissioner of Public Works (current)
3. Maryann Place – Interim Kittery Town Manager (previous)

4. Nancy Colbert Puff – Kittery Town Manager (current)
5. Phyllis Ford – Spruce Creek Association
6. Jessa Kellogg – Kittery Shoreland Resource Officer
7. Wendy Garland – Maine DEP (previous)
8. Kristin Feindel – Maine DEP (current)
9. Forrest Bell – FB Environmental Associates (current)
10. Emily DiFranco – FB Environmental Associates (previous)
11. Whitney Baker – FB Environmental Associates (previous)

2. TASK SUMMARY

2.1 Task 1: Project Management

The Town of Kittery and MEDEP finalized the contract for this project in April 2013. The Town of Kittery tracked project progress, expenses, and local match. Four semi-annual progress reports were completed. Jessa Kellogg, Shoreland Resource Officer, served as the Project Manager for the Town of Kittery.

2.2 Task 2: Steering Committee

The Steering Committee met five times throughout the course of this project. Committee members included Mary Ann Conroy, Norman Albert, Jessa Kellogg, Phyllis Ford, Wendy Garland, Emily DiFranco and Whitney Baker. The Steering Committee managed this project based on project tasks and met to discuss progress and next steps.

2.3 Task 3: LID Team: LID and Stormwater Best Management Practices

In SCWIP Phase I, the LID Team inventoried the Spruce Creek watershed during wet and dry weather to identify potential commercial and industrial sites for the implementation of stormwater BMPs. From this inventory, approximately ten sites were selected as good candidates for remediation. In Phases I and II, a total of seven sites were addressed. In Phase III, three additional sites were addressed. A brief summary of the work completed in Task 3 includes the following:

- **LID Site 1: Adams Drive Swale:** Improvements to this site include the installation of a riprap swale to slow and disperse stormwater runoff into a wooded buffer;
- **LID Site 2: Kittery Community Center:** Improvements to this site include infiltration steps, a terrace garden, and multiple buffers to address areas of exposed soils and significant erosion. Additionally, major pathways in the play area were stabilized with erosion control mulch.
- **LID Site 3: Dion Ave:** Improvements to this site include the installation of a Fabco biofiltration modular system to filter stormwater before it enters an existing storm drain. Rip rap was installed along the roadside perimeter to dissipate and pretreat flow.

2.4 Task 4: Septic Team: IDDE Evaluation Follow-up and Technical Assistance

For Task 4, SCWIP Phase III focused on identifying human sources of bacteria in Kittery by developing a database and map of all septic systems in the Spruce Creek watershed. The septic database and maps of priority risk sites were completed in May 2014. In addition, smoke testing of the sewer system was completed in July 2013 (Admiralty Village) and 2014 (follow-up on Colonial/Manson Ave. in Admiralty Village) to identify leaks or other problems with sewer pipes. Following the results of the smoke tests, the Shoreland Resource Officer dye tested the homes that did not have smoke apparent from one or both house vent stacks.

2.5 Task 5: Residential Team: Residential Socials and Residential Conservation Practices

In SCWIP Phase III, Technical Assistance reports were generated for three residences or areas. From these reports, 11 BMPs were installed on two residential properties with the help of 23 volunteers, donating 145 hours of their time. An additional three BMPs were installed on three properties in the Admiralty Village neighborhood.

A brief summary of the work completed by the Residential Team includes the following:

- **Residential Site 1: 10 Cottage Way:** Improvements to this site include the installation of a rain garden, an infiltration trench, and a vegetated buffer.
- **Residential Site 2: 578 Haley Road:** Improvements to this site include the installation of several vegetated buffer areas.
- **Residential Site 3: Admiralty Village Catchbasins:** Improvements to three residences include replacement of catchbasin covers and frames.

2.6 Task 6: Targeted Public Outreach

In SCWIP Phase III, a major goal was to continue a multi-tiered public outreach program to raise community awareness about water quality in the Spruce Creek watershed. Upon the completion of this project, over four public presentations and two workshops on non-point source pollution management were held, two “septic socials” were hosted by local residents in August 2014, and one end-of-project intercept survey was conducted during the Kittery Block Party on June 20, 2015.

Public Presentations

Four public presentations were given by FB Environmental (See Appendix D for more detailed descriptions):

- FB Environmental hosted a public event/presentation on canine tracking of human-specific bacteria sources at Fort Foster on July 31, 2013.
- Two workshops on Yardscaping were organized by the Outreach Team as part of Phase III on June 22, 2013 and July 1, 2013.
- At the Kittery Block Party on June 15, 2013, the Kittery Department of Public Works hosted a Stormwater Education booth featuring rain barrels, outreach materials, information on water quality in Spruce Creek, and other information to further educate the public about storm water runoff and

zero waste programs. A booth was again present at the Kittery Block Party in June 2014 and June 2015.

Workshops on NPS Management

- FB Environmental staff gave a brief presentation on the SCWIP and septic pollution management at a Kittery Town Council meeting on February 24, 2014 and on July 28, 2014, and also presented to the Kittery Planning Board on June 26, 2014.

Educational Exhibits

In addition to the public presentations, educational exhibits were organized and staffed by the Spruce Creek Association and the Town of Kittery.

- The Spruce Creek Association and FB Environmental organized a booth at the Kittery Trading Post Clean Water Music Series on June 24, 2014 and August 21, 2014.

Intercept Survey

In 2008, 2010, and 2012, intercept surveys were conducted in the Spruce Creek watershed to gauge the impact of public outreach and education efforts. At the end of Phase III, an additional intercept survey was conducted in June 2015 at the Kittery Block Party to gather responses and information regarding the success of those outreach and educational efforts put forth during Phase III of this project.

Technological Outreach

As part of Phase III, one website was updated to spread information about Spruce Creek and best management practices.

- **Protect Kittery Waters Website** (www.savekitterywaters.org): Created in 2009, this website provides a central location for information about the SCWIP, an overview of steps each resident or business owner can take to improve water quality in the watershed, a calendar of events for SCWIP projects, as well as links to other resources.

Additional Outreach Efforts

- **Press Releases:** A press release was published in December 2013 to highlight Environmental Canine Services work. An additional press release was published in November 2014 in conjunction with a tour of a Phase III BMP Site.
- **Watershed Pledge:** The Watershed Pledge is a public outreach tool that encourages local residents to discuss what they can do to improve water quality in the Spruce Creek watershed with their families, and commit to implementing these actions. Residents can pledge to improve buffers around their homes, care for their lawns and gardens in a more watershed-friendly way, prevent erosion and reduce runoff from their property, or simply spread the word to other residents. For their pledge, homeowners received a yard sign indicating their participation. During Phase III, 31 people pledged to complete a total of 332 watershed-friendly practices on their properties.

- **Tour of SCWIP Phase III BMP Site:** One tour of commercial BMPs installed at the Kittery Community Center in SCWIP Phase III was held on December 1, 2014. The tour also included a presentation on SCWIP Phase III activities and goals for the recently-awarded SCWIP Phase IV grant.
- **Flyers/Brochures:** A new flyer was designed as an update to the Department of Public Works' "Kittery Clean Water Initiative".
- **Septic Socials:** Two "septic social" events were hosted by Phyllis Ford on August 14, 2014 and Ann Grinnell on August 26, 2014. A total of 18 participants learned about current work within the Spruce Creek Watershed and septic system maintenance and conservation practices.

2.7 Task 7: Pollutant Load Reduction Estimates

Pollution reduction estimates were calculated for all sites where applicable. The EPA Region 5 Model was used to estimate load reduction for BMPs installed in 2013-2015. It is estimated that a total of 3.538 tons/year of sediment, 37.6 pounds/year of total nitrogen, and 6.9 pounds/year of total phosphorus were reduced through the implementation of BMPs. Pollutant reductions calculated with the Region 5 Model are reported in Pollutants Controlled Reports for the Maine DEP (Appendix E).

As of July 2015, water quality in the Spruce Creek watershed is still considered impaired based on recent water quality data. Shellfish harvesting areas still remain closed.

3. DELIVERABLES SUMMARY

<i>Deliverables:</i>	<i>Date(s) Submitted:</i>	<i>Comments:</i>
1. Progress Reports Final Project Report Site Tracker	<ul style="list-style-type: none"> • 5/13, 11/13, 5/14, 11/14, 5/15 • 9/15 • 11/13, updated 9/15 	These documents help organize and track project outcomes over the course of the grant period. The Site Tracker is particularly valuable in tracking pollutant reductions over time.
2. NPS Site Reports	<ul style="list-style-type: none"> • 9/14 – (4) Adams Drive swale, Curran residential property, Kittery Community Center, Admiralty Village catchbasins • 9/15 – (2) Dion Ave, Robinson 	These BMP sites helped reduce 3.5 tons of sediment, 37.6 lbs. of nitrogen, and 6.9 lbs. of phosphorus from entering Spruce Creek each year. This is one step closer to improving the water quality of Spruce Creek.
3. Map of septic systems	<ul style="list-style-type: none"> • 4/14 	A septic system database and risk assessment map developed for the Town of Kittery provided a starting point for identifying areas in the watershed at risk for sewer or septic system failure, which is likely the dominant source of bacteria to the creek.

<i>Deliverables:</i>	<i>Date(s) Submitted:</i>	<i>Comments:</i>
4. Results of residential conservation practices pledges	<ul style="list-style-type: none"> 9/15 	The 2015 Survey Intercept results reflected an increase in public understanding and concern about impacts to Maine's waterways. The initial and follow-up surveys were valuable and worth the effort.
5. Outreach materials	<ul style="list-style-type: none"> 9/15 – Summary of Residential Septic Socials, 2013 and 2014 Press Releases, Smoke Test Public Notice, 2014 Outreach Flyer, Clean Water Capital Initiative Website 	Outreach and education was a critical component of Phase III and was attempted through various means. Feedback from residents and businesses was positive and engaging, indicating that the efforts were effective.
6. Pollutants Controlled Reports	<ul style="list-style-type: none"> 2013 2014 2015 	These reports documented reductions in sediment, nitrogen, and phosphorus as a result of BMP installation in the watershed.

4. PROJECT OUTCOMES

- Completed the Town of Kittery Septic System Database and property ranking by pollution risk.
- Installed 17 BMPs to control polluted runoff (14 BMPs on 5 residential and 3 BMPs on 3 commercial or Town properties).
- Reduced 3.5 tons of sediment, 37.6 lbs. of nitrogen, and 6.9 lbs. of phosphorus from entering Spruce Creek each year.
- Logged over 145 volunteer hours.
- Updated the Save Kittery Waters website.
- Continued the Save Kittery Waters Pledge program, which received pledges from 31 local citizens to implement 332 watershed-friendly practices on their properties.
- Gave or hosted presentations or educational exhibits at over 10 events, including two “septic socials” and a BMP tour at the Kittery Community Center.
- Sent out 2 press releases
- Developed 1 new flyer, “Kittery Clean Water Initiative.”
- Informed over 300 watershed citizens about water quality and NPS pollution.

This project was successful because of the dedicated team of municipal staff and residents that care about improving the water quality of Spruce Creek. The Town of Kittery invested above and beyond the original match requirements for this project, which showcases their sincere commitment to the environment and public safety. Despite the successes of this project, there were some difficulties that complicated and delayed the completion of some of the original tasks. For instance, many of the BMPs installed during this project were on commercial property. The “go-ahead” for work to be completed on these properties often

had to go through many levels of approval. The long timeframe associated with this type of work was not anticipated and prevented the installation of some of the BMPs originally planned on commercial properties. Another major difficulty of this project was the transition of multiple new positions in the Town, Maine DEP, and FB Environmental.

5. SUMMARY OF TOTAL EXPENDITURES

	NPS Grant	Non-Federal Match	Total
Grant Agreement Amount	\$75,750.00	\$74,055.00	\$149,805.00
Funds Expended	\$75,750.00	\$58,770.32	\$134,520.32
Funds Balance	\$0	\$15,284.68	\$15,284.68

SCWIP Phase III Grant Expense and Non-Federal Match Summary							
Watershed Project Activity or Workplan Element	Grant Funds Expended	Non-Federal Match					Grant + Match
		Volunteer Match	In -Kind Services	Kittery Cash Match	Cost Share	Total Match	
Task 1: Project Management	\$6,764.45	\$660.00	\$2,460			\$3,120.00	\$9,884.45
Task 2: Steering Committee	\$3,021.25	\$360.00	\$1,100.00	\$10,000.00		\$11,460.00	\$14,481.25
Task 3: LID Team	\$22,842.53		\$18,879.70	\$5,075.16		\$23,954.86	\$46,797.39
Task 4: Septic Team	\$11,691.70		\$12,015.00			\$12,015.00	\$23,706.70
Task 5: Residential Team	\$21,286.09	\$937.50	\$2,029.56		\$738.40	\$3,705.46	\$24,991.55
Task 6: Outreach Team	\$8,629.98	\$1,680.00	\$2,445.00			\$4,125.00	\$12,754.98
Task 7: Pollutant Reduction Estimates	\$1,514.00		\$390.00			\$390.00	\$1,904.00
TOTAL	\$75,750.00	\$3,637.50	\$39,319.26	\$15,075.16	\$738.40	\$58,770.32	\$134,520.32

6. NON-FEDERAL MATCH DOCUMENTATION AND CERTIFICATION

GRANTEE INFORMATION:

Name: Town of Kittery
Address: 200 Rogers Road
Kittery, Maine 03904
Telephone: (207) 475-1321
Contact Person: Jessa Kellogg

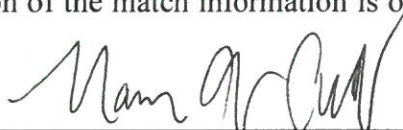
PROJECT INFORMATION:

Project Title: Spruce Creek Watershed Improvement Project Phase III
Project ID#: 2013RT06

Match Amount planned under the Grant Agreement	\$ 74,055.00
Match Amount Claimed	\$ 58,770.32

CERTIFICATION STATEMENT:

I certify that the non-federal match detailed in the attached information were expended in the course of completing work described in the Grant Agreement for the Project referenced above, and that detailed documentation of the match information is on file and available for review at the Grantee address shown above.



Date 9/28/2015 Signature of Grantee - Authorized Official

Table 1: Total Non-Federal Match for all Tasks for the SCWIP Phase III

Source	Activity or Item	Task	Hours	Rate/Value	Total
Town Manager	Project Management	1	3	\$40/hour	\$120.00
FB Environmental	Project Management	1	100	\$10/hour	\$1,000.00
Shoreland Resource Officer	Project Management	1	67	\$20/hour	\$1340.00
Phyllis Ford, SCA	Project Management	1	33	\$20/hour	\$660.00
Town of Kittery	Funds for update of watershed plan	2			\$10,000.00
Residents	Steering Committee Attendance	2	8	\$20/hour	\$160.00
DPW Commissioner	Steering Committee Attendance	2	10	\$40/hour	\$400.00
Steve Hall, Kittery Conservation Commission	Steering Committee Attendance	2	2	\$20/hour	\$40.00
Kristie Rabasca, Kittery MS4	Steering Committee Attendance	2	2	\$20/hour	\$40.00
Karen Kalmar, Kittery Planning Board	Steering Committee Attendance	2	2	\$20/hour	\$40.00
Christine Bennett, Kittery Land Trust	Steering Committee Attendance	2	2	\$20/hour	\$40.00
Spruce Creek Association	Steering Committee Attendance	2	10	\$20/hour	\$200.00
Shellfish Commission	Steering Committee Attendance	2	4	\$20/hour	\$80.00
Shoreland Resource Officer	Steering Committee Attendance	2	10	\$20/hour	\$200.00
FB Environmental	Steering Committee Attendance and Preparation	2	26	\$10/hour	\$260.00
Shoreland Resource Officer	LID Logistics	3	22	\$20/hour	\$440.00
FB Environmental	LID Meetings and Review	3	31	\$10/hour	\$310.00
DPW Commissioner	LID Meetings, Preparation, and Review	3	16	\$40/hour	\$640.00
Kittery DPW	Materials and Labor	3 - Adams Drive BMP	24		\$760.00
Kittery DPW	Materials and Labor	3 - KCC BMP	312		\$8,332.16
Kittery DPW	Materials and Labor	3 - Dion Ave	108		\$13,472.70
Kittery Highway Department	2013 Smoke test	4	2	\$30/hour	\$60.00
Kittery Sewer Department	2013 Smoke test	4	4	\$30/hour	\$120.00
Kittery Solid Waste Department	2013 Smoke test	4	2	\$30/hour	\$60.00
FB Environmental	2013 Smoke test	4	19	\$10/hour	\$190.00
Kittery DPW	2014 Manson Avenue smoke test	4	18	\$21/hour	\$378.00
Kittery Sewer Department	2014 Manson Avenue smoke test	4	9	\$30/hour	\$270.00
Shoreland Resource Officer	2014 Manson Avenue smoke test	4	3	\$20/hour	\$60.00
Town of Kittery	Manson Avenue follow-up investigation	4			\$9,392.00
FB Environmental	Septic database	4	120.5	\$10/hour	\$1,205.00

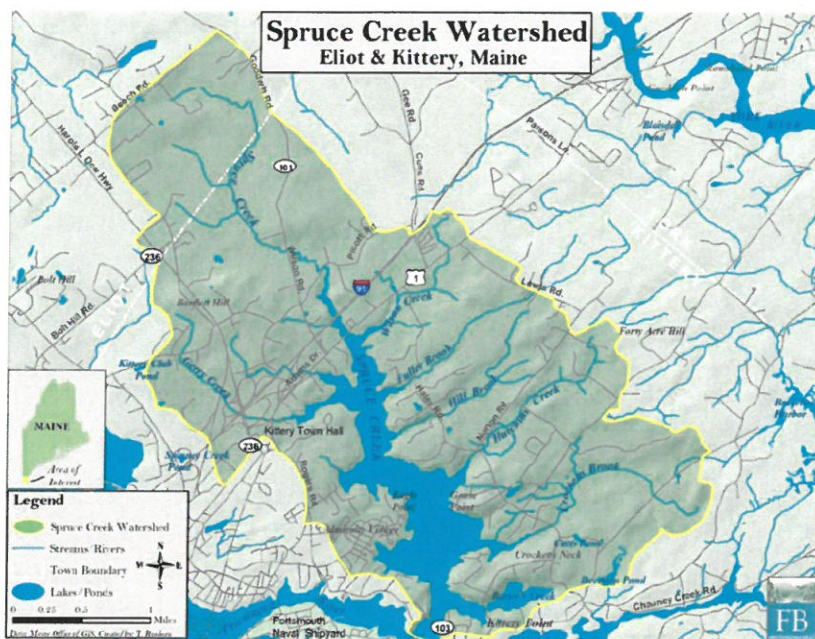
Source	Activity or Item	Task	Hours	Rate/Value	Total
Shoreland Resource Officer	Septic system database review	4	10	\$20/hour	\$200.00
Shoreland Resource Officer	Smoke test prep and mailings 2013	4	4	\$20/hour	\$80.00
Phyllis Ford	Food donation for volunteers	5			\$120.00
FB Environmental	Residential BMP review	5	51	\$10/hour	\$510.00
Shoreland Resource Officer	Residential BMP review	5	10	\$20/hour	\$200.00
FB Environmental	Residential Site Visits and Report	5	16	\$10/hour	\$160.00
Kittery DPW	Materials and Labor	5 - Catchbasins in Admiralty Village	12		\$287.56
Sam Curran	Homeowner (labor and planning)	5 - Curran BMP	18	\$15/hour	\$270.00
Kittery DPW	Materials and Labor	5 - Curran BMP	4		\$112.00
Spruce Creek Association	Volunteers for Site Installation	5 - Curran BMP	13.5	\$15/hour	\$202.50
Volunteers	Volunteers for Site Installation	5 - Curran BMP	8	\$15/hour	\$120.00
Sam Curran	Cash cost-share	5- Curran BMP			\$238.40
John Robinson	Homeowner (planning and installation)	5 - Robinson BMP	6	\$15/hour	\$90.00
FB Environmental	Site Installation	5 - Robinson BMP	14	\$10/hour	\$140.00
Phyllis Ford	Volunteers for Site Installation	5 - Robinson BMP	7	\$20/hour	\$140.00
Volunteers	Volunteers for Site Installation	5 - Robinson BMP	5	\$15/hour	\$75.00
US Coast Guard	Volunteers for Site Installation	5 - Robinson BMP	36	\$15/hour	\$540.00
John Robinson	Cash cost-share	5-Robinson BMP			\$500.00
DPW Commissioner	Attendance and preparation for outreach events	6	6	\$40/hour	\$240.00
John Robinson	Kittery Block Party outreach	6	4	\$20/hour	\$80.00
FB Environmental	Outreach events and material preparation	6	58.5	\$10/hour	\$585.00
Shoreland Resource Officer	Planning/Attendance at Outreach Events	6	49	\$20/hour	\$980.00
Phyllis Ford	Planning/Attendance at Outreach Events	6	42	\$20/hour	\$840.00
Jeff Estabrook, Rooterman	Spruce Creek Septic Social #1 & 2 Attendance	6	5	\$20/hour	\$100.00
Neighbor	Spruce Creek Septic Social #1 Attendance	6	6	\$20/hour	\$120.00
Spruce Creek Association	Spruce Creek Septic Social #1 Attendance	6	8	\$20/hour	\$160.00
Phyllis Ford	Spruce Creek Septic Social #1 Host	6	4	\$20/hour	\$80.00

Source	Activity or Item	Task	Hours	Rate/Value	Total
Karen Kalmar, Kittery Planning Board	Spruce Creek Septic Social #2 Attendance	6	2	\$30.00	\$60.00
Spruce Creek Association	Spruce Creek Septic Social #2 Attendance	6	6		\$150.00
Nancy Colbert Puff, Town of Kittery	Spruce Creek Septic Social #2 Attendance	6	2	\$40/hour	\$80.00
Watershed Residents	Spruce Creek Septic Social #2 Attendance	6	8	\$20/hour	\$160.00
Anne Grinnell	Spruce Creek Septic Social #2 Host	6	3	\$30/hour	\$90.00
Shoreland Resource Officer	Yardscaping Workshops	6	20	\$20/hour	\$400.00
FB Environmental	Pollutant controlled report review	7	3	\$10/hour	\$30.00
FB Environmental	Pollutant loading estimate	7	36	\$10/hour	\$360.00

7. APPENDIX A: WATERSHED DESCRIPTION

The Spruce Creek Watershed

The Spruce Creek watershed covers 9.8 square miles (6,112 acres) in the towns of Kittery (90% - 5,298 acres) and Eliot (10% - 611 acres) in the southernmost corner of the State of Maine. The headwaters of Spruce Creek are located in Eliot, and the creek flows in a southeasterly direction through Kittery for two miles before emptying into the Piscataqua River, which forms the border between Maine and New Hampshire. Spruce Creek is fed by six small fresh water streams: Wilson Creek, Fuller Brook, Hill Creek, Hutchins Creek, Crockett's Brook, and Barter's Creek. Near its confluence with the Piscataqua River, Spruce Creek is a coastal, tide-dominated system with a significant estuarine area approximately 2.25 miles long and half a mile wide. This watershed is part of the Atlantic Coastal Plain with the land from the coast to several miles inland appearing as flat or gently undulating terrain. Spruce Creek is influenced by the tidal flow from the Piscataqua River, approximately 2.5 square miles of clam flats are exposed at low tide. The marine environment consists of mud flats, high salt marsh, and ledge. Farther up the estuary toward U.S. Route 1, much of the creek is classified as low salt marsh. This area is rich in marine life, particularly soft shell clams.



The Spruce Creek watershed is located in York County. As of 2006, York County's population was 206,590, up about 20,000 people, or more than 10 percent, since 2000. From 2000 to 2006, the population growth rates for Kittery and Eliot were 5.9% and 8.3% respectively. This compares with 10.6% for York County, and 3.8% for Maine as a whole.

Land cover in the Spruce Creek watershed is dominated by upland forest, which covers 42% (2578 acres) of the watershed land area. Developed land is the second-largest land cover class, covering 1492 acres (24%) of the watershed and consisting of high intensity development (261 acres), medium intensity development (242 acres), low intensity development (594 acres), developed open space (92 acres), and roads (302 acres). There are approximately 985 acres (16%) of wetlands scattered throughout the watershed. Agricultural land, including crops, hayland and pasture, covers 7% (414 acres), and the remaining 3% is covered by other land uses, including unconsolidated shore, scrub-shrub, and grassland. An extensive retail outlet corridor serving over 3 million shoppers per year is located along U.S. Route 1 and Interstate 95, transecting the Spruce Creek watershed. The east side of the watershed is high density residential, largely

served by the Town sewer and containing many impervious surfaces and lawns. Impervious area covers approximately 11% of the Spruce Creek watershed.

The increased population and changing land use in the Spruce Creek watershed has led to a variety of water quality issues. Spruce Creek is currently listed on Maine's 305(b) report as impaired under Category 5-B-1: Estuarine and Marine Water Impaired by Bacteria (TMDL required) for non-point source pollutant sources. It has also been identified by the Maine Department of Environmental Protection (MDEP) as a "non-point source pollution priority watershed" due to bacterial contamination, low dissolved oxygen, toxic contamination, and a compromised ability to support commercial marine fisheries.