

5-16-2008

Recommendations for Future Restoration and Management Efforts for Mill Brook, Westbrook, Maine

Casco Bay Estuary Partnership

Jeff Varricchione

Maine Department of Environmental Protection

Follow this and additional works at: <https://digitalcommons.usm.maine.edu/cbep-publications>

Recommended Citation

Varricchione, J. (2008). Recommendations for Future Restoration and Management Efforts for Mill Brook, Westbrook, Maine. Portland, ME: University of Southern Maine, Muskie School of Public Service, Casco Bay Estuary Partnership.

This Report is brought to you for free and open access by the Casco Bay Estuary Partnership (CBEP) at USM Digital Commons. It has been accepted for inclusion in Publications by an authorized administrator of USM Digital Commons. For more information, please contact jessica.c.hovey@maine.edu.

Recommendations for Future Restoration and Management Efforts for Mill Brook, Westbrook, Maine



Includes Appendices of Data Sets and Reports from Various Organizations
on the Status of Mill Brook

May 16, 2008

Casco Bay Estuary Partnership
Habitat Restoration Committee

ACKNOWLEDGMENTS

Document compiled by:

Jeff Varricchione, Maine Department of Environmental Protection

Participants at the January 23, 2008 meeting included:

- Francis Brautigam, Maine Department of Inland Fisheries & Wildlife (MDIFW)
- Don Card, Maine Department of Marine Resources
- Margaret Chabot, AmeriCorps Program / Maine Department of Environmental Protection
- Matt Craig, Casco Bay Estuary Partnership / Presumpscot River Watershed Coalition
- Jon Kachmar, Maine State Planning Office, Gulf of Maine Council - Habitat Restoration Subcommittee
- Marcy Scott, National Oceanic & Atmospheric Administration / National Marine Fisheries Service
- Jeff Varricchione, Maine Department of Environmental Protection
- Jed Wright, U. S. Fish & Wildlife Service - Gulf of Maine Program

Additional persons who contributed or commented to this document include:

- Forrest Bell, Presumpscot River Watch and FB Environmental
- Fred Dillon, Presumpscot River Watch and FB Environmental
- Sandra Lary, U. S. Fish & Wildlife Service - Gulf of Maine Program
- Gail Wippelhauser, Maine Department of Marine Resources

TABLE OF CONTENTS

I.	Purpose.....	3
II.	Overview of Knowledge Regarding Mill Brook (Westbrook, ME).....	4
III.	Recommended Future Actions.....	16
IV.	Potential Leaders and Partners for Future Actions.....	20
V.	Figures 1 – 4 (Maps)	
VI.	Appendices	
	A. Maine Atlantic Salmon Commission habitat survey data	
	B-1. Maine Department of Inland Fisheries and Wildlife stream fishery investigation data from 2000 and 2005.	
	B-2. The Draft Fishery Management Plan for the Presumpscot River Drainage (2001) (prepared by the Maine Department of Marine Resources, Maine Department of Inland Fisheries & Wildlife, and Maine Atlantic Salmon Commission).	
	C. A preliminary photographic analysis of culvert/bridge crossings in the Mill Brook watershed was conducted by Jeff Varricchione (Maine DEP) on behalf of the Casco Bay Estuary Partnership's Habitat Restoration Committee.	
	D. Geomorphic assessment overview map of a survey Mill Brook conducted by the U. S. Fish and Wildlife Service - Gulf of Maine Program (2004). Background information on the "Rosgen" stream classification system is also provided.	
	E. Report summarizing a rapid stream habitat assessment effort conducted in 2003. The effort was led by the Maine Department of Environmental Protection's Maine Stream Team Program and performed by some volunteers from Presumpscot River Watch, Highland Lake Association, and the Casco Bay Estuary Partnership.	
	F. Summary of a watershed survey for non-point source (NPS) pollutants conducted in 2003 by volunteers from Presumpscot River Watch and other partner organizations.	
	G. Maps showing potential habitat restoration sites identified by Northern Ecological Associates in the Mill Brook watershed (Report date: 2005.)	
	H. Maps showing a variety of high value habitats and other natural features in Westbrook. The maps were created by the Beginning With Habitat program.	
	I. Map of city-owned properties in Westbrook, ME.	

PURPOSE

The purpose of this document is:

- (1) To briefly summarize discussion that occurred amongst staff from a variety of organizations that have been involved with assessment or management of Mill Brook (Westbrook, ME) at a meeting on January 23, 2008, as well as follow-up with other professionals in the region (see Acknowledgments section for a list of participants); and
- (2) Compile and summarize data, studies, and maps that already exist about the condition of Mill Brook and include detailed reports as appendices so that it can all be found in a single, convenient place; and
- (3) Propose recommended priority restoration and management activities that should occur in Mill Brook's watershed to help ensure its long term ecosystem health and value as an outstanding recreational resource to a large population in the vicinity of Portland, ME.

Note: Figures 1 – 4 contain maps of the Mill Brook watershed and points of interest.

OVERVIEW OF KNOWLEDGE REGARDING MILL BROOK

1. Fisheries and Fish Passage

• Anadromous and Catadromous Fisheries and Dam Modifications

Maine Department of Marine Resources

(plus numerous other partners including Central Maine Power, Casco Bay Estuary Partnership^{}, and U. S. Fish & Wildlife Service)*

The Presumpscot River historically supported runs of alewife, American shad, blueback herring and American eel, and these species likely occurred in Mill Brook as well. The construction of a dam at the head-of-tide in 1802 greatly reduced the abundance of the anadromous species by blocking their access to nearly all fresh water spawning habitat in the Presumpscot drainage. The impact of this dam on American eel was less severe, because of its catadromous life cycle and unusual biological characteristics.

Anadromous fish restoration in the Presumpscot River drainage was initiated when the Department of Marine Resources (DMR) stocked adult alewives into Highland Lake in 1987, and constructed a fishway at the outlet of the lake in 1988. DMR continued to stock the lake until 1991, a year after the fishlift constructed by Central Maine Power (CMP) at Smelt Hill Dam became operational. The fishlift provided access to the lower reaches of the river for alewives and American shad until 1996, when it was destroyed by a flood. In an attempt to maintain fish populations, alewives were stocked in Highland Lake by CMP (1997-1998) and DMR (2000-2003) and CMP opened gates in the dam to allow fish to pass upstream (1999-2001). Smelt Hill Dam was removed in 2002, and fish freely migrated above the head-of-tide in the spring of 2003.

Year	Alewives stocked
	By DMR
1987	500
1989	985
1990	1,138
1991	461
2000	3,873
2001	3,930
2002	1,999
2003	3,030
Total	17,916

^{*} The Casco Bay Estuary Project now calls itself the Casco Bay Estuary Partnership.

The 1996 storm that rendered the Smelt Hill fishlift inoperable also caused a partial breach of the Highland Lake Dam and significant downstream erosion and stream channel degradation in Mill Brook. Following several repairs to the old dam and subsequent failures, a new dam was constructed in 2000. Monitoring conducted by DMR at this site indicated that the new dam, existing fishway that had been altered during dam construction, and degraded stream channel was restrictive to fish passage. A project to restore the stream channel and replace the fishway baffles and trash rack was undertaken by DMR, municipalities of Westbrook, Falmouth and Windham; Highland Lake Association; local landowners; Friends of Presumpscot River; Coastal Conservation Association; Natural Resources Conservation Service; U.S. Fish and Wildlife Service; Maine Corporate Wetlands Restoration Partnership; Fish America Foundation; Casco Bay Estuary Project ; and National Fish and Wildlife Foundation. This project has been completed, and passage effectiveness is being evaluated.

In 2004, DMR installed a temporary fish trap in the fishway at Highland Lake to monitor the alewife run. A total of 6568 alewives were removed from the trap and released into Highland Lake. On May 29, Coastal Conservation Association members helped net an additional 1001 alewives that were stranded below the dam and couldn't access the fishway. These fish were also released into the lake.

Maine Atlantic Salmon Commission and Partner Efforts

Atlantic salmon habitat potential was surveyed in 2004 by Maine Atlantic Salmon Commission staff along with volunteers from the Maine Department of Environmental Protection and Presumpscot River Watershed Coalition. In general, the surveys revealed that very little, if any, valuable spawning habitat was present in Mill Brook. The stream was observed to have a moderate amount of habitat that is suitable for salmon fry, especially in the upper half (rockier, steeper gradient) portions of the stream. Data from these surveys is presented in Appendix A.

• Inland Fisheries

Maine Department of Inland Fisheries & Wildlife

The Maine Department of Inland Fisheries & Wildlife (MDIFW) has been stocking Mill Brook with brook trout since 1956 (most of the 70's and 80's not stocked) and brown trout since 1968 (most of the 80's not stocked). A summary of recent stocking by MDIFW is provided in Table 1. A small amount of natural reproduction does appear to be occurring, however, the majority of the recreational fishery is being maintained through annual stocking. Francis Brautigam (MDIFW) noted how he receives phone calls every year that comment on how nice a stream Mill Brook is for being so close to a large population centered in Portland, ME. MDIFW considers the stream to be a special resource because of this unique situation (habitat + urban setting). Maintaining mature intact riparian corridors, suitable minimum flow releases from Highland Lake, and groundwater inputs are critical to sustaining existing wild and stocked trout fisheries.

Table 1. Legal-Size Trout Recently Stocked in Mill Brook (043007) by MDIFW		
Year	Brook Trout	Brown Trout
2002	300	500
2003	300	550
2004	600	250
2005	500	350
2006	550	250
2007	700	250

Note: MDIFW stream fishery investigation data from 2000 and 2005 are included in Appendix B-1.

• Stream Crossings and Fish Passage

Maine Department of Marine Resources, U. S. Fish & Wildlife Service, and Maine Department of Transportation Efforts

Alewives migrating up Mill Stream to Highland Lake must negotiate culverts under three road crossings. After several years of consultation with DMR and USFWS (Curt Orvis, Northeast Regional Office, Hadley, Massachusetts), the Maine Department of Transportation (DOT) repaired twin culverts under Mill Brook Bridge on Austin Street. In 2004, concrete liners were placed in the two culverts, and a weir pool system was built in one culvert to compensate for perching and to provide a zone of passage during low water.

Casco Bay Estuary Partnership – Habitat Restoration Committee (CBEP-HRC)

In December 2007, a preliminary photographic analysis of culvert/bridge crossings in the Mill Brook watershed was conducted by Jeff Varricchione (Maine DEP) (Appendix C) on behalf of the CBEP-HRC. The bridge on Duck Pond Road did not appear to present a barrier to fish passage in Mill Brook. Photographs taken at the three remaining culverts (Hwy 302, Austin St. [sometimes referred to as Brook St.], and, E. Bridge St.) suggested that some of these culverts may possibly act as barriers to fish passage under certain flow conditions. Some efforts for improvement of passage conditions appeared to have been made, especially at Austin St. (confirmed by DMR). The CBEP-HRC plans to document summertime, low-flow stream-crossing conditions in 2008 using Maine Road-Stream Crossing Survey methods developed by U.S. Fish & Wildlife Service's Gulf of Maine Program and numerous other partners. The focus of this effort will be on Duck Pond Road, Hwy 302, and E. Bridge St.

• Fisheries Management

The Draft Fishery Management Plan For the Presumpscot River Drainage (2001), prepared by the Maine Department of Marine Resources, Maine Department of Inland Fisheries and Wildlife, and Maine Atlantic Salmon Commission, is included in Appendix B-2.

2. Geomorphic Assessment

U. S. Fish & Wildlife Service - Gulf of Maine Program

The U. S. Fish and Wildlife Service - Gulf of Maine Program conducted a geomorphic assessment of Mill Brook in 2004 with funding from the Presumpscot River Watershed Coalition using State of Vermont DEQ Phase I and II protocols. A map and background information are contained in Appendix D.

Some of the major findings included:

- Bedrock grade controls appear to significantly influence the morphology of the stream.
- Four downstream and middle reaches of the stream appear to be in fairly stable shape (MB1, MB2, MB4, and MB5), while four reaches (MB3, MB6, MB7, and MB8), mostly in the upstream half of the watershed, appear to have some low-moderate instability issues that may warrant further investigation. The most dominant instability issue identified was channel degradation (i.e., incision) followed by channel aggradation (i.e., excess sediment accumulation). Channel widening and planform (i.e., mapform, sinuosity) instability issues were identified less commonly.
- The intact nature of the riparian corridor throughout much of the length of Mill Brook bodes well for the future health of the stream.
- Significant ATV/Trail sediment inputs in the watershed need to be corrected to improve stream conditions.
- Effects of dam regulation of water levels in the stream, and their impact on geomorphic conditions need to be evaluated.
- [Note: MB1 was the low-gradient reach of Mill Brook that converges with the Presumpscot River; MB8 was the moderate gradient reach having a portion downstream of Duck Pond Road and a portion downstream of Hwy 302.]

3. Macroinvertebrate Biological Assessment

Maine Department of Environmental Protection

MDEP macroinvertebrate bioassessment monitoring of stream macroinvertebrate was conducted in the brook at upstream and down stream locations (near Hwy 302 and Austin St.). The sites were not listed in recent “Integrated Water Quality Monitoring and Assessment Report(s)” (MDEP[†]; 2002, 2004, 2006), indicating that these sites do meet their water quality statutory classification of Class B waters.

4. Water Quality Data

Presumpscot River Watch

Water quality results, as monitored by Presumpscot River Watch, are summarized as follows:

Dissolved Oxygen

- D. O. measurements reflect early morning conditions in Mill Brook (Figure 5 [page 10]). Measurements were made between 6:00 and 9:00 AM, with very few exceptions.
- D. O. measurements taken near Mill Brook’s confluence with the Presumpscot River (site M010) did not detect any violations of Class B standards (i.e., drop lower than 7 ppm) during half of the years included in the analysis. Median values at this site generally were higher than those at the Hwy 302 site (M030) on an annual basis.
- D. O. measurements taken at the Hwy 302 site (M030) detected some violations of Class B standards (i.e., drop lower than 7 ppm) during 7 out of 8 years included in the analysis. A small number of D. O. measurements lower than 4 ppm were detected at this site in 2002. Median values at this site generally were higher than those at the Hwy 302 site (M030) on an annual basis.
- D. O. measurements at the downstream end of Mill Brook (site M010) may have generally been higher because it was a greater distance downstream of Highland Lake which likely had warm water flowing out of its outlet during warm parts of the year. (Cold water can hold more D. O. than warm water.) The existence of a healthy riparian forest and inputs of cold groundwater seeps, probably helped D. O. levels improve from upstream to downstream. This is an interesting finding due to

[†] Integrated Water Quality Monitoring and Assessment Report(s) are available at the following website:
<http://www.maine.gov/dep/blwq/docmonitoring/305b/index.htm> .

the fact that the lower sections of Mill Brook are flatter and have less riffle (aerating) habitats than the upper portions of Mill Brook.

- Most D. O. results met state standard of 7 ppm (or greater) for Class B streams when combining the results of both the upstream (near Hwy 302; site M030) and downstream (near E. Bridge St.; site M010) monitoring sites.

E. coli Bacteria

- E. coli bacteria numbers exhibited a large range of readings within each year, likely influenced by sampling during both dry and wet weather (Figure 6 [page 11]).
- While between year variability was rather high, trend lines indicated that an increase in *E. coli* bacteria appeared to be occurring between 1999 and 2006 at each of the two monitoring sites.
- E. coli numbers were generally higher at the downstream site (M010), sometimes by an order of magnitude, than at the upstream site (M030).
- The number of E. coli bacteria exceedances increased during 1999-2006 (Table 2). This increase may be partly due to a 2005 change in DEP Class B instantaneous standards from 427 to 236 col/100 mL as well as greater seasonal rainfall amounts during period from 2004-2006.

Table 2. The number of E. coli bacteria exceedances during 1999-2006.

Year:	1999	2000	2001	2002	2003	2004	2005	2006
# of <i>E. coli</i> WQ exceedances:	2	0	1	5	3	2	3	8

- continued on next page -

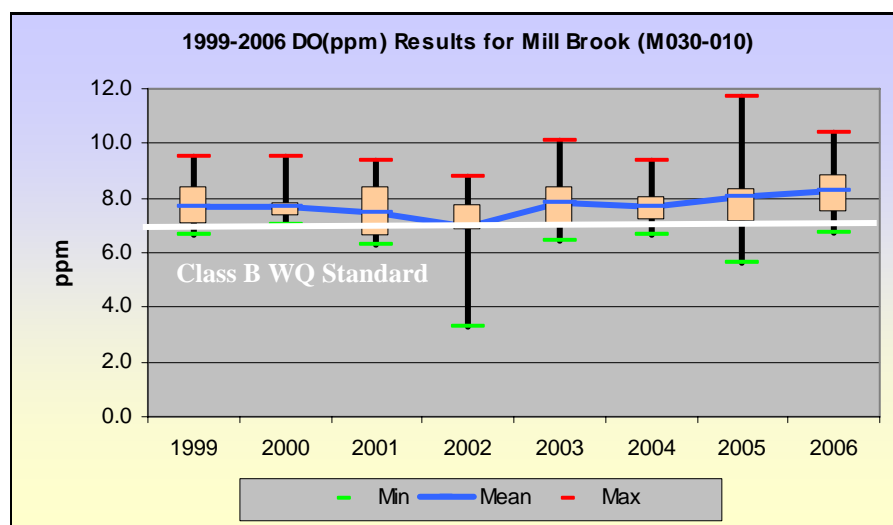
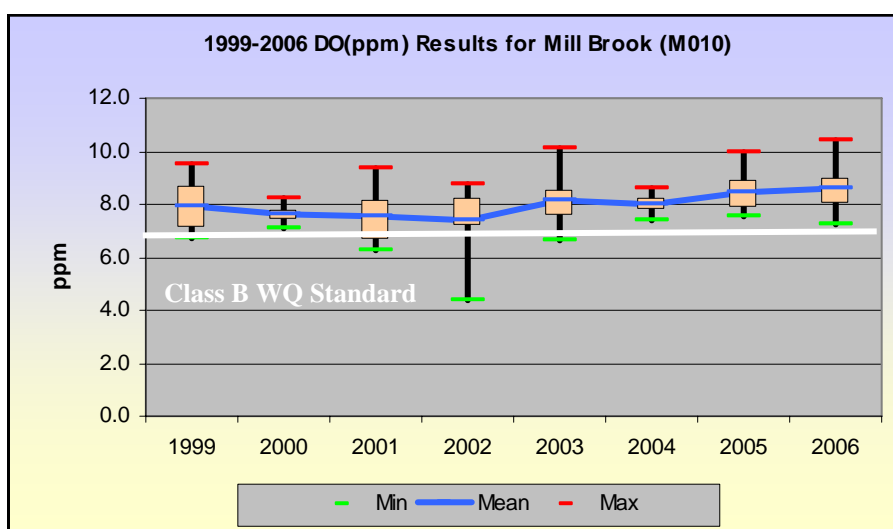
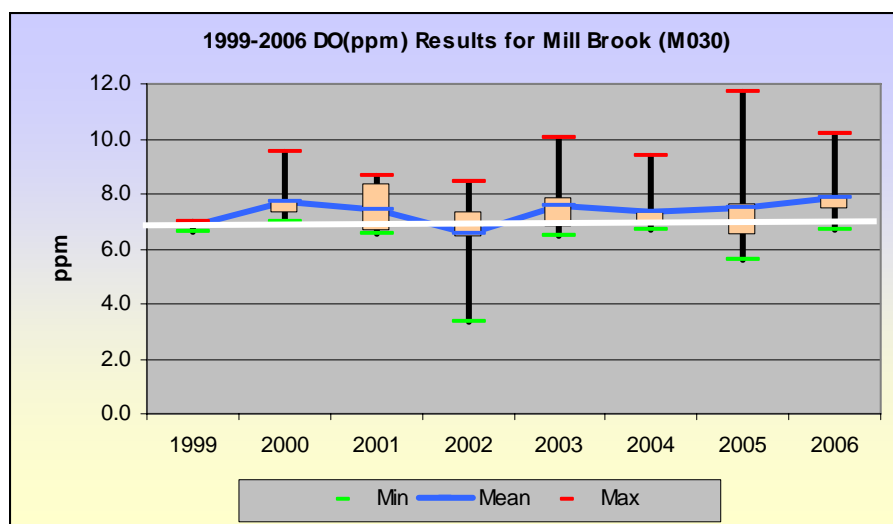


Figure 5. Dissolved oxygen summary data for two Mill Brook sites: M030 (at Hwy 302) and M010 (at E. Bridge St.), individually, and combined (bottom graph). Data provided by Presumpscot River Watch.

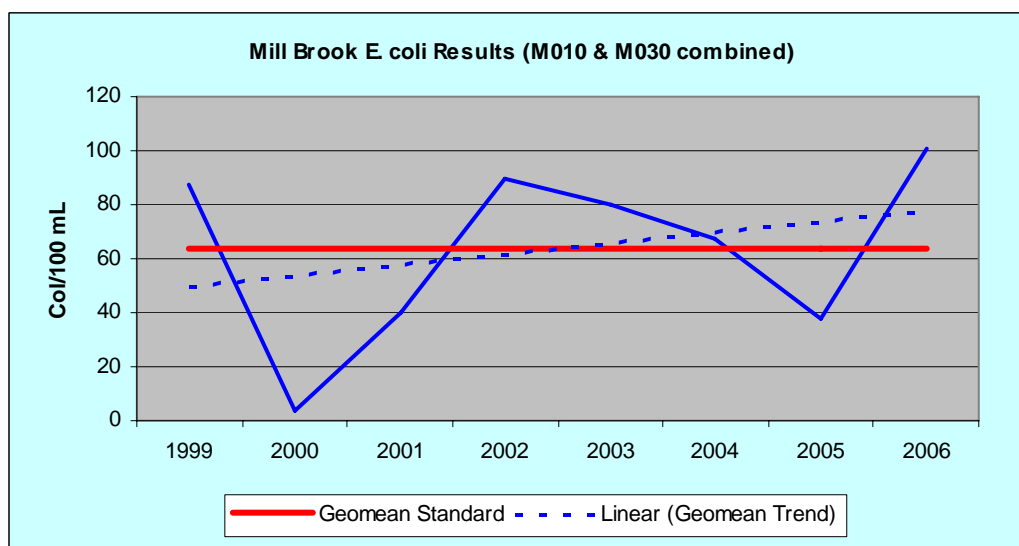
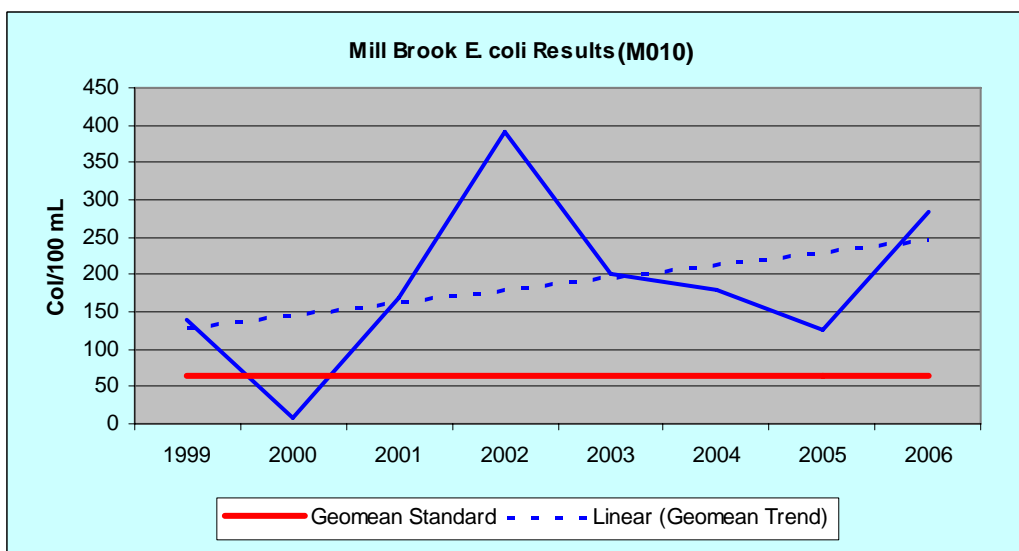
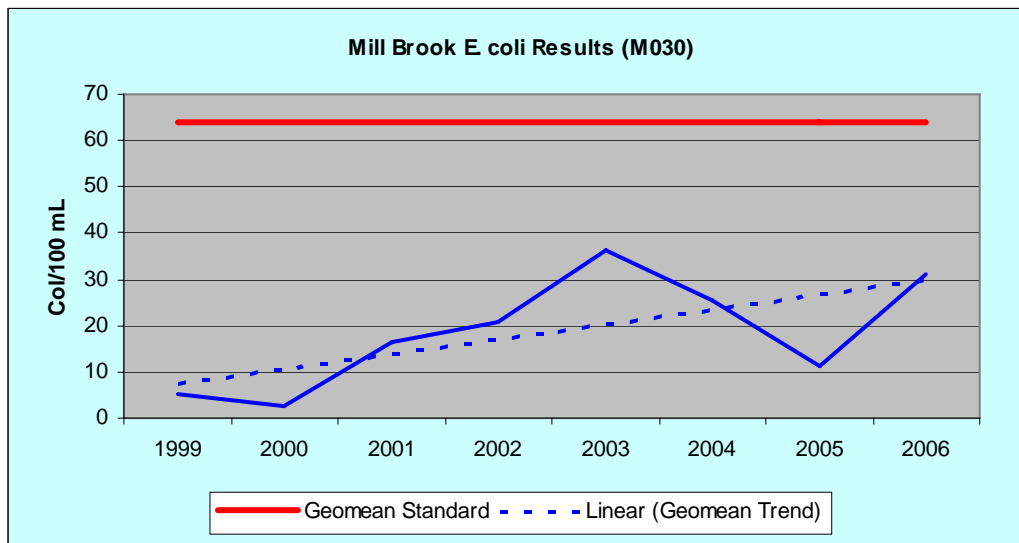


Figure 6. *E. coli* bacteria summary data for two Mill Brook sites: M030 (at Hwy 302) and M010 (at E. Bridge St.), individually, and combined (bottom graph). Data provided by Presumpscot River Watch.

5. Rapid Stream Habitat Assessments

Maine Department of Environmental Protection / Maine Stream Team Program plus Multiple Partners

A rapid stream habitat assessment was conducted in 2003, led by the Maine Department of Environmental Protection's Maine Stream Team Program and performed by some volunteers from Presumpscot River Watch, Highland Lake Association, and the Casco Bay Estuary Partnership.

Stream channel instability issues identified channel degradation (incision), aggradation, and widening, though in most areas they did not appear to be major problems due to a relatively intact riparian zone corridor along much of the stream.

Riparian vegetation conditions were damaged in a few locations, primarily in the vicinity of a powerline crossing area. Stream shading and streambank stability issues were noted in this region. Additionally, ATV/snowmobile trails exist in this region and appear to be a significant source of sediment pollution to the stream. Outside of the powerline region, ATV/snowmobile trail crossings through the stream, and associated sediment pollution to the stream remains a challenge for the protection of Mill Brook. A gravel quarry is located in the watershed. Any potential impacts from the quarry are unknown, and nothing obvious was noted during the survey.

Continuously-recording water temperature data loggers revealed that temperatures dropped by approximately 2 °C from approximately 0.25 mi below the Hwy 302 crossing down to approximately 0.5 mi upstream of E. Bridge St. This decrease in temperature is believed to be largely due to factors such as downstream distance from Highland Lake and its dam outlet, high quality riparian zone vegetation in most places, and inputs of cold groundwater via seeps and springs. MDIFW also noted recently that a relatively low degree of urban/suburban development in the watershed is probably helping to maintain groundwater recharge areas; hence preservation of these areas helps maintain coldwater inputs to Mill Brook.

Potential fish passage problems were preliminary identified at the E. Bridge Street and Hwy 302 crossings due to somewhat shallow flow conditions (see photographs in the report).

Details regarding all aspects of these survey efforts can be found in the report contained in Appendix E.

6. Watershed Surveys for Sources of Nonpoint Source Pollution to Mill Brook

(Presumpscot River Watch)

A watershed survey was conducted in 2003 by volunteers from Presumpscot River Watch and other partner organizations. The survey documented 17 sites that could benefit from the application of Best Management Practice implementation. Site problems ranged from severe soil erosion and sedimentation, to hanging or unstable culverts, stormwater runoff from impervious surfaces, to a lack of adequate riparian vegetation. Details of the survey findings and a map can be found in Appendix F.

7. Habitat Restoration Inventory for the Lower Presumpscot River Watershed

A Habitat Restoration Inventory for the Lower Presumpscot River Watershed report was completed in April 2005 by Northern Ecological Associates for the Casco Bay Estuary Project with funding from the Gulf of Maine Council for the Marine Environment and guidance from the Casco Bay Habitat Restoration Committee. The objective of the inventory was to identify, evaluate, and document potential habitat restoration opportunities in, and directly adjacent to, water bodies in the lower portion of the Presumpscot River Watershed. Specifically, inventories were conducted along the main branch of the Presumpscot River, the Presumpscot River Estuary, and the major tributaries to the Presumpscot River including Mill Brook, the East Branch of the Piscataqua, and the West Branch of the Piscataqua.

Restoration inventory surveys were conducted along approximately 5.6 miles of Mill Brook. The survey covered 59,136 linear feet (11.2 miles) of shoreline along both banks. The survey area extended from the Highland Lake Dam in Falmouth southeast to the confluence of Mill Brook with the Presumpscot River in Westbrook.

The following tables (Tables 3 and 4) summarize sources of degradation (56 sources) and the condition of degradation (at 109 sites) along or near Mill Brook. The findings at each Mill Brook site identified in the 2005 final report are contained in Appendix G. Maps showing sites identified by NEA in the Mill Brook watershed are contained in Appendix G.

- continued on next page -

Source of Degradation	Mill Brook
Land clearing (not right-of-way)	8
Maintained right-of-way clearings	13
Rip-rap (or other artificial hard structure)	3
Impervious surface	5
Intensive land management	2
Unstable bank	4
Invasive plant species	2
Drainage issue	2
Fill/debris/trash	5
ATV/off-road vehicle damage	10
Culvert issue	1
Dam/obstruction	1
Total Documented	56

Table 3. Summary of sources of degradation (56 sources) along or near Mill Brook as described in the 2005 report by Northern Ecological Associates.

Degraded Condition	Mill Brook
Buffer of well-vegetated shrubs and/or trees < 250 ft. wide (adjacent to waterbody and/or associated wetland)	23
Apparent lack of or impaired native vegetation along shoreline and/or bank (vegetation in freshwater and tidal systems)	24
Impaired aesthetic quality	9
Low bank stability/erosion (evidence of bank failure, fallen trees, undercutting, no overhanging vegetation on bank tops)	13
Unnatural channel (downcutting, widening, straightening, or evidence of manmade structures in or along channel that alter channel or reduce erosion of banks)	3
Adjacent to sources of potential high nutrient input or pollution (i.e., golf courses, agricultural areas, housing developments, large lawns) AND buffer < 250 ft	5
Impediment to natural water flow (constrictions, restrictions, redirection of flow)	3
Areas of concentrated high velocity runoff into waterbody (i.e., paved gullies, steep swales)	10
Evidence of unnatural sediment build-up/accumulation	11
In-stream impacts to substrate	6
Wetland loss (filled or hydrologic connection impaired)	0
Low water quality/clarity (turbid, muddy, surface sheen, algal growth, smell of pollutants)	1
Obstruction to fish passage (seasonal water withdrawal, dams, culverts that obstruct passage, diversions)	1
TOTAL	109

Table 4. Summary of the condition of degradation (at 109 sites) along or near Mill Brook as described in the 2005 report by Northern Ecological Associates.

8. Beginning With Habitat Maps - High Value Habitats

Maps showing a variety of high value habitats and other natural features are contained in Appendix H. The maps, created by the Beginning With Habitat program, that are contained in that appendix are as follows:

- Map 1 - Water Resources & Riparian Habitats
- Map 2 - High Value Plant & Animal Habitats
- Map 3 - Undeveloped Habitat Blocks
- Map 5 - Public and Conservation Lands
- Map 7 - Wetlands Characterization
- Map 8 - Valuable Habitat for USFWS Priority Trust Species
- Map 9 - Large Areas of Interior Forest
- Map 10 (Mylar) - Large Undeveloped Blocks, Water Resources, & Riparian Habitats

9. Landownership, Public Access, and Open Space Planning in the Mill Brook Watershed

A significant amount of the lands in the Mill Brook corridor (a large area upstream of the E. Bridge Street crossing and a large area downstream of Hwy 302) are owned by the City of Westbrook (Appendix I). These parcels may make useful building blocks for acquiring more for public access (perhaps through land trust [and other partner] efforts such as conservation easements). Additionally, a portion of the region upstream of E. Bridge Street has a sewer line running through it. In 2007 and 2008, the City of Westbrook began open space planning efforts. Working collaboratively with the city would maximize any open space and public access efforts.

- continued on next page -

RECOMMENDED FUTURE ACTIONS

1. Preserve Lands Adjacent Mill Brook and Throughout Its Watershed

Benefits associated with long-term preservation of lands in the Mill Brook corridor include:

- Shade and cooler water temperatures.
- Nonpoint source pollution (e.g., sediment) reduction.
- Inputs of food resources (e.g., leaf litter) and habitat diversity structures (e.g., large wood) for aquatic life.
- Maintenance of groundwater recharge areas and cold water inputs into the stream.
- Terrestrial wildlife habitat protection.
- Numerous recreational opportunities for citizens.

Recommended actions include:

- Prioritize areas in need of preservation in the Mill Brook watershed.
- Investigate the possibility of acquiring Casco Bay Estuary Partnership habitat restoration and land protection funds for the Mill Brook watershed.
- Determine landowners in the watershed who might be agreeable to land conservation efforts.
- Investigate other potential sources of funding for land protection efforts such as Land for Maine's Future grants, as well through partnerships with organizations such as the City of Westbrook, Presumpscot Regional Land Trust, Portland Trails, and other local land protection organizations.

→ Coordinate efforts with the City of Westbrook Planning Department, which is currently undergoing open space planning for the next few decades.

2. Reduce Pollution Impacts and Promote Healthy Riparian Buffers in the Mill Brook Watershed

- **Minimize Contribution of Eroded Soil and Sediments into Mill Brook**
- **Work with Local ATV Clubs and Riders to Try to Minimize their Impacts on Mill Brook (primarily eroded soil and sedimentation)**
- **Minimize Contribution of Other Pollutants such as Fertilizer, Pesticides, and *E. coli* Bacteria to Mill Brook**

- **Restore Riparian Vegetation Conditions Where They Have Been Damaged**

Healthy riparian vegetation (a.k.a. buffers) – especially trees, but also shrubs and other vegetation – offer many benefits to streams. Riparian buffer offer benefits such as:

- reducing the amount of pollutants that reach streams either through
 - filtering polluted runoff, or
 - binding together streambank soils with their thick root networks, which reduces streambank erosion;
- providing shade to help keep stream waters cool;
- providing food for aquatic organisms (in the form of leaves and twigs);
- contributing large wood (e.g., tree trunks and branches) that falls into the stream, which can then help retain leaves (food) and help scour out deep pools (cover) for fish.

Recommended actions include:

- Using the data sources in this compilation to identify important pollution sites.
- Working towards the installation of appropriate new or retrofitted best management practices (BMPs) on a variety of land uses including: agriculture, roads, powerlines, gravel quarry, etc. Make sure to work with experienced natural resource protection agencies such as the Cumberland County Soil & Water Conservation District, Natural Resources Conservation Service, or Maine DEP to make sure BMPs are implemented properly.

3. Protect or Restore Stream Continuity from Highland Lake to the Presumpscot River for the Benefit of Migrating Fisheries and Wildlife

- **Determine the Passage Success of Anadromous and Catadromous Fisheries in Mill Brook**

- The passage success of fish through various culverts and the fish ladder at Highland Lake needs to be determined. Grants available from NOAA-NMFS and other organizations may help fund these efforts.
- Seek DMR support and interns for fish counts. (Tom Squiers of DMR is supposedly working on this. Follow-up may be needed.) CBEP may be able to provide supplemental funds.

- **Conduct Culvert Assessment**

The Casco Bay Estuary Partnership – Habitat Restoration Committee is planning a culvert assessment of Mill Brook culverts and bridges using methods from Maine Road-Stream Crossing Survey and Maine Dam & Natural Barrier Survey Techniques (USFWS-GOMP). The survey is tentatively scheduled for August 2008.

- **Work with Critical Entities to Ensure Adequate Fish Passage**

- Contact Maine Department of Transportation (MDOT) and the City of Westbrook to determine all the culvert/bridge work they have done recently in the Mill Brook watershed. This will help minimize redundant efforts, determine what has occurred in the past, and establish partnerships, coordination, and (perhaps) funding mechanisms for future watershed improvement efforts.
- Coordinate with and seek funding from important regulators and other entities related to fish passage issues in the watershed. Make sure to determine what assessments and restoration work by various entities has taken place in the past. Regulators and entities of interest include:
 - City of Westbrook
 - Maine DOT
 - Maine DEP
 - Maine Department of Marine Resources
 - National Oceanic & Atmospheric Administration (NOAA) /National Marine Fisheries Service (NMFS)
 - U. S. Fish & Wildlife Service (USFWS) Gulf of Maine Program
- (FYI: DOT must consult with us regarding anadromous fish passage on state road projects [Gail Whipplehauser, DMR, pers. comm.].)

4. Inventory the Distribution and Abundance of Large Wood in Mill Brook // Augment Supplies of Large Wood if their Current Distribution and Abundance are Considered to be Inadequate

Due to historical uses of the lands around Mill Brook, large wood abundances in Mill Brook may be lower than would be present in an undisturbed watershed. If, after conducting an inventory, abundance of large wood in Mill Brook was determined to be low, then augmenting supplies of this wood (in a very controlled, permitted manner) might be a useful stream enhancement technique. Involvement of natural resource agencies such as Maine DEP and the U. S. Fish and Wildlife Service would be important towards helping ensure success of this type of project.

5. Coordinate Efforts in this Watershed with Recommended Courses of Action Described in Management Plans such as:

- A) The Fishery Management Plan for the Presumpscot River Drainage (developed by the Maine Department of Inland Fisheries & Wildlife, Maine Department of Marine Resources, and the Maine Atlantic Salmon Commission), and
- B) The Presumpscot River Management Plan[‡] (by the Presumpscot River Management Plan Steering Committee and Land & Water Associates).

→ Due to the numerous agencies and other entities involved in the Mill Brook watershed, it is highly recommended that coordination, communication, and a minimization of redundant efforts be promoted amongst these various organizations.

- continued on next page -

[‡] Also known as the “Presumpscot River Stakeholders Plan: The Future of a Changing River (5/03)”. Available at: <http://www.cascobay.usm.maine.edu/publications.html> .

POTENTIAL LEADERS AND PARTNERS FOR FUTURE ACTIONS

The following list contains organizations considered to be potential leaders or partner organizations on any future restoration or preservation activities in the Mill Brook watershed. This list is not exhaustive nor is it meant to exclude any organizations.

Non-Profit Environmental Organizations

Casco Bay Estuary Partnership
Coastal Conservation Association
Highland Lake Association
Portland Trails
Presumpscot Regional Land Trust
Presumpscot River Watershed Coalition
Trout Unlimited - Sebago Chapter

Municipalities

City of Westbrook

Federal Agencies

National Oceanic & Atmospheric Administration / National Marine Fisheries Service
U. S. Fish & Wildlife Service - Gulf of Maine Program

State/County Agencies & Organizations

Cumberland County Soil & Water Conservation District
Maine Department of Environmental Protection
Maine Department of Inland Fisheries & Wildlife
Maine Department of Marine Resources
Maine Department of Transportation