

# Northfield Brook in Thomaston and Northfield, Connecticut Track Down Survey Report



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Northfield Brook Track Down Survey Report  
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Task - #1d

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# Mill Brook Track Down Survey Report

## Introduction

Northfield Brook (CT DEP Local Basin ID #s 6909-00, -01, -02, -03, -04) is a stream that flows South through the Northfield section of Litchfield into Thomaston where it joins the Naugatuck River. Northfield Brook is an impaired stream that flows into the Department of Army Corps of Engineers (DOACE) Northfield Dam Flood Control Project (located in Thomaston). The DOACE is experiencing problems of sediment build up (see photos below) as well as elevated levels of nutrient concentration and bacteria within their facility near the toe of the watershed. As a result of these water quality degrading influences, the DOACE has been forced to close the swimming beach many times during most summers. They are even considering eliminating the pond altogether and allowing the stream to course through the project uncontrolled because of the unpredictable water quality problems. The many problems on DOACE property as well as the inclusion of the Northfield Brook on the EPA Impaired Waters of the United States list indicate stormwater and possibly waste water mismanagement in the watershed. The Northwest Conservation District (NCD) conducted a visual track down survey assessment of the entire Northfield Brook watershed on and above the DOACE property to identify conditions responsible for the listed impairments. The goal of the track down survey was to collect information on all the possible causes of impairment and recommend and implement solutions in an effort to have the brook removed from the US EPA's "Impaired Waters of the US" list.



DOACE Northfield Brook Lake Swimming and Recreation Area (note two large sediment deposits)



DOACE Northfield Brook Lake Swimming and Recreation Area (note two large sediment deposits)

## Background

The NCD has reviewed many land use applications in the Northfield Brook Watershed. We have worked with the land use commissions and the development community in both Litchfield and Thomaston to make projects protective of surrounding wetland and open water resources. However, some construction activities occurring in the watershed have deposited large amounts of sediment into the brook, for example, the former Northfield Gun Club at 58 McBride Road. The NCD is working with town and project managers to minimize further impacts to the watershed. There are also a number of livestock (horse, beef and dairy cattle) in the watershed. Many of these have access to the tributary streams and riparian/wetland areas surrounding open water wetlands. Another source of nutrients and sediments depositing in the Northfield Lake are failing detention basin structures in subdivisions above the lake.

Land use/land cover data in the Northfield Brook Watershed depicts primarily forested land with some residential development and agriculture (see Table 1 below). Given the high coverage of forest and relatively small areas of dense development, it is surprising to find multiple water quality problems leading to inclusion on the Impaired Water List. The most effective way to address land use issues and problems in the stream channels is to assess the entire watershed and create a watershed based plan. This plan will then guide the town through the priorities that must be addressed to restore the health of the stream.

### **Watershed Description**

The Northfield Brook is identified by the CT DEP as Local Basin #6909. The watershed is approximately 4 miles long and 2 miles wide at the widest point between the top of the watershed and the Northfield Flood Control Dam. The watershed above the Northfield Brook Lake Dam is approximately 3700 acres and has about 10 miles of associated perennial and intermittent streams. The top of the watershed is located in Mattatuck State Forest. The watershed becomes progressively more developed as you travel down to the Northfield Dam. Most of the watershed is forested, with the balance being agricultural and residential development. Agricultural land use is mostly pasture with hay fields providing the dominant crop (see Table 1 below).

Table 1. Current Land Cover Classifications in the Northfield Brook Watershed

Developed	12%	Forested wetland	2%
Deciduous Forest	59%	Coniferous forest	5.5%
Other Grasses & Agriculture	18%	Barren	0.5%
Turf & Grass	1.5%	Utility ROW	1.5

The headwaters of the Northfield Brook start at an elevation of 1100 feet above sea level and empty into the Northfield Flood Control Dam at 500 feet before draining to the Naugatuck River at 370 feet. An elevation change of 600 feet occurs over the 2.5 mile study area. Therefore, the Mill Brook has a moderately steep stream gradient of 5%. The flow energy created by the moderate stream gradient carries and deposits all sediments into DOACE Northfield Brook Lake Flood Control Project. This was evidenced by large sediment deposits in Northfield Lake. See sediment bars pictured in the Introduction section above. Knife Shop Pond in the Northfield section of Litchfield is about one mile upstream of DOACE Northfield Lake. Knife Shop Pond captures water from a relatively undeveloped portion of the watershed. Therefore, it does little to protect Northfield Brook Lake from the developed parts of the watershed.

Table 2. Background Data for North Field Brook Watershed

Northfield Brook local basin #	6909
Housatonic major basin #	6000
Local basin size	3700 acres / 5.8 square miles
Study Area Stream length	2.5 miles
Stream density	2.4 miles of stream per square mile
Road length	11.5 miles
Road density	2 miles of road per square mile
Number of stream crossings	27

## **Methodology**

Track down surveys are conducted according to a modified version of the Unified Stream Assessment (USA) method developed for small urban watersheds by the Center for Watershed Protection. The USA is a continuous stream walk that systematically evaluates conditions of the stream channel needed to identify restoration opportunities, including storm water retrofits, stream restoration, riparian management, and discharge prevention. Field assessment forms are used to document conditions, problems, and possible restoration/improvement actions. Eight *Impact Assessment Forms* record specific information about the condition and restorability of individual problem sites identified along the stream corridor. They include Stormwater Outfalls, Severe Erosion, Impacted Buffers, Utility Impacts, Trash and Debris, Stream Crossings, Channel Modification, and Miscellaneous Impacts. A *Reach Assessment Form* is used to summarize overall physical conditions of the entire survey reach. Finally, photographs are documented with a *Photo Inventory* form.

District staff worked with municipal officials in planning and conducting the surveys. This local knowledge and experience was very beneficial in identifying sources of impairments.

The USA consists of four steps: Pre-field Preparation; Stream corridor Assessment; Quality Control; and Data Interpretation.

### **1. Pre-field Preparation**

Prior to conducting the surveys, field teams were established and trained, supplies gathered and organized, survey reaches defined, field maps generated, assessment routes and schedules planned, and the public/streamside landowners notified about the surveys. Aerial photos, topographic maps, and existing data about known problem areas were reviewed to assist in defining survey reaches of uniform character and to familiarize field staff with the area to be surveyed. Each reach was assigned an identification number. Reaches comprise roughly ½ to 1 linear mile of stream, depending on access points.

### **2. Stream Corridor Assessment**

Field teams of two or more trained staff conducted the field surveys. The surveys were conducted on foot through July-August when water flows were slower and water levels lower, making it both possible and safe to walk in the streams. At this time, potential concerns are livestock access to the stream channel. The surveys were conducted during dry weather to eliminate the possible effects of rain events on normal conditions, such as washing away algae, obscuring the presence of aquatic vegetation, or making it difficult to determine the normal status of water level, water color and turbidity.

Field team responsibilities were divided as follows: one team member focused on the reach assessment and the impact assessment, and the other took photos and recorded GPS locations. Field teams walked up the stream corridor, but faced downstream when determining right/left bank problems. Individual impact sites were mapped and photographed as they were encountered, impact assessment forms completed and ID numbers assigned. The location and ID were documented on an associated survey data sheet. Reach assessment forms were completed after walking the entire survey reach.

### 3. Quality Control

Survey data was compiled in a database designed with input from DEP staff and input into an interactive map. Data was entered immediately after fieldwork was completed, and spot checked by the QA manager. Field team members reviewed draft stream corridor maps with site impact assessment locations and survey reach scores to identify inaccuracies in data entry and any gaps in stream corridor coverage.

### 4. Data Evaluation

USA data were used to create detailed maps of the stream corridor showing degraded/non-impacted reaches, the location of problem areas and restoration candidates.

## **Water Quality Status**

Currently the Northfield Brook is on the CT 2008 Impaired Waters list because at least one designated use cannot be supported, or at least one designated use is impaired. In the case of the Northfield Brook it is impaired for recreational use because of excessive E. Coli concentrations. It should also be noted that the cause of the impairment is not known, however non-point source pollution from agricultural operations and densely developed neighborhoods with failing stormwater management structures are potential sources.

### *Escherichia coli Sampling*

The DOACE has been sampling for (col/100ml) in the Northfield Lake continuously since 1995. The single sample maximum E. Coli concentration for a designated swimming area is 235 col/100ml. Once E. coli concentration exceeds 235 col/100ml swimming is prohibited. Some samples contained well over 1000 col/100ml also closing the swimming area. E. coli concentration exceeded 235 col/100ml at the swimming area on a regular basis throughout most Summer swimming seasons.

### *Phosphorus Concentration Sampling*

The DOACE has been sampling for total phosphorus (ug/l) in the Northfield Lake since 1995. Lake water quality is quickly degraded with algae problems when phosphorus concentrations exceed 20 ug/l. Lake water sampling indicates that total phosphorus concentrations regularly exceed 20 ug/l with a few lake water samples exceeding 50 ug/l. High phosphorus concentrations have been evidenced by serious algae bloom problems during the summer and early fall.

### **Water Quality Objective**

The NCD goal is to assist the CT DEP to identify problems in the watershed, draft a management plan and restore the physical, chemical and biological integrity of the Northfield Brook so that the designated use listed above can be restored and maintained. Only then will the Northfield Brook become eligible to be removed from the US EPA's impaired waters list.

### **US EPA Nine Elements Northfield Brook Watershed Based Plan.**

Below is an abbreviated nine-element EPA watershed based plan for Northfield Brook. The Total Maximum Daily Loads (TMDLs) have not been established for Northfield Brook and there has been no regular water quality sampling that has occurred outside the DOACE project. Therefore, only a qualitative estimates of potential load reductions and costs are provided at this time.

#### **1. IDENTIFICATION OF CAUSES AND SOURCE OF NPS POLLUTION**

##### Identification of NPS Sources – Track Down Surveys

A track down survey of Northfield Brook and its tributaries was conducted through July and August 2007 following the methods described in an US EPA approved Track Down Survey QAPP, US EPA Tracking # CT 06334, NCD August 2006. Site Impacts survey sheets were completed for all potential nonpoint pollution sources observed during the field survey (see Table – 3 below). A map of the survey locations with their associated survey data sheet and photo are included in the watershed map on the CD attached to this report.

<b>ID</b>	<b>Impact Sheet</b>	<b>Sheet Description</b>	<b>No. Completed</b>
SC	Stream Crossing	Culvert, Bridge or Dam	28
OT	Stormwater Outfall	Pipes and Small Tributaries	11
ER	Sever Bank Erosion	Bank Failure	4
MI	Miscellaneous Agricultural Impacts	Agricultural Impacts	(see livestock impacts section)
RA	Reach Level Assessment	Field Survey Data Sheet	10

### **Likely Sources of Non Point Source Pollution**

#### *Stormwater Runoff from Local Roads and State Highways*

Route 254 is the only road through the watershed with intermittent catch basin networks located along the right-of-way. Otherwise there are very few catch basins networks located throughout the entire watershed and water is conveyed via road side swales.

A majority of road runoff sheet flows to the vegetated road sides swales or rock lined ditch that diverts stormwater runoff directly to a tributary or main stem of Northfield Brook. (see photo below).



Route 254 Stormwater Runoff Away from Travel Lanes

The Center for Watershed Protection (CWP) published a research monograph that comprehensively reviews the available scientific data on the impacts of urbanization on impervious surfaces on small streams. These impacts are generally classified according to one of four broad categories: changes in hydrologic, physical, water quality or biological indicators. More than 225 research studies were assessed for this monograph. It documented the adverse impact of urbanization and impervious surfaces on one or more of these key indicators. In general, most research was focused on smaller watersheds, with drainage areas ranging from a few hundred acres up to ten square miles. Northfield Brook Watershed is 5.8 sq/mi. One conclusion extracted from the review of all these research studies is that surface water quality starts to significantly degrade as impervious surface coverage increases in a watershed. Significant impacts occur when impervious cover reaches 10% and above. Currently, the Northfield Brook Watershed has well below 10% impervious cover. In addition, the town of Thomaston and the CT DOT maintain over half the roads in the watershed and they have switched over to using 100% salt for winter road maintenance. Therefore, non-point source sediment pollution from road runoff is insignificant and unlikely causing the sediment impairments occurring in the Northfield Brook Lake.

### *Stream Crossings*

There are twenty seven locations where vehicles can cross streams in the Northfield Brook Watershed. Most of the stream crossings were stable. However there is one that is in dire need of repair and currently eroding into the brook. If left in disrepair the crossing will collapse and send hundreds of cubic yards of sediment into Northfield Lake (see Knife Shop Road Crossing photo at right).



In addition there is a misaligned crossing under State Route 254. If this misalignment is left unstabilized it will continue to erode and create additional sedimentation problems in Northfield Lake.

#### *Stream Bank Erosion*

There was only one area with severe bank erosion totaling 25 linear feet of erosion. The severe bank erosion is located just below Atwood Road in Thomaston and is pictured at right. This erosion site is occurring just below a medium density neighborhood with no stormwater volume management structures. This erosion site likely contributes sediments to the stream intermittently during large runoff events and is not a continuous source of sediments.



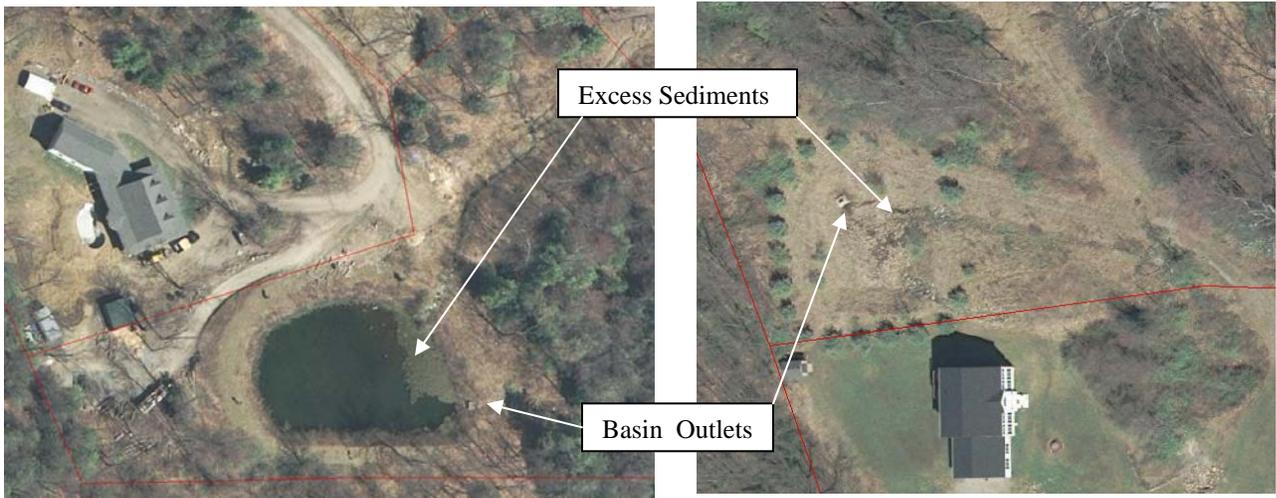
#### *Medium Density Neighborhoods*

There are a number of medium density (1/2 to 1 acre lots) neighborhoods in the watershed. Examples include Highwood Farm in Thomaston and the Borough of Northfield in Litchfield. Both these neighborhoods had tributaries to the Northfield Brook that were choked with filamentous algae growth (see photo below). Heavy lawn fertilizer application, pet waste and failing septic systems are all potential nutrient enrichment sources that are feeding into the algae problems in both tributary streams and Northfield Lake.



*Tributary Exiting Highwood Farms Subdivision Choked with Filamentous Algae*

The Highwood Farm Subdivision in Thomaston has two stormwater basin structures that are entirely failing. Both basins are completely full of sediments and invasive vegetation, and the outlet structures do not allow water to be detained or metered out slowly (see basin photos below). Therefore, these basins have no capacity to detain stormwater and they are providing no water quality renovation.



Because these basins are completely full of sediments and the outlet structures have no flow control, a very large gully has eroded in the hillside above Northfield Lake and deposited over 1000 cubic yards of sediments and debris into Northfield Lake (see photos below).



*Gully Erosion from Failing Basins*



*Sediment Deposition in Lake from Failing Basins*

### *Agriculture and Livestock Access*

After completing a visual inspection of all the stream channels of the watershed, land use activities and high resolution aerial photos, it is likely agriculture activities are partially responsible for impairments in the watershed. A water quality problem uncovered using a visual assessment method was unfettered livestock to stream and riparian areas (see photo below).



*Cattle Access Stream Near Intersection of Route 254 and McBride Road*

Water quality degradation where livestock have access to stream channels is caused by:

- a) destruction of riparian vegetation
- b) erosion of the stream channel and banks and the resultant in-stream sediment deposition
- c) erosion of soils from the riparian areas and the resultant in-stream sediment deposition
- d) pollutant loading from nutrient rich animal waste being carried into the stream by stormwater runoff
- e) pollutant loads from animal waste being deposited directly into the stream
- f) degradation of stream bed stability and aquatic habitat

All of the problems listed above are occurring in the upper watershed of the Northfield Brook, and all are likely causing water quality degradation. Livestock can access most of the stream channels in Sub Watershed #s 6909 (Local Basin 6909-02). However, all these threats to water quality can simply be eliminated by restricting and/or eliminating livestock access to the stream channels and the immediate riparian area buffering the stream channels. Creating exclusionary fencing along the tributary stream that drains Local Basin # 6909-02. could be accomplished at relatively low cost to the farm operator. This is a necessary action to remove the Northfield from the US EPA's Impaired Waters of the United States list.

## 2. NPS MANAGEMENT MEASURES

Three major sources of Non Point Sources were documented during the Track Down Surveys. Failing stormwater management structures, unfettered livestock access to the streams and a collapsing and eroding road crossing. To address these non point sources of pollution (sediments and nutrients) the following must be accomplished.

The failing stormwater structures on the Highwood Farms Subdivision in Thomaston are currently the biggest single contributor of sediments to Northfield Brook Lake. Because the sediments are being carried by stormwater runoff from over 15 acres of impervious surface, it is certainly carrying a heavy load of nutrients. The best way to resolve the sediment and nutrient problems created by the failing stormwater structures is to retro fit a stormwater wetland into the existing basins. The town of Thomaston owns the basins and over 13 acres around them. Therefore, there is plenty of space to accomplish a stormwater wetland retrofits. Installing stormwater retrofits would remove all sediment and most of the nutrients from stormwater runoff and prevent any down gradient erosion and water quality degradation.

Exclude livestock from stream and riparian areas. The CT Department of Environmental Protection and the US Department of Agriculture (USDA) - Natural Resources Conservation Service (NRCS) and the USDA – Farm Service Agency (FSA) commonly recommend a 50 foot to 100 foot undisturbed buffer remain between agricultural activities and water resources. The reason the USDA and the CT DEP feel so strongly about this buffer setback is that research has proven time and again that the best way to protect soil, wetlands and water resources from agricultural impacts is to allow for an undisturbed buffer around wetlands and watercourses. In fact the USDA feels so strongly about keeping livestock and agricultural activities away from wetlands and open water that they have created programs to cost share (up to 75%) for the following:

- 1) The installation of exclusionary fencing around wetland and water courses.
- 2) The creation of watering troughs with solar pumps to fill them.
- 3) Installing water wells and pipes to get drinking water to livestock
- 4) Designing and constructing access points to streams for drinking, if conditions are suitable.
- 5) Rental payments of pasture acreage between any installed buffer fences.

The grant programs that offer funding for the above projects come from the USDA. The USDA – NRCS Environmental Quality Incentives Program (EQIP) supplies funding for number 1 through 4 above, and the USDA – FSA Conservation Reserve Program (CRP) supplies funding for number 5. The USDA – NRCS also administer a grant program called the Wildlife Habitat Enhancement Program (WHIP). This program provides funding to improve habitat for Threatened and Endangered (T and E) species. There are T and E species indicated in the areas where livestock have access to streams and riparian corridors. A WHIP grant would improve habitat for a T and E species in these areas, and an additional benefit of implementation would be water quality protection.

During the Track Down Survey field work in 2007, NCD notified both the Town of Thomaston and the CT Department of Transportation that the Stream Crossing at Knife Shop Road was in eminent danger of failing which would deposit hundreds of cubic yards of sediments and construction debris into Northfield Lake. Shortly after the NCD notification the collapsing culverts were removed, a bridge was installed and the road reopened.

### 3. LOAD REDUCTION ESTIMATES OF MANAGEMENT MEASURES

Two major sources of NPS pollution are currently identified. They include the failing detention structures serving a large subdivision above Northfield Lake (Highwood Farms, Thomaston) and unfettered livestock access to the stream and riparian environment. Either one of these NPS sources alone could degrade water quality enough to have the Northfield Brook placed on the Impaired Water list. However, these two NPS sources together are creating real water quality problems for extended periods of time at Northfield Lake. The swimming area has been closed for weeks at a time.

It is difficult to quantify the amount of nutrients and E. coli that the failing detention structures and livestock are contributing to the water quality degradation as the current track down survey did not accomplish any water quality or flow sampling. Therefore it is difficult to predict the load reduction accomplished by removing the sources. However, a simple stormwater retrofit design made to the failing stormwater structures and excluding livestock from the stream and riparian areas could possibly eliminate NPS pollution from these sources. On going water quality sampling occurring at the DOACE Northfield Lake facility will show pollutant reduction associated with addressing NPS problems in the watershed.

### 4. TECHNICAL AND FINACIAL ASSISSTANCE COSTS, AUTHORITIES

The costs of retrofitting the two failing stormwater detention structures with stormwater wetland will be associated with planning, design, permitting, construction and revegetation of the project areas. Cooperation in the form of planning and funding, will be required from local, state and federal agencies and sources, as well as public and private foundations.

The USDA currently has program that assist farm owners/managers in the watershed to minimize the impacts of agricultural activities in the watershed. See Livestock Access Section in the Identification of Causes and Sources of Nonpoint Source Pollution above.

### 5. PUBLIC INFORMATION AND EDUCATION

As part of the Northfield Brook Watershed Assessment / Track Down Survey, there was a digital interactive map created. The map was created as a .PDF (Portable Document Format) which can be viewed with free or purchased versions of Adobe Acrobat Reader®. The digital interactive map uses a high resolution arial photo of the watershed that was taken in 2004. Also on the map are roads, streams ponds and wetlands. When the digital map is opened you will see a number of colored pins (or thumb tacks) 📌. All the pins are connected by links to either photos taken of problem spots in the watershed with their associated track down survey data sheet, or a typical picture taken at that location. The red pins 📌 indicate locations of problematic erosion sites, the 📌 blue pins indicate locations of stream crossing, the 📌 green pins are photos of miscellaneous typical photos and major problem spots, the 📌 yellow pins mark stormwater outfalls and the 📌 orange pin indicates problems with Livestock access to streams.

The map is titled Northfield Brook Interactive Watershed Map.pdf (see attached).

The information compiled by the Track Down Surveys was also converted into a presentation that was delivered at regularly scheduled Inland Wetland Commission meetings in Thomaston and Litchfield. When commissions are faced with making informed decisions on permanent land use changes, it is important to understand the vulnerability of the entire watershed.

#### 6. IMPLEMENTATION SCHEDULE

Work has begun the design of the stormwater wetland Retro Fits. The original plan-of-development design sheets for the subdivision have been located. The Thomaston Department of Public Works has cleared all the trees and brush in and around the failing detention basin areas so that a designing engineer can access the basins for preliminary retrofit design work. The Construction Design Sheets and Construction Report once completed will contain the cost of implementing and stabilizing the retrofits. It will then be possible to solicit adequate funding.

The USDA-NRCS has been notified of the areas where livestock have access to the stream and riparian areas in the Northfield Brook Watershed. They will contact farm managers/owners to assess their willingness to apply for funding to manage livestock outside of the stream corridors.

#### 7. MEASURES OF MILESTONES

Measures of success associated with this project will include the installation of stormwater wetland retrofits and fencing of the stream and riparian areas from livestock.

#### 8. CRITERIA TO DETERMINE IF LOAD REDUCTIONS ARE ACHIEVED

NPS pollution in the watershed is degrading water quality to the point where the DOACE swimming area may be permanently closed and the lake drained. However, as of the drafting of this report the plans are to keep the swimming beach open while continually monitoring water quality. The DOACE has been keeping detailed records of both nutrients, dissolved oxygen and E. coli. concentrations in lake water since 1995. Therefore, sampling will indicate how effective addressing the two identified sources of NPS pollution will be on water quality improvement.

#### 9. MONITORING

The DOACE will continue their water quality monitoring in Northfield Lake. On going water quality monitoring can be used to assess the effectiveness of both stormwater wetland retrofits and livestock exclusion practices.

APPENDIX A  
Reach Level Assessment Survey Sheets

**Reach Level Assessment**

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-04-1

**Accessibility:** 1

---

***Location***

**Date:** 8/9/06

**Start Long / Lat:**

73°-5'-39.06" / 41°-41'-24.31"

**End Long / Lat:**

73°-5'-13.33" / 41°-41'-35.95"

**Start Description:** 5x5 Box Culvert

**End Description:** Atwood Rd

---

***Channel Dimensions***

**Top Width (ft):** 6

**Bottom Width (ft):** 6

**RT Bank Height (ft):** 2-12

**LT Bank Height (ft):** 2-12

---

***Stream Conditions***

**Primary Substrate:** Boulder

**Base Flow as % Channel Width:** 0-25%

**Shading:** mostly >75%

**Clarity:** Clear

**Secondary Substrate:** Bedrock

**Floating Aquatic Plants:** None

**Attached Aquatic Plants:** None

**Channel Dynamics:** Bank failure/scour, slope failure – south of Atwood Rd

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***Reach Conditions***

**Surrounding Land Use:** Forested

**Wildlife:** Fish, Deer, Frogs

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***Notes:***

Steep, Rocky, Almost dry. Lots of garbage near Atwood Rd. oil barrel – farm equipment

## Reach Level Assessment

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-00-2-L1

**Accessibility:** 4

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### **Location**

**Date:** 8/8/06

**Start Long / Lat:**

73°-5'-28.39" / 41°-41'-9.45"

**End Long / Lat:**

73°-5'-39.06" / 41°-41'-24.31"

**Start Description:** Lake / Swimming area

**End Description:** 5x5 Box Culvert

---

### **Channel Dimensions**

**Top Width (ft):** 10

**Bottom Width (ft):** 10

**RT Bank Height (ft):** 2

**LT Bank Height (ft):** 2

---

### **Stream Conditions**

**Primary Substrate:** Cobble

**Secondary Substrate:** Bedrock

**Base Flow as % Channel Width:** 25-50%

**Shading:** mostly >75%

**Floating Aquatic Plants:** NA

**Clarity:** Clear

**Attached Aquatic Plants:** Lots Algae

**Channel Dynamics:** Bed scour – bedrock substrate was stable

---

### **Reach Conditions**

**Surrounding Land Use:** Forested / Suburban

**Wildlife:** Fish

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### **Notes:**

Attached algae blooms and heavy sedimentation dropping in pond @ beginning of reach.  
Heavy gully erosion from Highwood Farms Subdivision basin outlets to pond.

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## Reach Level Assessment

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-00-2-R1

**Accessibility:** 3

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### **Location**

**Date:** 8/9/06

**Start Long / Lat:**

73°-5'-39.06" / 41°-41'-24.31"

**End Long / Lat:**

73°-6'-2.45" / 41°-41'-59.36"

**Start Description:** 5 x 5 Box Culvert

**End Description:** Knife Shop Rd

---

### **Channel Dimensions**

**Top Width (ft):** 7

**Bottom Width (ft):** 7

**RT Bank Height (ft):** 2

**LT Bank Height (ft):** 2

---

### **Stream Conditions**

**Primary Substrate:** Boulder

**Secondary Substrate:** Bedrock

**Base Flow as % Channel Width:** 0-25%

**Shading:** mostly >75%

**Floating Aquatic Plants:** None

**Clarity:** Opaque Iron Deposit

**Attached Aquatic Plants:** None

**Channel Dynamics:** Bank Scour

---

### **Reach Conditions**

**Surrounding Land Use:** Forested

**Wildlife:** Fish, Deer

---

### **Notes:**

Siltation and Iron Staining at Knife Shop Road crossing.

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## Reach Level Assessment

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-01-1

**Accessibility:** 3

---

### **Location**

**Date:** 8/16/06

**Start Long / Lat:**

73°-7'-8.76" / 41°-41'-6.34"

**End Long / Lat:**

73°-6'-45.73" / 41°-41'-31.4"

**Start Description:** Pull off near Nystrom Pond

**End Description:** 2<sup>nd</sup> Moosehorn Crossing

---

### **Channel Dimensions**

**Top Width (ft):** 4

**Bottom Width (ft):** 4

**RT Bank Height (ft):** 1

**LT Bank Height (ft):** 1

---

### **Stream Conditions**

**Primary Substrate:** Cobble

**Base Flow as % Channel Width:** 0-25%

**Shading:** mostly >75%

**Clarity:** Clear

**Secondary Substrate:**

**Floating Aquatic Plants:** None

**Attached Aquatic Plants:** None

**Channel Dynamics:** None

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### **Reach Conditions**

**Surrounding Land Use:** Forested

**Wildlife:** Fish

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**Notes:**

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## Reach Level Assessment

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-01-1-L1

**Accessibility:** 4

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### **Location**

**Date:** 8/15/06

**Start Long / Lat:**

73°-7'-8.71" / 41°-41'-5.9"

**End Long / Lat:**

73°-6'-55.41" / 41°-40'-48.9"

**Start Description:** Nystrom Dam

**End Description:** Town Beach

---

### **Channel Dimensions**

**Top Width (ft):** 8

**Bottom Width (ft):** 8

**RT Bank Height (ft):** 8

**LT Bank Height (ft):** 8

---

### **Stream Conditions**

**Primary Substrate:** Cobble

**Base Flow as % Channel Width:** 0-25%

**Shading:** pond sunny / outfalls shady

**Clarity:** Orangy water

**Secondary Substrate:**

**Floating Aquatic Plants:** None

**Attached Aquatic Plants:** Some Algae

**Channel Dynamics:** None

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### **Reach Conditions**

**Surrounding Land Use:** Forested/ Park/ Suburban

**Wildlife:** None

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### **Notes:**

Heavy algae growth at outfall of pond. Excess trash build in public access areas.

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## Reach Level Assessment

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-01-2-R1

**Accessibility:** 2

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### **Location**

**Date:** 8/9/06

**Start Long / Lat:**

73°-6'-21.2" / 41°-41'-49.57"

**End Long / Lat:**

73°-6'-45.2" / 41°-41'-31.71"

**Start Description:** Rt 254 crossing

**End Description:** Moosehorn Rd

---

### **Channel Dimensions**

**Top Width (ft):** 10

**Bottom Width (ft):** 10

**RT Bank Height (ft):** 3

**LT Bank Height (ft):** 3

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### **Stream Conditions**

**Primary Substrate:** Cobble

**Secondary Substrate:** Boulder

**Base Flow as % Channel Width:**

**Shading:** Mostly >75%

**Floating Aquatic Plants:** None

**Clarity:** Clear / Opaque

**Attached Aquatic Plants:** Some

**Channel Dynamics:** Downcutting, Bank failure/scour, slope failure

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### **Reach Conditions**

**Surrounding Land Use:** Suburban / Forested

**Wildlife:** Fish

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**Notes:** Oil slick from outfall of small pond, undercutting from drainage off old Northfield Rd field. Pond with dam- collapsed dam, cloudy water, sediment, fire hydrant drained pond level.

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## Reach Level Assessment

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Watershed/Subshed ID & Survey Reach ID 6909-02-1

Accessibility: 1

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### Location

Date: 8/11/06

Start Long / Lat:

73°-6'-49.15" / 41°-41'-32.47"

End Long / Lat:

73°-7'-26.2" / 41°-42'-14.23"

Start Description: Moosehorn Rd Crossing

End Description: Long Ridge Farm

---

### Channel Dimensions

Top Width (ft): 6

Bottom Width (ft): 6

RT Bank Height (ft): 2

LT Bank Height (ft): 2

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### Stream Conditions

Primary Substrate: Silt/ Clay

Base Flow as % Channel Width: 0-25%

Shading: Mostly >75%

Clarity: Turbid / Opaque

Secondary Substrate:

Floating Aquatic Plants: None

Attached Aquatic Plants: Some Algae

Channel Dynamics: Widening, Headcutting, Sed. deposition, Bank scour

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### Reach Conditions

Surrounding Land Use: Forested/ Pasture/ Suburban

Wildlife: Deer, very few Fish

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### Notes:

Stretch from Goodwin Hill to beaver dam – cloudy water, red orange iron /algae build up, Strong organic odor from Long Ridge Farm, Cattle with stream access, Heavy algae growth.

## Reach Level Assessment

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-03-1

**Accessibility:** 4

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### **Location**

**Date:** 8/9/06

**Start Long / Lat:**

73°-6'-2.48" / 41°-41'-54.36"

**End Long / Lat:**

73°-6'-7.37" / 41°-42'-5.88"

**Start Description:** North Knife Shop Rd crossing

**End Description:** Hopkins Rd

---

### **Channel Dimensions**

**Top Width (ft):** 7

**Bottom Width (ft):** 7

**RT Bank Height (ft):** 2

**LT Bank Height (ft):** 2

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### **Stream Conditions**

**Primary Substrate:** Cobble

**Secondary Substrate:** Bedrock

**Base Flow as % Channel Width:** 0-25%

**Shading:** mostly >75%

**Floating Aquatic Plants:** None

**Clarity:** Clear

**Attached Aquatic Plants:** None

**Channel Dynamics:** NA

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### **Reach Conditions**

**Surrounding Land Use:** Forested

**Wildlife:** Fish, Deer

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### **Notes:**

Reach almost dry

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## Reach Level Assessment

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-03-1-L1

**Accessibility:** 3

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### **Location**

**Date:** 8/17/06

**Start Long / Lat:**

73°-6'-11.75" / 41°-57.26"

**End Long / Lat:**

73°-7'-31.45" / 41°-43'-3.03"

**Start Description:** McBride Road

**End Description:** Rt 254

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### **Channel Dimensions**

**Top Width (ft):** 4

**Bottom Width (ft):** 4

**RT Bank Height (ft):** 1

**LT Bank Height (ft):** 1

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### **Stream Conditions**

**Primary Substrate:** Cobble

**Base Flow as % Channel Width:** 0-25%

**Shading:** Mostly >75%

**Clarity:** Clear

**Secondary Substrate:**

**Floating Aquatic Plants:** None

**Attached Aquatic Plants:** None

**Channel Dynamics:** NA

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### **Reach Conditions**

**Surrounding Land Use:** Forested

**Wildlife:** Fish, Deer, Frogs

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**Notes:** Undisturbed forested section of the watershed.

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## Reach Level Assessment

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**Watershed/Subshed ID** & **Survey Reach ID** 6909-03-1-L2

**Accessibility:** 1

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### **Location**

**Date:** 8/18/06

**Start Long / Lat:**

73°-7'-40.69" / 41°-42'-36.61"

**End Long / Lat:**

73°-8'-11.66" / 41°-43'-44.87"

**Start Description:** Knife Shop Pond

**End Description:** Pond @ Richards Rd

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### **Channel Dimensions**

**Top Width (ft):** 6

**Bottom Width (ft):** 6

**RT Bank Height (ft):** 2

**LT Bank Height (ft):** 2

---

### **Stream Conditions**

**Primary Substrate:** Cobble

**Secondary Substrate:** Bedrock

**Base Flow as % Channel Width:** 25-50%

**Shading:** Mostly >75%

**Floating Aquatic Plants:** None

**Clarity:** Clear

**Attached Aquatic Plants:** None

**Channel Dynamics:** Little to none

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### **Reach Conditions**

**Surrounding Land Use:** Forested

**Wildlife:** Fish, Deer

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**Notes:** Quality water, many small waterfalls and pools. Abundance of fish. Heavily wooded state land.