

Mill Brook in Cornwall, Connecticut
Track Down Survey Report
November 2008



Prepared by:
Northwest Conservation District
1185 New Litchfield Street
Torrington CT 06790
Phone: (860)-626-7222 / Fax: (860)-626-8833
www.conservect.org/northwest

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WATERSHED MAP

Interactive Mill Brook Watershed Map (See attached CD)

Mill Brook Track Down Survey Report

Introduction

Mill Brook (CT DEP Local Basin ID #6008) is a stream that flows West through Cornwall CT into the Housatonic River. Both the US EPA and the Fisheries Division of the CT DEP accomplished aquatic organism sampling at many locations throughout the watershed since the early 1990s and noted a significant lack of expected populations and diversity of fish and macroinvertebrates in the upper half of the watershed. The Northwest Conservation District (NCD) conducted a visual track down survey assessment of the entire Mill Brook watershed to possibly identify conditions responsible for impairments that may affect aquatic organisms. The goals of the track down survey are to collect information on all the possible causes of impairment and recommend and implement solutions in an effort to have the stream removed from the US EPA's "Impaired Waters of the US" list.

Background

The NCD has reviewed many land use application in the Millbrook Watershed. We have worked with the town commissions and with the site design community to make project protective of surrounding wetland and open water resources. Currently there appears to be no construction activity occurring in the watershed. Two large land disturbing activities (Cornwall Consolidated School and a pasture expansion project on Hedgerow Farm) have occurred in the last 10 years but both projects are now vegetated and stabilized.

The Town of Cornwall has accomplished a Natural Resource Inventory for the purpose of revising their Town Plan of Conservation and Development. The NCD is currently assisting the town with planning and land use strategies that will allow the town to guide growth while at the same time preserve its rural character and agricultural heritage. The goal is to return to historic settlement patterns to reduce sprawl.

The land use land cover in the Mill Brook Watershed is mostly forested with agriculture and residences coming in a distant second and third. It is very surprising that it is on the US EPA's impaired waters list. The best way to address problems in the stream channels and with land use issues is to assess the entire watershed and create a watershed based plan. This will then guide the town through the priorities that must be addressed to remove this stream from the US EPA's impaired waters list.

Watershed Description

Mill Brook is identified by the CT DEP as Local Basin #6008. The Mill Brook Watershed is approximately 2.5 miles long and 2 miles at the widest point. The watershed is approximately 3800 acres and has about 8 miles of associated perennial and intermittent streams. The top of the watershed is located in a headwater wetland system just above Cream Hill Lake. The Mill Brook then braids through western Cornwall, along State Route 128 and empties into the Housatonic at the red covered bridge in West Cornwall Village. Most of the watershed is forested, with the balance being agricultural

and residential development. The agriculture land use is mostly pasture with hay fields providing the dominant crop (see Table 1 below).

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

Developed	0.6%	Forested wetland	5%
Deciduous forest	50.2%	Coniferous forest	20.3%
Other grasses & agriculture	21.8%	Barren	0.1%
Turf & Grass	2%		

The headwaters of the Mill Brook start at an elevation of 1100 feet above sea level and empty to the Housatonic River at approximately 500 feet above sea level. An elevation change of 600 feet occurs over 2.5 miles. Therefore, the Mill Brook has a moderately steep stream gradient of 5%. The flow energy created by the moderate stream gradient allows the Mill Brook to be very efficient at carrying sediments. This was evidenced by the lack of sediment deposition noted throughout the watershed.

Table 2. Background Data for the Mill Brook Watershed

Mill Brook local basin #	6008
Housatonic major basin #	6000
Local basin size	3800 acres / 5.9 square miles
Stream length	2.6 miles
Stream density	2.7 miles of stream per square mile
Roads length	9.3 miles
Road density	1.5 miles of road per square mile
Number of stream crossings	20

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. Finally, photographs are documented with a **Photo Inventory** form.

District staff worked with municipal officials in planning and conducting the surveys; their local knowledge and experience benefited greatly efforts to identify 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 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 that a rain event may have 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, and impact assessment forms completed and ID numbers assigned. The location and ID were documented on an associated survey data sheet.

3. Quality Control

Survey data was compiled in a database designed with input from DEP staff and linked to an interactive Adobe Acrobat file. 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

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

Water Quality Status

Currently the Mill Brook is listed as a Category 5 impaired water according to section 303(d) of the USEPA Clean Water Act. Category 5 waters have at least one designated use that cannot be supported, or at least one designated use that is impaired. In the case of Mill Brook both “Habitat for Fish” and “Other Aquatic Life and Wildlife” are the designated uses that are impaired. It should also be noted that the cause of the impairment is not known, however non-point source pollution from animal feeding operations are listed as a potential source.

Water Quality Objective

It is the NCD’s goal 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 Mill Brook so that the designated uses listed above can be restored and maintained. Only then will the Mill Brook become eligible to be removed from the US EPA’s impaired waters list.

US EPA Nine Elements Mill Brook Watershed Based Plan.

Below is an abbreviated nine-element EPA watershed based plan for Mill Brook. The purpose for an abbreviated plan includes the unknown impairments associated with the impaired uses and the qualitative nature of the information gathered by a track down survey. No water chemistry testing was accomplished during the track down survey.

1 IDENTIFICATION OF CAUSES AND SOURCE OF NPS POLLUTION

Identification of NPS Sources – Track Down Surveys

A track down survey of Mill Brook and its tributaries was conducted through July and August 2008 following the methods described in an US EPA approved Track Down Survey QAPP, US EPA Tracking # CT 07288, NCD August 2007. Site Impact 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.

ID	Impact Sheet	Sheet Description	No. Completed
SC	Stream Crossing	Culvert, Bridge or Dam	18
ER	Severe Bank Erosion	Bank Failure	3
MI	Miscellaneous	Agricultural Impacts	(see livestock impacts section)

Likely Sources of Non Point Source Pollution

Stormwater Runoff from Local Roads and State Highways

There were only a few catch basins located throughout the entire watershed and they always exited to a road side swale. A majority of road runoff sheet flows to the vegetated road sides, and the state highways had curb cut structures that diverted stormwater runoff

directly into road shoulder vegetation or rip rap slopes that carried water into the streams. (see photo below).



Curb Cut in Route 128 to Divert 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 (the Mill Brook Watershed is 5.9 square miles). 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 with significant impacts occurring when impervious cover reaches 10% and above. Currently, the Mill Brook watershed has well below 10% impervious cover. Therefore, non-point source pollution from road runoff is insignificant and unlikely causing the current impaired state of the Mill Brook.

Stream Crossing

There are twenty seven locations where vehicles can cross the streams of the Mill Brook Watershed. All of the stream crossings were stable (see Rattlesnake Road Crossing at right). However, there is one stream crossing, on Scoville Road that is misaligned causing severe bank erosion just below the outfall. Continued erosion in this area may eventually destabilize the crossing (see photos below). Currently a tree and other shrub vegetation are helping to hold the headwall and the road grade together.



However, the tree in the right hand photo above has an exposed root system which will kill the tree causing further bank erosion. The two photos below are of an outfall where one of two tributaries to Mill Brook crosses underneath Scoville Road. (This problem is occurring on the eastern most tributary).

Because severe stream bank erosion is a problem here, it will be detailed in the Stream Bank Erosion Section below.



Stream Crossing at Scoville Road and the associated Bank Erosion

Stream Bank Erosion

There were three locations of severe bank erosion totaling over 150 linear feet of erosion. One bank erosion site is pictured and described above, and the others are pictured below. The first photo pictured below is bank erosion located along State Route 128. This erosion site is occurring along a very straight section of stream and does not appear to be in danger of additional consecutive failures in the future. The second photo pictured below is located in a pasture adjacent to the intersection of Town and Scoville Roads. All the erosion sites likely contribute sediments to the stream intermittently during large runoff events, and do not represent a continuous source of sediments to the water column. The intermittent nature of bank erosion inputs along with the steep overall gradient of the Mill Brook Watershed does not allow sediments to remain in the watershed. They are quickly scoured and transported to the Housatonic River which also has a relatively steep gradient. Most of the Mill Brook sediments likely stay in suspension until the Housatonic River reaches Lake Lillanonah.



At the point where the Housatonic River empties into Lake Lillanonah, most of the sediments drop out of suspension and deposited at the top of the lake (see photo below). The picture below is taken from Lovers Leap Park in New Milford showing the hundreds of thousands of cubic yards of material that has been deposited at the top of Lake Lillanonah. The Mill Brook Watershed represents less than 1% of the entire Housatonic River Watershed and therefore has likely contributed less than 1% of the sediments deposited at the top of Lake Lillanonah. This sediment deposition is occurring

outside the Mill Brook watershed. However, it is important to understand how erosion in one part of the watershed can impact another part.



Lake Lillanonah looking south from Lover's Leap State Park in New Milford during a 10 foot lake draw down.

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 agricultural activities are partially responsible for impairment in the watershed. The dominant issue uncovered using a visual assessment method was unfettered livestock access to approximately one mile out of the eight miles of stream channel inspected in the watershed.



Cattle Access to Stream Near Intersection of Town and Scoville 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 with the resultant stream sediment deposition
- c) Erosion of soils from the riparian areas with the resultant stream sediment deposition
- d) Pollutant loading from nutrient rich animal waste being carried into the stream by stormwater runoff
- e) Pollutant loading from animal waste being deposited directly into the stream
- f) Degradation of stream bed stability and aquatic habitat

All of the problems listed in (a) through (f) above are occurring somewhere within the 1 mile of stream channel that livestock have access to, and all are likely causing water quality degradation. Livestock can access most of the stream channels in Sub Watershed #s 6008 (00-1, 01-1 and 00-2-R2). However, all these threats (a through f) 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 1 mile of stream would be very expensive but is one of the actions that will need to occur in the effort to remove the Mill Brook from the US EPA's Impaired Waters of the United States list.

Both 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 that 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) Installation of exclusionary fencing around wetland and water courses.
- 2) Creation of watering troughs with solar pumps to fill them.
- 3) Installation of water wells and pipes to get drinking water to livestock
- 4) Design and construction of 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 a few T and E species indicated in the areas where livestock have access to streams and riparian corridors. A WHIP grant would improve habitat for T and E species in these areas with the additional benefit of implementation would be water quality protection.

2 LOAD REDUCTION ESTIMATES OF MANAGEMENT MEASURES

All the erosion sites documented in the track down assessment have contributed tens of cubic yard of sediment to the stream channels to be carried away during high water events. In watershed 6008-00-1 soil erosion is combined with nutrient rich animal waste also getting into the water column. Limiting livestock access to the stream will minimize and even eliminate these impacts.

3 NPS MANAGEMENT MEASURES

See Livestock Access Section in the Identification of Causes and Sources of Nonpoint Source Pollution above.

4 TECHNICAL AND FINACIAL ASSISSTANCE COSTS, AUTHORITIES

Cost associated with the development and implementation of erosion control plans at the erosion sites in the Mill Brook watershed need to be estimated individually. Grants from local, state and federal sources as well as public and private foundations, should be evaluated. Technical assistance for implementation can be sought from the Northwest Conservation District, USDA NRCS and FSA as well as the CT DEP. There are currently a host of funding sources to assist farm owners/managers in the watershed to minimize the impacts of agricultural activities in the watershed. See Livestock Access Section of the Identification of Causes and Sources of Nonpoint Source Pollution.

5 PUBLIC INFORMATION AND EDUCATION

As part of the Mill 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 a software program called Adobe Acrobat Reader®. The digital interactive map uses a high resolution aerial photo of the watershed that was taken in 2004. The map also depicts 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 📌 are locations of problematic erosion sites, the 📌 blue pins are the locations of stream crossing and the 📌 green pins are photos of miscellaneous typical photos and minor problem spots. The map is titled Mill Brook Watershed Interactive Map.pdf (see attached).

6 IMPLEMENTATION SCHEDULE

All the measures discussed above to address problems in the Mill Brook Watershed have been initiated.

7 MEASURES OF MILESTONES

Measures of success associated with this project include the fencing of the stream from livestock access and the stabilization of all the erosion sites. Addressing both erosion and livestock access have been initiated.

8 CRITERIA TO DETERMINE IF LOAD REDUCTIONS ARE ACHIEVED

Reduction in nutrient and sediment loading can be demonstrated through future water quality monitoring in the upper Mill Brook Watershed. Water sampling should occur pre and post implementation of specific management practices to assess the measures specific effectiveness at reducing pollutant load in the stream.

9 MONITORING

Monitoring of the Mill Brook Watershed should be coordinated with the implementation of the management measures. The CT DEP, the Town of Cornwall and local organizations should continue to work together to conduct ambient water quality monitoring in the Mill Brook Watershed.

Uncertainty Analysis

Both the US EPA and the Fisheries Division of the CT DEP accomplished aquatic organism sampling at many locations throughout the watershed since the early 1990s and noted a significant lack of expected populations and diversity of fish and macroinvertebrates in the upper half of the watershed. The track down survey only allowed for the visual inspection of stream waters, the stream channel condition and the condition of the riparian corridor. There was no water quality sampling accomplished during this assessment to investigate compounds of concern in the water column. However, there was some heavy water staining occurring in the upper part of the watershed. Because no water chemistry samples were taken the source or reason for the staining is unknown. Factors that cause staining (ex. high iron content) can affect both fish and macroinvertebrates. Therefore, a simple follow up to help assess why the stream is impaired in the upper watershed would be to perform some water chemistry sampling to assess if compounds of concern in the water column are causing problems. See photo below of stained waters in the upper watershed.



Stained Water Below Stream Crossing on Town Road

Conclusion

After walking the entire watershed and performing visual inspections of all the stream channels and riparian corridors, uninhibited livestock access to the stream channel emerged as a dominant problem. Given the abundant programs that are available to the agricultural community for livestock exclusion, it could be very easy to secure the resources needed to completely exclude livestock from all of the channels in the Mill Brook Watershed and its tributaries. We look forward to working with the agricultural community to facilitate these projects.