Mill Brook Shoreline Survey
May, 2000

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Mill Brook Task Force
Concord Division of Natural Resources

I. Introduction

I. Introduction

Mill Brook – Its History and Existing Conditions

The Mill Brook flows through the center of Concord and plays a significant role in the cultural, residential, and commercial character of the Town. The flood and ebb stages of Mill Brook have played an important part in the development of Concord, from establishment of industry to the location of the Town cemeteries. The headwaters of Mill Brook are located in Lincoln, MA. Mill Brook is approximately three miles in length, from its headwaters to its confluence with the Concord River. In Concord, Mill Brook flows along Cambridge Turnpike, through Heywood Meadow, through the center of town (Milldam), through Chamberlain Park, along Keyes Road, under Lowell Road, and drains to the Concord River just above the North Bridge. The Mill Brook watershed encompasses approximately 2,100 acres, including Crosby's Corner (Route 2), Merriam's' Corner, the Town Forest, and Concord Center.

Today, Mill Brook is significantly degraded in relation to its pre-colonial condition. Over the years, channelization, wetland destruction, sedimentation, erosion, unregulated discharges, stormwater runoff, unregulated development, and litter have taken a toll on the integrity of the Brook. These impacts have degraded water quality to the point that the Brook is no longer capable of supporting the abundant fish and wildlife that it has historically supported.

Although Mill Brook has been compromised over the years from human impact, all is not bad news. The health of the Brook has improved over the past century due to advances in environmental knowledge and an increase in environmental awareness. Rules and regulations have been promulgated on the federal, state, and local levels, which largely eliminates wetland destruction and limits discharges to the Brook. Sanitation has greatly improved, ending discharge of raw sewage to the Brook. Much of the erosion and sedimentation associated with unregulated agriculture and poorly engineered, muddy roadways have been eliminated.

However, there is still room for improvement. It is important to remain ever vigilant to protect Mill Brook from further degradation and to seize opportunities to improve its condition. Running through the heart of Concord, Mill Brook is an urbanized stream. As such, it is constantly subject to human-induced impacts that jeopardize its integrity. Although it may not be possible to return Mill Brook to pre-colonial conditions, it is within our grasp to maintain previous successes through public education and monitoring. It is also possible to continue to improve conditions through stream cleanups, restoration efforts, creation of passive recreation and education opportunities, and reduction of sediment and untreated stormwater runoff discharges.

The Mill Brook Task Force

In recognition of the need to monitor and protect Mill Brook, a group of volunteer citizens was convened under the auspices of the Concord Division of Natural Resources. This volunteer group was formed in 1995 under the title of the Mill Brook Task Force (MBTF). The mission of the MBTF is the stewardship and protection of Mill Brook. The MBTF accomplishes this

mission through a variety of projects including but not limited to public outreach, water quality monitoring, biodiversity monitoring, annual stream cleanups, and support of efforts to improve water quality. As part of their ongoing efforts to document and improve conditions within the Mill Brook watershed, the MBTF spearheaded the organization and implementation of the Mill brook Shoreline Survey.

The Mill Brook Stream Team

Under the auspices of the Mill Brook Task Force and the Concord Division of Natural Resources, and under the guidance of DEP's Adopt-A-Stream program, a Stream Team of 28 individuals was formed. The Mill Brook Stream Team includes members from the Mill Brook Task Force, state and local officials, abutters to the Brook, and other concerned citizens. On May 16 and 18, 2000, the Mill Brook Stream Team carried out the field work which is the basis for this Shoreline Survey Report and Action Plan, and subsequently identified primary issues currently affecting Mill Brook. The results of their efforts are presented in this report. It is the intention of the Mill Brook Task Force and Mill Brook Stream Team to improve conditions in the Mill Brook watershed through implementation of the Action Plan within this report.

The Shoreline Survey Report and Action Plan

The Shoreline Survey Report and Action Plan is the synthesis of data gathered during the Shoreline Survey, and input from meetings with the Stream Team and DEP's Adopt-A-Stream coordinators. The Report and Action Plan is a valuable tool for public awareness, reviewing any proposed activities within the Mill Brook watershed, and for planning projects to improve conditions in the watershed.

The Shoreline Survey Report and Action Plan reflects conditions within the Mill Brook watershed as recorded in May, 2000. Future Shoreline Survey Reports at five-to-ten-year intervals will help to build a record over time of conditions within the watershed. Such a record will prove valuable to track improving or degrading conditions within the watershed, and will help to identify issues early, before they become major issues. Currently, Mill Brook is in reasonably good health. The primary issues recurrently identified during survey efforts and determined to be impacting the health of the Brook are:

- Trash and lawn debris
- Stormwater runoff
- Sedimentation carried in stormwater runoff and unregulated snow plowing up against the banks of the Brook.

Through implementation of the Action Plan and coordination with municipal and state agencies, the Mill Brook Stream Team and Mill Brook Task Force hopes to begin remediation of these issues.

II. Narrative Descriptions of Sections Surveyed

Mill Brook Shoreline Survey

Narratives as Written by Surveyors
Typed and edited by Natural Resources Staff

Compilation of Narratives from Data Sheets

Segment #1 – Marsh from Concord River to Concord Lumber culvert

Don Costello & Terry Baker

I met with Terry Baker, my partner, and quickly learned that it is a tremendous plus to have an experienced shoreline survey veteran as a partner. Terry was terrific in detailing observations with sound explanation.

Generally, the stream observed from the culvert and beyond the flowing side out 350+ yards flowed slowly and looked good-health. The water was clear, odorless, with a sandy-some gravel-and-rock bottom. The banks had some moss in spots and periodic bushes and trees. The photos (1,2,3,4,5) attached present a healthy look in the area surveyed.

There were two problem areas: 1) Address immediately the culvert (1) (30+ yards) at the Concord Lumber Company, especially the pipeline and entry side of the culvert. A clean-up assignment should be scheduled – NOW; and, 2) in two areas where dead tree limbs/trunks cross the stream – REMOVE.

Segment #2: Concord Lumber culvert to Main Street culvert

John & Lorna Mack & Terry Baker

The Mill Brook enters a large culvert under Concord Lumber at the beginning of this segment. This is the worst spot on our segment. There are fallen trees, brush and trash impeding the culvert. This area should be regularly cleaned. However, there is a pretty view upstream by two houses with overhanging trees and then there is a wetland, unfortunately much invaded by loosestrife. Lowell Road crosses a culvert which flows well and the next stretch by Brooks Pharmacy is in pretty good shape, though buckthorn and other bushes are beginning to impede the flow and should be cleared. The stream is very clean and clear except for the invasions of loosestrife to Anderson's. Terry Baker and others have done a remarkable job of cleaning the banks of debris. Rumor or fact has it that a 10' trout was caught in this section. Much credit too to the home owners on the East bank.

Segment #3: Main Street weir and culvert to Heywood Street culvert

Hank Sikkema & Liz Berk

Section 1: Back of Anderson's – (Pipe 1) to Milldam culvert

Mill Brook channeled by commercial building cement foundations on right (facing upstream) and by granite block wall on left all the way to Main Street. Sandy cobble bottom with width of 7' at culvert and varying depths from 12" to 22" at culvert. 2' x 3' cardboard box was caught on 2" x 6' tree limb under culvert, blocking flow – (was removed). Erosion of right bank behind cheese shop and of left bank granite slabs from top of wall, now in brook bottom.

Section 2: From Milldam to First Parish Bridge

Sluice in parking lot gives direct run-off into brook. A 19" dam spans brook, with depth of 1' above dam and 15" below. Culvert about 6'. Granite walls channel brook from 7' to 3', the latter increasing depths to 22-32" in spots – with parking lots on every side. (Pipe 2) (Pipe 3) and little protection from this run-off. Brook unwalled for 30' behind church slope, with some erosion – then channeled all the way to bridge on left, and almost on right – with some erosion and muddiness where it stops. (100' from bridge) (buffered by trees and bushes on both sides to bridge) Bridge is 14' wide – mallards, muskrats and large eels have been seen in this section – as well as beaver. The white sucker had just come and gone and a report of a brook trout was heard from an angler on 5/12/00. Bottom consistently firm with sand and rocks. (Fire wood at First Parish is a temptation for kids to throw into brook)

Section 3: First parish Foot Bridge to Heywood Meadow Auto Bridge

The shorelines varied in vegetation and erosion:

300' south of bridge: heavy erosion on left, but base was solid

350' south of bridge: right shore – sign of oil (?) where water had receded. No visible drainage channel, but on leaf/refuse pile. Lots of Jewel weed. Large willows on both sides. Wild iris growing on left shore; bottom turns to mud.

400' south of bridge: for about 300' there is mowed lawn and erosion on right; wild area on left; 24" of mud on bottom; again, some oil residue on right shore. Overgrowth on left with lots of branches over the brook. Beech saplings

Stone marker at south side of lot at 77 Walden: Mowed area on left with fencing with railroad ties at base as retainer. Unmowed/wildflowers – buttercups on Right. Bottom was muddy with some grasses; then became firm. Invasives on shore (bittersweet?). Small saplings/shrub hanging in brook.

There is an iron fence that crosses the brook with elaborate pulley system which could lower the bottom to water (?) level. Had not been used for some time by looks of ropes. North of this fence had big rocks, firm bottom. On right bank, ground very wet, mowed area could be left to grow and hopefully absorb some wetness, skunk cabbage coming up in this area. There was a large chunk of concrete, or smooth granite 5' long by 12" think in the center of the brook.

Second stone marker on right at fence and the end of mowed lawns on right. Depth at this fence is 13".

Right shore is 2' mud (quicksand) run off with ferns and draining channel to brook. Oil residue here also. Erosion on shore. Becomes almost impassable on right shore. Entire area for 30' from shore towards houses is wet.

200' South is an auto bridge for a private driveway to 105 Walden. Bridge is 14' wide. Water under bridge is 22" deep. Culvert is 69" wide top of culvert to water line is 31". Fence with railroad ties holding erosion continues to this point on left shore. Erosion on right; there is some lawn area on right before the bridge; brook bottom is firm. (This fencing has been very effective). Just south of bridge was wet and draining area from right into brook. Sign of oil on right shore.

50' South of bridge is second pulley wire fence across brook. House is on left shore between bridge and fence. The fence is beginning of telephone company building. We had to go to Walden Street to get back to shore line.

Behind the telephone company lot there is a 20' wild area, then asphalt driveway. Area is overgrown and wet. Brook becomes wider with left side eroded significantly. The bottom was firm and sandy. The right side is less eroded. There is a lot of Osier dogwood (?) The brook is totally covered over for 10-12 feet with this dogwood. Passable by walking in brook under branches.

South corner of telephone company: Brook is firm in center but 2' mud depth on sides. Water is 16" deep. 12' of mud on right side and overgrown for 25' down the brook. The bottom is firm in this area. There is an unmowed field on left; wooded/mucky area on right; also some oily residue with no obvious source. There is some overgrowth blocking the channel at south end of telephone company building with debris getting stuck here. The right side is heavy with shrubs and saplings.

Just before Heywood (auto) bridge the bottom is firm. There is oil residue on right shore where water has receded. Water is 24-26" deep. There are low saplings on left; depths now vary from shallow to deep under bridge. Culvert is 5' wide with lots of rocks. 3' from top of culvert to water is 6" deep under culvert. Firm bottom.

It was interesting to see the alternating firm and muddy bottom surfaces during this stretch. It was unclear where the oil(?) residue was coming from, but appeared to be where the water had receded. There were no other signs of oil leading to these deposits.

Segment #4: Heywood Street culvert to Police Station
Frances & John Neville

Behind the fire and police station on the banking leading down to a 40' diameter brook pool was a collection of debris, among other things: numerous Dunkin Donut Styrofoam cups; spilled street marking paint (near shed); a couple of pails; a concrete post 5' long (near shed); a part of a telephone pole, with creosote, on the bank behind the fire station (below where the boat is parked); construction debris (photo #1); and road marking patterns.

There is a 6" diameter pipe about midway down the slope to the Mill Brook pond from the fire station. No fluid was seen in the pipe. Looks like it could be the exit of a storm drain (Photo #2).

The brook is about 20' wide leading in and out of the pond but has numerous aquatic plants in it.

Behind the electric substation on the left bank there is a mound of dirt with what may be a fox or coyote den. (at least that is what the 10" hole would indicate!)

There is bittersweet, fiddle heads, jack in the pulpits, and other wild plants along the left bank. There are also a number of trees (apple, maple, and mountain ash) in varying conditions as well as old tree falls, very swampy. The bushes appear to be honey suckle and a variety of thorn bushes (blackberries for sure) back from the brook about 15-20 feet in the area opposite the large apartment house (190?) on Walden Street. (Photo #3)

There are a couple piles of dirt upstream a bit, one of which has apparently become a home to wildlife, there is also evidence of leaf and brushes dumping hither and thither. (Photo #10)

The brook has a good flow overall.

There is good wildlife habitat along the left side of the brook in the heavy swamp.

(Photos #8 & #9) there is heavy swamp below another pool approximately 25 feet in diameter upstream and above this pool. (Photo #17) there are cut trees along the bank (kids?). There are duck tracks and ferns, dead rushes of loose strife and pussy willows. The stream has a good flow here and is over 14" deep (and so is the mud into which one of us stepped). (Photo #18)

The bottom here is silt and mud.

About 4 yards upstream of the bridge (left bank) is signs of oil, but from what?

There is leaf dumping evident by the Heywood street bridge and along the entire length of the portion from Heywood street to the light plant substation in the open and mostly mowed field along Walden Street.

On street level the bridge area is in need of repair, there are washouts on the dirt surface, and the bridge railings look tenuous. The washouts are between 8 and 12 inches deep (these washouts were repaired with soil and grass seed the day after we noted them – wonder why!) (Photo #11)

Under the bridge the walls look a bit cracked with cement and rocks easing forward (another bridge like Lincoln's?).

The right side of the Mill Brook:

(Photo #12) there is a path from Heywood Meadow to the Mill Brook (Photo #13). Some growth in the 20-foot pond and the stream and pond have a mud bottom (good water flow throughout). The path continues parallel along the brook about 12' away. There are maple trees, wild flowers, and fiddle heads.

The brook widens to about 14', with still more maples and a very muddy, slippery banking. There is a bench along the way and the path leads back out to the Heywood Meadow (maybe 75 feet).

Below the path there are a lot of dead falls and signs of cut trees (beaver?).

There is evidence of parking lot erosion (Photo #14), with the stone dust heading toward the stream – maybe 30 feet to go.

The right bank is well filled with shrubs and trees – great for wildlife. (Photo #16)

Segment #5: Police Station to intersection of drainage ditch from Thoreau Street
John & Frances Neville

Segment 5 extends from behind the fire and police station to a bit beyond the greenhouse and behind the corner of the courthouse. (about a ½ inch to the right of the words "Fire Sta" shown on the map)

In this section approaching the banks of the brook is often quite difficult due to marshy ground, pools, brambles and trees (Photos #1-4). We eventually adopted a strategy of going around these obstacles until we got to a break that allowed access to the brook. This was true for both sides of the brook and we would recommend that the next survey of this section be done "in stream", by kayak or other low-draft craft.

This section has a "wilder" appearance than Section 4, perhaps due to the lack of residences. There are none along this section on the left of the brook, and those on the right (about 4) have deep lots running to the brook. One exception is the greenhouse and associated storage building behind it which is covered with a blue tarpaulin (Photo #5). The storage building behind the greenhouse seems to come within a few feet of the brook bank. We only observed the greenhouse and storage building from the left side of the brook. A closer survey of this area should be done as we saw some short logs (about 5" x 2') down the brook bank and a pane of glass (12" x 20" approximate) almost at the water's edge.

In general, the brook has a "healthy" appearance with clear water and a moderately quick flow. We did not see any fish, except for bubbles, but did see some evidence of beavers (Photos #6 & #7).

There were also some suggestions that this section might have had prior settlers (Photos #8 and #9).

Segment #6: Drainage ditch from high school pond to Walden Street
Chris & Susan Ledoux

Very slow-moving throughout. Area below high school field was too densely covered with brush to access. The area near the high school had a small amount of trash (1/2 trash bag). The area between Thoreau St. and Alcott School was pretty clean, adjacent to un-mowed fields. The area directly behind Alcott expanded from 3' width (as most of the segment was) to more of a wide wetland. The final area near Walden St. had a small amount of trash. No fish were observed, but birds were abundant throughout.

Segment #7: Drainage ditch from Walden Street to intersection with brook
Ted and Pat Landry

The stream crosses Walden Street near court house and joins Mill Brook about 1,000 feet to the East. At Walden Street, one house is adjacent to stream with large lawn. The brook wanders through heavily wooded wetlands area. On the left bank, phragmites are evident in low wetlands beyond shoreline growth of trees and tall bushes.

The stream appears to have no recreational assets with only limited opportunity for trails or paths.

Segment #8: Brook from intersection with drainage ditch to Cambridge Turnpike
Brian English

This area begins at the Cambridge Turnpike and is adjoined by a large wetland system. There is a lot of trash in and around the wetlands and on the left bank of stream approximately 100' down. The water in the wetlands is brown, source unknown. The water in the channel is clear and flows to the town forest out behind the court house. Again, a large forested area coupled with a wetland system provides excellent habitat potential for a variety of species. Another concern is the drainage ditch which connects to the brook behind the court house is choked with vegetation, and I don't know if there is a potential for a migration of these aquatic plants into the Mill Brook.

Segment #9: Cambridge Turnpike to Hawthorne Lane
Lynn Huggins & Hasso Ewing

This segment of the stream contains two areas of differing characteristics. The first approximately 150 feet of the stream is sandy bottom, the sides of the stream buffered with evergreen trees and shrubs and one brief section of residential lawn. The water is about one foot deep, is tea colored with no odor and slight flow. Three pipes were observed in this area and described.

Approximately 75 feet downstream from the bridge at Hawthorne Lane, the area opens up to a large floodplain. The left and right banks are bordered by grasses, cat-tail, some willow, some red maple, some yellow flage, and loosestrife pockets. The loosestrife is observable along the outside of the open area but does not appear closer than 75 feet on either side of the stream. The stream bottom changes from sand to muck with deep organic material on the edges. The water is about 2 feet deep, black colored with an anaerobic odor and slight flow. There is no overhead protection. There is evidence of abundant bird life. Because this stream observation was completed in the evening, few direct observations were made. However, one of the survey team observers lives on this stream segment and has observed spring peepers, bull frogs, pheasant, red-winged blackbird, heron, hawk, "Baltimore" oriole, Canada geese, mallard ducks, coyote, muskrat, deer, fox, woodpecker, Great Horned owl. Approximately 30 feet downstream from where the area opens up, there is a large willow tree on the left side of the bank underneath which are signs of an old agricultural dump containing scrap metal, glass, rusted fence and equipment. It would be good to clean this up.

Approximately half way through this second segment there is evidence of ditching on the right side of the stream. The water is not flowing so it is unlikely to be a feeder stream. Nearby on the left bank is a second, smaller, ditch flowing slowly into the Mill Brook. This is covered with a reddish-brown film with clear water underneath. The source may be a storm drain on Hawthorne Lane within the driveway loop of #121.

Approximately three-quarters of the way across this segment, the water deepens to over two feet with more than three feet of organic material on the stream bottom. We took some photographs here of the area. Shortly after this point, the brook loses definition as the area becomes quite wet. We were unable to continue further.

A visual observation of the end of this segment was made from Cambridge Turnpike. The brook backs up at this point because the road blocks its flow. The area is quite full of trash and the water is black and dirty. The surface has a lot of algae or duck weed and there is no evidence that the water is flowing.

Segment #10: Hawthorne Lane to intersection of tributary from Lexington Road
Andy & Linda Proulx

The segment starts at the confluence of the Mill Brook tributary from Cambridge Turnpike and the tributary from Lexington Road. At this point, most of the brook is open without cover, with mostly a muddy bottom. The banks are small or non-existent and border wetlands with significant amounts of purple loosestrife on the right bank and mostly small shrubs on the left bank. The stream is closest to agricultural fields at the confluence. As the brook progresses downstream, the cover from large trees and shrubs increases significantly so that at some points, the stream is inaccessible. There were many birds heard along the brook, but not identified. There are two beaver lodges along the segment and a small beaver dam. There are many deer tracks along the banks.

At the farm buildings, there is significant trash....bottles, machines, cars, etc. within 50 feet of the brook.

Strange area of dead (?) trees near photograph 21.

Segment #11: Brook from intersection of tributary from Lexington Rd. to Cambridge Tpke.
Brian English (Near Crosby's Pond)

This area was only accessible to view from Cambridge Turnpike. The water is relatively clear and the area is heavily wooded with wetland grasses and plants. The cover here and its inaccessibility create a secure habitat for a variety of species. And, although I didn't find evidence of a lot of use from wildlife, it is in part due to the fact that this area is fairly secure from human intrusions due t its vast wetland areas.

Segment #12: Cambridge Turnpike to Fairyland Pond dam
Lydia Rogers & Barbara Wheeler

Beginning after the Fairyland spillway, this segment forms extensive wetlands visible halfway to Cambridge Turnpike. Deep holes and pockets of muddy water formed by roots and downed trees indicate the stream is submerged. Then it emerges as a well-defined moving stream, with a banking on the right containing an old dump site. A wide path is between stream right and a steep slope. Animal scat of fox, otter and fisher was observed, deer rubbings, and beaver chews. A rich diversity of trees, shrubs, and aquatic plants are in the area next to the turnpike.

Segment #13: Fairyland Pond dam to Brister's Hill spring
Terry Baker & Jas Smith

The brook starts at a spring out of the base of the hill parallel to Route 2 about 100 meters from it. Two feet wide by 4" deep. At 100 yards the brook is 1' wide x 3" deep, at 150 yards a culvert under a trail at right angles to brook 15" diameter pipe. 1/3 full at inlet, 2/3 full at outlet = level of pond. Oily sheen, scum, milky, much rotting leaves and vegetation and fallen trees. Grasses, skunk cabbage, 100' trees – red oak red maple and others.

Segment #14: Cambridge Turnpike to Route 2, including Crosby's Pond
Jack & Billy Crosby

I have divided my segment 14 into 3 sections. Section 1: This is where the pipe under Route 2 empties to Crosby's Pond. The brook is roughly 200 yards long and is crystal clear and fast running through heavily vegetated and difficult to negotiate. Section 2: Crosby's Pond itself though heavily infested with water/pond lilies is clear and at the highest level it can be without overflowing its banks thanks to the recent infusion of busy beavers. Section 3: This is the short section from the Crosby Pond overflow dam to where the brook goes under Cambridge Turnpike. Nearly impenetrable but normal.

Segment #15: Route 2 to source in Lincoln
Jack Crosby, Mary Sheldon & Andy Proulx

Winding, meandering, relatively swiftly running, 4-5' wide, cold (45-50°F), clear, odorless water, many ripples and tingling sound. Lush, green, sometimes impenetrable vegetation on both sides with fern, skunk cabbage, blueberry (low & high bush), poison ivy, underneath a canopy of mostly deciduous trees and a good proportion of mature white pines. Intact heavily vegetated stream banks. Fallen branches and heavy leaf litter. Many dead, standing trees with evidence of woodpeckers. Evidence of many animal tracks esp. near Rt. 2 – deer, raccoon, cat prints? Trash – some tues, old metal – but minimal.

Segment #16: Tributary from Lexington Road to intersection with brook
Brian English

The tributary from Lexington Road is beginning to fill with aquatic vegetation. Most of the tributary is inaccessible, providing good habitat for a variety of wildlife. Saw 2 mallard ducks, 2 Canadian geese with 8

ducklings, and 2 beavers at work behind Palumbo Farm. In the bare field, there were various tracks visible including raccoon and various birds. The water is clear, but there is a potential for water contamination from Lexington Road. Being inaccessible makes this area immune to human intrusion – caution – don't try to wade it, silt deposits are up to 3.5" deep. According to Mr. Palumbo, there are approximately 5 active beaver dams in back of his farm creating a large wetland area.

Segment #17: Drainage ditches from Lexington Road to Bedford Levels
Jas Smith & Terry Baker

Mill Brook is almost better described as one long pool with the hint of a current. It becomes completely dry and is visible only as a damp ditch in the Bedford levels area. This may be related to a man-made pond which is used for irrigation. Habitat on the left side is optimal for deer and other birds and animals seeking dense cover near food and water sources. On other occasions, I have crossed this woodland and found almost impenetrable vines and shrubs. Highly visible deer runs enter the reparion zones and mark stream crossing.

Due to the minimal water flow, fish and other aquatic species are probably not plentiful in this small source of Mill Brook.

Segment #18: St. Bernard's Cemetery to intersection with drainage ditch at Meriam's Corner
Carol Dwyer & Jean Rosner

The Mill Brook emerges flowing slowly out of Gowing swamp which is South of St. Bernard's cemetery on Bedford Street and opposite the Ripley School.

It winds along through a wooded area, low banks at first and then becoming quite high on both sides opposite a low valley containing several ponds. Houses #47, 45, and 43 on Old Bedford way have used top of high bank for yard waste, old cut trees and various huge iron relics – former resident at #47 collected iron junk – will require a tow truck and tractor to remove unsightly mess.

Opposite house #45, brook turns abruptly East – more ponds – then through a culvert and into a ditch, low banks between open fields – with thick bushes/trees right along brook – then South again – still between fields. Deer tracks seen along stream in this area.

Stream then enters woods – hard to follow in stream – too much growth and a fallen log – low banks. Passes through culvert on Old Bedford road – woods continues on both sides about 50' on left and 100' on right – to a swamp and then a pond. Unable to go further – water too deep. Deer tracks again on edge of planted field on right. Saw no sewage pipes, water did not smell any place. We think we got the best section of all!!

III. Results of Shoreline Survey

Iill Brook Shoreline Survey

Summary of "Priorities for Action" Sheets

Written by Surveyors, Typed and Edited by Natural Resources Staff
June, 2000

Segment Location & Survey Team	Problems Found (See survey records for details)	Assets Found	Surveyors' Proposed Priorities for Action
1. Marsh from Concord River to Concord Lumber culvert *Don Costello & Terry Baker*	a) Tree, brush & debris at end of culvert b) "Downed" tree trunks in channel c) Odd lumber, etc. in immediate area of lumber yard	a) Good habitat, stream flow, and banks in good condition b) One area on left bank could be a park	a) Tree trunks b) Trash & lumber c) Develop park
2. Concord Lumber culvert to Main Street culvert *John & Lorna Mack, Terry Baker*	a) Roots & branches impeding flow b) Trash clogging Concord Lumber culvert	a) Opportunities for trails and clearings	a) Vegetation blocking brook b) Trash by Concord Lumber culvert
3. Main Street weir and culvert to Heywood Street culvert *Hank Sikkema & Liz Berk*	a) Unbuffered runoff potential from parking lot b) Erosion where walls aren't present c) Sticks, boards in channel snagging debris d) Oil in water in several places e) Not attractive behind Walden St. businesses f) Heywood Bridge railing deteriorated g) Two metal fences crossing brook	a) Channeling controls erosion and deepens brook for fish b) Two house lots had erosion control (RR ties) c) Potential for plantings, benches, tables, etc.	a) Non-point source pollution from parking lot b) Attractiveness of brook in town center c) Low branches & saplings d) Heywood bridge railing e) Status of 2 fences crossing brook f) Develop sitting area
4. Heywood Street culvert to Police Station *Frances & John Neville*	a) Debris and litter behind police station b) Dumping of leaves and grass clippings along brook	a) Brook has good flow overall b) Wildlife habitat	a) Debris and litter behind police station b) Dumping of leaves and grass clippings along brook

	c) Heywood St. bridge and railings look tenuous, washouts from surface d) Signs of oil just upstream from bridge		c) Heywood St. bridge and railings look tenuous, washouts from surface d) Signs of oil just upstream from bridge
5. Police Station to intersection of drainage ditch from Thoreau Street *John & Frances Neville*	a) Possible debris on bank behind greenhouse	a) Clear water, flowing quickly b) Evidence of early settlers: gravestones, trees	a) Possible debris on bank behind greenhouse
6. Drainage ditch from High School pond to Walden Street *Chris & Susan Ledoux*			
7. Drainage ditch from Walden Street to intersection with brook *Ted & Pat Landry*	a) One lawn could discharge runoff into stream	a) Good habitat with little or no ready access b) Clear stream with no discharges of any kind	a) Remove beaver dams that may appear b) Maintain stream
8. Brook from intersection with drainage ditch to Cambridge Turnpike *Brian English*	a) Roadside runoff b) Trash c) Drainage ditch connecting is clogged with aquatic vegetation	a) Large wetland system creates diverse habitat b) Flows through Town Forest, keeping area protected	a) Roadside runoff b) Trash c) Drainage ditch impact?
9. Cambridge Turnpike to Hawthorne Lane *Lynn Huggins & Hasso Ewing*	a) Old dump with scrap metal, etc. b) Small ditch with water covered with reddish-brown film flowing in c) At Cambridge Tpk, water is black, algae and duck weed, trash & no evidence of flow	a) Abundant wildlife	d) Old dump with scrap metal, etc. e) Small ditch with water covered with reddish-brown film flowing in f) At Cambridge Tpk, water is black, algae and duck weed, trash & no evidence of flow
10. Hawthorne Lane to intersection of tributary from Lexington Road *Andy & Linda Proulx*	a) Trash around farm buildings b) Cutting of vegetation just below confluence c) Purple loosestrife d) Discolored side flow	a) Good habitat along entire length, large buffer zone b) Good cover of stream upstream of Hawthorne Ln	a) Trash b) Identification of and analysis of discolored side flow c) Cleared area
11. Brook from intersection of tributary	a) Roadside runoff	a) Dense cover for	a) Roadside runoff

from Lexington Road to Cambridge Turnpike (near Crosby's Pond) *Brian English*	b) Trash	wildlife b) Good habitat	b) Trash
12. Cambridge Turnpike to Fairyland Pond dam *Lydia Rogers & Barbara Wheeler*	a) Wetlands full of purple loosestrife b) Trash, roadside and old dump site	a) Excellent trail, near high school b) Just before Tpk, rich area of aquatic plants & beaver house c) Abundant birds and animals	a) Mill Brook Garden area: littered, oily water, some algae near house, slight smell b) Old dump site near Tpk: broken glass, rusty metal
13. Fairyland Pond dam to Brister's Hill spring *Terry Baker & Jas Smith*	a) None	a) Good habitat b) Recreation access c) Town park well kept d) Area seems stable	a) Continue present care taking
14. Cambridge Turnpike to Route 2, including Crosby's Pond *Jack & Billy Crosby*	a) No problems	a) Good habitat for wildlife	a) None
15. Route 2 to source in Lincoln *Jack Crosby, Mary Sheldon & Andy Proulx*	a) Minimal amount of trash	a) Clear, cold, swiftly running, odorless water b) Lots of animal sign	
16. Tributary from Lexington Road to intersection with brook *Brian English*	a) Lexington Road runoff and garbage to adjacent land b) Aquatic vegetation building up	a) Excellent habitat for a variety of species b) Little human intrusion	a) Road runoff b) Tributary dredging? c) Roadside trash
17. Drainage ditches from Lexington Road to Bedford Levels *Jas Smith & Terry Baker*	a) Use of agricultural pond having impact on brook?	a) Recreational use: part of viewshed & water supply for Nat. Park Svc Interpretive Trail	a) Understand use of lagoon b) Determine land ownership and consider protection if not already
18. St. Bernard's Cemetery to intersection with drainage ditch at Meriam's Corner *Carol Dwyer & Jean Rosner*	a) Yard waste and metal trash dumped along Old Bedford	a) Water clean and does not smell b) Deer sign	a) Yard waste and metal trash dumped along Old Bedford

IV. Action Plan

Mill Brook Task Force
RECOMMENDATIONS FOR ACTION
Date June 8, 2000
Based on Shoreline Survey, May 2000

Mission Statement:

To restore and protect Concord's Mill Brook and its watershed by developing, championing, and participating in the implementation of a Master Plan.

I. Reporting: Immediate Action.

Share information about problems with town/city officials and support actions to solve these problems.
Report to:

A. **Natural Resources Commission: (NRC)**

1. Write letter to NRC from the Mill Brook Task Force stressing the importance of mitigation for storm water for brook. Mention the Mill Brook Task Force's support for both the mitigation planned in the s. 319 Grant and additional mitigation for runoff from other parking lots in town.
2. Report the wire fence that crosses the brook. (Section 3).
3. Report oil upstream of Heywood's Brook (Section 4).
4. Request that the NRC check structure (within 6 feet of the brook) behind the greenhouse on Cambridge Turnpike (Section 5).
5. Report concerns about the fill and growth in the ditches to the subcommittee of the NRC that deals with ditches (Section 8).
6. Report the increasing debris (cars, trash) and an old trash heap. Flooding waters run over debris and bring runoff into brook. (Section 10).
7. Report cleared area (Section 10).
8. Report erosion and Fairyland Pond Trail. The trail could be dug so that it slopes into the hillside. This could be work for a volunteer group. Some members of the Task Force could participate in the trail work (Section 13).

B. **Department of Public Works**

1. Report that the Heywood Bridge and its railing are unsafe (Sections 3 and 4).
2. Report washout of gravel by the bridge (Section 3 and 4). (Reported to DPW by Shoreline Survey Team.)
3. Report concern about the blockage of flow by the Cambridge Turnpike Bridge (Section 9).

C. **Concord Police**

1. Report grass dumping (Section 4)
2. Describe Mill Brook Clean Up plan and request their participation in clean up efforts behind fire and police station (Section 4)

II. Short Term Actions: Suggestions:

A. Field work (Contact person and subcommittee: Katie Holden, Natural Resources)

1. In consultation with the NRC, check vegetation to determine whether it (1) benefits habitat, (2) is a nuisance and/or (3) blocks the flow:
    - vegetation (Section 1).
    - vegetation piles (Section 2).
    - branches (Section 3).
2. Investigate discolored flow. If possible take a sample and have it tested. (Section 10).

B. Clean up (Contact person and subcommittee: Katie Holden, Natural Resources)

B1. Sites that require clean ups:

1. General debris (Section 1).
2. Lumber yard trash (Section 2).
3. Many small clean ups, granite slabs (Section 3).
4. Area behind police station (Section 4).
5. Trash (Section 8).
6. Floatables (Section 10).
7. Trash (Section 11).
8. Trash (Section 12).
9. Informal dump with batteries, glass, etc. (Section 12).
10. Trash (Section 16).
11. Trash (Section 18).

B2. Suggestions to prevent trash from reaching Mill Brook

1. Create a poster of both ugly and pretty pictures saying dump and don't dump
2. Work on education efforts (including article in paper).
3. Write a Mill Brook Task Force letter to abutters.
4. Provide additional trash and recycle containers (Grant from Anne Dorfman)
5. Use Riverways Program "trash cards" to identify what is being dumped in the brook and on its banks as part of an education effort to prevent dumping. Assessment could be done in conjunction with schools or scout troops and published in the Concord Journal and elsewhere.
6. As part of education efforts, promote an event with trash sculptures.

C. Education and citizen awareness

1. Establish a "Mill Brook" monthly article (with pictures when possible) in the Concord Journal and to describe Mill Brook issues.

D. Wildlife Assessment

As both short term and long term work

1. Pull together information from the Shoreline Survey about wildlife and habitat
2. Continue to take walks to observe and document evidence of wildlife in different times of year.

E. Investigate possibilities for access, sitting areas and parks along Mill Brook (work with partners such as the NRC)

1. Look at the area at Lowell Road (Section 2).
2. Consider a sitting area at Heyward and Walden (Section 3).

F. Route 2 Improvements and Wildlife Habitat

1. Investigate and support opportunities to protect habitat and wildlife crossovers when Route 2 is restructured.

III. Long Term Strategies: Suggestions

A. Establish an ongoing Stream Steward Program for Mill Brook

1. Establish an ongoing program to monitor the health of Mill Brook. Volunteer stewards will take sections of the brook and check on a regular basis (monthly, quarterly, biannually) to look for problems, and natural resources. The stewards will report problems to the Mill River Task Force and to make records and take photos of the brook.
2. Consider combining sections so that people can have a broader understanding of Mill Brook.
3. Determine how the records/photos will be used.

B. **Promote ongoing efforts education and citizen awareness**

C. **Strongly support efforts to protect habitat and wildlife crossovers when Route 2 is restructured.**

1. Raise awareness and build a constituency for establishing crossovers and protecting habitat.
2. Work with the NRC and other groups to promote wildlife protection,
3. Look for and support efforts to encourage the State Highway Department (or others) to find money or grants for this project.

D. **Investigate and solve the lily pond problem (Section 14).**

E. **Record oral history of Mill Brook.**

V. Data Collection Examples

Shoreline Survey Field Data Sheet (1)

Segment begins: Concord Lumber
Segment ends: Minuteman Hist Pk

Date: 5/23/2000 — 2-3 P.M.
Observers: Don Costello — Terry Baker
Today's weather: clear - sunny - 60 degrees
Weather over past 24 -48 hours: some intermittent

If you take photographs, mark the location on the map, and write it on the backs of the photos, along with date. Be spec (reference nearby road or house), so that people can compare later photos

INSTREAM CONDITIONS

Stream bottom

1. What is stream bottom made of? (*mark from 1=most typical to 6=least typical)*

1 Organic debris (leaves, twigs)	3 Gravel (1/4 - 2")
2 Silt (mud)	2 Cobbles (2 -10')
5 Sand (1/16 to 1/4")	1 Boulders (> 10")

2. What color is the stream bottom? *(circle one)*
   Black (Brown) Orange/Red Yellow (Sandy) Gray Other

Water

3. What color is the water? *(circle)* Cloudy (Tea) Milky Muddy Other Looks good
4. What is the water odor? (circle) (None) Rotten eggs Musky Fishy Oily Ammonia Other
5. Problem areas. *(checkmark, describe location and cause, if apparent. *Locate on map.)*
   ___ Oily sheen or smell _____
   ___ Sewage: smell, milky color, toilet paper _____
   ___ Foam or scum *(describe. Does a stick break it up?)* _____
   ___ Fishy odor or fish kill _____
   ___ Floating garbage Some of entire shore, some (Remove)
6. How deep is the water? *(circle)* Less than 1' (More than 1') More than 2' More than 3'
7. How does the water level compare to normal for this time of year? (*circle*)
   Normal Higher Lower (Don't know) If very high or low, can you tell why?
8. Is the water flowing *(circle)* Quickly (Slightly) Almost still
9. Number of pools 2 Number of riffles Don't know
10. Is stream flow blocked *by...(circle and *locate on map.)* Trees Not yet Trash Large objects
    one dead tree over stream might to be removed.

Vegetation

11. Are there areas of extremely dense or clogging aquatic vegetation in any section? *(circle)* Yes (No)
    **If yes, locate on map and describe cause, if obvious.* _____
    Species, if known *(circle)* Duckweed Water chestnut Other _____
12. Are there areas covered with algae? *(Circle)* Streambed Around pipes NO
    *If algae seems abnormally heavy, *locate on map. Draw in extent of algae on map.*
13. Are there wetlands? (*Circle. *locate on map.*) (Yes) No If yes, are they degraded by... (*circle*)
    Phragmites Purple Loosestrife Fill Blockages Ditches
    Sediment Disturbed banks Pipes Trash (Other) bushes / some Trees

STREAM CORRIDOR CONDITIONS

Riparian Area and Land Use

14. Do trees and shrubs overhang the stream and provide shade? (circle) (Yes) No
If yes, estimate what percentage of the bank is shaded 40 %

15. What are the stream bank conditions? *(circle. Put a star* next to the most common.)*
Left Bank: (Looking downstream) (If doing only one bank, indicate which one) RIGHT BANK

Eroding	(Trees/Shrubs)	(Grass/Flowers)*	Loosestrife/Phragmites
Beaches	Riprap/channelized	(Shrubs/brambles)	Wetlands/marsh
Right Bank: Eroding	Trees/Shrubs	(Grass/Flowers)	Loosestrife/Phragmites
Beaches	Riprap/channelized	Shrubs/brambles	(Wetlands/marsh)

16. Is there a vegetated riparian area beyond the stream bank? If yes, indicate condition.
(circle. Put a star next to the most common.)*
Left Bank: (Shrubs/grasses)* mowed pasture/meadow Forested/trees Park with few trees Lawn
Right Bank: (Shrubs/grasses)* mowed pasture/meadow Forested/trees Park with few trees Lawn
If area is not vegetated, please describe condition: (i.e. parking lot, pavement, roadway, buildings)
Left Bank: Lumber Company over culvert
Right Bank: Sand → Pedestrian bridge on Bank (both sides)

17. If the riparian area is forested or in shrubs and grasses, estimate width of the vegetated area (to a lawn, road, or other change in land use) left bank 30 yards right bank 50 yards

18. Are there places that have fill or clear-cutting? *(circle)* Yes (No)
If yes, mark locations on map as fill F1, F2, F3. Etc (or clear-cutting CC1 CC2, CC3, etc).

19. What are the land uses visible from the river? *(checkmark and circle the dominant land use type.)*

___ Industrial	✓ Parking lots	___ Golf courses
✓ Commercial	✓ Roads	✓ Protected/conservation land
___ Agricultural	___ Landfills	___ Undeveloped/unprotected land
✓ Residential	___ Railroads	___ Wastewater treatment plants
___ Park/ ballfields	___ Junkyards	___ Other *(describe)*

20. Do you see runoff from any of the following? *(circle. *If run-off is significant locate on map.)*
Manure Pet / goose droppings (Parking lots)* Sewage (Roads)*
Bridges Construction Plowed fields Lawns Other_____

Pipes: Please fill out separate pipe survey and mark locations on map as P1, P2, P3, etc.

Trash: Describe any potential cleanup areas. *Locate on map. yes culvert area (both sides)

Potential Open Space: *Describe and locate on map:* _____

Recreation

21. Is there designated public access to the stream? Is it appropriate for... *(circle and *locate on map.)* NO
Canoeing Fishing Swimming Walking Bicycling Other_____

22. Are there areas which are informal or potential access points? No (Yes)* *Describe and *locate on map.*

WILDLIFE / HABITAT

Aquatic Habitat/Species

23. Do you see fish or evidence of fish? (describe) No

Estimate number _____. *If possible, describe species & size.* _____

Evidence of fish? (i.e. nests) _____

24. Other forms of aquatic life? *(circle, identify species if known)*

Aquatic insects Turtles Frogs Salamander Snail Mussels Clams

Other None Observed

Evidence of aquatic species? (i.e. eggs, tracks) Some Tracks Noted

25. Wildlife and fish habitat elements present in water *(check)*

__Pools and riffles in stream

✓Gravel stream bottom

✓Rocks and boulders in stream

__Emergent aquatic vegetation

✓Vegetation hanging over the banks and water

✓Fallen trees in water

Riparian Habitat/Species (look along stream bank and vegetated riparian areas)

26. Animals or evidence of animals? *(circle)*

(Holes) Teeth marks Food storage/eating Dens Scat Footprints/tracks

Specific animals seen (or evidence of) _____

27. Wildlife habitat elements located near the stream *(check)*

✓Standing dead trees

✓Fallen tree limbs and trunks

__Scattered rocks and boulders

__Stone walls (without cement)

__Vines

__Springs and seeps

✓Vernal pools

28. Birds? (circle) Herons Mallard ducks Wood ducks Canada geese Other _____

Evidence of birds: (i.e. nests, footprints) Not observed on This Day

29. Do you know if there are rare & endangered species of plants or animals in your segment? *If so, identify.*

Did not observe

30. Links from riparian area to other areas of wildlife habitat: *(check)*

✓Wetlands adjacent to stream

__Abandoned cropland or pasture near stream

__The riparian area is vegetated with trees and/or shrubs at least 100 feet wide

✓The riparian area connects to adjacent open space or greenway

Adopt a Stream

Shoreline Survey Summary Sheet

Segment begins: _____
Segment ends: _____

Date: 5/23/2004 2-3:00 PM
Observers: TERRY BAKER, DOU COSTELLO
Today's weather: EXHIBIT - CLEAR WARM TO HOT
Weather over past 24 -48 hours: SOME SPORADIC RAIN

These sheets are designed to give the "big picture" of your segment. They provide the basis of the narrative description of segments in the Shoreline Survey report.

NARRATIVE DESCRIPTION

SAMPLE 1: The river flows slowly through this segment. The banks on the south side are eroded for a distance of about 100 yards (a football field), with parkland behind it. On the other side of the river, the banks have cement walls, industrial buildings and parking lots. There was a marsh at the lower end. A small stream came into the river, and the water quality seemed worse after it entered. Bits of oil floated on the water, and the stream smelled like asphalt. There were a few gulls in the industrial section, and there were turtles, a muskrat hole and a great blue heron in the wetland/marsh.
SAMPLE 2: Segment 2 flows quickly through conservation land, with several small riffles. We saw several anglers along the banks. There were many downed trees in the stream, which provide good habitat for fish. Vegetation along the stream is thick, second-growth forest with an old dirt road providing good access for walking or mountain biking. There are several old appliances in the river near the Rt. 20 bridge.

Describe your segment in a paragraph:

I MET WITH TERRY BAKER, MY PARTNER, AND QUICKLY LEARNED THAT IT IS A TREMENDOUS PLUS TO HAVE AN EXPERIENCED SHORELINE SURVEY VETERAN AS A PARTNER. TERRY WAS TERRIFIC IN ASSISTING OBSERVATIONS WITH SOUND EXPLANATION.

GENERALLY THE STREAM OBSERVED FROM THE CULVERT AND BEYOND THE FLOWING (AT 30± YARDS) FLOWED SLOWLY AND LOOKED GOOD-CLEAR. THE WATER WAS CLEAR, ODORLESS, WITH A SANDY-SOME GRAVEL - AND ROCK BOTTOM. THE BANKS HAD SOME MUCK IN SPOTS AND PERIODIC BOARDS AND TRASH.

THE PHOTOS ATTACHED PRESENT A HEALTHY LOOK IN THE AREA SURVEYED: → [1, 2, 3, 4, 5]

RECOMMENDATIONS: (30yd±)

I - ADDRESS IMMEDIATELY THE CULVERT (1) AT THE CONCORD LUMBER CO., ESPECIALLY THE PIPE LINE AND ENTRY SIDE OF CULVERT. A CLEAN-UP ASSIGNMENT SHOULD BE SCHEDULED - NOW

II - IN TWO AREAS WHERE DEAD TREE LIMBS/TRUNKS CROSS THE STREAM - REMOVE

Ashuelot River 5

Shoreline Survey Field Data Sheet

Segment begins: Fire & Police Stn
Segment ends: Greenhouse

Date: 15, 16, 21 IN MAY '00
Observers: John & Frances Nevzlle
Today's weather: Partly cloudy, some showers
Weather over past 24 -48 hours: same

If you take photographs, mark the location on the map, and write it on the backs of the photos, along with date. Be specific (reference nearby road or house), so that people can compare later photos

INSTREAM CONDITIONS

Stream bottom

1. What is stream bottom made of? (*mark from 1=most typical to 6=least typical)*

5 Organic debris (leaves, twigs)	3 Gravel (1/4 - 2")
1 Silt (mud)	5 Cobbles (2 -10')
2 Sand (1/16 to 1/4")	6 Boulders (> 10")

2. What color is the stream bottom? *(circle one)*
   Black (Brown) Orange/Red Yellow Sandy Gray Other

Water

3. What color is the water? *(circle)* Cloudy (Tea) Milky Muddy Other _____
4. What is the water odor? (circle) (None) Rotten eggs Musky Fishy Oily Ammonia Other
5. Problem areas. *(checkmark, describe location and cause, if apparent. *Locate on map.)*
   - 0 Oily sheen or smell _____
   - 0 Sewage: smell, milky color, toilet paper _____
   - 0 Foam or scum *(describe. Does a stick break it up?)* _____
   - 0 Fishy odor or fish kill _____
   - 0 Floating garbage _____
6. How deep is the water? *(circle)* Less than 1' (More than 1') More than 2' More than 3'
7. How does the water level compare to normal for this time of year? (*circle*)
   Normal Higher Lower (Don't know) If very high or low, can you tell why?
8. Is the water flowing *(circle)* Quickly (Moderately) Slightly Almost still
9. Number of pools Number of riffles (Don't know) As could not follow same continuously
10. Is stream flow blocked *by...(circle and *locate on map.)* Trees Trash Large objects

Vegetation

11. Are there areas of extremely dense or clogging aquatic vegetation in any section? *(circle)* Yes (No)
    **If yes, locate on map and describe cause, if obvious.* _____
    Species, if known *(circle)* Duckweed Water chestnut Other _____
12. Are there areas covered with algae? *(Circle)* Streambed Around pipes
    *If algae seems abnormally heavy, *locate on map. Draw in extent of algae on map.*
13. Are there wetlands? (*Circle. *locate on map.*) Yes No If yes, are they degraded by... (*circle*)
    Phragmites Purple Loosestrife Fill Blockages (Ditches) DRAINAGE
    Sediment Disturbed banks Pipes Trash Other _____

STREAM CORRIDOR CONDITIONS

Riparian Area and Land Use

14. Do trees and shrubs overhang the stream and provide shade? (circle) Yes No
If yes, estimate what percentage of the bank is shaded

15. What are the stream bank conditions? *(circle. Put a star* next to the most common.)*

Left Bank: (Looking downstream) (If doing only one bank, indicate which one)

Eroding	Trees/Shrubs	Grass/Flowers	Loosestrife/Phragmites
Beaches	Riprap/channelized	Shrubs/brambles	Wetlands/marsh

Right Bank:

Eroding	Trees/Shrubs	Grass/Flowers	Loosestrife/Phragmites
Beaches	Riprap/channelized	Shrubs/brambles	Wetlands/marsh

16. Is there a vegetated riparian area beyond the stream bank? If yes, indicate condition.
*(circle. Put a star*next to the most common.)*

Left Bank: Shrubs/grasses mowed pasture/meadow Forested/trees Park with few trees Lawn

Right Bank: Shrubs/grasses mowed pasture/meadow Forested/trees Park with few trees Lawn

If area is not vegetated, please describe condition: (i.e. parking lot, pavement, roadway, buildings)

Left Bank: _____

Right Bank: _____

17. If the riparian area is forested or in shrubs and grasses, estimate width of the vegetated area (to a lawn, road, or other change in land use) left bank _____ right bank _____

18. Are there places that have fill or clear-cutting? *(circle)* Yes No
If yes, mark locations on map as fill F1, F2, F3. Etc (or clear-cutting CC1 CC2, CC3, etc).

19. What are the land uses visible from the river? (*checkmark and circle the dominant land use type.*)

___ Industrial	___ Parking lots	___ Golf courses
___ Commercial	___ Roads	___ Protected/conservation land
___ Agricultural	___ Landfills	___ Undeveloped/unprotected land
___ Residential	___ Railroads	___ Wastewater treatment plants
___ Park/ ballfields	___ Junkyards	___ Other *(describe)*

20. Do you see runoff from any of the following? *(circle. *If run-off is significant locate on map.)*

Manure	Pet / goose droppings	Parking lots	Sewage	Roads
Bridges	Construction	Plowed fields	Lawns	Other_____

Pipes: Please fill out separate pipe survey and mark locations on map as P1, P2, P3, etc.

Trash: Describe any potential cleanup areas. **Locate on map.*

Potential Open Space: *Describe and locate on map:* _____

Recreation

21. Is there designated public access to the stream? Is it appropriate for... *(circle and *locate on map.)*
Canoeing Fishing Swimming Walking Bicycling Other_____

22. Are there areas which are informal or potential access points? No Yes- *Describe and *locate on map.*

WILDLIFE / HABITAT

Aquatic Habitat/Species

23. Do you see fish or evidence of fish? (describe) ONLY BOBBERS
Estimate number _____. *If possible, describe species & size.* _____
Evidence of fish? (i.e. nests) _____

24. Other forms of aquatic life? *(circle, identify species if known)*
Aquatic insects Turtles Frogs Salamander Snail Mussels Clams
Other _____
Evidence of aquatic species? (i.e. eggs, tracks) _____

25. Wildlife and fish habitat elements present in water *(check)*

- ✓ Pools and riffles in stream
- __ Gravel stream bottom
- ✓ Rocks and boulders in stream
- ✓ Emergent aquatic vegetation
- ✓ Vegetation hanging over the banks and water
- ✓ Fallen trees in water

Riparian Habitat/Species (look along stream bank and vegetated riparian areas)

26. Animals or evidence of animals? *(circle)*
Holes Teeth marks Food storage/eating Dens Scat Footprints/tracks
Specific animals seen (or evidence of) BEAVER

27. Wildlife habitat elements located near the stream *(check)*

- ✓ Standing dead trees
- ✓ Fallen tree limbs and trunks
- __ Scattered rocks and boulders
- __ Stone walls (without cement)
- ✓ Vines
- __ Springs and seeps
- ✓ Vernal pools

28. Birds? (circle) Herons Mallard ducks Wood ducks Canada geese Other _____
Evidence of birds: (i.e. nests, footprints) FOOTPRINTS

29. Do you know if there are rare & endangered species of plants or animals in your segment? *If so, identify.*
JACK IN PULPITS EAGLE HEADS

30. Links from riparian area to other areas of wildlife habitat: *(check)*

- ✓ Wetlands adjacent to stream
- ✓ Abandoned cropland or pasture near stream
- ✓ The riparian area is vegetated with trees and/or shrubs at least 100 feet wide
- ✓ The riparian area connects to adjacent open space or greenway

Section 5: Milldam Survey

Section 5 extends from behind the Fire and Police Station to a bit beyond the greenhouse and behind the corner of the courthouse. (about a 1/2 inch to the right of the words "Fire Sta" shown on the map.)

In this section approaching the banks of the brook is often quite difficult due to marshy ground, pools, brambles and trees (Photos #1-4). We eventually adopted a strategy of going around these obstacles until we got to a break that allowed access to the brook. This was true for both sides of the brook and we would recommend that the next survey of this section be done "in stream", by kayak or other low-draft craft.

This section had a "wilder" appearance than Section 4, perhaps due to the lack of residences. There are none along this section on the left of the brook and those on the right (about 4) have deep lots running to the brook. One exception is the greenhouse and associated storage building behind it which is covered with a blue tarpaulin (Photo #5). The storage building behind the greenhouse seems to come within a few feet of the Brook bank. We only observed the greenhouse and storage building from the left side of the brook. A closer survey of this area should be done as we saw some short logs (about 5 inches by 2 feet) down the brook bank and a pane of glass (12-inch by 20-inch approximate) almost at the water's edge.

In general the brook has a "healthy" appearance with clear water and a moderately quick flow. We did not see any fish, except for bubbles, but did see some evidence of beavers (Photos #6, 7).

There were also some suggestions that this section might have had prior settlers (photos #8 and #9).

Adopt a Stream 9

Shoreline Survey Field Data Sheet

Segment begins: Hawthorne Lane
Segment ends: Cambridge Turnpike

Date: 5/17/00
Observers: Hasso Ewing + Lynn Hudgens
Today's weather: dry; 70°; sunny; calm
Weather over past 24 -48 hours: same

If you take photographs, mark the location on the map, and write it on the backs of the photos, along with date. Be specific (reference nearby road or house), so that people can compare later photos

INSTREAM CONDITIONS

Stream bottom

1. What is stream bottom made of? (*mark from 1=most typical to 6=least typical)*

___ Organic debris (leaves, twigs)	___ Gravel (1/4 - 2")
1 Silt (mud)	___ Cobbles (2 -10')
5 Sand (1/16 to 1/4")	___ Boulders (> 10")

2. What color is the stream bottom? *(circle one)*
   Black Brown Orange/Red Yellow Sandy Gray Other

Water

3. What color is the water? *(circle)* Cloudy Tea Milky Muddy Other _____
4. What is the water odor? (circle) None Rotten eggs Musky Fishy Oily Ammonia Other
5. Problem areas. *(checkmark, describe location and cause, if apparent. *Locate on map.)*
   ___ Oily sheen or smell _____
   ___ Sewage: smell, milky color, toilet paper _____
   ___ Foam or scum *(describe. Does a stick break it up?)* _____
   ___ Fishy odor or fish kill _____
   ___ Floating garbage _____
6. How deep is the water? *(circle)* Less than 1' More than 1' More than 2' More than 3'
   variable depth along course from 1 foot to as deep as 2 feet
7. How does the water level compare to normal for this time of year? (*circle*)
   Normal Higher Lower Don't know If very high or low, can you tell why?
8. Is the water flowing *(circle)* Quickly Slightly Almost still
9. Number of pools none Number of riffles none Don't know
10. Is stream flow blocked *by...(circle and *locate on map.)* Trees Trash Large objects

Vegetation

11. Are there areas of extremely dense or clogging aquatic vegetation in any section? *(circle)* Yes (No)
    **If yes, locate on map and describe cause, if obvious.* _____
    Species, if known *(circle)* Duckweed Water chestnut Other _____
12. Are there areas covered with algae? *(Circle)* Streambed Around pipes
    *If algae seems abnormally heavy, *locate on map. Draw in extent of algae on map.*
13. Are there wetlands? (*Circle. *locate on map.*) (Yes) No If yes, are they degraded by... (*circle*)
    Phragmites (Purple Loosestrife) Fill Blockages (Ditches)
    Sediment Disturbed banks (Pipes) (Trash) Other _____

WILDLIFE / HABITAT

Aquatic Habitat/Species

23. Do you see fish or evidence of fish? (describe) NO

Estimate number _____. *If possible, describe species & size.* _____

Evidence of fish? (i.e. nests) _____

24. Other forms of aquatic life? *(circle, identify species if known)*

Aquatic insects Turtles Frogs Salamander (Snail) Mussels Clams

Other _____

Evidence of aquatic species? (i.e. eggs, tracks) _____

25. Wildlife and fish habitat elements present in water *(check)*

__Pools and riffles in stream

__Gravel stream bottom

__Rocks and boulders in stream

__Emergent aquatic vegetation

✓Vegetation hanging over the banks and water

__Fallen trees in water

Riparian Habitat/Species (look along stream bank and vegetated riparian areas)

26. Animals or evidence of animals? *(circle)*

Holes Teeth marks Food storage/eating Dens (Scat) (Footprints/tracks)

Specific animals seen (or evidence of) [illegible]

27. Wildlife habitat elements located near the stream *(check)*

__Standing dead trees

__Fallen tree limbs and trunks

__Scattered rocks and boulders

__Stone walls (without cement)

__Vines

__Springs and seeps

__Vernal pools

28. Birds? (circle) Herons Mallard ducks Wood ducks Canada geese Other _____

Evidence of birds: (i.e. nests, footprints) _____

29. Do you know if there are rare & endangered species of plants or animals in your segment? *If so, identify.*

DO NOT KNOW

30. Links from riparian area to other areas of wildlife habitat: *(check)*

✓Wetlands adjacent to stream

__Abandoned cropland or pasture near stream

__The riparian area is vegetated with trees and/or shrubs at least 100 feet wide

✓The riparian area connects to adjacent open space or greenway

Shoreline Survey Summary Sheet/Segment 9
Segment Begins: Hawthorne Lane
Segment Ends: Cambridge Turnpike

NARRATIVE DESCRIPTION

This segment of the stream contains two areas of differing characteristics. The first approximately 150 feet of the stream is sandy bottom, the sides of the stream buffered with evergreen trees and shrubs and one brief section of residential lawn. The water is about 1 foot deep, is tea colored with no odor and slight flow. Three pipes were observed in this area and described.

Approximately 75 feet downstream from the bridge at Hawthorne Lane, the area opens up to a large floodplain. The left and right banks are bordered by grasses, cat-tail, some willow, some red maple, some yellow flag, and loostrife pockets. The loostrife is observable along the outside of the open area but does not appear closer than 75 feet on either side of the stream. The stream bottom changes from sand to muck with deep organic material on the edges. The water is about 2 feet deep, black colored with an anaerobic odor and slight flow. There is no overhead protection. There is evidence of abundant bird life. Because this stream observation was completed in the evening, few direct observations were made. However, one of the survey team observers lives on this stream segment and has observed spring peepers, bull frogs, pheasant, red-winged blackbird, heron, hawk, "Baltimore" oriole, canada geese, mallard ducks, coyote, muskrat, deer, fox, woodpecker, Great Horned owl. Approximately 30 feet downstream from where the area opens up, there is a large willow tree on the left side of the bank underneath which are signs of an old agricultural dump containing scrap metal, glass, rusted fence and equipment. It would be good to clean this up.

Approximately half way through this second segment there is evidence of ditching on the right side of the stream. The water is not flowing so it is unlikely to be a feeder stream. Nearby on the left bank is a second, smaller, ditch flowing slowly into the Mill Brook. This is covered with a reddish-brown film with clear water underneath. The source may be a storm drain on Hawthorne Lane within the driveway loop of #121.

Approximately three-quarters of the way across this segment, the water deepens to over 2 feet with more than 3 feet of organic material on the stream bottom. We took some photographs here of the area. Shortly after this point, the brook loses definition as the area becomes quite wet. We were unable to continue further.

A visual observation of the end of this segment was made from Cambridge Turnpike. The brook backs up at this point because the road blocks its flow. The area is quite full of trash and the water is black and dirty. The surface has a lot of algae or duck weed and there is no evidence that the water is flowing.

VI. Action Plan Implementation and Accomplishments

Mill Brook Task Force
Action Plan Implementation and Accomplishments
December 2002

In May 2000 a Shoreline Survey Report & Action Plan was drafted based on the Shoreline Survey completed in 1999. Over the past two years, the Mill Brook Task Force has been busy implementing many of the Proposed Recommendations for Action from this Report. The following is a summary of the Task Force's accomplishments and plans for the future. The outline used below is the same as used for the Recommendations for Action. The Task Force has also developed a revised Action Plan which is attached.

A. Reporting

The tasks outlined in this section involved reporting specific issues to the Natural Resources Commission (NRC), Department of Public Works (DPW), and the Concord Police, and then combining and coordinating efforts to solve them.

The Force has continually reported issues involving stormwater discharges to Mill Brook. To improve water quality discharges from stormwater to Mill Brook, the Task Force applied and obtained a DEP Section 319 Grant. The Force in cooperation with the NRC and DPW used this grant to install a Vortechnics storm water quality treatment unit in a parking lot that will treat stormwater collected within the Monument Square area, which handles a significant amount of traffic. The DPW is scheduled to officially connect this unit to the drainage system in Spring 2003.

Another Force initiative to improve stormwater quality to the brook consisted of implementing a Catch Basin Tagging Program. The Force placed tags which state "NO DUMPING – DRAINS TO MILL BROOK" to 60 catch basins that drain to Mill Brook. In order to promote public awareness, the tags were placed near catch basins around Concord Center. The Force plans on tagging 200 more basins in Spring based on the survival of the existing tags over winter. A brochure was created which explains the program. The catch basin tagging project and brochure will also assist the Town in obtaining a NPDES stormwater permit from DEP.

In response to the Forces report of the erosion at Fairyland Pond Trail to the NRC, the trail was dug to slope into the hillside to prevent erosion towards the brook.

The Force reported the washout of gravel by the Heywood Bridge and concerns about bridge safety to the DPW. The runoff/erosion problems at the Heywood St. Bridge/Mill brook area are to be addressed in the Spring of 2003 when the DPW will be replacing the culvert and bridge.

The Force organized a clean up and removed a significant amount of trash behind the Police Station. The Force reported this issue to the Police in an effort to ensure trash is kept out of the brook area.

B. Short Term Actions:

Clean Up

The multiple areas requiring clean ups were completed during bi-annual Clean Up days. Monitoring problem areas throughout the year has shown that they have mostly remained clean. Members have also worked on cleaning various sections of the brook throughout the year. The Force plans on continuing clean ups.

Education and citizen awareness

Over the past two years, the Force has increased public awareness and education of the Mill Brook by writing newspaper articles, reprinting the Mill Brook Guide, creating brochures, and participating in RiverFest.

In 2001, the Force had a second printing of the guide, *Concord's Mill Brook, Flowing Through Time*. The guide describes the cultural, historical, and ecological significance of the Mill Brook. The Force also continues to maintain their web site.

A general brochure about the Task Force and the Mill Brook was developed and mailed to abutters of Mill Brook. The brochure describes ways to help protect the brook and the activities and accomplishments of the Mill Brook Task Force. The brochure will help to increase member participation in the Task Force and increase citizen awareness.

A second brochure describing the catch basin tagging project was developed and mailed to abutters of Mill Brook. Abutters were also notified by mail about when the tagging program was to begin. The Force also published a newspaper article about the tagging project.

An Adopt-a-Catch Basin program was also developed by the Force to monitor catch basins. The program consists of residents selecting a basin to monitor throughout the year and report issues to CPW. The tagging project brochure included a form for residents to sign up to participate in the Adopt-a-Catch Basin program.

The Force also promoted education and awareness by participating in RiverFest. The Force staffed a table located on Chamberlin Bridge near Town center and provided public with information about Mill Brook. The Force plans on continuing and expanding involvement in RiverFest.

Investigate possibilities for access, trails, sitting areas and parks along Mill Brook

A trail and sitting area were created in Heywood Meadow along Mill brook. The Force is currently working on plans to create a new trail to connect the Heywood trail to Town forest trails. The Force is currently researching the feasibility of constructing the bridge that Ralph Waldo Emerson used to cross over Mill Brook. Constructing this bridge would create a significant link in the effort to connect existing trails and provide a corridor along Mill Brook. Enjoyment of this corridor by the public would increase awareness and appreciation for the Mill Brook.

The Force has also begun to research installing a bridge behind Main St. Café and creating a path along Mill Brook to Chamberlain Park. The bridge, located near the new Town Information Center, would promote appreciation of Mill Brook and provide maximization use of downtown parks.

C. Long Term Actions

The Force plans to support the NRC with promoting wildlife protection and establishing a crossover when the Route 2 restructuring project begins.

Mill Brook Task Force
RECOMMENDATIONS FOR ACTION
Date December 2002

Mission Statement:

To restore and protect Concord's Mill Brook and its watershed by developing, championing, and participating in the implementation of a Master Plan.

I. Reporting: Immediate Action.

Share information about problems with town/city officials and support actions to solve these problems.
Report to:

A. **Natural Resources Commission: (NRC)**

1. Request that the NRC check structure (within 6 feet of the brook) behind the greenhouse on Cambridge Turnpike (Section 5).
2. Report concerns about the fill and growth in the ditches to the subcommittee of the NRC that deals with ditches (Section 8).
3. Report the increasing debris (cars, trash) and an old trash heap. Flooding waters run over debris and bring runoff into brook. (Section 10).
4. Report cleared area (Section 10).

II. Short Term Actions: Suggestions:

A. Field work (Contact person and subcommittee: Katie Holden, Natural Resources)

1. In consultation with the NRC, check vegetation to determine whether it (1) benefits habitat, (2) is a nuisance and/or (3) blocks the flow:
   - vegetation (Section 1).
   - vegetation piles (Section 2).
   - branches (Section 3).
2. Investigate discolored flow. If possible take a sample and have it tested. (Section 10).

B. Clean up (Contact person and subcommittee: Katie Holden, Natural Resources)

B1. Sites that require clean ups:

1. Informal dump with batteries, glass, etc. (Section 12).

B2. Suggestions to prevent trash from reaching Mill Brook

1. Create a poster of both ugly and pretty pictures saying dump and don't dump
2. Work on education efforts (including article in paper).
3. Provide additional trash and recycle containers (Grant from Anne Dorfman)

4. Use Riverways Program "trash cards" to identify what is being dumped in the brook and on its banks as part of an education effort to prevent dumping. Assessment could be done in conjunction with schools or scout troops and published in the Concord Journal and elsewhere.
5. As part of education efforts, promote an event with trash sculptures.

C. Education and citizen awareness

1. Establish a "Mill Brook" monthly article (with pictures when possible) in the Concord Journal and to describe Mill Brook issues.

D. Wildlife Assessment

As both short term and long term work

1. Pull together information from the Shoreline Survey about wildlife and habitat
2. Continue to take walks to observe and document evidence of wildlife in different times of year.

E. Investigate possibilities for access, sitting areas and parks along Mill Brook (work with partners such as the NRC)

1. Look at the area at Lowell Road (Section 2).
2. Investigate construction of foot bridge on Emerson property to town property over Mill Brook.

F. Route 2 Improvements and Wildlife Habitat

1. Investigate and support opportunities to protect habitat and wildlife crossovers when Route 2 is restructured.

III. Long Term Strategies: Suggestions

A. Establish an ongoing Stream Steward Program for Mill Brook

1. Establish an ongoing program to monitor the health of Mill Brook. Volunteer stewards will take sections of the brook and check on a regular basis (monthly, quarterly, biannually) to look for problems, and natural resources. The stewards will report problems to the Mill River Task Force and to make records and take photos of the brook.
2. Consider combining sections so that people can have a broader understanding of Mill Brook.
3. Determine how the records/photos will be used.

B. Promote ongoing efforts education and citizen awareness

C. Strongly support efforts to protect habitat and wildlife crossovers when Route 2 is restructured.

1. Raise awareness and build a constituency for establishing crossovers and protecting habitat.
2. Work with the NRC and other groups to promote wildlife protection,
3. Look for and support efforts to encourage the State Highway Department (or others) to find money or grants for this project.

D. Investigate and solve the lily pond problem (Section 14).

E. Record oral history of Mill Brook.