

REPORT

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2003 Annual Monitoring Report Upper 1/2-Mile Reach of the Housatonic River

**General Electric Company
Pittsfield, Massachusetts**

February 2004

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BLASLAND, BOUCK & LEE, INC.
engineers & scientists



08-0149

Corporate Environmental Programs
General Electric Company
100 Woodlawn Avenue, Pittsfield, MA 01201

February 11, 2004

Dean Tagliaferro
On-Scene Coordinator
U.S. Environmental Protection Agency
c/o Weston Environmental Engineering
One Lyman Street
Pittsfield, MA 01201

**Re: GE Pittsfield/Housatonic River Site
Upper ½-Mile Reach Removal Action (GECD800)
2003 Annual Monitoring Report**

Dear Mr. Tagliaferro:

The General Electric Company (GE) has completed the 2003 monitoring events in general accordance with the requirements of the *Removal Action Work Plan – Upper ½-Mile Reach of Housatonic River* (Work Plan; BBL, August 1999). This letter transmits the 2003 Annual Monitoring Report summarizing the post-construction monitoring activities performed during 2003.

Please call me if you have any questions.

Very truly yours,

Andrew J. Silfer /dmr

Andrew T. Silfer, P.E.
GE Project Coordinator

ATS/dmn
Enclosure

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Public Information Repositories
GE Internal Repositories

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1. Introduction

1.1 Purpose and Scope

This annual report summarizes the results of various post-restoration monitoring activities conducted by the General Electric Company (GE) during 2003 for the Upper ½-Mile Reach of the Housatonic River in Pittsfield, Massachusetts, under the Consent Decree (CD) for the GE-Pittsfield/Housatonic River Site. This report was prepared on GE's behalf by Blasland, Bouck & Lee, Inc. (BBL) and AMEC Earth & Environmental (AMEC). These monitoring activities were performed in accordance with the requirements of the *Removal Action Work Plan for Upper ½-Mile Reach of Housatonic River* (Work Plan) (BBL, 1999) (Appendix F to the CD).

During 2003, monitoring activities for restored sections of the Upper ½-Mile Reach were performed for the restored bank and river areas. Specific monitoring requirements associated with these areas are presented in the Work Plan.

Monitoring activities associated with the restored bank areas address the following components:

- Restored bank vegetation; and
- Restored bank erosion.

Monitoring activities associated with the restored river areas address the following components:

- Sediment cap isolation layer;
- Aquatic habitat enhancement structures;
- Armor stone layer;
- Water column; and
- Biota.

Descriptions of the monitoring activities performed for each of the above-listed components, response actions (if appropriate), and future activities are presented in this report.

1.2 Report Organization

After this introductory section, this report is organized into the following sections.

- Section 2 – Restored Bank Vegetation Monitoring. This section summarizes the restored bank vegetation monitoring and response actions conducted during 2003. As detailed in the Work Plan, these activities were implemented in the bank areas that were restored as part of the Upper ½-Mile Reach Removal Action – i.e., the areas where bank soils were excavated as part of that Removal Action and areas that were cleared to allow access for the removal activities.
- Section 3 – Restored Bank Erosion Monitoring. This section summarizes the monitoring and response actions conducted during 2003 to address erosion on the restored banks along the Upper ½-Mile Reach, excluding the approximately 170-foot-long section previously excavated and restored as part of the Building 68 Area Removal Action.

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- Section 4 – Sediment Cap Isolation Layer Monitoring. This section summarizes the sediment cap isolation layer monitoring conducted in 2003 and presents the results of these monitoring activities.
 - Section 5 – Aquatic Habitat Enhancement Structures and Armor Stone Layer Monitoring. Section 5 summarizes the monitoring conducted in 2003 for the aquatic habitat enhancement structures and armor stone layer.
 - Section 6 – Water Column Monitoring. This section summarizes the water column monitoring conducted in 2003 and presents the results of these monitoring activities.
 - Section 7 – Biota Monitoring. Section 7 summarizes the biota monitoring activities conducted in 2003 and presents the results of these activities.
 - Section 8 – Summary and Future Activities. This section summarizes the overall activities completed as part of the 2003 monitoring program and describes future monitoring activities related to restored bank vegetation, restored bank erosion, sediment cap isolation layer, aquatic habitat enhancement structures and armor stone layer, water column, biota, and restored sediments.

2. Restored Bank Vegetation Monitoring

2.1 General

Vegetative restoration activities were implemented in those areas where bank soils were excavated as part of the Upper ½-Mile Reach Removal Action and in areas cleared to allow access for the removal activities (see Figure 2-1). The restoration techniques outlined in the Work Plan were intended to restore the vegetative community, in those disturbed riparian areas, to a functional value that exceeds that of the riparian habitat present prior to the removal action. As part of the restoration process, GE, in conjunction with representatives of the Natural Resource Trustees (Trustees), monitors those areas that were restored to ensure the success and biological integrity of the intended vegetative community.

An annual summary monitoring report is required to document the results of that year's monitoring visits and the conditions of the restored areas within the Upper ½-Mile Reach. This report section fulfills the annual summary monitoring report requirement for the calendar year 2003.

2.2 Monitoring Program

2.2.1 General Monitoring Approach

The vegetative monitoring program consists of two visits each year for the first three years after planting, and an annual visit to be conducted during the fifth and seventh years after planting. In each of the first three years after planting, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visits in the fifth and seventh years after planting will be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than 1/4 acre), the timing for monitoring will be restarted following actions to replant the lost trees or shrubs (except in the case where a third party is responsible for growth failure).

Survival rates, based on stem counts of trees and shrubs and percent of herbaceous cover, are the key components of measuring the success of planted areas. The following performance standards are used to assess the adequacy of the restoration efforts over the Upper ½ Mile Reach:

1. All planted trees, shrubs, and vines must meet an 80% survival rate of the amount originally planted. To ensure this survival rate, supplemental plantings of appropriate species will be made if a monitoring event indicates a loss greater than 20%. Any dead trees or shrubs in excess of 20% of the original planting will be replaced before October 1 of the year in which monitoring occurs.
2. Herbaceous coverage of 100% will be maintained outside the foliar extent of the trees. Supplemental seeding or other activities will be utilized to maintain 100% herbaceous coverage.
3. No greater than 5% of the restoration area of either bank will be allowed to be covered by invasive plant species. Any invasive species in excess of the 5% coverage limit will be removed in accordance with the requirements of the *Invasive Species Control Plan* (BBL, 2001).

The survivability of the plants is determined both by mortality and by apparent vigor. Monitoring also assesses whether supplemental activities, such as additional fertilizing or watering, are necessary.

During each of the monitoring visits, the restoration areas are inspected for the presence of the following invasive plant species:

- Asiatic Bittersweet *Celastrus orbiculatus*
- Common Buckthorn *Rhamnus cathartica*
- Norway Maple *Acer platanoides*
- Staghorn Sumac *Rhus typhina*
- Morrows Honeysuckle *Lonicera morrowii*
- Amur Honeysuckle *Lonicera maackii*
- Tatarian Honeysuckle *Lonicera tatarica*
- Autumn-olive *Elaeagnus umbellata*
- Russian-olive *Elaeagnus angustifolia*
- Black Locust *Robinia pseudoacacia*
- Buckthorn *Rhamnus frangula*
- Japanese Honeysuckle *Lonicera japonica*
- Japanese Barberry *Berberis thunbergii*
- European Barberry *Berberis vulgaris*
- Porcelain Berry *Ampelopsis brevipedunculosa*
- Black Swallow-wort *Vincetoxicum nigrum*
- Garlic Mustard *Allaria petiolata*
- Goutweed *Aegopodium podagraria*
- Japanese Knotweed *Polygonum cuspidatum*
- Multiflora Rose *Rosa multiflora*
- Common Reed *Phragmites australis*
- Purple Loosestrife *Lythrum salicaria*
- Yellow Iris *Iris pseudacorus*
- Winged euonymus *Euonymus alata*
(or burning bush)

A certified arborist (selected in consultation with the Trustees) assists in the completion of the monitoring program. The arborist, Chris Frank of C.L. Frank & Company of Northampton, Massachusetts, utilizes best professional judgment to assess the apparent vigor of the planted specimens. The arborist observes the plantings and is present for each restored banks vegetation monitoring visit.

Each monitoring visit consists of a pedestrian survey of all areas on both banks where restoration activities have occurred. During the field visit, personnel conducting the inspection, supported by the certified arborist, perform a stem count of planted trees and shrubs to determine survival rates. Estimates of groundcover by herbaceous species are made to verify aerial coverage. Any indications of damage from trespassing or herbivory are noted. Signs of erosion are also noted and any actions to address invasive species are initiated. The monitoring visits are documented through field notes and photographs. Based on the results of each visit, recommendations for remedial actions such as replanting, watering, repair of areas impacted by erosion, and implementation of measures to reduce herbivory are made. Full details of the restored bank vegetation monitoring visits were provided in previously submitted trip reports, which are included in Attachment A, with photographic logs included in Attachment B.

2.2.2 Detailed Monitoring Approach

GE and the Trustees have agreed to an approach to the monitoring methodology that was utilized in 2001 and was further revised in 2002. The Standard Operating Procedure agreed upon for conducting the periodic monitoring is included as Attachment C.

2.3 Monitoring Activities

During 2003, monitoring visits were conducted in late spring; May 28th and 29th, and in late summer; September 10th, 11th, and 12th. This was the third year of monitoring for the areas originally planted in 2000, the second year of monitoring for those areas that were planted in 2001, and the first year of monitoring for those areas planted in 2002. All soil removal activities along the riverbank were completed in 2002 and all planting areas have been restored. Table 2-1 presents a summary of the planting areas, the planting dates, and the quantities of materials planted. The planting areas are shown on Figure 2-1.

Representatives of GE and the Trustees jointly conducted the monitoring visits. Information regarding the results of each monitoring visit was prepared and submitted in two trip reports dated July 25, 2003 and November 24, 2003 (included in Attachment A). Photographic logs of each of these visits are included in Attachment B.

A summary of the late spring and late summer 2003 monitoring visits is presented below. Table 2-2 through Table 2-6 tabulate the results of these monitoring inspections.

2.3.1 Spring 2003 Monitoring Event

The spring 2003 monitoring visit was conducted on May 28th and 29th, 2003. Charles Harman of AMEC conducted the monitoring visit for GE, Tom O'Brien was present for the Trustees, and Chris Frank of C. L. Frank & Associates accompanied the monitoring party as the certified arborist.

For canopy species, the only areas that did not meet the performance standard were planting areas 1, 2, and 4A. The protective screens that were placed around the canopy specimens in the fall of 2001 continued to provide good protection from herbivorous animals. Some maintenance was required to stabilize some of the screens. This action was to be undertaken by C.L. Frank & Associates prior to the September inspection.

For understory species, the only areas that did not meet the performance standard were planting areas 1, 3, 4A, 4B, and 5. The losses appear to be the result of activities by herbivorous mammals and a prolonged severe winter.

Red-osier dogwoods were thin in some spots and appeared to have been impacted by herbivorous activities. Since red-osier dogwoods grow prolifically, the September event was used to indicate whether the plants had recovered from both the effects of winter and the effects of herbivory. In the spring trip report, GE stated its intention to monitor red-osier growth in the late summer inspection. It was noted that thin performance in spring followed by observations of strong growth in summer has been the pattern of observation for the first two years of the monitoring program.

Regarding grapevines, these planting showed improved survival over the 2002 monitoring visits. Of particular notice was the proliferation of native grapes. In some areas (e.g., planting area 4B), extensive patches of native grapevine were developing and had potential to occupy extensive portions of the planting areas.

In most areas, herbaceous cover was slightly less than the required performance standard. No significant bare areas or patches (i.e., areas greater than 15-20 square feet) were observed in any of the planting areas.

The presence of invasive plant species was significantly reduced from 2002. Invasive control activities are ongoing and being performed along the banks of the entire Upper ½ Mile Reach.

In order to meet performance standards, GE indicated in the spring trip report its intention to review the results of the forthcoming late summer 2003 monitoring event prior to implementing any response actions.

2.3.2 Late Summer 2003 Monitoring Event

The late summer 2003 monitoring visit was conducted on September 11 and 12, 2003. Charles Harman of AMEC conducted the monitoring visit for GE, Bill Stack from Woodlot Alternatives was present for the Trustees and Chris Frank of C. L. Frank & Associates accompanied the monitoring party as the certified arborist.

This monitoring event examined all planting areas that were scheduled to be monitored in 2003 as part of the vegetation monitoring program. Older planting areas, such as planting area 1, showed a good establishment of the planting species. The box elders in particular increased in size (15 to 20 feet in height) with strong growth in other planting canopy and subcanopy specimens. Tree wire cages that were placed around the canopy specimens in the fall of 2001 continue to provide good protection from herbivorous animals. Ongoing maintenance by C.L. Frank & Associates has been required to stabilize some of the cages.

Regarding canopy species that were planted in the various planting areas, the only areas that did not meet the performance criteria were planting areas 2, 4A, and 5. For understory specimens, the planting areas that did not meet the performance standard were planting areas 1, 3, 4A, 4B, and 5; the composite group of 8, 9, 9A, 11, and 11; and area 12.

Red-osier dogwoods were thin in some spots and appeared to have been impacted by herbivorous actions. Only planting areas 1 and 12 did not meet the performance standard.

There are only two patches of planted grapevine that can be compared between 2002 and 2003 (i.e., planting areas 1 and 4B). Compared to the 2002 results, survivorship increased in planting area 1 and decreased in planting area 4B. In some areas, extensive patches of native grapevine were observed to be developing. Continued monitoring of the grape patches will occur to see if sufficient recruitment of wild grape vines continues to compensate for any lack of success with the planted grape vines.

In most areas, herbaceous cover was slightly less than the required performance standard. No significant bare areas or patches (i.e., areas greater than 15-20 square feet) were observed in the planting areas, with the exception of planting areas 2, 3, 4A, composite area 6, 6A, 7, 8A, and planting area 14. The areas that were bare appear to be that way as a result of poor soil.

The presence of invasive plant species was significantly reduced from 2002. Invasive control activities are ongoing and being performed along the banks of the entire Upper ½ Mile Reach.

2.4 Response Actions

GE implemented response activities in October 2003 to correct the negative variances that were identified in the planting areas for canopy, understory, and red-osier dogwood. With respect to canopy specimens, box elders were planted to raise the number of plants in planting areas with variances to a 90% survival rate. Box elders were utilized because they have been consistently shown to have the greatest survival of any of the planted canopy specimens. The following numbers of plants were installed:

- Planting area 2: 30 box elders
- Planting area 4a : 33 box elders
- Planting area 5: 10 box elders

For the understory specimens, silky dogwoods were planted to raise the number of plants in planting areas with variances to a 90% survival rate. Silky dogwoods were chosen because of their historic ability to flourish in the respective planting areas. The following numbers of plants were installed:

- Planting area 1: 36 silky dogwoods
- Planting area 3: 12 silky dogwoods
- Planting area 4a : 12 silky dogwoods
- Planting area 4b: 34 silky dogwoods
- Planting area 5: 21 silky dogwoods
- Planting area 11: 19 silky dogwoods
- Planting area 12: 12 silky dogwoods

Red-osier dogwoods were planted to raise the number of plants in planting areas with variances to a 90% survival rate. The following plants were installed:

- Planting area 1: 9 red-osier dogwoods
- Planting area 12: 13 red-osier dogwoods

In addition to these plantings, corrective actions were taken to address the bare soil spots that had been identified in various planting areas. A heavy mulch/compost/organic soil mixture was placed over these areas at a thickness ranging from two to four inches (averaging about three inches). This material will act as a mechanism to increase the organic content in this soil and to allow for natural succession to increase establishment of the herbaceous community in these areas. These areas were not seeded with herbaceous species due to the lateness in the year. It is believed that natural seeding in the spring will be a sufficient method for reestablishing the herbaceous communities. The need for supplemental reseeding will be evaluated upon the completion of the summer monitoring activities in 2004.

3. Restored Bank Erosion Monitoring

3.1 General

The cleared and restored bank areas of the Upper ½-Mile Reach (excluding the approximately 170-foot long section excavated and restored as part of the Building 68 Area Removal Action) are to be inspected for significant areas of soil erosion or bank failure. In areas where a significant amount of erosion (e.g., ruts, gullies, washouts, or sloughing) is observed within the cleared or restored areas or riprap protection, GE is to implement measures to replace/restore the eroded soil or riprap to the original restoration design conditions.

3.2 Monitoring Program

The post-restoration monitoring program consists of a visual inspection of the cleared and restored bank areas for signs of erosion on a semi-annual basis during the first year after the herbaceous cover is restored, and annually in years 2 through 5. At the end of the 5-year period, GE is to propose a long-term monitoring program that is to be implemented upon approval by EPA. 2003 represented the first year of monitoring for all of the restored bank areas, and hence semi-annual monitoring was performed.

3.3 Monitoring Activities

To complete monitoring requirements set forth in the Work Plan, the restored banks in the Upper ½ Mile Reach were inspected in the spring and late summer of 2003, in order to assess cleared and restored areas for evidence of erosion. The results of the monitoring visits are summarized in Table 3-1, and full descriptions of both inspection visits are provided in trip reports included in Attachment A. Photographic logs are included in Attachment B.

3.4 Monitoring Results and Response Actions

3.4.1 Spring 2003 Monitoring Event

The first restored bank erosion monitoring visit was completed in the spring of 2003 (May 29, 2003). During this visit, three areas showed evidence of measurable erosion or impacts such that response actions were required.

3.4.1.1 Area 1

Area 1 is located approximately 30 feet downstream of Building 68 on the northern shore of the river (Figure 3-1). Less than 0.5 cubic yards of clean backfill appeared to have eroded from the restored bank into the River (see Attachment A). The likely cause of the erosion was the placement of hay bales on the storm drain gate, which impeded surface drainage and forced excess water to discharge around the storm drain headwall and over the bank. Evidence of eroded soil was not apparent in the river and no removal was necessary. To address future erosion concerns at this location, the hay bales were removed from the storm drain and placed in a more

suitable location. Subsequently, in September of 2003, the bank was restored with additional topsoil and reseeded near the top of the bank, and additional riprap was installed downstream of the storm drain headwall.

3.4.1.2 Area 2

Area 2 is located between the southern shore of the river and the Newell St. Parking Lot Area within swale No. 11 (see Figure 3-1). Less than 1 cubic yard of clean backfill from the restored banks appeared to have been eroded from both sides of the swale (see Attachment A). The apparent cause of the erosion was the settling of riprap and sub-soil in the middle of the swale exposing the sides of the swale. No eroded soil was visible in the river and no removal was necessary. In September 2003, hay bales were placed at the head of the swale to reduce water velocities and additional riprap was placed in the swale to protect against future erosion at this location.

3.4.1.3 Area 3

Movement of riprap was noted within swale No. 19, between the Newell St. Parking Lot Area and the southern shore of the river. This area is shown as Area 3 on Figure 3-1. To address this issue, in September 2003, additional riprap was placed within swale No. 19.

3.4.2 Summer 2003 Monitoring Event

The second bank erosion monitoring event took place on August 25, 2003. During this monitoring event, no new signs of measurable erosion or other adverse impacts were identified. However, it was noted that the three areas identified in the Spring 2003 Restored Bank Erosion Monitoring Event had not yet been addressed. As noted, these repairs were subsequently completed in September 2003. The full Summer 2003 Bank Erosion Monitoring event is documented in the trip report included in Attachment A.

4. Sediment Cap Isolation Layer Monitoring

4.1 General

Periodic sampling of the sediment cap isolation layer is required to monitor its long-term effectiveness in controlling polychlorinated biphenyl (PCB) migration from the underlying sediment. The objective of the monitoring program is to compile data for set locations during different time periods in order to establish a database for long term evaluation.

4.2 Monitoring Program

Post-restoration isolation layer monitoring is to occur at intervals of one year and five years after the completion of restoration activities. For each sampling location, post-restoration sampling of the isolation layer consists of the following:

- collection of isolation layer samples one year after cap placement; and
- collection of isolation layer samples five years after cap placement.

During 2003, monitoring of the isolation layer cap included sampling at two of six locations specified in the Work Plan (since the one-year sampling at the other four locations had been performed previously) and at one location selected by EPA. Locations of all of the sediment cap isolation layer sampling points are shown on Figure 4-1.

4.3 Monitoring Activities

Sampling for the one-year monitoring event was completed on August 27, 2003 at 3 locations; CAP-MON-6 through 8 (see Figure 4-1). For each sample taken, the overlying armor stone and any accumulated sediment in the armor stone were, to the extent practical, removed by hand, and the geogrid and geotextile temporarily cut back to allow access to the underlying isolation layer. Immediately following these removals, two undisturbed core samples were taken at each of the sampling locations. At the time of sample collection, for each sample location, one core was sectioned into two-inch increments, providing core segments from the 2- to 4-, 4- to 6-, and 6- to 8-inch intervals above the bottom geotextile layer, which were analyzed for PCB and total organic carbon (TOC) concentrations. The second full-depth core remained intact and was used to provide additional one-year TOC data.

4.4 Monitoring Results and Response Actions

Isolation layer sampling results for 2003 monitoring activities are shown in Table 4-1. Though post-excavation and baseline sampling were completed prior to 2003, the results of all of the isolation layer sampling are shown in Table 4-1 for completeness. The sampling summary in Table 4-1 includes sample location, sample ID, date of sample collection, sample depth interval, and analytical results for PCB and TOC where appropriate.

The results of the one-year isolation layer monitoring activities in 2003 for CAP-MON-6 through 8 were as follows:

- PCBs were detected at only one location (CAP-MON-8) in the uppermost depth interval (6-8") at a concentration of 0.062 ppm, only slightly above the detection limit.
- TOC results for the depth intervals ranged from 0.88% to 1.5% with an average of 1.1%.
- TOC concentrations in full depth cores ranged from 0.6% to 1.4% with an average of 0.96%.

Near the completion of the Upper 1/2-Mile Removal Action, EPA expressed concerns regarding the levels of TOC contained in some of the isolation layer material that was used for restoration. As a result, in a letter dated August 26, 2002, EPA requested additional sampling of the isolation layer material that was placed from the beginning of the project through October 2001. In response, GE developed a proposed plan for TOC sampling of that isolation layer material, the performance of a seepage meter study, and the submission of a report presenting these results and evaluating the effectiveness of the isolation layer. The proposed plan was submitted to EPA in a letter dated September 9, 2002. EPA provided conditional approval of that plan in letters dated September 25 and December 31, 2002. Thereafter, in accordance with EPA's December 31, 2002 letter, GE submitted a revised seepage meter protocol on January 20, 2003, and that protocol was approved by EPA on February 27, 2003. The TOC sampling proposed in GE's plan has been completed. However, due to an extremely wet summer and fall in 2003 and the installation of a flow bypass system as part of EPA's 1½ Mile Reach Removal Action further downstream, GE was unable to collect the necessary seepage meter data in 2003. Based on agreement with EPA, once the appropriate seepage meter data have been collected, GE will propose a revised date for submission of the evaluation report and will then prepare and submit that report to EPA.

5. Monitoring of Aquatic Habitat Enhancement Structures and Armor Stone Layer

5.1 General

Periodic monitoring of the aquatic habitat enhancement structures is required in order to evaluate structural stability, the effects on aquatic habitat, and potential for increased bank-side erosion. The armoring layer of stone placed over the isolation layer within the riverbed must also be monitored periodically to ensure that it is effectively preventing erosion of the underlying sediment cap isolation layer.

5.2 Monitoring Program

The post-restoration monitoring program for both the aquatic habitat enhancement structures and the armor stone layer consists of annual visual inspections for five years during low-flow conditions. Observations should determine if significant movement of the armor stone or reduction in the armor stone thickness has occurred. At the end of the 5-year period, GE will propose a long-term monitoring program that will be implemented upon EPA approval.

5.3 Monitoring Activities

During 2003, monitoring activities for the armor stone layer were performed in conjunction with the monitoring event for the aquatic habitat enhancement structures. The combined monitoring event was conducted on September 10, 2003, one day prior to the vegetative monitoring survey. The results of that monitoring event were included in the November 24, 2003 vegetative monitoring trip report that outlined the results of the September 2003 vegetative monitoring event. That trip report is included as Attachment A to this report.

To conduct the monitoring inspection, the length of the Upper ½-Mile Reach was walked and the habitat enhancement structures and armor stone layer were visually examined. In the upstream portions of the reach, the water depth was sufficient to allow for wading of the river in order to examine the habitat structures and armor stone layer in detail. However, the damming of the river downstream at the Elm Street Bridge to facilitate removal activities being performed by EPA in the 1½-Mile Reach resulted in an upstream ponding effect necessitating the crest of the riverbank be walked to observe the aquatic habitat structures from an elevated position.

5.3.1 Aquatic Habitat Enhancement Structures

The aquatic habitat enhancement structures that were monitored during the 2003 survey included:

- Wing deflectors;
- Vortex weirs;
- Modified vortex weirs;
- W-weir; and

-
- Habitat enhancement boulders and boulder clusters.

As defined by the Work Plan, the general objectives of the placement of the aquatic habitat structures were to:

- Recreate riffle/pool structural variability in the instream habitat;
- Provide instream and bankside cover for aquatic organisms;
- Increase variability in water flow and depth;
- Increase bank stability; and
- Improve substrate conditions.

The approximate location of each habitat enhancement structure is presented on Figure 4-1. In general, the aquatic habitat enhancement structures that were monitored appeared to be stable with no evidence of bankside erosion. Areas of deposition and scouring of recently deposited sediment on top of the armor stone was observed around most of the habitat enhancement structures. Reduced functionality was noted for several of the habitat structures, which may be a temporary condition caused by increased water levels due to the ponding effect from the downstream damming of the river by EPA (to facilitate implementation of the 1½ Mile Reach Removal Action). Aquatic wildlife, including large populations of several benthic macroinvertebrates, were observed near the majority of the habitat structures. More detailed observations of the aquatic habitat structures are presented below.

Cell B

Single wing deflector – The deflector is semi-vegetated with an approximate 20-foot-diameter patch of woody debris immediately downstream. A scour hole, approximately 1.5 feet deep, has developed in the sediments deposited on the armor layer around the apex of the deflector. A depositional bar of unconsolidated material approximately one foot above the armor stone layer has developed just downstream of the deflector apex.

Cell C

Boulders – The boulders placed in the channel are under water but are breaking the stream current. A scour area in the sediments deposited on the armor layer extends approximately 15 feet downstream of the boulders. Some scouring around the face of the boulders can be seen with the accumulation of coarse material in the scour areas.

Island – The island appears to be working well in concert with the deflector in Cell B and a series of boulders placed between the island and the streambank to create a patchwork of shallow/ripple areas and channels. The boulders adjacent to the island work in tandem to reduce the current and allow for a build-up of soft sediment just downstream of the island. One of the boulders next to the island in Cell C is almost entirely under sediment. However, there is little option for correcting that, and the placement of the boulder in the downstream wash of other boulders would only result in further sedimentation. All of the boulders appeared to have a healthy layer of algae over them.

Cell D3

Boulders – The boulders that were placed in this area of the river have well developed scour holes in the sediments deposited on the armor layer that are about 6 feet in length. Woody debris has been trapped around the boulders and a large number of crayfish (Order *Decapoda*) were observed around the boulders.

Cell G1

Three-boulder cluster – This cluster area is producing good habitat diversity in and around this area of the river. Scour holes in the sediments deposited on the armor layer have developed around each of the boulders and a sediment depositional area can be seen developing just downstream. A large number of minnows and crayfish were observed around the boulders. .

Cell G2/F2

W-weir – The rock w-weir at this location was almost completely buried in sediment and was providing little current reduction. There was minimal scour of the sediments deposited on the armor layer and the only section of the weir that appeared to be semi-functional was the northern end of the weir. The reduced functionality of the weir may be a temporary situation resulting from the ponding effect from the downstream damming of the river.

Cell G3

Three-boulder cluster – The boulders in this cluster are providing little in the way of habitat variability. The boulders are embedded in sediment and are completely underwater. However, this may be a temporary situation resulting from the ponding effect from the downstream damming of the river. A large number of small fish were seen in the vicinity of this boulder cluster.

Cell F3

Three-boulder cluster – The boulders in this cluster are functioning well. There is good current flow around the boulders and these are protruding above the surface of the water, creating pools and breaks in the water flow. Some rooted aquatic vegetation (water-celery, *Vallisneria americana*) can be seen in the vicinity of the boulders. Additionally, woody debris is accumulating around the boulders.

Two-boulder cluster – The boulders in this cluster also appear to be functioning well in terms of developing variable aquatic habitat. Scour holes in the sediment deposited on the armor layer are developing around the boulders and a depositional area of soft sediment can be seen developing between the boulders and the center channel of the river.

Three-boulder cluster – This boulder cluster was submerged in approximately 6 feet of water due to the ponding effect from the downstream damming of the river, making it difficult to make an assessment of its functioning success.

Cell H1

Boulder cluster – This boulder cluster is located in a low velocity reach. The boulders are located at such a water depth, due to the ponding effect from the downstream damming of the river, that there was minimal agitation of the water surface. There is some woody debris that has been retained by the boulders, and a large number of small fish and crayfish were observed in and around the cluster.

Cell I1/J1

Rock weir – Due to the ponding effect for the downstream damming of the river, this weir was completely submerged, with only minimal agitation of the water surface. Water-celery was noted growing in the soft

sediment retained by the weir. The presence of the weir has resulted in development of a scour pool in the sediments deposited on the armor layer, where a large number of fish were noticed in still waters.

Cell H2

Single boulder – This boulder appears to be providing good habitat structure. It has created a good scour area in the sediments deposited on the armor layer that is populated with crayfish.

Cell J1

Two-boulder cluster – This cluster appears to function well in coordination with the rock weir located just upstream. It appears to offer a good velocity break in the current.

Three-boulder cluster – This cluster appears to provide little agitation of the water surface due to the ponding effect from the downstream damming of the river. However, good scour areas have developed in the sediment deposited on the armor layer at the base of the boulders.

Single boulder – This boulder also appears to provide little agitation of the water surface due to the ponding effect from the downstream damming of the river. A good scour area has developed in the sediment deposited on the armor layer at the base of the boulder.

Cell J2

“J”-boulder formation – This formation appears to provide excellent habitat function. The water depth is such that a good ripple is formed in the water’s surface. Woody debris is retained in the formation and scour areas in the sediment deposited on the armor layer have formed around the boulders. A large number of crayfish were observed in the area of the formation.

Cell I3

Single-wing deflector – Due to the ponding effect of the downstream damming of the river, this deflector is completely submerged. However, the deflector does appear to be redirecting the current and functions to create differential current areas that allow for the deposition of soft sediment.

Cell I3/J3

Vortex rock weir – The vortex weir appears to be functioning more as a large boulder cluster than as a true weir due to the ponding effect of the downstream damming of the river. The weir is providing good underwater habitat for fish and invertebrates in the voids between the boulders, and a scour pool has been created in the sediments deposited on the armor layer on the downstream side of the weir.

Cell J3

Boulder cluster – This boulder cluster is providing good habitat and a slight water surface ripple effect. Scour areas are apparent around the boulders.

Three-boulder cluster – This cluster is producing some water surface agitation and is functioning well in terms of developing habitat. Scour areas have developed around the boulders in the sediments deposited on the armor layer, and some woody debris can be seen collecting in the cluster.

Three-boulder cluster – This cluster is also producing some water surface affects (i.e., ripples) and is functioning well in terms of developing habitat. Scour areas have developed around the boulders in the sediments deposited on the armor layer, and some woody debris can be seen collecting in the cluster. This cluster works in concert with the cluster located just upstream.

5.3.2 Armor Stone Layer

In general, the armor stone layer appeared to be stable with no areas of erosion of the armor layer noted. In many areas, the armor layer has been covered with sediment deposits. One general observation of the armor stone is that the stone is providing excellent habitat for a wide variety of invertebrates such as mayflies (Order *Ephemeroptera*) and caddis flies (Order *Trichoptera*) and a large number of crayfish.

6. Water Column Monitoring

6.1 General

The objective of the post-restoration water column monitoring program is to identify and evaluate water column impacts that may be a result of post-removal and restoration activities in the Upper ½ Mile Reach. Water column monitoring activities use procedures consistent with the monitoring previously performed for the during-construction water column monitoring program.

6.2 Monitoring Program

Water column monitoring is to be conducted for the first five years following completion of restoration activities. The monitoring program consists of water column sampling performed three times annually; following high- and storm-flow events, and during low-flow periods. Samples are to be collected at both the Newell and Lyman Street locations and are analyzed for total/dissolved PCB and total suspended solids (TSS). Field data such as turbidity, temperature, and depth are also collected for each event. Results of the 2003 monitoring activities are displayed in Table 6-1. Following analyses of five years of monitoring water column data, GE may, if appropriate, submit to EPA a plan for modification or elimination of water column monitoring.

6.3 Monitoring Activities

In 2003, water column samples were taken at two separate locations (Lyman and Newell St. Bridges). Samples were collected on three occasions: following a high-flow event (i.e., > 440 cfs), a storm-flow event (i.e., following a rainfall event of >0.25 inches in a 24-hour period), and during an extended low-flow period. High-flow samples were collected on March 26 while flow in the river was 703 cfs. The day prior to collection of the storm-flow samples on July 22, the Pittsfield area received 0.40 inches of precipitation. On the day of storm-flow sample collection, flow in the river was 49 cfs. Low-flow samples were collected on July 27 while flow was 19 cfs. The flow in the river is reported from data collected at the USGS flow gauge located in Coltsville, MA (USGS meteorological 0119700). Precipitation data was taken from daily NOAA/NWS data reported from the Pittsfield airport.

6.4 Monitoring Results

The water column monitoring results indicated that PCBs were not detected except in the unfiltered storm-flow sample from the downstream location (Lyman Street), in which PCBs were detected at a level of 0.027 ppb, only slightly above the detection limit. TSS results ranged from 4 to 11 ppm. Complete results of 2003 water column monitoring are included in Table 6-1.

7. Biota Monitoring

7.1 General

Following restoration of the Upper ½-Mile Reach, GE conducted an additional caged mussel study in 2003, following the same protocol presented in the Work Plan and utilized prior to and during the Removal Action. The objective of the caged mussel studies was to monitor the effects of the removal and replacement activities on the bioavailability of PCBs in the vicinity of the Upper ½-Mile Reach.

7.2 Monitoring Program

The design of the post-restoration caged mussel study was similar to the pre-removal and during-removal monitoring programs, and was scheduled to occur over a 12-week period. Mussels were placed at three locations in the Housatonic River: upstream of the Upper ½-Mile Reach at the Newell Street Bridge, downstream at the Lyman Street Bridge, and further downstream at the Dawes Avenue Bridge (Figure 7-1). At each location, two mussel cage arrays each consisting of two holding cages were suspended in the water column. Each cage acts as a flow-through chamber that allows food particles to enter the cage while retaining the study population of mussels without injury (Figure 7-2). Each cage holds from 30 to 60 mussels (for a total of up to 240 mussels per location). The mussels used in this study were obtained from a source population in the Connecticut River (the west bank just north of Newton Brook at the northern Massachusetts border near West Northfield) that was identified previously by EPA and were collected one day before initiating the study.

7.3 Monitoring Activities

The 2003 caged mussel study was performed from August 22 to November 10. The Work Plan states that samples are to be collected every two weeks over the duration of the study. However, water levels during the 2003 study were often too high for sampling due to high-flow events and the damming of the river by EPA downstream of Lyman Street Bridge. As a result, the 2-week subsampling schedule was adjusted, and sampling occurred at the 2-, 5-, 6-, 9-, 11-, and 13-week exposure periods. Table 7-1 presents the results of all the caged mussel monitoring activities that occurred in 2003. It should be noted that during the performance of the biota study EPA was conducting removal activities in the 1½ Mile Reach of the river between Lyman Street and Dawes Avenue.

In each sampling event, the mussel cage arrays were removed from the water, and one whole-body composite sample of approximately four mussels was removed from each cage for a total of up to four samples per location. Because three of the twelve cages were lost during the first two weeks of the study during two high-flow events (approximately 1500 cfs and 2500 cfs), only four mussels were collected per composite sample as compared to six mussels per sample in the pre-removal and during-removal studies. An additional three cages were lost later in the study due to high flows, which further reduced the total number of mussels available for sampling. For instance, only 2 of 4 samples were collected at Dawes Avenue during the 11-week and 13-week sampling events due to cage loss. In addition, increased water levels due to the ponding effect of the downstream damming of the river prevented a complete sample from being collected from Newell Street (2 of 4 samples) and Lyman Street (0 of 4 samples) during the 6-week sampling event.

7.4 Monitoring Results

A total of 64 samples (two quality control samples and between six to twelve samples from each sampling period) were collected over the duration of the study. Samples were submitted to Northeast Analytical, Inc. in Schenectady, New York, for analysis of PCBs and lipid concentrations in mussel tissues minus the shell. Results of the PCB and lipid analyses for the control samples and the different sampling periods are presented in Table 7-1. Comparison of upstream and downstream mussel data indicates a general increase in PCB levels from the upstream (Newell St.) to the downstream (Lyman St. and Dawes Ave.) locations. However, comparison of post-removal data to pre- and during-removal data indicate a general decrease in PCB concentrations following the completion of removal activities.

8. Summary and Future Activities

8.1 Restored Bank Vegetation Monitoring

During 2003, vegetative monitoring was conducted in the spring (May) and late summer (September). In the spring, losses in both the canopy and understory were noted. It appeared that the losses were the result of both herbivorous activity and a long, hard winter. The use of tree cage guards continued to provide protection from herbivorous activity on the canopy species. The late summer monitoring visit indicated continued losses in both the canopy and in the understory. Additionally, the late summer monitoring visit supported earlier conclusions that limitations in herbaceous growth were occurring and were most likely the result of the poor condition of the existing soils in certain areas that were only cleared to facilitate access (i.e., no soil removal/replacement).

In response to both vegetative losses and the inability of certain portions of the planting areas to support vegetation, certain corrective actions were implemented in October. Sufficient canopy, understory, and red-osier dogwoods were planted to bring the survival rate back up to 90%. A heavy mulch/compost/organic soil mixture was placed over bare soil areas at a thickness ranging from two to four inches (averaging about three inches), to increase the organic content in this soil and allow for natural succession to increase the herbaceous community in these areas. These areas were not seeded with herbaceous species due to the lateness in the year. It is believed that natural seeding in the spring will be a sufficient vector for re-establishing the herbaceous communities. The need for supplemental reseeding will be evaluated after the completion of the summer monitoring activities in 2004.

For 2004, vegetation monitoring will be conducted once during the spring and once during the late summer/fall time periods. As per the monitoring schedule, planting areas 1, 2, 3, 4A, and 5 will not be quantitatively monitored in 2004. Instead, the next inspection to ascertain conformance with the performance standard for these areas is July/August 2005. The planting areas to be inspected in both the spring and late summer/fall will be planting areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11, 11A, 12, 13, 14, 15, 16 and 17. Planting areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11 and 11A will be undergoing the third year of monitoring. Planting areas 12, 13, 14, 15, 16 and 17 will be undergoing the second year of monitoring. Results of each monitoring event will be summarized and submitted to EPA in trip reports and in the 2004 Annual Monitoring Report. A complete summary of the future monitoring activities is included in Table 8-1. Monitoring is expected to continue through 2009.

8.2 Restored Bank Erosion Monitoring

Restored bank erosion monitoring was conducted in the spring (May) and summer (August) in 2003. During the spring monitoring event, some minor erosion was noted in three areas, which was addressed in September 2003. The integrity of the cleared and restored areas of the banks of the Upper ½ Mile Reach are to be monitored for five years following completion of restoration activities. The Work Plan calls for the banks to be inspected semi-annually for the first year following completion and annually for the remaining four years. Since 2003 represented the first year following completion of restoration activities, monitoring of restored bank areas will be performed annually for 2004 through 2007. A complete summary of the future monitoring activities is included in Table 8-1. At the end of the 5-year period, GE will propose a long-term monitoring program for EPA approval.

8.3 Sediment Cap Isolation Layer Monitoring

During 2003, sediment cap isolation layer monitoring was performed at three locations (CAP-MON-6 through 8). PCBs were detected at only one location, in the upper sampling segment (suggesting that PCBs did not migrate through the cap), at a concentration slightly above the detection limit. TOC results were all greater and 0.5%, averaging approximately 1%. The isolation layer sampling performed in 2003 fulfilled the requirement of one-year post-cap placement monitoring at the remaining monitoring locations. Isolation layer monitoring is not required again until 2005 (5-year monitoring requirement for 3 of the eight locations). In order to consolidate the sampling efforts, it is proposed that the five-year monitoring for all eight locations be performed in 2007 (i.e., the 5-to-7-year interval). A complete summary of the future monitoring activities is included in Table 8-1. At the end of the 5-to-7-year period, GE will propose a long-term monitoring program for EPA approval.

In 2002, in response to EPA concerns regarding the levels of TOC in some isolation layer materials placed through October 2001, GE developed and proposed a plan for TOC sampling of those isolation layer materials, the performance of a seepage meter study, and the submission of a report presenting these results and evaluating the effectiveness of the isolation layer. This plan was conditionally approved by EPA in letters dated September 25 and December 31, 2002. The TOC sampling has been completed; however, due to unfavorable weather conditions and EPA's installation of the flow bypass system in the 1½ Mile Reach, sufficient seepage meter data could not be collected in 2003. Based on agreement with EPA, once the appropriate seepage meter data have been collected, GE will propose a revised date for submission of the evaluation report and will then prepare and submit that report to EPA.

8.4 Monitoring of Aquatic Habitat Enhancement Structures and Armor Stone Layer

Monitoring of the aquatic habitat enhancement structures and armor stone layer was conducted in September 2003 and no side-bank or armor layer erosion was noted. However, reduced functionality of several aquatic habitat structures were noted, which may be a temporary condition due to the ponding effect of the downstream damming of the river as part of the 1½ Mile Reach Removal Action. For 2004, the aquatic habitat enhancement structures and armor stone layer will be monitored in the late summer/fall in conjunction with the vegetative monitoring survey. Monitoring of the aquatic habitat enhancement structures and armor stone layer will continue annually for 2004 through 2007. A complete summary of the future monitoring activities is included in Table 8-1. At the end of the 5-year period, GE will propose a long-term monitoring program for EPA approval.

8.5 Water Column Monitoring

During 2003, water column monitoring was performed three times (i.e., high-, storm- and low-flow events) at both the Newell and Lyman St. bridge locations. PCBs were not detected except in one storm-flow sample from Lyman St. bridge, in which PCBs were detected slightly above the detection limit. 2003 represented the first year that water column monitoring was completed following restoration of the Upper ½ Mile Reach. Water column monitoring will continue to be performed three times annually for 2004 through 2007. A complete summary of the future monitoring activities is included in Table 8-1. Following analyses of five years of monitoring water column data, GE may, if appropriate, submit to EPA a plan for modification or elimination of water column monitoring.

8.6 Biota Monitoring

The post-restoration biota monitoring program, consisting of a caged mussel study, was performed in 2003, and the results indicate a general increase in PCB levels from the upstream to downstream locations. However, comparison of post-removal data to pre- and during-removal data indicate a general decrease in PCB concentrations following the completion of removal activities. Additional biota monitoring is not planned at this time.

8.7 Restored Sediments Monitoring

Three rounds of periodic sampling of the sediments on top of the cap in the Upper ½-Mile Reach will be performed at 5-year intervals, beginning five years after completion of construction on the sediment removal/replacement activities. Therefore, the restored sediment sampling monitoring program will be conducted beginning in 2007. A complete summary of the future monitoring activities is included in Table 8-1.

References

- Blasland, Bouck & Lee, Inc. (BBL) 1999. Removal Action Work Plan for Upper ½-Mile Reach of Housatonic River. Prepared for GE, Pittsfield, MA.
- BBL. 2001. Draft Invasive Species Control Plan for Upper ½-Mile Reach of Housatonic River. Prepared for GE, Pittsfield, MA.

Tables

TABLE 2-1
SUMMARY OF BANK PLANTING AREAS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Area	Planting Date	Cell Area	Planting Area (ac)	Toe Planting Length (lf)	Vines					Understory			Dogwood Band		Canopy				Total
					Woody Vines <i>Vitis riparia</i>	Serviceberry <i>Amelanchier canadensis</i> <i>Amelanchier arborea</i>	Northern Arrowwood <i>Viburnum dentatum</i>	Silky Dogwood <i>Cornus anomum</i>	Winterberry Holly <i>Ilex verticillata</i>	SubTotal	Red-Osier Dogwood <i>Cornus sericea</i>	Total	Eastern Cottonwood <i>Populus deltoides</i>	Boxelder <i>Acer negundo</i>	Black Willow <i>Salix nigra</i>	Silver Maple <i>Acer saccharinum</i>			
1	May-00	A,C	0.30	328	0	0	37	37	36	110	82	192	79	79	26	28	210		
1	Oct-00	A,C	--	--	0	36	0	0	0	36	0	36	0	0	0	0	0		
1	Jun-01	A,C	--	--	22	0	1	1	1	2	0	2	0	0	0	0	0		
1	Oct-01	A,C	--	--	0	10*	10	9	10	39	8	47	10	10	24	21	65		
1	Oct-02	A,C	--	--	0	6*	5	6	6	23	6	29	0	0	0	0	0		
1	Oct-03	A,C	--	--	0	0	0	36	0	36	9	45	0	0	0	0	0		
2	May-00	D	0.17	NA	0	0	0	0	0	0	0	0	44	44	15	15	118		
2	Oct-01	D	--	--	0	0	0	0	0	0	0	0	9	9	14	8	40		
2	Oct-03	--	--	--	0	0	0	0	0	0	0	0	0	30	0	0	30		
3	May-00	E	0.05	45	0	0	18	18	19	55	11	66	13	13	4	4	34		
3	Oct-00	E	--	--	0	18	0	0	0	18	0	18	0	0	0	0	0		
3	Jun-01	E	--	--	0	0	0	0	1	1	0	1	1	1	0	0	2		
3	Oct-01	E	--	--	0	5*	4	4	4	17	0	17	5	5	4	4	18		
3	Oct-02	E	--	--	0	6*	0	6	0	12	8	20	3	0	0	2	5		
3	Oct-03	E	--	--	0	0	0	12	0	12	0	12	0	0	0	0	0		
Subtotal					0.52	373	22	81	75	117	76	349	124	473	164	191	87	80	522
4A	Oct-00	G1,G2	0.16	395	0	19	18	18	18	73	74	147	64	63	5	10	142		
4A	Oct-01	G1,G2	--	--	0	12*	6	6	6	30	12	42	3	4	10	5	22		
4A	Oct-02	G1,G2	--	--	0	8*	4	4	10	26	8	34	30	10	0	0	40		
4A	Oct-03	G1,G2	--	--	0	0	0	12	0	12	0	12	0	33	0	0	33		
4B	Jun-01	G2,G3	0.40	416	22	54	56	56	0	166	134	300	95	95	33	33	256		
4B	Oct-01	G2,G3	--	--	0	0	0	0	53	53	0	53	0	0	0	0	0		
4B	Oct-02	G2,G3	--	--	0	8*	4	6	2	20	8	28	10	0	10	10	30		
4B	Oct-03	G2,G3	--	--	0	0	0	34	0	34	0	34	0	0	0	0	0		
5	Oct-00	F1,F2	0.10	NA	0	19	18	18	18	73	0	73	25	25	8	8	66		
5	Oct-03	F1,F2	--	--	0	0	0	21	0	21	0	21	0	10	0	0	10		
6	Jun-01	F3	0.07	226	0	0	0	0	0	0	57	57	21	21	7	7	56		
6A	Jun-01	F3	0.05	NA	0	0	0	0	0	0	0	0	8	8	3	3	22		
7	Jun-01	F3	0.01	NA	0	0	0	0	0	0	0	0	3	3	1	1	8		
Subtotal					0.79	1037	22	120	106	175	107	508	293	801	259	272	77	77	685
8	Oct-01	H1	0.02	32	0	0	0	0	0	0	6	6	6	4	2	2	14		
8	Oct-02	H1	--	--	0	0	0	0	0	0	2	2	0	0	0	0	0		
8A	Oct-01	H1	0.05	104	0	0	0	0	0	29	29	29	12	7	4	4	27		
9	Oct-01	H1	0.01	NA	0	0	0	0	0	0	0	0	3	2	1	1	7		
9A	Oct-01	H1,H2	0.06	187	0	0	0	0	0	0	31	31	12	7	4	4	27		
9A	Oct-02	H1	--	--	0	0	0	0	0	0	2	2	0	0	0	0	0		
10	Oct-01	B68	0.18	NA	0	36*	36	37	37	146	0	146	47	47	16	16	126		
11	Oct-01	H2	0.04	88	0	0	0	0	0	0	20	20	8	6	3	3	20		
11	Oct-02	H2	--	--	0	0	0	0	0	0	2	2	0	0	0	0	0		
11	Oct-03	H2	--	--	0	0	0	19	0	19	0	19	0	0	0	0	0		
11A	Oct-01	H2	0.06	83	0	0	0	0	0	0	28	28	12	7	4	4	27		
11A	Oct-02	H2	--	--	0	0	0	0	0	0	2	2	0	0	0	0	0		
12	May-02	J1	0.19	269	0	18*	0	19	18	55	67	122	50	50	0	17	117		
12	Oct-02	J1	--	--	22	0	18	0	0	18	0	18	0	0	17	0	17		
12	Oct-03	J1	--	--	0	0	0	12	0	12	0	12	0	0	0	0	0		
13	May-02	I1	0.10	234	0	18*	0	18	19	55	41	96	26	26	0	9	61		
13	Oct-02	I1	--	--	0	18	0	0	0	18	18	36	0	0	0	0	9		
14	Oct-02	J3	0.21	192	22	37*	37	36	36	146	48	194	56	56	19	19	150		
15	May-02	I2	0.00	40	0	0	0	0	0	0	10	10	0	0	0	0	0		
16	Oct-02	I2	0.01	72	0	0	0	0	0	0	18	18	3	3	1	1	8		
17	Oct-02	I3	0.04	108	0	0	0	0	0	0	27	27	10	10	3	3	26		
Subtotal					0.96	1409	44	109	109	141	110	469	364	833	245	225	83	83	636
Total					2.27	2819	88	310	290	433	293	1326	781	2107	668	688	247	240	1843

Notes:

1. Woody vines planted at an approximate density of 40 vines/acre on 4' centers in a 15'x30' patch with a minimum of 150' between patches.
2. Understory planted at an approximate density of 730 shrubs/acre (including red-osier dogwood) on 4' centers in a 30'x50' patch with a minimum of 40' between patches.
3. Canopy planted in varying densities, clumps, or if necessary, sinuous lines.
4. Dogwood band planted on 4' centers in a single row along the toe of the bank.
5. * - in consultation with EPA and Trustees, Chokecherry (*prunus serotina*) was planted in substitution of Serviceberry for these areas.

TABLE 2-2
RESULTS OF CANOPY MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes	
					Non-stressed	Stressed	Total				
5/31 2001	1	May-00	210	168	139	12	151	0	-17	a, b, c	
	2	May-00	118	94	79	3	82	0	-12	d, e	
	3	May-00	34	27	8	1	9	0	-18	f	
	4, Cell G1	Oct-00	142	114	117	12	129	0	15	g, h	
	5	Oct-00	66	53	55	4	59	0	6		
6/23 2001 ¹	1	May-00	210	168	71	52	123	1	-45	j, h	
	2	May-00	118	94	45	22	67	0	-27	k	
	3	May-00	34	27	11	2	13	0	-14	l	
	4, Cell G1	Oct-00	142	114	51	55	106	41	-8	j, m	
	5	Oct-00	66	53	44	16	60	3	7	j	
5/20 2002 ¹	1	May-00	210	168	139	27	166	5	-2	n	
	2	May-00	118	94	69	20	89	0	-5	o	
	3	May-00	34	27	22	7	29	0	2		
	4A	Oct-00	142	114	53	23	76	3	-38	o	
	4B	Jun-01	256	205	139	58	197	7	-8		
	10	Oct-01	126	101	120	4	124	1	23		
	5	Jun-01	66	53	46	8	54	0	1		
	6, 6A, 7, 8A	June/Oct-01	113	90	60	26	86	3	-4	o	
	8, 9, 9A, 11, 11A	1-Oct	95	76	108	5	113	2	37	p	
8/13 2002 ¹	1	May-00	210	168	175	3	178	0	10	m, n	
	2	May-00	118	94	90	5	95	0	1		
	3	May-00	34	27	25	1	26	0	-1		
	4A	Oct-00	142	114	86	2	88	0	-26		
	4B	Jun-01	256	205	201	1	202	0	-3		
	10	Oct-01	126	101	141	1	142	0	41		
	5	Jun-01	66	53	61	3	64	0	11		
	6, 6A, 7, 8A	June/Oct-01	113	90	102	3	105	0	15		
	8, 9, 9A, 11, 11A	Oct-04	95	76	159	1	160	0	84		
5/28 2003 ¹	1	May-00	210	168	158	1	159	0	-9	m, n	
	2	May-00	118	94	84	0	84	0	-10		
	3	May-00	34	27	27	0	27	0	0		
	4A	Oct-00	142	114	89	1	90	0	-24		
	4B	Jun-01	256	205	217	3	220	0	15		
	10	Oct-01	126	101	124	3	127	0	26		
	5	Jun-01	66	53	52	1	53	0	0		
	6, 6A, 7, 8A	June/Oct-01	113	90	112	0	112	0	22		
	8, 9, 9A, 11, 11A	Oct-01	95	76	163	0	163	0	87		
	12	May/Oct-02	134	107	134	0	134	0	27		
	13	May/Oct-02	70	56	76	0	76	0	20		
	14	Oct-02	150	120	163	1	164	0	44		
	15	May-02	---	---	---	---	---	---	---		
	16	Oct-02	8	6	8	0	8	0	2		
	17	Oct-02	26	21	27	0	27	0	6		
	9/11 2003 ¹	1	May-00	210	168	176	15	191	0	23	m, n
		2	May-00	118	94	76	0	76	0	-18	
3		May-00	34	27	27	0	27	0	0		
4A		Oct-00	142	114	92	3	95	0	-19		
4B		Jun-01	256	205	243	0	243	0	38		
10		Oct-01	126	101	115	12	127	0	26		
5		Jun-01	66	53	50	1	51	0	-2		
6, 6A, 7, 8A		June/Oct-01	113	90	136	0	136	0	46		
8, 9, 9A, 11, 11A		Oct-01	95	76	103	0	103	0	27		
12		May/Oct-02	134	107	141	0	141	0	34		
13		May/Oct-02	70	56	71	0	71	0	15		
14		Oct-02	150	120	138	6	144	0	24		
15		May-02	---	---	---	---	---	---	---		
16		Oct-02	8	6	8	0	8	0	2		
17		Oct-02	26	21	25	0	25	0	4		

Notes:

- a. The stressed specimens were boxelder (5) and cottonwood (2).
- b. Black willow and silver maple were significantly underrepresented in the count. Only 2 black willows and 7 silver maples were identified.
- c. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry (*Prunus serotina*), American elm (*Ulmus americana*), black willow, and red oak (*Quercus rubra*).
- d. Black willow and silver maple were significantly underrepresented in the count. Only 1 black willow and 10 silver maples were identified.
- e. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, red oak and black cherry.
- f. No black willow or silver maples were noted. Herbivory is probably the result of the loss.
- g. Black willow and silver maple were significantly underrepresented in the count. Only 5 black willow and 10 silver maples were identified.
- h. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry, American elm, black willow, red oak, and shagbark hickory (*Carya ovata*).
- i. Joint GE/Trustee monitoring event.
- j. Cottonwood and boxelder are the dominant species surviving in this area.
- k. Resprout species include black cherry, American elm, red oak, green ash (*Fraxinus pennsylvanica*), speckled alder (*Alnus rugosa*), bigtooth aspen (*Populus grandidentata*).
- l. Resprout species in this area include American elm, green ash, red oak, white willow (*Salix alba*).
- m. Resprout observed species include black cherry and American elm.
- n. Resprout observed species include black cherry and American elm.
- o. Only other resprout species was black cherry.

TABLE 2-3
RESULTS OF UNDERSTORY MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes	
					Non-stressed	Stressed	Total				
5/31 2001	1	May-00	146	117	93	4	97	0	-20		
	2	May-00	---	---	---	---	---	---	---	a	
	3	May-00	73	58	56	1	57	0	-1	b	
	4, Cell G1	Oct-00	73	58	54	8	62	0	4		
	5	Oct-00	73	58	68	4	72	0	14		
8/23 2001 ¹	1	May-00	146	117	59	34	93	0	-24	c, d	
	2	May-00	---	---	---	---	---	---	---		
	3	May-00	73	58	47	2	49	2	-9	d	
	4, Cell G1	Oct-00	73	58	19	17	36	33	-22	d	
	5	Oct-00	73	58	44	19	63	7	5	d	
5/20 2002 ^e	1	May-00	146	117	83	34	117	10	0	f	
	2	May-00	---	---	---	---	---	---	---		
	3	May-00	73	58	26	26	52	0	-6	f	
	4A	Oct-00	73	58	24	19	43	4	-15	f	
	4B	Jun-01	219	175	99	74	173	0	-2	f	
	10	Oct-01	73	58	54	20	74	0	16	f, g	
	5	Jun-01	73	58	33	26	59	1	1	f	
	6, 6A, 7, 8A 8, 9, 9A, 11, 11A	June/Oct 01 Oct-01	---	---	---	---	---	---	---	---	g
8/13 2002 ^e	1	May-00	146	117	92	16	108	0	-9	c	
	2	May-00	---	---	---	---	---	---	---		
	3	May-00	73	58	52	2	54	0	-4		
	4A	Oct-00	73	58	37	3	40	0	-18		
	4B	Jun-01	219	175	167	4	171	0	-4		
	10	Oct-01	73	58	72	4	76	0	18		
	5	Jun-01	73	58	62	2	64	0	6		
	6, 6A, 7, 8A 8, 9, 9A, 11, 11A	June/Oct 01 Oct-01	---	---	---	---	---	---	---	---	
5/28 2003 ^e	1	May-00	146	117	94	3	97	0	-20		
	2	May-00	---	---	---	---	---	---	---		
	3	May-00	73	58	40	1	41	0	-17		
	4A	Oct-00	73	58	45	6	51	0	-7		
	4B	Jun-01	219	175	148	8	156	0	-19		
	10	Oct-01	73	58	55	4	59	0	1		
	5	Jun-01	73	58	49	0	49	0	-9		
	6, 6A, 7, 8A 8, 9, 9A, 11, 11A	June/Oct 01 Oct-01	---	---	---	---	---	---	---	---	
	12	May/Oct 02	73	58	65	3	68	0	10		
	13	May/Oct 02	73	58	65	1	66	0	8		
	14	Oct-02	146	117	154	3	157	0	40		
	15	May-02	---	---	---	---	---	---	---		
	16	Oct-02	---	---	---	---	---	---	---		
	17	Oct-02	---	---	---	---	---	---	---		

TABLE 2-3
RESULTS OF UNDERSTORY MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
9/12 2003 ^e	1	May-00	146	117	95	0	95	0	-22	
	2	May-00	---	--	---	---	---	---	---	
	3	May-00	73	58	53	1	54	0	-4	
	4A	Oct-00	73	58	52	2	54	0	-4	
	4B	Jun-01	219	175	161	2	163	0	-12	
	10	Oct-01	73	58	56	3	59	0	1	
	5	Jun-01	73	58	45	0	45	0	-13	
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--	
	8, 9, 9A, 11, 11A	Oct-01	73	58	47	0	47	0	-11	
	12	May/Oct 02	73	58	54	0	54	0	-4	
	13	May/Oct 02	73	58	67	1	68	0	10	
	14	Oct-02	146	117	148	0	148	0	31	
	15	May-02	---	---	---	---	---	---	---	
	16	Oct-02	---	---	---	---	---	---	---	
	17	Oct-02	---	---	---	---	---	---	---	

Notes:

- a. No understory specimens were planted in this area.
- b. 54 understory specimens were originally planted in May 2000. An additional 18 were planted in October 2000.
- c. Overall survival of the understory species is skewed towards the plot located in the western end of Area 1. There is very good survival in that plot and very poor survival in the plot located in the eastern end of Area 1.
- d. In general, serviceberry had the poorest survival and tended to be that species with the greatest demonstrated stress.
- e. Joint GE/Trustee monitoring event.
- f. In general, winterberry hollies appeared to have begun sprouting and putting on leaves when they were hit with frost. Stress appeared to be cold induced. Also, serviceberries that were stressed in 2001 appeared to be a very good condition.
- g. One shrub clump was moved from Area 10 to Area 11 at the request of the trustees

TABLE 2-4
RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count*		Comments	Notes
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard: < 4 foot on center		
5/31/2001	1	May-00	82	66	101 (by count)	---		
	2	May-00	--	--	---	---		b
	3	May-00	11	9	13 (by count)	---		
	4, Cell G1	Oct-00	74	59	74 (by count)	---		
	5	Oct-00	--	--	---	---		b
8/23/2001 ^c	1	May-00	82	66	First 100' (Partial) Second 100' (Partial)	First 100' - 10 foot section Second 100' - 20 foot section Third 100'		
	2	May-00	--	--	---	---		b
	3	May-00	11	9	---	100%		
	4, Cell G1	Oct-00	74	59	Partial	Sparse western 50', with no specimens left last 20'		
	5	Oct-00	--	--	---	---		b
5/20/2002 ^c	1	May-00	82	66	First 100' (Partial) Second 100' (Partial) Third 100' (Partial)	First 100' - 50 foot section Second 100' - 20 foot section Third 100' - 20 foot section Fourth 100' - 100%		
	2	May-00	---	---	---	---		b
	3	May-00	11	9	Partial	50% of first 50 feet is sparse		
	4A	Oct-00	74	59		First 100' - 100% Second 100' - 100% Third 100' - 100%	Thin for entire section, water stress in some sections	
	4B	Jun-01	134	107	First 100' (Partial) Second 100' (Partial) Third 100' (Partial)	First 100' - 20 foot section Second 100' - 20 foot section Third 100' - 20 foot section Fourth 100' - 100%		
	10	Oct-01	---	---	---	---		b
	5	Jun-01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	First 100' - Partial Second 100' - 100%	First 100' - missing first 30 foot section		d
	8, 9, 9A, 11, 11A	Oct-01	82	66	First 100' (Partial) Second 100' (Partial) Third 100' (Partial) Fourth 100' (Partial) Fifth 100' (Partial)		18 dead red-osier dogwoods identified over the length of this stretch	e
	8/13/2000 ^c	1	May-00	82	66	First 100' - Gaps at 17' to 23' interval, 33' to 38' interval, and 61' to 69' interval Second 100' - Gaps at 7' to 10' interval Third 100' - Gap at 60 foot point	Fourth 100'	
2		May-00	---	---	---	---		b
3		May-00	11	9	Gap in the red-osier dogwood band at the 70' to 100' interval	---		
4A		Oct-00	74	59	First 100' - Gap at the 0 to 20' interval and the 89' to 100' interval	Second 100' Third 100'	Water stress in some sections	
4B		Jun-01	134	107	First 100' - Thin at 70' to 100' interval Fourth 100' - Thin at 90' point	Second 100' Third 100'		
10		Oct-01	---	---	---	---		b
5		Jun-01	---	---	---	---		b
6, 6A, 7, 8A		June/Oct 01	89	71	---	First 100' Second 100' First 100'		d
8, 9, 9A, 11, 11A		Oct-01	82	66	Second 100' - Missing 2 plants Fourth 100' - Missing 1 plant	Third 100' - Partial	18 dead red-osier dogwoods identified over the length of this stretch	e

TABLE 2-4
RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes	
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard: < 4 foot on center			
5/28/2003 ^c	1	May-00	82	66	First 100' - Gaps at 30' to 40' interval, and 80' to 100' interval Second 100' - gaps at 105' to 119', 120' to 134', 135' to 200' intervals, all were cut back, some new sprouts Third 100' - plants at 201' to 280' had been topped	---	Extensive herbivorous action on the plants.		
	2	May-00	---	---	Thin at the 24' to 50' interval, several gaps	---		b	
	4A	Oct-00	74	59	First 100' - Plants in 0 to 33' interval had been topped Second 100' - Plants at 170' to 200' interval were weak and stressed Third 100' - Plants at end of planting area were gone	---			
					First 100' - Topped at 60' to 100' interval Second 100' - Plants all present, but indications of herbivory Third 100' - Missing plants at 211 and 285 foot points	Fourth 100' Fifth 100' Sixth 100'			
	10	Oct-01	---	---	---	---		b	
	5	Jun-01	---	---	---	---		b	
	6, 6A, 7, 8A	June/Oct 01	89	71	---	First 100' Second 100' Third 100' Fourth 100'		d	
	8, 9, 9A, 11, 11A	Oct-01	82	66	---	First 100' Second 100' Third 100' Fourth 100'		e	
	12	May/Oct 02	67	54	---	First 100' Second 100' - 1 dead plant at 194' and 1 at 198'			
	13	May/Oct 02	59	47	---	Plants all present; though last three were topped			
	14	Oct-02	48	38	---	All present; 26 plants planted in right of way of which 2 were missing			
	15	May-02	10	8	---	Missing 1			
	16	Oct-02	18	14	---	Missing 1			
	17	Oct-02	27	22	---	All present			

TABLE 2-4
RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard: < 4 foot on center		
9/12/2003 ^f	1	May-00	82	66	First 100' - Gaps at 28' to 39' interval, and 81' to 85' interval; Second 100' - gaps at 117' to 131'; Third 100' - Gaps at 232', 250' to 262', and 275' to 300'	--	A total of 17 RO dogwood missing, need 1 plant to meet performance standard	
	2	May-00	---	---	---	---		b
	3	May-00	11	9	---	All present		
	4A	Oct-00	74	59	First 100' - Gaps at 18' to 33'; Second 100' - Gaps at 176' to 181';	--	A total of 5 RO dogwoods missing from planting area, meets performance standard	
	4B	Jun-01	134	107	First 100' - Gap at 69' to 75'; Sixth 100' - Gap at 547' to 555'	Second 100' Fourth 100' Fifth 100'	A total of 4 RO dogwood missing from planting area, meets performance standard	
	10	Oct-01	---	---	---	---		b
	5	Jun-01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	---	First 100' Second 100' Third 100'		d
	8, 9, 9A, 11, 11A	Oct-01	82	66	First 100' - Gaps at 0' to 4' and 60' to 85'; Second 100' - Gap at 177' to 181'; Third 100' - Missing 1	--	A total of 4 RO dogwoods missing from planting area, meets performance standard	e
	12	May/Oct 02	67	54	First 100' - Gap at 20' to 25'; Second 100' - Gap at 196' to 200'; Third 100' - Gaps at 200' to 242' and 271' to 300'	--	A total of 20 RO dogwoods missing from planting area, does not meet performance standard, 7 plants needed to meet the performance standard	
	13	May/Oct 02	59	47	---	Missing one plant	Meets performance standard	
	14	Oct-02	48	38	---	Missing one plant	Meets performance standard	
	15	May-02	10	8	---	Missing two plants	Meets performance standard	
	16	Oct-02	18	14	---	Missing one plant	Meets performance standard	
	17	Oct-02	27	22	---	All present	Meets performance standard	

Notes:

- a. Based on discussions with the Trustees during the 8/23/2001 monitoring event, it was agreed that individual counts of red-osier dogwood would not be made. Instead, based on visual observation, it would be identified which parts of the bank did not meet the original planting scheme of one plant every 4 feet. If that measure were not met, then remedial plantings would be utilized to establish the red-osier dogwood to that required density.
- b. No red-osier dogwoods were planted in this area.
- c. Joint GE/Trustee monitoring event.
- d. In this sequence of areas, 57 red-osier dogwoods were planted in Area 6 and 32 red-osier dogwood were planted in Area 8A, none were planted in Areas 6A and 8A.
- e. In this sequence of areas, 6 red-osier dogwoods were planted in Area 8, 32 red-osier dogwood were planted in Area 9A, 14 red-osier dogwoods were planted in Area 11, and 30 red-osier dogwoods were planted in Area 11A.

TABLE 2-5
RESULTS OF GRAPE VINE MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Wild Grapes or Grape Patches	Comments
					Non-stressed	Stressed	Total Vines			
5/31/2001	1	May-00	22	18	22	0	22	0	0	
8/23/2001 ^a	1	May-00	22	18	8	8	16	6	0	
5/20/2002 ^a	1	May-00	22	18	0	6	6	0	0	
	4B	Jun-01	22	18	0	5	5	0	0	
	9A	Oct-01	---	---	---	---	---	---	---	b
8/13/2002 ^a	1	May-00	22	18	0	0	0	0	6	
	4B	Jun-01	22	18	0	13	13	0	6	
	9A	Oct-01	---	---	---	---	---	---	>>18	b
5/28/2003 ^a	1	May-00	22	18	14	0	14	0	0	The number of planted grapes observed in this plot does not meet the performance criteria. No native plants observed in this plot to compensate.
	4B	Jun-01	22	18	9	0	9	0	1 wild plant and several plots	While the number of planted grapes plus the number of individual native grape plants noted in this planting area did not meet the performance criteria, several large plots with numerous plants did compensate for the lack of individual plants.
	12	Oct-02	22	18	13	0	13	0	3	The number of planted grapes plus the number of individual native grape plants noted in this planting area did not meet the performance criteria.
	14	Oct-02	22	18	19	0	19	0	0	Performance criteria met.
9/12/2003 ^a	1	May-00	22	18	4	1	14	0	23	The number of planted grapes observed in this plot does not meet the performance criteria. However a large number of wild grapes now growing. As such, exceeds performance standard.
	4B	Jun-01	22	18	9	0	9	0	10 wild plants	The number of planted grapes plus the number of individual native grape plants noted in this planting area meet the performance criteria.
	12	Oct-02	22	18	6	0	6	0	20 grape patches	The number of planted grapes plus the number of individual native grape plants noted in this planting area meet the performance criteria.
	14	Oct-02	22	18	16	0	16	0	0	Performance criteria not met.

Notes:

- a. Joint GE/Trustee monitoring event
- b. Due to limitations in stock, this area has not been planted with grape vine as scheduled.

TABLE 2-6
RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Target Performance Standard (% Cover)	General Monitoring Results (Total % Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
8/23 2001*	1	May-00	100%	First 100' ~50% coverage		
				Second 100' ~80% coverage		
	4, Cell G1	Oct-00	100%	Third 100' ~85% coverage		
				Final 60' ~50% coverage		
				~75% coverage		
2	May-00	100%	~85% coverage			
			First 100' ~45% coverage			
5/20 2002*	1	May-00	100%	Second 100' ~75% coverage		
				Third 100' ~85% coverage		
	4A	Oct-00	100%	70% coverage		
				First 100' ~85% coverage		
				Second 100' ~90% coverage		
2	May-00	100%	Third 100' ~90% coverage			
			Final 60' ~80% coverage			
4B	Jun-01	100%	~85% coverage			
			~85% coverage			
			First 100' ~50% coverage			
			Second 100' ~65% coverage			
			Third 100' ~80% coverage			
10	Oct-01	100%	First 100' ~85% coverage			
			Second 100' ~75% coverage			
			Fourth 100' ~75% coverage			
5	Jun-01	100%	~75% coverage			
			First 100' ~85% coverage			
6, 6A, 7, 8A	June/Oct-01	100%	~70% coverage			
			Second 100' ~85% coverage			
			Third 100' ~85% coverage			
			Fourth 100' ~75% coverage			
8, 9, 9A, 11, 11A	Oct-01	100%	First 100' ~70% coverage			
			Second 100' ~50% coverage			
			Third 100' ~75% coverage			
			Fourth 100' ~30% coverage			
8/13 2002*	1	May-00	100%	Overall ~90%		For some areas of herbaceous cover that are less than 100%, reason for lack of coverage appears to be related to dry weather and lack of rain, some areas had small patches (less than one square foot) that might be bare as a result of poor soil, only one location in the First 100 foot interval that will be handled through a response action to correct site conditions.
				First 100'		
				Upper bank: 0 to 33' interval ~50%, upper 67' foot ~95%;		
				Lower bank: 0 to 35' interval ~80%, 35' to 65' interval ~95%;		
				80' interval ~95%;		
				Second 100'		
				0 to 15' interval ~85%, 75' ~95%;		
	Third 100' ~100% coverage					
	Final 60' ~100% coverage					
	2	May-00	100%	~90% coverage		Herbaceous cover in this area tends to be thinner towards the top of the slope, some of the lack of coverage appears to be because of lack of rain and poor soil. One area within this planting area should be addressed through a response action to correct the poor coverage.
				~80% at top of slope, ~95% coverage at bottom of slope		
	3	May-00	100%	~80% at top of slope, ~95% coverage at bottom of slope		Response actions are proposed for one segment of this planting area.
				First 100' ~75% coverage		
4A	Oct-00	100%	Second 100' ~75% coverage		Response actions are proposed for 4 segments of this planting area.	
			Third 100' ~75% coverage			
			Third 100' ~85% coverage			
4B	Jun-01	100%	Second 100' ~93% coverage		Response actions are proposed for one segment of this planting area	
			Third 100' ~100% coverage			
			Fourth 170' ~95% coverage			
10	Oct-01	100%	First 100' ~95% coverage		Response actions are proposed for 2 segments of this planting area.	
			Second 100' ~90% coverage			
5	Jun-01	100%	Third 100' ~65% coverage		Response actions are proposed for one segment of this planting area.	
			~90% coverage overall; ~95% in eastern section, ~85% in the middle segment, with the western slope being thin with a lot of debris			
6, 6A, 7, 8A	June/Oct-01	100%	First 100' ~85% with the top of slope being thin		Response actions are proposed for one segment of this planting area.	
			Second 100' ~85%			
8, 9, 9A, 11, 11A	Oct-01	100%	First 100' ~90% coverage		Response actions are proposed for 2 segments of this planting area.	
			Second 100' ~65% coverage			
			Third 100' ~90% coverage			
			Fourth 100' ~80% coverage			

TABLE 2-6
RESULTS OF HERBACEOUS GROUND COVER MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Target Performance Standard (% Cover)	General Monitoring Results (Total % Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
5/28 2003*	1	May-00	100%	First 100' ~95% coverage		For some areas of herbaceous cover that are less than 100%, some areas had small patches (less than one square foot) that might be bare as a result of poor soil
				Second 100' ~95% coverage		
				Third 100' ~95% coverage		
				Final 60' ~95% coverage		
	2	May-00	100%	~95% coverage		Herbaceous cover in this area still tends to be thinner towards the top of the slope
	3	May-00	100%	~95% coverage		Herbaceous cover shows definite improvement after response actions of previous year
	4A	Oct-00	100%	First 100' ~90% coverage		Herbaceous cover shows improvement over previous year
				Second 100' ~90% coverage		
				Third 100' ~90% coverage		
	4B	Jun-01	100%	First 100' ~90% coverage		
				Second 100' ~90% coverage		
				Third 100' ~95% coverage		
				Fourth 100' ~95% coverage		
				Fifth 100' ~100% coverage		
				Sixth 100' 95% coverage		
	10	Oct-01	100%	First 100' ~95% coverage		
				Second 100' ~95% coverage		
Third 100' ~85% coverage						
5	Jun-01	100%	~95% coverage			
6, 6A, 7, 8A	June/Oct-01	100%	First 100' ~95% coverage			
			Second 100' ~95% coverage			
			Third 100' ~95% coverage			
			Fourth 100' ~95% coverage			
8, 9, 9A, 11, 11A	Oct-01	100%	First 100' ~100% coverage			
			Second 100' ~95% coverage			
			Third 100' ~95% coverage			
			Fourth 100' ~90% coverage			
12	May/ Oct-02	100%	First 100' ~95% coverage			
			Second 100' ~90% coverage			
13	May/ Oct-02	100%	~95% coverage			
14	Oct-02	100%	~95% coverage			
15	May-02	100%	~100% coverage			
16	Oct-02	100%	~100% coverage			
17	Oct-02	100%	~100% coverage			

TABLE 2-6
RESULTS OF HERBACEOUS GROUND COVER MONITORING SURVEYS

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Target Performance Standard (% Cover)	General Monitoring Results (Total % Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
9/12 2003*	1	May-00	100%	First 100' ~85% coverage	No, in certain sections	For areas of herbaceous cover that are less than 100%, the areas had small patches (less than one square foot) that might be bare as a result of poor soil
				Second 100' ~100% coverage		
				Third 100' ~95% coverage		
				Final 60' ~95% coverage		
	2	May-00	100%	~85% coverage	No	Herbaceous cover in this area still tends to be thinner towards the top of the slope
	3	May-00	100%	~75% coverage	No	Herbaceous cover in this area still tends to be thinner towards the top of the slope
	4A	Oct-00	100%	First 100' ~70% coverage	No	Herbaceous cover shows improvement over previous year
				Second 100' ~90% coverage		
				Third 100' ~95% coverage		
	4B	Jun-01	100%	First 100' ~75% coverage	No	For some areas of herbaceous cover that are less than 100%, the areas had bare patches of soil that might be bare as a result of poor soil conditions; much of the gaps in coverage were oriented towards the top of the bank
				Second 100' ~80% coverage		
				Third 100' ~85% coverage		
				Fourth 100' ~85% coverage		
				Fifth 100' ~95% coverage		
				Sixth 100' 95% coverage		
	10	Oct-01	100%	First 100' ~95% coverage	No	For some areas of herbaceous cover that are less than 100%, the areas had small patches (less than one square foot) that might be bare as a result of poor soil conditions.
				Second 100' ~95% coverage		
Third 100' ~85% coverage						
5	Jun-01	100%	~90% coverage	No		
6, 6A, 7, 8A	June/Oct-01	100%	First 100' ~85% coverage	No	For some areas of herbaceous cover that are less than 100%, the areas had patches that might be bare as a result of poor soil conditions.	
			Second 100' ~90% coverage			
			Third 100' ~90% coverage			
8, 9, 9A, 11, 11A	Oct-01	100%	First 100' ~90% coverage	No	For some areas of herbaceous cover that are less than 100%, the areas had bare patches of soil that might be bare as a result of poor soil conditions.	
			Second 100' ~90% coverage			
			Third 100' ~85% coverage			
12	May/Oct-02	100%	First 100' ~95% coverage	No		
			Second 100' ~90% coverage			
			Third 100' ~90% coverage			
13	May/Oct-02	100%	~90% coverage	No		
14	Oct-02	100%	~90% coverage	No		
15	May-02	100%	~85% coverage	No		
16	Oct-02	100%	~85% coverage	No		
17	Oct-02	100%	~85% coverage	No		

Notes:
a. Joint GE/NRD Trustee Monitoring Event

TABLE 3-1
 RESTORED BANK EROSION INSPECTION SUMMARY
 2003 ANNUAL MONITORING REPORT
 UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
 GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Spring 2003 Erosion Inspection

Area	Description	Approximate Size (Soil Loss/Disturbed Area)	Response Action
Areas with Measurable Erosion			
300 feet downstream of Building 68 Area	Movement of rip rap and erosion of soil. Clean backfill area. No evidence of eroded soil in river.	<0.5 CY	Place topsoil and seed in upper bank area. Place rip rap around headwall.
Newell Street Parking Lot Area/Swale No.11	Settlement of rip rap and erosion from sides of swale. Clean backfill area. No evidence of eroded soil in river.	<1 CY	Place additional rip rap along sides of swale.
Other Impacted Areas			
Newell Street Parking Lot Area/Swale No.19 (middle)	Rip rap settlement /movement	~ 1 SY	Place additional rip-rap in swale.

Summer 2003 Erosion Inspection

Area	Description	Approximate Size	Action
No New Bank Areas with Measurable Erosion Observed			

Notes:

CY = cubic yard
 SY = square yard

TABLE 4-1
ISOLATION LAYER SAMPLING SUMMARY
2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Cell	Sample ID	Post Excavation Sediment Results				Depth Interval	Isolation Layer Baseline Results				Isolation Layer 1-Year Results			
		Date	Depth Interval	Total PCBs	TOC		Sample Date	Total PCBs	TOC (DI)	TOC (FD)	Sample Date	Total PCBs	TOC (DI)	TOC (FD)
G1	CAP-MON -1	6/23/00	Surface	20	4,500	2" - 4"	11/9/00	0.027J	Rejected	NA	11/5/01	ND(0.0551)	1,040	703
						4" - 6"	11/9/00	ND(0.038)	Rejected	NA	11/5/01	0.0790	1,450	1,850
						6" - 8"	11/9/00	ND(0.040)	Rejected	NA	11/5/01	ND(0.0576)	1,350	1,190
G1	CAP-MON -2	8/17/00	Surface	19.0	ND(5970)	2" - 4"	11/9/00	ND(0.039)	Rejected	NA	11/5/01	0.0845[0.074]	1490[1010]	788
						4" - 6"	11/9/00	ND(0.040)	Rejected	NA	11/5/01	ND(0.0581)	897	1120 [910]
						6" - 8"	11/9/00	ND(0.039)	Rejected	NA	11/5/01	ND(0.0588)	844	798
G2	CAP-MON -3	8/17/00	Surface	1.72	ND(1230)	2" - 4"	11/9/00	ND(0.039)	Rejected	NA	11/5/01	ND(0.0570)	699	1,060
						4" - 6"	11/9/00	0.030J	Rejected	NA	11/5/01	ND(0.0552)	946	1,270
						6" - 8"	11/9/00	ND(0.039)	Rejected	NA	11/5/01	ND(0.0575)	1,090	1,180
G3	CAP-MON -4	2/22/01	Surface	519	NS	2" - 4"	2/27/01	ND(0.0636)	Rejected	NA	2/27/02	ND(0.0570)	4630	5040
						4" - 6"	2/27/01	ND(0.0580)	Rejected	NA	2/27/02	ND(0.0569)	3640	3530
						6" - 8"	2/27/01	ND(0.0558)	Rejected	NA	2/27/02	ND(0.0553)	3610 [3450]	3240
F3	CAP-MON -5	5/4/01	Surface	8.46	NS	2" - 4"	5/10/01	ND(0.0582)	Rejected	NA	7/3/02	ND(0.0588)	6320 [5040]	4980
						4" - 6"	5/10/01	ND(0.0559)	Rejected	NA	7/3/2002	ND(0.0589)	4560	5130
						6" - 8"	5/10/01	ND(0.0583)	Rejected	NA	7/3/2002	ND(0.0591)	5140	2630
J1	CAP-MON -6	1/15/02	Surface	1,000	NS	2" - 4"	1/30/02	ND(0.061) [ND(0.0586)]	8680 [9120]	7,670	8/27/03	ND(0.061)	10000	8400
						4" - 6"	1/30/02	ND(0.061) [ND(0.0586)]	12,200	10,000	8/27/03	ND(0.059)	13000	14000
						6" - 8"	1/30/02	ND(0.061) [ND(0.0586)]	6,030	11,000	8/27/03	ND(0.061) [ND(0.060)]	15000 [11000]	11000
J3	CAP-MON -7	8/2/02	Surface	88.8	NS	2" - 4"	8/16/02	ND(0.054) [ND(0.053)]	10,000 [8900]	14,000	8/27/03	ND(0.058)	11000	6000
						4" - 6"	8/16/02	ND(0.055)	11,000	13,000	8/27/03	ND(0.058)	11000	8900
						6" - 8"	8/16/02	ND(0.058)	6,700	12,000	8/27/03	ND(0.060)	12000	10000
J3	CAP-MON -8	8/2/02	Surface	216	NS	2" - 4"	8/16/02	ND(0.057)	9,100	30,000	8/27/03	ND(0.060)	11000	10000
						4" - 6"	8/16/02	ND(0.052)	6,200	15,000	8/27/03	ND(0.058)	8800	9600
						6" - 8"	8/16/02	ND(0.054)	7,300	16,000	8/27/03	0.062	9700	8700

Notes:

TOC - Total Organic Carbon
 DI - depth interval
 FD - full depth
 NA - Not Applicable
 ND - Analyte was not detected. The value in parentheses is the associated detection limit.
 J - Indicates an estimated value less than the practical quantitation limit (PQL).

1. Duplicate sample results presented in brackets.
2. PCB and TOC results presented in ppm.

TABLE 6-1
WATER COLUMN MONITORING

2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in parts per million, ppm)

Sample ID:	HR-032603-D1	HR-032603-U1	HR-072203-D1	HR-072203-U1	LOCATION 4	LOCATION 2
Sample Location:	Lyman St. Bridge	Newell St. Bridge	Lyman St. Bridge	Newell St. Bridge	Lyman St. Bridge	Newell St. Bridge
Date Collected:	03/26/03	03/26/03	07/22/03	07/22/03	07/29/03	07/29/03
Sampling Event:	High Flow	High Flow	Storm Flow	Storm Flow	Low Flow	Low Flow
PCBs-Unfiltered						
Total PCBs	ND(0.0000220)	ND(0.0000220)	0.0000270	ND(0.0000220)	ND(0.0000220)	ND(0.0000220)
PCBs-Filtered						
Total PCBs	ND(0.0000220)	ND(0.0000220)	ND(0.0000220)	ND(0.0000220)	ND(0.0000220)	ND(0.0000220)
Conventional Parameters						
Particulate Organic Carbon	NA	NA	NA	NA	0.334	0.345
Total Suspended Solids	8.40	9.80	11.0	10.6	4.05	3.52
Chlorophyll (a)	NA	NA	NA	NA	0.0023	0.0019
Field Measurements						
Conductivity (mS/cm)	0.132	0.132	NA	NA	0.552	0.524
pH (Standard Units)	8.18	7.73	NA	NA	9.40	9.19
Sample Depth (m)	0.87	0.76	0.33	0.20	0.18	0.12
Turbidity (ntu)	6.0	8.0	16	18	1.0	1.0
Water Temperature (°C)	4.0	3.7	NA	NA	22.6	22.3

Notes:

1. Samples were collected by Blasland, Bouck & Lee, Inc. and submitted to Northeast Analytical, Inc. and/or Aquatec Biological Sciences, for analysis of filtered and unfiltered PCBs, total suspended solids (TSS), particulate organic carbon (POC), and chlorophyll (a).
2. Sampling methods involved the collection of composite grab samples at each location, representative of three stations (25, 50, and 75 percent of the total river width at each location) at 50 percent of the total river depth at each station.
3. NA - Not Analyzed/Measured.
4. ND - Analyte was not detected. The number in parentheses is the associated detection limit.
5. AG - Aroclor 1260 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.

TABLE 7-1
 POST-REMOVAL CAGED MUSSEL STUDY
 COMPARISON OF MEAN TOTAL AND MEAN LIPID-NORMALIZED PCB-CONCENTRATIONS ^{1,2}

2003 ANNUAL MONITORING REPORT
 UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
 GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Sample Period Location	Number of Samples ³	Lipid (%)	Total PCB ^{4,5} (mg/kg)	Lipid-Normalized PCB ⁵ (mg/kg-lipid)
Control ^a	2	0.47	ND (<0.055)	NA
2 - Week				
Newell St.	4	0.43	0.079	18
Lyman St.	4	0.42	0.20	49
Dawes Ave.	4	0.45	0.41	90
5 - Week				
Newell St. ^b	4	0.39	0.13	34
Lyman St.	4	0.31	0.21	67
Dawes Ave.	4	0.31	0.44	142
6 - Week				
Newell St. ^c	2	0.32	0.16	53
Lyman St.	0	NA	NA	NA
Dawes Ave.	4	0.29	0.53	182
9 - Week				
Newell St.	4	0.41	0.14	40
Lyman St.	4	0.54	0.34	63
Dawes Ave. ^d	4	0.49	0.59	124
11 - Week				
Newell St.	4	0.64	0.063	9.9
Lyman St.	4	0.61	0.34	56
Dawes Ave.	2	0.66	0.50	75
13 - Week				
Newell St.	4	0.45	0.11	24
Lyman St.	4	0.38	0.25	65
Dawes Ave.	2	0.34	0.43	126

Notes:

mg/kg - milligram per kilogram (ppm - parts per million)

mg/kg - lipid - Sample PCB divided by sample percent lipid times 100 and then averaged across samples (ppm - parts per million)

ND - analyte was not detected (the detection limit is in parentheses)

NA - not applicable

1. Arithmetic mean concentrations for whole-body minus the shell mussel samples.
2. Mussels were collected from a source population in the Connecticut R. used previously by the USEPA.
3. Each whole-body composite sample consisted of four mussels, except where noted.
4. Total PCBs are based on the quantification of Aroclor concentrations.
5. Mean total PCB and lipid-normalized PCB concentrations reported on a wet-weight basis.
 - a. Both whole-body composite samples consisted of six mussels each.
 - b. One whole-body composite sample consisted of three mussels.
 - c. Both whole-body composite samples consisted of three mussels each.
 - d. One whole-body composite sample consisted of three mussels. Another whole-body composite sample

**TABLE 8-1
SUMMARY OF FUTURE POST-CONSTRUCTION MONITORING ACTIVITIES¹**

**2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS**

Monitoring Activity ²	Year to be Performed						Comments
	2004	2005	2006	2007	2008	2009	
Sediment Cap Isolation Layer							
CAP-MON-1 through CAP-MON-8	---	---	---	Year 5-7 ³	---	---	Consists of periodic sampling (i.e., one year after cap placement, and at the end of the initial five-year period after cap placement) of the isolation layer at select locations along the Upper 1/2-Mile Reach.
Armor Stone Layer	Year 2	Year 3	Year 4	Year 5	---	---	Visual inspection and photographs following first ice-out and high water condition (i.e., a flow of 440 cfs or greater) during low flow conditions (includes inspection of rip rap along toe of slope)
Aquatic Habitat Enhancement Structures	Year 2	Year 3	Year 4	Year 5	---	---	Visual inspection to be performed in the summer during a period of low-flow condition on an annual basis for five years.
Restored Sediments ⁴	---	---	---	Year 5	---	---	Sampling to consist of 39 grab samples, collected at the locations identified in the Upper 1/2-Mile Work Plan. See note 3 for additional information.
Cleared and Restored Bank Soil Areas	Year 2	Year 3	Year 4	Year 5	---	---	Visual inspection of the cleared and restored bank areas for signs of erosion after each storm and high-water event (i.e., a flow of 440 cfs or greater) on a semi-annual basis during the first year and on an annual basis in years 2 through 5.
Restored Bank Vegetation ⁵							
Planting Areas 1, 2, 3, 4A, and 5	---	Year 5	---	Year 7	---	---	Consists of 2 visits during each of the first three years after planting, and an annual visit during the fifth and seventh years after planting. In each of the first three years, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August). The single visit in the fifth and seventh year will be conducted in the summer (July/August).
Planting Areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11, and 11A	Year 3	---	Year 5	---	Year 7	---	
Planting Areas 12, 13, 14, 15, 16, and 17	Year 2	Year 3	---	Year 5	---	Year 7	
Water Column Monitoring	Year 2	Year 3	Year 4	Year 5	---	---	Consists of sampling performed three times annually (high flow, storm flow, and low flow) for the first five years at the Newell and Lyman Street sampling locations.

Notes:

1. Please refer to the *Removal Action Work Plan - Upper 1/2-Mile Reach of Housatonic River* (Upper 1/2-Mile Work Plan; BBL, August 1999) for additional details.
2. EPA and EOE A shall be notified at least one week prior to conducting monitoring activities.
EPA contact is Dean Tagliaferro: (413) 236-0969
EOEA contact is Dale Young: (413) 447-9771
GE contact is Andy Silfer: (413) 494-3561
3. To consolidate sampling efforts, GE has proposed that 5-year monitoring for all isolation layer locations be performed in 2007.
4. GE will conduct three rounds of periodic sampling of the restored sediments at five-year intervals, beginning five-years after completion of construction on the sediment removal/replacement activities. As indicated in the above table, the first sampling round will occur in 2007. The second and third round of sampling is anticipated to be performed in 2011 and 2015. Sampling shall be performed in accordance with the Upper 1/2-Mile Work Plan.
5. Unless otherwise indicated by GE, AMEC will be responsible for the coordination and performance of monitoring associated with the restored bank vegetation.

Figures



- LEGEND:**
- SEDIMENT WORK AREA
 - BANK SOIL REMOVAL AREA
 - TOP OF BANK
 - BUILDING 69 REMOVAL AREA
 - CLEARING LIMITS/PLANTING AREA
 - GOVERNMENT BARRIER LOCATION
 - LANDSCAPE SPECIES
 - VINE PATCHES
 - WOODS/SHRUBS
 - STONE/RIP-RAP
 - RED-CEDAR-DOCKWOOD
 - 4A PLANTING AREA

- NOTES:**
1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.
 2. MEAS 6A, 6B, 6C, AND 11A WERE ADDED AT THE REQUEST OF THE EDA.
 3. MAPPING IS BEST AVAILABLE INFORMATION AS OF 12/15/06 BASED ON MAPPING PROVIDED BY LOOKWOOD MAPPING, INC. PREPARED FROM 1995 AERIAL PHOTOGRAPHS DATA PROVIDED BY GENERAL ELECTRIC AND BLAIR AND BOUGH, P.C. CONSTRUCTION PLANS, REBAR AND OTHER SDC TOPOGRAPHIC INFORMATION PROVIDED BY TAYLOR BROTHERS & SONS, 1984 FIELD SURVEY.
 4. COORDINATE ORG BASED ON 1987 STATE PLAT COORDINATES.
 5. ELEVATION DATUM REFERENCED TO MGD 1988.

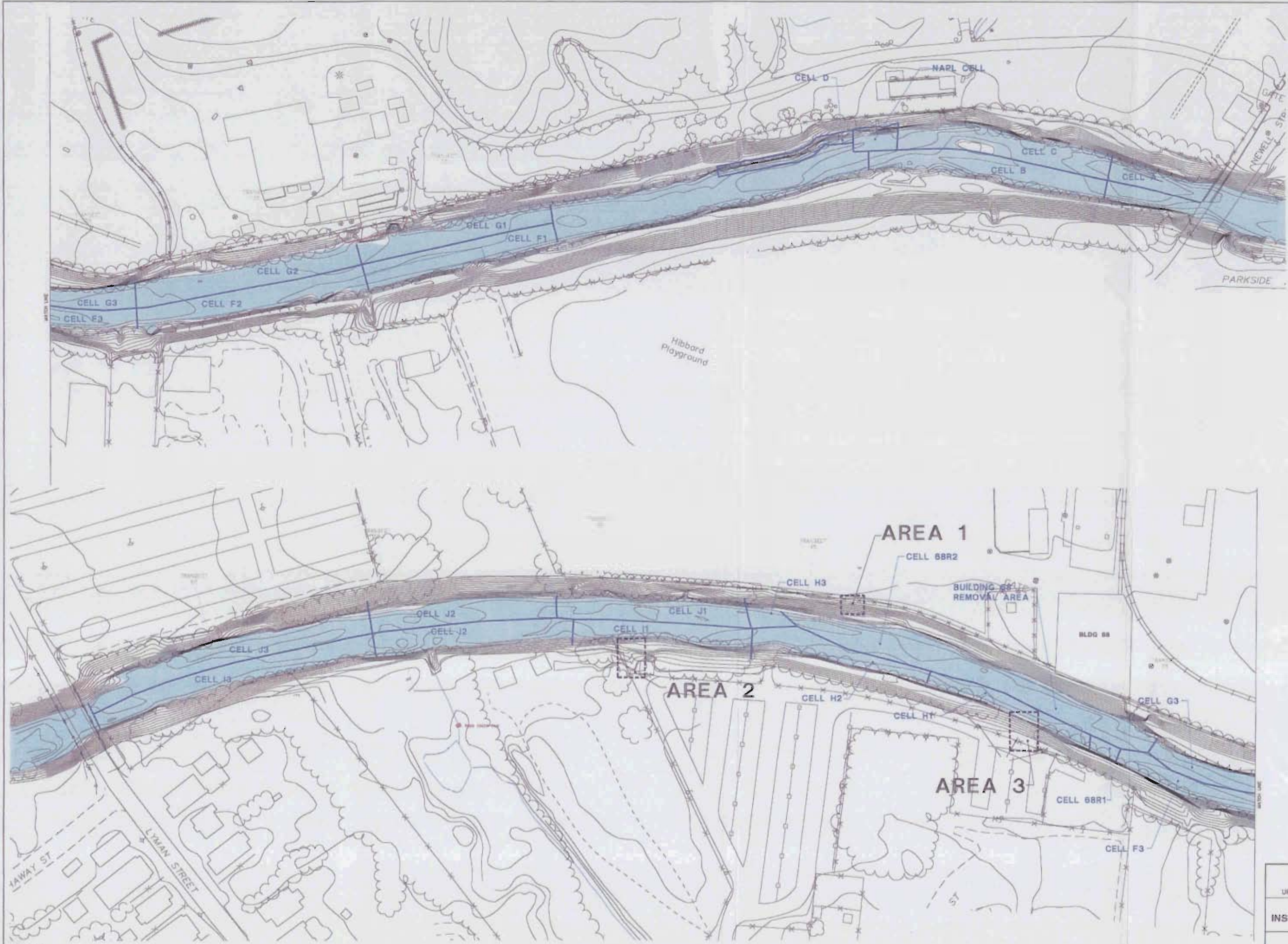
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
2006 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

RESTORED BANK PLANTING AREAS



FIGURE
2-1

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PITTSFIELD, MA
BBL ENGINEERING, INC. 100 WEST STREET, PITTSFIELD, MA 01201
TEL: 413-439-1111 FAX: 413-439-1112



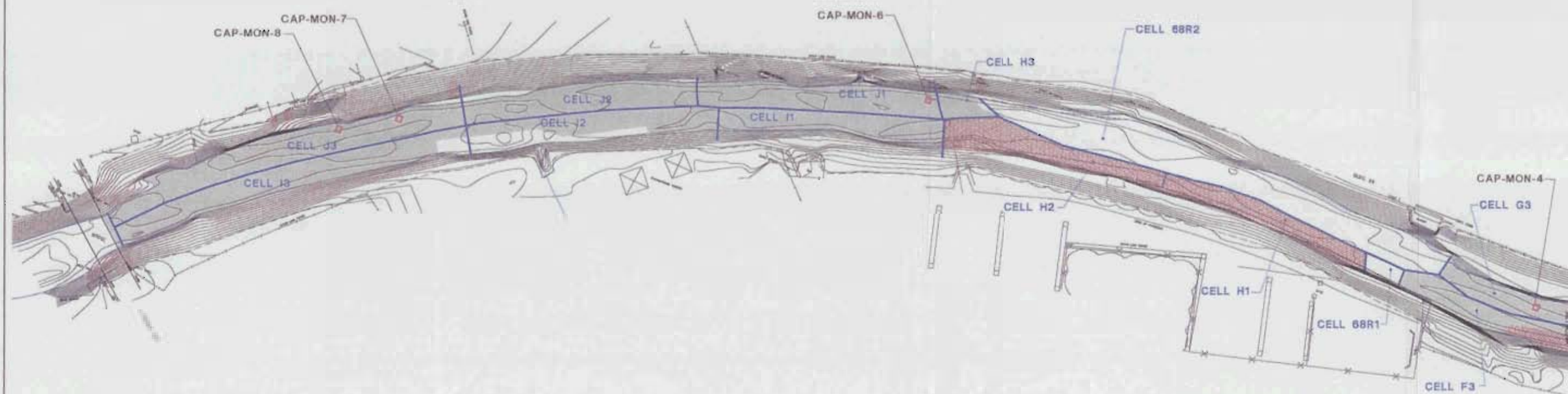
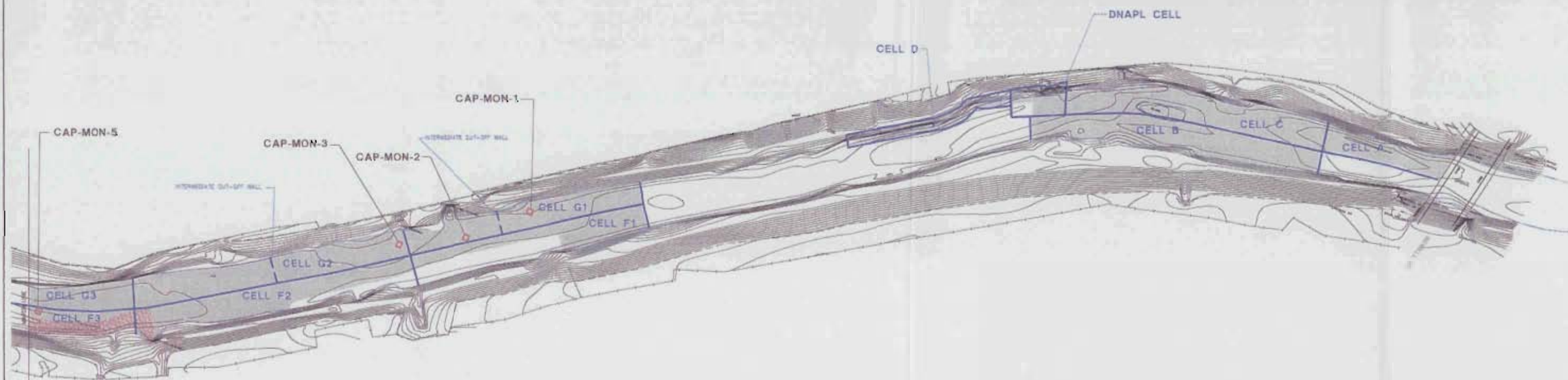
LEGEND
 TOP OF BANK
 APPROXIMATE LOCATION OF IMPACTED AREA NOTED DURING INSPECTION

NOTES
 1. ALL FEATURES AND LOCATIONS SHOWN ARE APPROXIMATE.

GENERAL ELECTRIC COMPANY
 PITTSFIELD, MASSACHUSETTS
 2003 ANNUAL MONITORING REPORT
 UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
**RESTORED BANK EROSION
 INSPECTION AND RESPONSE AREAS**



DATE: 08/08/04
 BY: [unreadable]
 CHECKED: [unreadable]
 APPROVED: [unreadable]



- LEGEND
- CAP AND ARMOR AREAS (ARMOR STONE 2100, 17')
 - CAP AND ARMOR AREAS (ARMOR STONE 2100, 17')
 - SEDIMENT CAP ISOLATION LAYER MONITORING LOCATION

- NOTES
1. ALL LOCATIONS AND DISTANCES ARE APPROXIMATE.
 2. FIGURE DEPICTS SEVERAL LOCATIONS OF MAJOR COMPONENTS OF THE HABITAT RESTORATION PLAN.
 3. BOLLARDS ARE PLACED ON TOP OF THE ARMOR LAYER AND ARE NOT ALIGNED WITH THE ARMOR LAYER.
 4. ISOLATION LAYER SAMPLE LOCATIONS IN ACCORDANCE WITH WORK PLAN OF A SELECTED SAMPLE LOCATIONS CAP-MON-2 AND CAP-MON-3.



GENERAL ELECTRIC COMPANY
 PITTSFIELD, MASSACHUSETTS
 2003 ANNUAL MONITORING REPORT
 UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

**SEDIMENT CAP ISOLATION LAYER
 SAMPLE LOCATIONS**

BBL
 BURNS, BOND & LEE, INC.
 ENGINEERS, SCIENTISTS, ARCHITECTS

FIGURE
4-1

1. DRAWING DATE
 2. DRAWING BY
 3. DRAWING CHECKED BY
 4. DRAWING APPROVED BY



- LEGEND:**
- ⊙ BIOTA MONITORING LOCATION
 - EDGE OF WATER
 - PAVED ROADWAY
 - - - UNPAVED ROADWAY OR TRAIL
 - ▬ RAILROAD
 - VEGETATION

- NOTES:**
1. THE BASE MAP FEATURES PRESENTED ON THIS FIGURE WERE PHOTOGRAMMETRICALLY MAPPED FROM APRIL 1990 AERIAL PHOTOGRAPHS, AND FROM JANUARY 1997 AND OCTOBER 1998 SURVEYS PERFORMED BY BBL.
 2. MONITORING LOCATIONS ARE APPROXIMATE.
 3. MAPPING IS BEST AVAILABLE INFORMATION AS OF 12/10/98 BASED ON MAPPING PROVIDED BY LOCKWOOD MAPPING, INC. PREPARED FROM 1990 AERIAL PHOTOGRAPHY; DATA PROVIDED BY GENERAL ELECTRIC; AND BLASLAND AND BOUCK, P.C. CONSTRUCTION PLANS, RIVERBANK AND RIVER BED TOPOGRAPHIC INFORMATION PROVIDED BBL FROM OCTOBER 12-23, 1998 FIELD SURVEY.
 4. COORDINATE GRID BASED ON 1927 STATE PLAN COORDINATES.



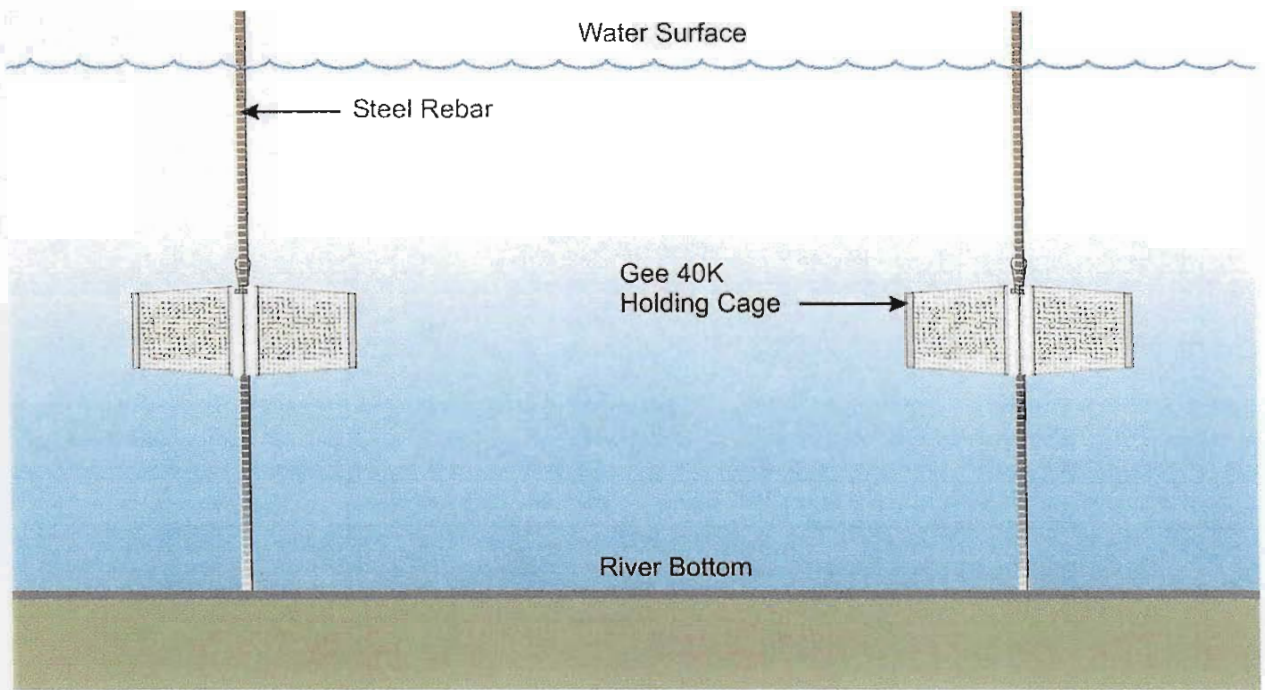
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
2003 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

BIOTA MONITORING LOCATIONS

BBL
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

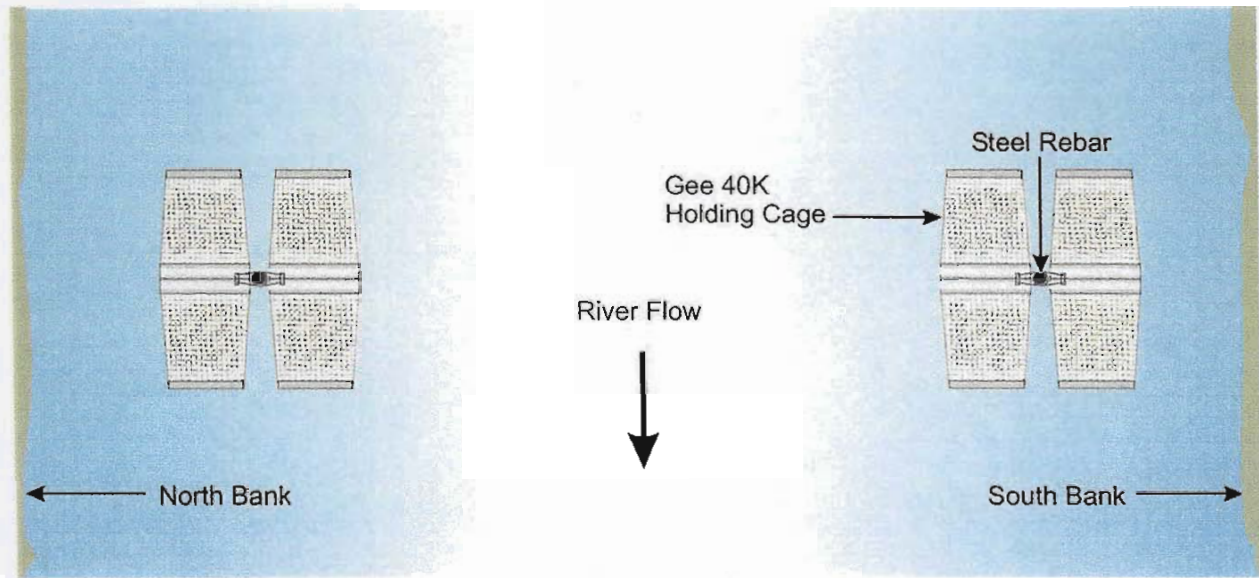
FIGURE
7-1

X: 2014002.DWG
L: 08/04 OFF=REF
P: PAGESET/PLT-DL
3/5/04 SW-BB-RJP NES LAF
N/20140001/REV=01/20140001.DWG



NOT-TO-SCALE

Elevation



NOT-TO-SCALE

Plan View

GENERAL ELECTRIC COMPANY
 PITTSFIELD, MASSACHUSETTS
 2003 ANNUAL MONITORING REPORT
 UPPER 1/2-REACH OF HOUSATONIC RIVER

MUSSEL CAGE ARRAYS



FIGURE
7-2

Attachments

Attachment A

Previously Submitted Trip Reports



Corporate Environmental Programs
General Electric Company
100 Woodlawn Avenue, Pittsfield, MA 01201

June 24, 2003

Dean Tagliaferro
On-Scene Coordinator
U.S. Environmental Protection Agency
c/o Weston Environmental Engineering
One Lyman Street
Pittsfield, MA 01201

**Re: GE Pittsfield/Housatonic River Site
Upper ½-Mile Reach Removal Action (GECD800)
Bank Erosion Inspection (Spring 2003)**

Dear Mr. Tagliaferro:

Consistent with requirements set forth in the final *Removal Action Work Plan – Upper ½-Mile Reach of Housatonic River* (Work Plan) (Blasland, Bouck & Lee, Inc. [BBL], August 1999), GE has performed monitoring activities for the restored banks of the Upper ½ Mile Reach to assess both the cleared and restored areas for evidence of erosion. This monitoring event (spring 2003) occurred on May 29, 2002 with representatives of the U.S. Environmental Protection Agency (EPA) and the US Army Corps of Engineers (USACE) and BBL. The following people performed the inspection:

- Dean Tagliaferro, EPA;
- Charlie Marney, USACE;
- Mark Graveling, BBL; and
- Bruce Eulian, BBL.

Based on discussions with EPA and USACE, this trip report has been prepared following the spring 2003 bank erosion monitoring event to allow for response activities to be performed within a reasonable time period after completion of the bank monitoring event. During the bank monitoring event two areas were identified with evidence of measurable erosion and one other impacted area requiring further action due to settlement or movement of rip rap. These three areas are shown on Exhibit A. In addition, in accordance with requirements of the Work Plan, GE must also identify, to the extent practicable, the cause of erosion, evaluate the source, dispersal, and quantity of eroded soil in the River, and where necessary and feasible, develop proposed measures for removal of the eroded material from the river. This evaluation and GE's proposed measures to replace/restore the eroded areas to the previous restoration conditions and to reduce the potential for future erosion (if appropriate) are provided below.

Areas with Measurable Erosion

During the May 29, 2003 bank inspection, a measurable loss of bank soil was noted at two areas. These areas are identified as Area 1 and Area 2 on Figure 1 and are shown in Photos 1, 2, and 3. Descriptions of the areas, along with the proposed response action, are presented below and summarized in Table 1

Area 1 – Less than 0.5 cubic yards (cy) of soil appears to have eroded into the River from the northern bank area approximately 300 feet downstream of Building 68 (see Figure 1, Photos 1 and 2). The source of eroded material was clean backfill from within the bank removal area near the top of the bank. The cause of erosion appears to be haybales placed on the storm drain grate above this area that apparently impeded and backed up the surface drainage causing it to discharge over the bank. No evidence of eroded soil was observed in the adjacent River and, therefore, no removal activities are planned at this location. To reduce potential for future erosion in this area, the haybales were removed from directly over the storm drain grate. It is not anticipated that additional erosion will occur after removal of the haybales. The bank will be restored by placing additional topsoil and seed in the upper bank area (Photo 1) and placing additional rip rap downstream of the headwall (Photo 2).

Area 2 – Less than 1 cy of soil appears to have eroded into the River from the southern bank area in the Newell Street Parking Lot Area within swale No. 11 area (see Figure 1, Photo 3). The source of eroded material was clean backfill from within the bank removal area along both sides of the swale. The cause of erosion appears to be settlement of the rip rap and soil in the center portion of the swale exposing the sides of the swale. No evidence of eroded soil was observed in the adjacent River and, therefore, no removal activities are planned at this location. To reduce potential for future erosion in this area, additional rip rap will be placed along both sides of the swale. In addition, haybales will be placed at the head of the swale to reduce water velocities entering the swale.

Other Impacted Areas

During the May 22, 2002 bank inspection, one other impacted area was noted in the Newell Street Parking Lot area within Swale No. 19 (middle swale) where some movement of rip rap had occurred. This area is identified as Area 3 on Figure 1 and shown in Photo 4. This area will be addressed by placing additional rip rap in the swale (see Table 1).

After completion of the above activities, GE will continue to conduct inspections in accordance with the requirements of the work plan which includes a second inspection to be performed in summer 2003 and annual inspections to be performed in 2004 through 2007. If signs of erosion are observed during these inspections, GE will propose measures to address the areas and minimize future erosion.

Please contact me if you have any questions.

Sincerely,

Andrew J. Silfer/dmn

Andrew T. Silfer, P.E.
GE Project Coordinator

ATS/dmn

Attachments

cc: T. Angus, MDEP
R. Bell, DEP
J. Bieke, Shea & Gardner*
M. Carroll, GE
T. Conway, EPA*
Mayor Hathaway, City of Pittsfield
C. Fredette, CDEP
R. Goff, USACE*
M. Gravelding, BBL*
S. Gutter, Sidley, Austin, Brown & Wood*
H. Inglis, EPA*
S. Messur, BBL*
K.C. Mitkevicius, USACE*
D. Young, EOEAA*
B. Olson, EPA*
S. Steenstrup, DEP*
D. Jamros, Weston*
A. Weinberg, DEP
Public Information Repositories*

(* with attachments)

Table 1

General Electric Company - Pittsfield Massachusetts
1/2-Mile Reach Removal Action Monitoring

Spring 2003 Bank Inspection Summary

Area	Description	Approximate Size	Action
Areas with Measurable Erosion			
1 - 300 feet downstream of Building 68 Area	Movement of rip rap and erosion of soil. Clean backfill area. No evidence of eroded soil in river.	<0.5 CY	Place tosoil and seed in upper bank area. Place rip rap around headwall.
2 - Newell Street Parking Lot Area/Swale No.11	Settlement of rip rap and erosion from sides of swale. Clean backfill area. No evidence of eroded soil in river.	<1 CY	Place additional rip rap along sides of swale.
Other Impacted Areas			
3 - Newell Street Parking Lot Area/Swale No.19 (middle)	Rip rap settlement /movement	~ 1 SY	Place additional rip-rap in swale.

Key:
CY = cubic yard
SY = square yard



- LEGEND:
- TOP OF BANK
 - - - - - APPROXIMATE LOCATION OF DRAINAGE/CHANNEL RESTORED IN ACCORDANCE WITH THE UPPER 1/2-MILE WORK PLAN
 - - - - - APPROXIMATE LOCATION OF DRAINAGE/CHANNEL RESTORED AT THE REQUEST OF EPA
 - - - - - APPROXIMATE LOCATION OF IMPACTED AREA NOTED DURING INSPECTION

NOTES:
 1. ALL FEATURES AND LOCATIONS SHOWN ARE APPROXIMATE.

GENERAL ELECTRIC COMPANY
 PITTSFIELD, MASSACHUSETTS
 UPPER 1/2-MILE REACH REMOVAL ACTION

**SPRING 2003 BANK
 EROSION INSPECTION**

BBL
 BARNES, BOCK & LEE, INC.
 ENGINEERS, ARCHITECTS, PLANNERS

FIGURE
1

© 2004 BBL
 ALL RIGHTS RESERVED
 10/20/04 10:00 AM
 10/20/04 10:00 AM
 10/20/04 10:00 AM



Corporate Environmental Programs
General Electric Company
100 Woodlawn Avenue, Pittsfield, MA 01201

July 25, 2003

Mr. Dean Tagliaferro
US Environmental Protection Agency
c/o Roy Weston, Inc.
One Lyman Street
Pittsfield, MA 01201

Re: Trip Report - May 2003 Vegetation Monitoring (GECD800)

Dear Mr. Tagliaferro:

Enclosed please find a memorandum representing the trip report for the May 2003 vegetation monitoring visit for the restored banks of the Upper ½ Mile Reach of the Housatonic River.

Please call me with any questions.

Yours truly,

Andrew T. Silfer, P.E.
GE Project Coordinator

ATS/dmn
Attachment

cc: T. Angus, MDEP
R. Bell, MDEP
J. Bieke, Esquire, Shea & Gardner *
M. Carroll, GE
T. Conway, EPA *
C. Fredette, CDEP
R. Goff, USACE *
M. Gravelding, BBL *
Mayor Hathaway, City of Pittsfield
H. Inglis, EPA *
D. Jamros, Weston *
S. Messur, BBL *
K. C. Mitkevicius, USACE *
D. Young, MA EOEA *
B. Olson, EPA *
S. Steenstrup, MDEP *
A. Weinberg, DEP
Public Information Repositories *

(* with attachments)

MEMORANDUM

TO: Andrew Silfer, P.E.
General Electric

FM: Charles R. Harman, P.W.S.
AMEC Earth & Environmental

CC: Mark Gravelding, P.E.
Blasland, Bouck & Lee, Inc.

SUBJ: Trip Report;
May 2003 Monitoring Visit
First ½ Mile Restoration Project, Housatonic River
Pittsfield, Massachusetts

DATE: July 25, 2003

As outlined in Section 9.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BB&L, 1999), habitat restoration activities were implemented in those areas where bank soils were excavated as part of the removal action and in areas that were cleared to allow access for the removal activities. The ecorestoration techniques outlined in the work plan are intended to restore the vegetative community in those disturbed riparian areas to a functional value that exceeds that of the riparian habitat prior to the removal action.

As part of the habitat restoration process and specified in Section 11.6.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BB&L, 1999), GE agreed to monitor those areas that were restored to ensure the success and biological integrity of the intended vegetative community. The monitoring program consists of two visits during each of the first three years after planting, and an annual visit to be conducted during the fifth year and seventh year after planting. In each of the first three years after planting, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visit in the fifth year and seventh year after planting will be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than 1/4 acre), the timing for monitoring will be restarted following actions to replant the lost trees or shrubs (except in the case where a third party is responsible for growth failure).

An annual summary monitoring report is required to be prepared documenting the results of that year's monitoring visits and the conditions of the restored areas within the Upper ½-Mile Reach. That report is to be submitted to the U.S. Environmental Protection Agency by December 15 of that year. Additionally, a trip report summarizing the findings of each monitoring visit is to be submitted following the completion of each monitoring visit.

This trip report is filed for the monitoring visit that was conducted on May 28 and 29, 2003. The results of the visit are detailed in the attached tables.

1. Charles Harman of AMEC conducted the monitoring visit for GE and Tom O'Brien was present for the NRD Trustees. Chris Frank of C. L. Frank & Associates accompanied the monitoring party as the certified arborist.
2. All areas that were planted as part of the streambank restoration were included in this monitoring event. Remedial actions have been completed. During the monitoring survey, planting areas 6, 6A, 7, 8A were inspected as one contiguous unit, as were planting areas 8, 9, 9A, 11, 11A. All other planting areas were surveyed as distinct units.
3. This is the beginning of the third year of monitoring for planting areas 1, 2, 3, 4A, and 5. This is the beginning of the second year of monitoring for planting areas 4B, 10, composite planting area 6, 6A, 7, 8A, and composite planting area 8, 9, 9A, 11, 11A. This is the first year of monitoring for planting areas 12, 13, 14, 15, 16, and 17.
4. The specific results of the monitoring visit are presented in the attached tables.
5. For canopy species, the only areas that did not meet the performance criteria were planting area 1, area 2, and area 4A. GE will review the results of the monitoring event that is planned for August 2003 and will implement any planting in the fall 2003 that is needed to meet the performance standards.
6. Protective screens were placed around the canopy specimens in the fall of 2001. These screens continue to provide good protection from herbivorous animals. Some maintenance is required to stabilize some of the screens. This action was to be undertaken by C.L. Frank & Associates prior to the August inspection.
7. For understory species, the only areas that did not meet the performance criteria were planting areas 1, 3, 4A, 4B and 5. The losses appear to be the result of herbivorous activities and a prolonged severe winter. GE will review the results of the monitoring event that is planned for August 2003 and will implement any planting in the fall 2003 that is needed to meet the performance standards.
8. Red-osier dogwoods were thin in some spots and appeared to have been impacted by herbivorous actions. GE will monitor the condition of the red-osier dogwoods in August 2002 and determine if any additional corrective actions are needed. Red-osier dogwoods will grow prolifically and the August event should indicate whether the plants have recovered from both the effects of winter and the effects of herbivory. If additional plantings are required to meet the performance standards, they will be performed in the fall. It is noted that thin performance in May followed by observations of strong growth in August has been the pattern of observation for the first two years of the monitoring program.

9. Grapevines showed improved survival over the 2002 monitoring visits. In some areas (planting area 4B), extensive patches of native grapevine are developing.
10. In most areas, herbaceous cover was slightly less than the required performance standard in all areas. No significant bare areas or patches (i.e., areas greater than 15-20 square feet) were observed in any of the planting areas. GE will monitor the condition of the herbaceous cover during the August monitoring event and if any further corrective action is needed, it will be conducted following the August monitoring event.
11. The presence of invasive plant species has been significantly reduced from last year. Locations of invasive plant species were identified and noted by C. L. Frank & Associates for further action in the near term. Invasive control activities are on going and being performed along the banks of the entire First ½ Mile Reach.

The next monitoring visit is tentatively scheduled for August 26 – 27, 2003.

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/31 2001	1	May 00	210	168	139	12	151	0	-17	a, b, c
	2	May 00	118	94	79	3	82	0	-12	d, e
	3	May 00	34	27	8	1	9	0	-18	f
	4, Cell G1	Oct 00	142	114	117	12	129	0	+15	g, h
	5	Oct 00	66	53	55	4	59	0	+6	
8/23 2001 ¹	1	May 00	210	168	71	52	123	1	-45	j, h
	2	May 00	118	94	45	22	67	0	-27	k
	3	May 00	34	27	11	2	13	0	-14	l
	4, Cell G1	Oct 00	142	114	51	55	106	41	-8	j, m
	5	Oct 00	66	53	44	16	60	3	+7	j
5/20 2002 ¹	1	May 00	210	168	139	27	166	5	-2	n
	2	May 00	118	94	69	20	89	0	-5	o
	3	May 00	34	27	22	7	29	0	+2	
	4A	Oct 00	142	114	53	23	76	3	-38	o
	4B	June 01	256	205	139	58	197	7	-8	
	10	Oct 01	126	101	120	4	124	1	+23	
	5	June 01	66	53	46	8	54	0	+1	
	6, 6A, 7, 8A	June/Oct 01	113	90	60	26	86	3	-4	o
	8, 9, 9A, 11, 11A	Oct 01	95	76	108	5	113	2	+37	p
8/13 2002 ¹	1	May 00	210	168	175	3	178	0	+10	m, n
	2	May 00	118	94	90	5	95	0	+1	
	3	May 00	34	27	25	1	26	0	-1	
	4A	Oct 00	142	114	86	2	88	0	-26	
	4B	June 01	256	205	201	1	202	0	-3	
	10	Oct 01	126	101	141	1	142	0	+41	
	5	June 01	66	53	61	3	64	0	+11	
	6, 6A, 7, 8A	June/Oct 01	113	90	102	3	105	0	+15	
	8, 9, 9A, 11, 11A	Oct 01	95	76	159	1	160	0	+84	

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/28 2003 ⁱ	1	May 00	210	168	158	1	159	0	-9	m, n
	2	May 00	118	94	84	0	84	0	-10	
	3	May 00	34	27	27	0	27	0	0	
	4A	Oct 00	142	114	89	1	90	0	-24	
	4B	June 01	256	205	217	3	220	0	+15	
	10	Oct 01	126	101	124	3	127	0	+26	
	5	June 01	66	53	52	1	53	0	0	
	6, 6A, 7, 8A	June/Oct 01	113	90	112	0	112	0	+22	
	8, 9, 9A, 11, 11A	Oct 01	95	76	163	0	163	0	+87	
	12	May/Oct 02	134	107	134	0	134	0	+27	
	13	May/Oct 02	70	56	76	0	76	0	+20	
	14	Oct 02	150	120	163	1	164	0	+44	
	15	May 02	---	---	---	---	---	---	---	---
	16	Oct 02	8	6	8	0	8	0	+2	
17	Oct 02	26	21	27	0	27	0	+6		

Notes on Canopy Surveys:

- The stressed specimens were boxelder (5) and cottonwood (2).
- Black willow and silver maple were significantly underrepresented in the count. Only 2 black willows and 7 silver maples were identified.
- Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry (*Prunus serotina*), American elm (*Ulmus americana*), black willow, and red oak (*Quercus rubra*).
- Black willow and silver maple were significantly underrepresented in the count. Only 1 black willow and 10 silver maples were identified.
- Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, red oak and black cherry.
- No black willow or silver maples were noted. Herbivory is probably the result of the loss.
- Black willow and silver maple were significantly underrepresented in the count. Only 5 black willow and 10 silver maples were identified.

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

- h. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry, American elm, black willow, red oak, and shagbark hickory (*Carya ovata*).
- i. Joint GE/Trustee monitoring event.
- j. Cottonwood and boxelder are the dominant species surviving in this area.
- k. Resprout species include black cherry, American elm, red oak, green ash (*Fraxinus pennsylvanica*), speckled alder (*Alnus rugosa*), bigtooth aspen (*Populus grandidentata*).
- l. Resprout species in this area include American elm, green ash, red oak, white willow (*Salix alba*).
- m. Resprout species in this area include red oak and American elm.
- n. Resprout observed species include black cherry and American elm.
- o. Only other resprout species was black cherry.
- p. Only other resprout species was American elm.

TABLE 2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/31 2001	1	May 00	146	117	93	4	97	0	- 20	
	2	May 00	---	---	---	---	---	---	---	a
	3	May 00	73	58	56	1	57	0	- 1	b
	4, Cell G1	Oct 00	73	58	54	8	62	0	+ 4	
	5	Oct 00	73	58	68	4	72	0	+ 14	
8/23 2001 ^e	1	May 00	146	117	59	34	93	0	- 24	c, d
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	47	2	49	2	- 9	d
	4, Cell G1	Oct 00	73	58	19	17	36	33	- 22	d
	5	Oct 00	73	58	44	19	63	7	+ 5	d
5/20 2002 ^e	1	May 00	146	117	83	34	117	10	0	f
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	26	26	52	0	-6	f
	4A	Oct 00	73	58	24	19	43	4	-15	f
	4B	June 01	219	175	99	74	173	0	-2	f
	10	Oct 01	73	58	54	20	74	0	+16	f, g
	5	June 01	73	58	33	26	59	1	+1	f
	6, 6A, 7, 8A	June/Oct 01	---	---	---	---	---	---	---	
8, 9, 9A, 11, 11A	Oct 01	73	58	46	22	68	0	+10	g	
8/13 2002 ^e	1	May 00	146	117	92	16	108	0	-9	c
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	52	2	54	0	-4	
	4A	Oct 00	73	58	37	3	40	0	-18	
	4B	June 01	219	175	167	4	171	0	-4	
	10	Oct 01	73	58	72	4	76	0	+18	
	5	June 01	73	58	62	2	64	0	+6	
	6, 6A, 7, 8A	June/Oct 01	---	---	---	---	---	---	---	
8, 9, 9A, 11, 11A	Oct 01	73	58	69	1	70	0	+12		
5/28 2003 ^e	1	May 00	146	117	94	3	97	0	-20	
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	40	1	41	0	-17	

TABLE 2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
	4A	Oct 00	73	58	45	6	51	0	-7	
	4B	June 01	219	175	148	8	156	0	-19	
	10	Oct 01	73	58	55	4	59	0	+1	
	5	June 01	73	58	49	0	49	0	-9	
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--	
	8, 9, 9A, 11, 11A	Oct 01	73	58	58	0	58	0	0	
	12	May/Oct 02	73	58	65	3	68	0	+10	
	13	May/Oct 02	73	58	65	1	66	0	+8	
	14	Oct 02	146	117	154	3	157	0	+40	
	15	May 02	---	---	---	---	---	---	---	
	16	Oct 02	---	---	---	---	---	---	---	
	17	Oct 02	---	---	---	---	---	--	---	

Notes on the Understory Surveys:

- a. No understory specimens were planted in this area.
- b. 54 understory specimens were originally planted in May 2000. An additional 18 were planted in October 2000.
- c. Overall survival of the understory species is skewed towards the plot located in the western end of Area 1. There is very good survival in that plot and very poor survival in the plot located in the eastern end of Area 1.
- d. In general, serviceberry had the poorest survival and tended to be that species with the greatest demonstrated stress.
- e. Joint GE/Trustee monitoring event.
- f. In general, winterberry hollies appeared to have begun sprouting and putting on leaves when they were hit with frost. Stress appeared to be cold induced. Also, serviceberries that were stressed in 2001 appeared to be a very good condition.
- g. One shrub clump was moved from Area 10 to Area 11 at the request of the trustees

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					> 4 foot on center	Meets target performance standard, < 4 foot on center,		
5/31 2001	1	May 00	82	66	101 (by count)	---		
	2	May 00	--	--	--	---		b
	3	May 00	11	9	13 (by count)	---		
	4, Cell G1	Oct 00	74	59	74 (by count)	---		
	5	Oct 00	--	--	--	---		b
8/23 2001 ^c	1	May 00	82	66	First 100' (Partial) Second 100' (Partial)	First 100' - 10 foot section Second 100' - 20 foot section Third 100'		
	2	May 00	--	--	---	--		b
	3	May 00	11	9	---	100%		
	4, Cell G1	Oct 00	74	59	Partial	Sparse western 50', with no specimens left last 20'		
	5	Oct 00	--	--	---	---		b
5/20 2002 ^c	1	May 00	82	66	First 100' (Partial) Second 100' (Partial) Third 100' (Partial)	First 100' - 50 foot section Second 100' - 20 foot section Third 100' - 20 foot section Fourth 100' - 100%		
	2	May 00	---	---	---	--		b
	3	May 00	11	9	Partial	50% of first 50 feet is sparse		
	4A	Oct 00	74	59		First 100' - 100% Second 100' - 100% Third 100' - 100%	Thin for entire section, water stress in some sections	

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					> 4 foot on center	Meets target performance standard, < 4 foot on center,		
	4B	June 01	134	107	First 100' (Partial) Second 100' (Partial) Third 100' (Partial)	First 100' - 20 foot section Second 100' - 20 foot section Third 100' - 20 foot section Fourth 100' - 100%		
	10	Oct 01	---	---	---	---		b
	5	June 01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	First 100' - Partial Second 100' - 100%	First 100' - missing first 30 foot section		d
	8, 9, 9A, 11, 11A	Oct 01	82	66	First 100' (Partial) Second 100' (Partial) Third 100' (Partial) Fourth 100' (Partial) Fifth 100' (Partial)		18 dead red-osier dogwoods identified over the length of this stretch	e
8/13 2002 ^c	1	May 00	82	66	First 100' - Gaps at 17' to 23' interval, 33' to 38' interval, and 61' to 69' interval Second 100' - Gaps at 7' to 10' interval Third 100' - Gap at 60 foot point	Fourth 100'		
	2	May 00	---	---	---	---	---	b
	3	May 00	11	9	Gap in the red-osier dogwood band at the 70' to 100' interval	---		
	4A	Oct 00	74	59	First 100' - Gap at the 0 to 20' interval and the 89' to 100' interval	Second 100' Third 100'	Water stress in some sections	
	4B	June 01	134	107	First 100' - Thin at 70' to 100' interval Fourth 100' - Thin at 90' point	Second 100' Third 100'		

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					> 4 foot on center	Meets target performance standard, < 4 foot on center,		
	10	Oct 01	---	---	---	---		b
	5	June 01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	---	First 100' Second 100'		d
	8, 9, 9A, 11, 11A	Oct 01	82	66	Second 100' – Missing 2 plants Fourth 100' – Missing 1 plant	First 100' Third 100' – Partial	18 dead red-osier dogwoods identified over the length of this stretch	e
5/28 2003 ^c	1	May 00	82	66	First 100' – Gaps at 30' to 40' interval, and 80' to 100' interval Second 100' – gaps at 105' to 119', 120' to 134', 135' to 200' intervals, all were cut back, some new sprouts Third 100' – plants at 201' to 280' had been topped	---	Extensive herbivorous action on the plants.	
	2	May 00	---	---	---	---		b
	3	May 00	11	9	Thin at the 24' to 50' interval, several gaps	---		
	4A	Oct 00	74	59	First 100' – Plants in 0 to 33' interval had been topped Second 100' – Plants at 170' to 200' interval were weak and stressed Third 100' – Plants at end of planting area were gone.	---		

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					> 4 foot on center	Meets target performance standard, < 4 foot on center,		
	4B	June 01	134	107	First 100' – Topped at 60 to 100' interval Second 100' – Plants all present, but indications of herbivory Third 100' – Missing plants at 211 and 285 foot points	Fourth 100' Fifth 100' Sixth 100'		
	10	Oct 01	---	---	---	---		b
	5	June 01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	---	First 100' Second 100' Third 100' Fourth 100'		d
	8, 9, 9A, 11, 11A	Oct 01	82	66	---	First 100' Second 100' Third 100' Fourth 100'		e
	12	May/Oct 02	67	54	---	First 100' Second 100' – 1 dead plant at 194' and 1 at 198'		
	13	May/Oct 02	59	47	---	Plants all present; though last three were topped		
	14	Oct 02	48	38	---	All present; 26 plants planted in right of way of which 2 were missing		
	15	May 02	10	8	---	Missing 1		
	16	Oct 02	18	14	---	Missing 1		
	17	Oct 02	27	22	---	All present		

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Notes on Red-Osier Dogwood Surveys:

- a. Based on discussions with the Trustees during the 8/23/2001 monitoring event, it was agreed that individual counts of red-osier dogwood would not be made. Instead, based on visual observation, it would be identified which parts of the bank did not meet the original planting scheme of one plant every 4 feet. If that measure were not met, then remedial plantings would be utilized to establish the red-osier dogwood to that required density.
- b. No red-osier dogwoods were planted in this area.
- c. Joint GE/Trustee monitoring event.
- d. In this sequence of areas, 57 red-osier dogwoods were planted in Area 6 and 32 red-osier dogwood were planted in Area 8A, none were planted in Areas 6A and 8A.
- e. In this sequence of areas, 6 red-osier dogwoods were planted in Area 8, 32 red-osier dogwood were planted in Area 9A, 14 red-osier dogwoods were planted in Area 11, and 30 red-osier dogwoods were planted in Area 11A.

TABLE 4

RESULTS OF GRAPE VINE MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Number of Wild Grape	Comments
					Non-stressed	Stressed	Total Vines			
5/31 2001	1	May 00	22	18	22	0	22	0	0	
8/23 2001 ^a	1	May 00	22	18	8	8	16	6	0	
5/20 2002 ^a	1	May 00	22	18	0	6	6	0	0	
	4B	June 01	22	18	0	5	5	0	0	
	9A	Oct 01	---	---	---	---	---	---	---	b
8/13 2002 ^a	1	May 00	22	18	0	0	0	0	6	
	4B	June 01	22	18	0	13	13	0	6	
	9A	Oct 01	---	---	---	---	---	---	>>18	b
5/28 2003 ^a	1	May 00	22	18	14	0	14	0	0	The number of planted grapes observed in this plot does not meet the performance criteria. No native plants observed in this plot to compensate.
	4B	June 01	22	18	9	0	9	0	1 wild plant and several plots	While the number of planted grapes plus the number of individual native grape plants noted in this planting area did not meet the performance criteria, several large plots with numerous plants did compensate for the lack of individual plants.
	12	Oct 02	22	18	13	0	13	0	3	The number of planted grapes plus the number of individual native grape plants noted in this planting area did not meet the performance criteria.
	14	Oct 02	22	18	19	0	19	0	0	Performance criteria met.

TABLE 4

RESULTS OF GRAPE VINE MONITORING SURVEYS

Notes on Grape Vine Surveys:

- a. Joint GE/Trustee monitoring event
- b. Due to limitations in stock, this area has not been planted with grape vine as scheduled.

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Comments
8/23 2001 ^a	1	May 00	100%	First 100' ~50% coverage Second 100' ~80% coverage Third 100' ~85% coverage Final 60' ~50% coverage	
	2	May 00	100%	~75% coverage	
	3	May 00	100%	~85% coverage	
	4, Cell G1	Oct 00	100%	First 100' ~45% coverage Second 100' ~75% coverage Third 100' ~85% coverage	
	5	Oct 00	100%	70% coverage	
5/20 2002 ^a	1	May 00	100%	First 100' ~85% coverage Second 100' ~90% coverage Third 100' ~90% coverage Final 60' ~80% coverage	
	2	May 00	100%	~85% coverage	
	3	May 00	100%	~85% coverage	
	4A	Oct 00	100%	First 100' ~50% coverage Second 100' ~65% coverage Third 100' ~80% coverage	
	4B	June 01	100%	First 100' ~85% coverage Second 100' ~85% coverage Third 100' ~85% coverage Fourth 100' ~75% coverage Fifth 100' ~75% coverage	
	10	Oct 01	100%	First 100' ~85% coverage Second 100' ~85% coverage	
	5	June 01	100%	~75% coverage	
	6, 6A, 7, 8A	June/ Oct 01	100%	~70% coverage	

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Comments
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' ~70% coverage Second 100' ~50% coverage Third 100' ~75% coverage Fourth 100' ~ 30% coverage	
8/13/2002 ^a	1	May 00	100%	Overall ~90% First 100' Upper bank: 0 to 33' interval ~50%; upper 67' foot ~95%; Lower bank: 0 to 35' interval ~80%; 35' to 65' interval ~95%; 80' interval ~95%; Second 100' 0 to 15' interval ~85%; 75' ~95%; Third 100' ~100% coverage Final 60' ~100% coverage	For some areas of herbaceous cover that are less than 100%, reason for lack of coverage appears to be related to dry weather and lack of rain, some areas had small patches (less than one square foot) that might be bare as a result of poor soil, only one location in the First 100 foot interval that will be handled through a response action to correct site conditions.
	2	May 00	100%	~90% coverage	Herbaceous cover in this area tends to be thinner towards the top of the slope; some of the lack of coverage appears to be because of lack of rain and poor soil. One area within this planting area should be addressed through a response action to correct the poor coverage.
	3	May 00	100%	~80% at top of slope, ~95% coverage at bottom of slope	Response actions are proposed for one segment of this planting area.
	4A	Oct 00	100%	First 100' ~75% coverage Second 100' ~75% coverage Third 100' ~75% coverage	Response actions are proposed for 4 segments of this planting area.
	4B	June 01	100%	First 100' ~85% coverage Second 100' ~93% coverage Third 100' ~100% coverage Fourth 170' ~95% coverage	Response actions are proposed for one segment of this planting area
	10	Oct 01	100%	First 100' ~95% coverage Second 100' ~90% coverage Third 100' ~ 65% coverage	Response actions are proposed for 2 segments of this planting area.

TABLE 5

RESULTS OF HERBACEOUS GROUND COVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Comments
	5	June 01	100%	-90% coverage overall; ~95% in eastern section, ~85% in the middle segment, with the western slope being thin with a lot of debris	Response actions are proposed for one segment of this planting area.
	6, 6A, 7, 8A	June/Oct 01	100%	First 100' ~85% with the top of slope being thin Second 100' ~85%	Response actions are proposed for one segment of this planting area.
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' ~90% coverage Second 100' ~65% coverage Third 100' ~90% coverage Fourth 100' ~80% coverage	Response actions are proposed for 2 segments of this planting area.
5/28 2003 ^a	1	May 00	100%	First 100' ~95% coverage Second 100' ~95% coverage Third 100' ~95% coverage Final 60' ~95% coverage	For some areas of herbaceous cover that are less than 100%, some areas had small patches (less than one square foot) that might be bare as a result of poor soil
	2	May 00	100%	~95% coverage	Herbaceous cover in this area still tends to be thinner towards the top of the slope
	3	May 00	100%	~95% coverage	Herbaceous cover shows definite improvement after response actions of previous year
	4A	Oct 00	100%	First 100' ~90% coverage Second 100' ~90% coverage Third 100' ~90% coverage	Herbaceous cover shows improvement over previous year
	4B	June 01	100%	First 100' ~90% coverage Second 100' ~90% coverage Third 100' ~95% coverage Fourth 100' ~95% coverage Fifth 100' ~100% coverage Sixth 100' 95% coverage	
	10	Oct 01	100%	First 100' ~95% coverage Second 100' ~95% coverage Third 100' ~85% coverage	
	5	June 01	100%	~95% coverage	

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Comments
	6, 6A, 7, 8A	June/ Oct 01	100%	First 100' ~95% coverage Second 100' ~95% coverage Third 100' ~95% coverage Fourth 100' ~95% coverage	
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' ~100% coverage Second 100' ~95% coverage Third 100' ~95% coverage Fourth 100' ~90% coverage	
	12	May/Oct 02	100%	First 100' ~95% coverage Second 100' ~90% coverage	
	13	May/Oct 02	100%	~95% coverage	
	14	Oct 02	100%	~95% coverage	
	15	May 02	100%	~100% coverage	
	16	Oct 02	100%	~100% coverage	
	17	Oct 02	100%	~100% coverage	

Notes on Herbaceous Coverage Surveys:

- a. Joint GE/Trustee monitoring event.

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasives)	Monitoring Results (Percent Invasives)	Primary Observed Invasive Species	Notes
8/23 2001 ^a	1	May 00	< 5%		bittersweet, purple loosestrife, common mullein, bittersweet nightshade, buckthorn	
	2	May 00	< 5%		bittersweet, buckthorn, Norway maple, winged euonymus	
	3	May 00	< 5%		bittersweet, Morrow's honeysuckle, purple loosestrife	
	4, Cell G1	Oct 00	< 5%		bittersweet, Japanese barberry, Morrow's honeysuckle, bittersweet nightshade, Norway maple, buckthorn	
	5	Oct 00	< 5%		Japanese knotweed, bittersweet, Japanese barberry, purple loosestrife	
5/20 2002 ^a	1	May 00	< 5%	First 100' <5% Second 100' <5% Third 100' <5% Final 60' <5%	buckthorn, bittersweet, Japanese barberry, garlic mustard	
	2	May 00	< 5%	Approximately 5%	bittersweet, buckthorn, Morrow's honeysuckle, Norway Maple, cypress spurge	
	3	May 00	< 5%	Approximately 10%	bittersweet, buckthorn, Morrow's honeysuckle, cypress spurge	
	4A	Oct 00	< 5%	First 100' ~15% Second 100' ~10% Third 100' <5%	burning bush, multiflora rose, Norway maple, Morrow's honeysuckle, buckthorn	
	4B	June 01	< 5%	First 100' <10% Second 100' <10% Third 100' <10% Fourth 100' 0% Fifth 100' 0%	Norway maple, bittersweet and garlic mustard	
	10	Oct 01	< 5%	<5%	None noted	
	5	June 01	< 5%	>5%	Japanese knotweed, Morrow's honeysuckle, buckthorn, bittersweet, multiflora rose	
	6, 6A, 7, 8A	June/ Oct 01	< 5%	<5%	burning bush, garlic mustard, buckthorn	

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasives)	Monitoring Results (Percent Invasives)	Primary Observed Invasive Species	Notes
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' <5% Fourth 100' <5% Fifth 100' <5%	None noted	
8/13 2002 ^a	1	May 00	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5% Final 60' ~5%	buckthorn, bittersweet, garlic mustard, purple loosestrife	
	2	May 00	< 5%	~10%	cypress spurge	
	3	May 00	< 5%	~5%	bittersweet, buckthorn, Morrow's honeysuckle, cypress spurge	
	4A	Oct 00	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5%	Morrow's honeysuckle, buckthorn, bittersweet, purple loosestrife, cypress spurge	
	4B	June 01	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5% Fourth 170' <5%	Norway maple, purple loosestrife, bittersweet and garlic mustard,	
	10	Oct 01	< 5%	~5%	Purple loosestrife	
	5	June 01	< 5%	~5%	Japanese knotweed, Morrow's honeysuckle, buckthorn, bittersweet,	
	6, 6A, 7, 8A	June/ Oct 01	< 5%	First 100' ~5% Second 100' <5%	garlic mustard, bittersweet	
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' ~5% Fourth 100' <5%	purple loosestrife, bittersweet, garlic mustard, cypress spurge	
5/28 2003 ^a	1	May 00	< 5%	First 100' ~5% Second 100' ~7% Third 100' ~5% Final 60' <5%	bittersweet, garlic mustard	

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasives)	Monitoring Results (Percent Invasives)	Primary Observed Invasive Species	Notes
	2	May 00	< 5%	~10%	cypress spurge, bittersweet, garlic mustard	
	3	May 00	< 5%	~10%	bittersweet, cypress spurge, garlic mustard	
	4A	Oct 00	< 5%	First 100' ~10% Second 100' ~7% Third 100' <5%	bittersweet, cypress spurge, garlic mustard	
	4B	June 01	< 5%	First 100' ~10% Second 100' ~7% Third 100' <5% Fourth 170' <5% Fifth 100' <5% Sixth 100' <5%	bittersweet and garlic mustard	
	10	Oct 01	< 5%	First 100' <5% Second 100' >5% Third 100' ~5%	bittersweet and garlic mustard	
	5	June 01	< 5%	~7%	Japanese knotweed, Morrow's honeysuckle, barberry, bittersweet	
	6, 6A, 7, 8A	June/Oct 01	< 5%	First 100' ~5% Second 100' <5% Third 100' ~5% Fourth 100' ~5%	garlic mustard, bittersweet	
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' >5% Third 100' >5% Fourth 100' >5%	bittersweet, garlic mustard, cypress spurge	
	12	May/Oct 02	< 5%	First 100' <5% Second 100' >5%	garlic mustard, bittersweet	
	13	May/Oct 02	< 5%	>5%	garlic mustard, bittersweet	
	14	Oct 02	< 5%	<5%	garlic mustard, bittersweet	
	15	May 02	< 5%	>5%	garlic mustard, bittersweet	
	16	Oct 02	< 5%	>5%	garlic mustard, bittersweet	

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasives)	Monitoring Results (Percent Invasives)	Primary Observed Invasive Species	Notes
	17	Oct 02	< 5%	>5%	garlic mustard, bittersweet	



Corporate Environmental Programs
General Electric Company
100 Woodlawn Avenue, Pittsfield, MA 01201

November 24, 2003

Mr. Dean Tagliaferro
US Environmental Protection Agency
c/o Roy Weston, Inc.
One Lyman Street
Pittsfield, MA 01201

Re: Trip Report - September 2003 Vegetation Monitoring (GECD800)

Dear Mr. Tagliaferro:

Enclosed please find a memorandum representing the trip report for the September 2003 vegetation monitoring visit for the restored banks of the Upper ½ Mile Reach of the Housatonic River.

Please call me with any questions.

Yours truly,

Andrew T. Silfer, P.E.
GE Project Coordinator

ATS/dmn
Attachment

cc: T. Angus, MDEP
R. Bell, DEP
J. Bieke, Shea & Gardner
M. Carroll, GE
T. Conway, EPA
Mayor Hathaway, City of Pittsfield
S. Peterson, CDEP
R. Goff, USACE
M. Graveling, BBL
H. Inglis, EPA
S. Messur, BBL
K.C. Mitkevicius, USACE
D. Young, EOE
B. Olson, EPA
S. Steenstrup, DEP
D. Jamros, Weston
A. Symington, DEP
Public Information Repositories

MEMORANDUM

TO: Andrew Silfer, P.E.
General Electric

FM: Charles R. Harman, P.W.S.
AMEC Earth & Environmental

CC: Mark Gravelding, P.E.
Blasland, Bouck & Lee, Inc.

SUBJ: Final Trip Report;
Sept 2003 Monitoring Visit
First ½ Mile Restoration Project, Housatonic River
Pittsfield, Massachusetts

DATE: November 24, 2003

As outlined in Section 9.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BB&L, 1999), habitat restoration activities were implemented in those areas where bank soils were excavated as part of the removal action and in areas that were cleared to allow access for the removal activities. The ecorestoration techniques outlined in the work plan are intended to restore the vegetative community in those disturbed riparian areas to a functional value that exceeds that of the riparian habitat prior to the removal action.

As part of the habitat restoration process and specified in Section 11.6.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BB&L, 1999), GE agreed to monitor those areas that were restored to ensure the success and biological integrity of the intended vegetative community. The monitoring program consists of two visits during each of the first three years after planting, and an annual visit to be conducted during the fifth year and seventh year after planting. In each of the first three years after planting, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visit in the fifth year and seventh year after planting will be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than 1/4 acre), the timing for monitoring will be restarted following actions to replant the lost trees or shrubs (except in the case where a third party is responsible for growth failure).

An annual summary monitoring report is required to be prepared documenting the results of that year's monitoring visits and the conditions of the restored areas within the Upper ½-Mile Reach. That report is to be submitted to the U.S. Environmental Protection Agency by January 31 of the following year. Additionally, a trip report summarizing the findings of each monitoring visit is to be submitted following the completion of each monitoring visit.

In addition to the vegetative survey, monitoring inspections of the aquatic habitat structures and the condition of the armor stone layer were conducted. The inspection of the aquatic habitat structures consisted of a walking survey to physically observe the condition of each of the structures and the inspection of the armor stone layer consisted of visual observations for evidence of erosion.

This trip report is filed for the monitoring visit that was conducted on September 10, 11, and 12, 2003. As noted above, the summer monitoring visit was originally planned for the July/August timeframe. However, due to travel conflicts with USEPA's contractor, Woodlot Alternatives, the visit was postponed until September. Both GE and the USEPA contractor agreed that the summer monitoring results would not be affected by conducting the site visit in early September rather than late August. The USEPA and the Trustees were apprised of the need for the schedule change and approved the modification of the timing. The results of the visit are detailed in the attached tables.

1. Charles Harman of AMEC conducted the monitoring visit for GE. Michael Cheiminski from Woodlot Alternatives was present representing the USEPA during the aquatic habitat structures survey conducted on September 10, 2003. Bill Stack from Woodlot Alternatives was present representing the USEPA during the streambank vegetation monitoring survey conducted on September 11 and 12, 2003. Chris Frank of C. L. Frank & Associates accompanied the streambank monitoring party as the certified arborist.
2. The structures installed within the Housatonic River for aquatic habitat enhancement were assessed by walking the length of the first ½ mile and visually examining each of the aquatic habitat structures. The majority of the structures were performing the functions of habitat enhancement and evidence of erosion of the armor stone layer was not observed. One of the boulders next to the island in Cell C is almost entirely under sediment. However, there is little option for correcting that, and the placement of the boulder in the downstream wash of other boulders would only result in further sedimentation. Other than that, all of the aquatic structures looked in good shape and were providing habitat enhancement functions. Continued monitoring of the aquatic habitat is recommended to assure that target restoration objectives are achieved.
3. It did appear that the USEPA's damming of the river downstream at the Elm Street Bridge is resulting in an upstream ponding effect, as the water was definitely higher in the downstream reaches of the river than noted in past years. It did make finding the structures in that area difficult. The result of the high water was that the habitat structures in the lower reach of the first ½ mile were not necessarily performing the intended functions of providing breakwaters in the river current, however, when the river elevation is returned to a more normal level it is anticipated that the structures will function as designed.
4. This monitoring event examined all planting areas that were scheduled to be addressed as part of the streambank restoration. During the monitoring survey,

planting areas 6, 6A, 7, 8A were inspected as one contiguous unit, as were planting areas 8, 9, 9A, 11, 11A. All other planting areas were surveyed as distinct units.

5. This is the beginning of the third year of monitoring for planting areas 1, 2, 3, 4A, and 5. This is the beginning of the second year of monitoring for planting areas 4B, 10, composite planting area 6, 6A, 7, 8A, and composite planting area 8, 9, 9A, 11, 11A. This is the first year of monitoring for planting areas 12, 13, 14, 15, 16, and 17.
6. The specific results of the monitoring visit are presented in the attached tables.
7. Older planting areas, such as planting area 1, show a good establishment of the planting species. The box elders in particular have increased in size to 15 to 20 feet in height, with strong growth in other planting canopy and subcanopy specimens. There is a distinct difference between those planting areas that are three years old, versus two years, versus one year.
8. For canopy species, the only areas that did not meet the performance criteria were planting area 2, area 4A, and area 5. GE implemented remedial activities to correct the variances (*e.g.*, planting of canopy specimens) in October 2003. Box elders were planted to raise the number of plants in planting areas with variances to a 90% survival rate. The following number of plants were installed:

Planting area 2	30 canopy specimens
Planting area 4a	33 canopy specimens
Planting area 5	10 canopy specimens
9. Tree wire cages were placed around the canopy specimens in the fall of 2001. These cages continue to provide good protection from herbivorous animals. Ongoing maintenance by C.L. Frank & Associates has been required to stabilize some of the cages.
10. The planting areas with negative variances in the understory (does not meet the performance standard) were planting areas 1, 3, 4A, 4B, 5, the composite group of 8, 9, 9A, 11, and 11; and area 12. Planting areas 3, 4A, and 12 only needed 4 shrubs each to come up to the performance standard. GE implemented remedial activities to correct the variances (*e.g.*, planting of understory specimens) in October 2003. Silky dogwoods were planted to raise the number of plants in planting areas with variances to a 90% survival rate. The following number of plants were installed:

Planting area 1	36 understory specimens
Planting area 3	12 understory specimens
Planting area 4a	12 understory specimens
Planting area 4b	34 understory specimens
Planting area 5	21 understory specimens

Planting area 11	19 understory specimens
Planting area 12	12 understory specimens

11. Red-osier dogwoods were thin in some spots and appeared to have been impacted by herbivorous actions. Only planting areas 1 and 12 did not meet the performance standard. One plant is needed to address the variance in area 1 and 7 plants are necessary to address the variance in area 12. GE implemented remedial activities to correct the variances (*e.g.*, planting of red-osier dogwood) in October 2003. Red-osier dogwoods were planted to raise the number of plants in planting areas with variances to a 90% survival rate. The following number of plants were installed:

Planting area 1	9 red-osier dogwood specimens
Planting area 12	13 red-osier dogwood

12. There are only two patches of planted grapevine that can be compared between 2002 and 2003 (*i.e.*, planting areas 1 and 4B). Compared to the 2002 results, survivorship increased in planting area 1 and decreased in planting area 4B. In some areas, extensive patches of native grapevine are developing. Continued monitoring of the grape patches will occur to see if sufficient recruitment of wild grape vines continues to compensate for any lack of success with the planted grape vines.
13. In most areas, herbaceous cover was slightly less than the required performance standard. No significant bare areas or patches (*i.e.*, areas greater than 15-20 square feet) were observed in the planting areas, with the exception of planting areas 2, 3, 4A, composite area 6, 6A, 7, 8A, and planting area 14. The areas that are bare appear to be that way as a result of poor soil. A heavy mulch/compost/organic soil mixture has been placed over these areas at a thickness ranging from two to four inches (averaging about three inches). This material will act as a mechanism to increase the organic content in this soil and to allow for natural succession to increase the herbaceous community in these areas. These areas were not seeded due to the lateness in the year. It is believed that natural seeding in the spring will be a sufficient vector for reestablishing the herbaceous communities. The need for supplemental reseeding will be evaluated pending the completion of the summer monitoring activities in 2004.
14. The presence of invasive plant species has been significantly reduced from last year. Locations of invasive plant species were identified and noted by C. L. Frank & Associates for further action in the near term. Invasive control activities are on going and being performed along the banks of the entire First ½ Mile Reach.

The next monitoring visit is tentatively scheduled for May 2004. As per the monitoring schedule, planting areas 1, 2, 3, 4A, and 5 will not be quantitatively monitored in 2004. Instead, the next inspection to ascertain conformance with the performance criteria for these areas is July/August 2005.

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/31 2001	1	May 00	210	168	139	12	151	0	-17	a, b, c
	2	May 00	118	94	79	3	82	0	-12	d, e
	3	May 00	34	27	8	1	9	0	-18	f
	4, Cell G1	Oct 00	142	114	117	12	129	0	+15	g, h
	5	Oct 00	66	53	55	4	59	0	+6	
8/23 2001	1	May 00	210	168	71	52	123	1	-45	j, h
	2	May 00	118	94	45	22	67	0	-27	k
	3	May 00	34	27	11	2	13	0	-14	l
	4, Cell G1	Oct 00	142	114	51	55	106	41	-8	j, m
	5	Oct 00	66	53	44	16	60	3	+7	j
5/20 2002	1	May 00	210	168	139	27	166	5	-2	n
	2	May 00	118	94	69	20	89	0	-5	o
	3	May 00	34	27	22	7	29	0	+2	
	4A	Oct 00	142	114	53	23	76	3	-38	o
	4B	June 01	256	205	139	58	197	7	-8	
	10	Oct 01	126	101	120	4	124	1	+23	
	5	June 01	66	53	46	8	54	0	+1	
	6, 6A, 7, 8A	June/Oct 01	113	90	60	26	86	3	-4	o
	8, 9, 9A, 11, 11A	Oct 01	95	76	108	5	113	2	+37	p
8/13 2002	1	May 00	210	168	175	3	178	0	+10	m, n
	2	May 00	118	94	90	5	95	0	+1	
	3	May 00	34	27	25	1	26	0	-1	
	4A	Oct 00	142	114	86	2	88	0	-26	
	4B	June 01	256	205	201	1	202	0	-3	
	10	Oct 01	126	101	141	1	142	0	+41	
	5	June 01	66	53	61	3	64	0	+11	
	6, 6A, 7, 8A	June/Oct 01	113	90	102	3	105	0	+15	
8, 9, 9A, 11, 11A	Oct 01	95	76	159	1	160	0	+84		

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes	
					Non-stressed	Stressed	Total				
5/28/ 2003 ⁱ	1	May 00	210	168	158	11	159	0	-9	m, n	
	2	May 00	118	94	84	0	84	0	-10		
	3	May 00	34	27	27	0	27	0	0		
	4A	Oct 00	142	114	89	1	90	0	-24		
	4B	June 01	256	205	217	3	220	0	+15		
	10	Oct 01	126	101	124	3	127	0	+26		
	5	June 01	66	53	52	1	53	0	0		
	6, 6A, 7, 8A	June/Oct 01	113	90	112	0	112	0	+22		
	8, 9, 9A, 11, 11A	Oct 01	95	76	163	0	163	0	+87		
	12	May/Oct 02	134	107	134	0	134	0	+27		
	13	May/Oct 02	70	56	76	0	76	0	+20		
	14	Oct 02	150	120	163	1	164	0	+44		
	15	May 02	---	---	---	---	---	---	---		
	16	Oct 02	8	6	8	0	8	0	+2		
	17	Oct 02	26	21	27	0	27	0	+6		
	9/11/ 2003 ⁱ	1	May 00	210	168	176	15	191	0	+23	m, n
		2	May 00	118	94	76	0	76	0	-18	
3		May 00	34	27	27	0	27	0	0		
4A		Oct 00	142	114	92	3	95	0	-19		
4B		June 01	256	205	243	0	243	0	+38		
10		Oct 01	126	101	115	12	127	0	+26		
5		June 01	66	53	50	1	51	0	-2		
6, 6A, 7, 8A		June/Oct 01	113	90	136	0	136	0	+46		
8, 9, 9A, 11, 11A		Oct 01	95	76	103	0	103	0	+27		
12		May/Oct 02	134	107	141	0	141	0	+34		
13		May/Oct 02	70	56	71	0	71	0	+15		
14		Oct 02	150	120	138	6	144	0	+24		
15		May 02	---	---	---	---	---	---	---		
16		Oct 02	8	6	8	0	8	0	+2		

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
	17	Oct 02	26	21	25	0	25	0	+4	

Notes on Canopy Surveys:

- a. The stressed specimens were boxelder (5) and cottonwood (2).
- b. Black willow and silver maple were significantly underrepresented in the count. Only 2 black willows and 7 silver maples were identified.
- c. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry (*Prunus serotina*), American elm (*Ulmus americana*), black willow, and red oak (*Quercus rubra*).
- d. Black willow and silver maple were significantly underrepresented in the count. Only 1 black willow and 10 silver maples were identified.
- e. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, red oak and black cherry.
- f. No black willow or silver maples were noted. Herbivory is probably the result of the loss.
- g. Black willow and silver maple were significantly underrepresented in the count. Only 5 black willow and 10 silver maples were identified.
- h. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry, American elm, black willow, red oak, and shagbark hickory (*Carya ovata*).
- i. Joint GE/Trustee monitoring event.
- j. Cottonwood and boxelder are the dominant species surviving in this area.
- k. Resprout species include black cherry, American elm, red oak, green ash (*Fraxinus pennsylvanica*), speckled alder (*Alnus rugosa*), bigtooth aspen (*Populus grandidentata*).
- l. Resprout species in this area include American elm, green ash, red oak, white willow (*Salix alba*).
- m. Resprout species in this area include red oak and American elm.
- n. Resprout observed species include black cherry and American elm.
- o. Only other resprout species was black cherry.
- p. Only other resprout species was American elm.

TABLE 2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/31 2001	1	May 00	146	117	93	4	97	0	-20	
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	56	1	57	0	-1	a
	4, Cell G1	Oct 00	73	58	54	8	62	0	+4	b
	5	Oct 00	73	58	68	4	72	0	+14	
8/23 2001 ^e	1	May 00	146	117	59	34	93	0	-24	c, d
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	47	2	49	2	-9	d
	4, Cell G1	Oct 00	73	58	19	17	36	33	-22	d
	5	Oct 00	73	58	44	19	63	7	+5	d
5/20 2002 ^e	1	May 00	146	117	83	34	117	10	0	f
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	26	26	52	0	-6	f
	4A	Oct 00	73	58	24	19	43	4	-15	f
	4B	June 01	219	175	99	74	173	0	-2	f
	10	Oct 01	73	58	54	20	74	0	+16	f, g
	5	June 01	73	58	33	26	59	1	+1	f
	6, 6A, 7, 8A	June/Oct 01	---	---	---	---	---	---	---	
8/13 2002 ^e	8, 9, 9A, 11, 11A	Oct 01	73	58	46	22	68	0	+10	g
	1	May 00	146	117	92	16	108	0	-9	c
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	52	2	54	0	-4	
	4A	Oct 00	73	58	37	3	40	0	-18	
	4B	June 01	219	175	167	4	171	0	-4	
	10	Oct 01	73	58	72	4	76	0	+18	
	5	June 01	73	58	62	2	64	0	+6	
5/28 2003 ^e	6, 6A, 7, 8A	June/Oct 01	---	---	---	---	---	---	---	
	8, 9, 9A, 11, 11A	Oct 01	73	58	69	1	70	0	-12	
	1	May 00	146	117	94	3	97	0	-20	
	2	May 00	---	---	---	---	---	---	---	
	3	May 00	73	58	40	1	41	0	-17	

TABLE 2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
	4A	Oct 00	73	58	45	6	51	0	-7	
	4B	June 01	219	175	148	8	156	0	-19	
	10	Oct 01	73	58	55	4	59	0	+1	
	5	June 01	73	58	49	0	49	0	-9	
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--	
	8, 9, 9A, 11, 11A	Oct 01	73	58	58	0	58	0	0	
	12	May/Oct 02	73	58	65	3	68	0	+10	
	13	May/Oct 02	73	58	65	1	66	0	+8	
	14	Oct 02	146	117	154	3	157	0	+40	
	15	May 02	---	---	---	---	---	---	---	
	16	Oct 02	---	---	---	---	---	---	---	
	17	Oct 02	---	---	---	---	---	---	---	
9/12/2003*	1	May 00	146	117	95	0	95	0	-22	
	2	May 00	---	--	---	---	---	---	---	
	3	May 00	73	58	53	1	54	0	-4	
	4A	Oct 00	73	58	52	2	54	0	-4	
	4B	June 01	219	175	161	2	163	0	-12	
	10	Oct 01	73	58	56	3	59	0	+1	
	5	June 01	73	58	45	0	45	0	-13	
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--	
	8, 9, 9A, 11, 11A	Oct 01	73	58	47	0	47	0	-11	
	12	May/Oct 02	73	58	54	0	54	0	-4	
	13	May/Oct 02	73	58	67	1	68	0	+10	
	14	Oct 02	146	117	148	0	148	0	+31	
	15	May 02	---	---	---	---	---	---	---	
	16	Oct 02	---	---	---	---	---	---	---	

TABLE 2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
	17	Oct 02	---	---	---	---	---	--	---	

Notes on the Understory Surveys:

- a. No understory specimens were planted in this area.
- b. 54 understory specimens were originally planted in May 2000. An additional 18 were planted in October 2000.
- c. Overall survival of the understory species is skewed towards the plot located in the western end of Area 1. There is very good survival in that plot and very poor survival in the plot located in the eastern end of Area 1.
- d. In general, serviceberry had the poorest survival and tended to be that species with the greatest demonstrated stress.
- e. Joint GE/Trustee monitoring event.
- f. In general, winterberry hollies appeared to have begun sprouting and putting on leaves when they were hit with frost. Stress appeared to be cold induced. Also, serviceberries that were stressed in 2001 appeared to be a very good condition.
- g. One shrub clump was moved from Area 10 to Area 11 at the request of the trustees

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard, < 4 foot on center,		
5/31/2001	1	May 00	82	66	101 (by count)	---		
	2	May 00	--	--	--	---		
	3	May 00	11	9	13 (by count)	---		b
	4, Cell G1	Oct 00	74	59	74 (by count)	---		
	5	Oct 00	--	--	--	---		b
8/23/2001 ^c	1	May 00	82	66	First 100' (Partial) Second 100' (Partial)	First 100' - 10 foot section Second 100' - 20 foot section Third 100'		
	2	May 00	--	--	---	---		
	3	May 00	11	9	---	100%		b
	4, Cell G1	Oct 00	74	59	Partial	Sparse western 50', with no specimens left last 20'		
	5	Oct 00	--	--	---	---		b
5/20/2002 ^c	1	May 00	82	66	First 100' (Partial) Second 100' (Partial) Third 100' (Partial)	First 100' - 50 foot section Second 100' - 20 foot section Third 100' - 20 foot section Fourth 100' - 100%		
	2	May 00	---	---	---	---		b
	3	May 00	11	9	Partial	50% of first 50 feet is sparse		
	4A	Oct 00	74	59		First 100' - 100% Second 100' - 100% Third 100' - 100%	Thin for entire section, water stress in some sections	

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard, < 4 foot on center,		
	4B	June 01	134	107	First 100' (Partial) Second 100' (Partial) Third 100' (Partial)	First 100' - 20 foot section Second 100' - 20 foot section Third 100' - 20 foot section Fourth 100' - 100%		
	10	Oct 01	---	---	---	---		
	5	June 01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	First 100' - Partial Second 100' - 100%	First 100' - missing first 30 foot section		b d
	8, 9, 9A, 11, 11A	Oct 01	82	66	First 100' (Partial) Second 100' (Partial) Third 100' (Partial) Fourth 100' (Partial) Fifth 100' (Partial)		18 dead red-osier dogwoods identified over the length of this stretch	e
8/13/ 2002 ^c	1	May 00	82	66	First 100' - Gaps at 17' to 23' interval, 33' to 38' interval, and 61' to 69' interval Second 100' - Gaps at 7' to 10' interval Third 100' - Gap at 60 foot point	Fourth 100'		
	2	May 00	---	---	---	---		b
	3	May 00	11	9	Gap in the red-osier dogwood band at the 70' to 100' interval	---		
	4A	Oct 00	74	59	First 100' - Gap at the 0 to 20' interval and the 89' to 100' interval	Second 100' Third 100'	Water stress in some sections	
	4B	June 01	134	107	First 100' - Thin at 50' to 100' interval Fourth 100' - Thin at 90' point	Second 100' Third 100'		

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard, < 4 foot on center,		
	10	Oct 01	---	---	---	---		b
	5	June 01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	---	First 100' Second 100'		d
	8, 9, 9A, 11, 11A	Oct 01	82	66	Second 100' - Missing 2 plants Fourth 100' - Missing 1 plant	First 100' Third 100' - Partial	18 dead red-osier dogwoods identified over the length of this stretch	e
5/28/2003 ^c	1	May 00	82	66	First 100' - Gaps at 30' to 40' interval, and 80' to 100' interval Second 100' - gaps at 105' to 119', 120' to 134', 135' to 200' intervals, all were cut back, some new sprouts Third 100' - plants at 201' to 280' had been topped	---	Extensive herbivorous action on the plants.	
	2	May 00	---	---	---	---		b
	3	May 00	11	9	Thin at the 24' to 50' interval, several gaps	---		
	4A	Oct 00	74	59	First 100' - Plants in 0 to 33' interval had been topped Second 100' - Plants at 170' to 200' interval were weak and stressed Third 100' - Plants at end of planting area were gone	---		

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard, < 4 foot on center,		
	4B	June 01	134	107	First 100' - Topped at 60 to 100' interval Second 100' - Plants all present, but indications of herbivory Third 100' - Missing plants at 211 and 285 foot points	Fourth 100' Fifth 100' Sixth 100'		
	10	Oct 01	---	---	---	---		b
	5	June 01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	---	First 100' Second 100' Third 100' Fourth 100'		d
	8, 9, 9A, 11, 11A	Oct 01	82	66	---	First 100' Second 100' Third 100' Fourth 100'		e
	12	May/Oct 02	67	54	---	First 100' Second 100' - 1 dead plant at 194' and 1 at 198'		
	13	May/Oct 02	59	47	---	Plants all present, though last three were topped		
	14	Oct 02	48	38	---	All present, 26 plants planted in right of way of which 2 were missing		
	15	May 02	10	8	---	Missing 1		
	16	Oct 02	18	14	---	Missing 1		
	17	Oct 02	27	22	---	All present		

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard, < 4 foot on center,		
9/12/2003 ^c	1	May 00	82	66	First 100' – Gaps at 28' to 39' interval, and 81' to 85' interval; Second 100' – gaps at 117' to 131'; Third 100' – Gaps at 232', 250' to 262', and 275' to 300'	---	A total of 17 RO dogwood missing, need 1 plant to meet performance standard	
	2	May 00	---	---	---	---		b
	3	May 00	11	9	---	All present		
	4A	Oct 00	74	59	First 100' – Gaps at 18' to 33'; Second 100' – Gaps at 176' to 181';	---	A total of 5 RO dogwoods missing from planting area, meets performance standard	
	4B	June 01	134	107	First 100' – Gap at 69' to 75'; Sixth 100' – Gap at 547' to 555'	Second 100' Fourth 100' Fifth 100'	A total of 4 RO dogwood missing from planting area, meets performance standard	
	10	Oct 01	---	---	---	---		b
	5	June 01	---	---	---	---		b
	6, 6A, 7, 8A	June/Oct 01	89	71	---	First 100' Second 100' Third 100'		d
	8, 9, 9A, 11, 11A	Oct 01	82	66	First 100' – Gaps at 0' to 4' and 60' to 65'; Second 100' – Gap at 177' to 181' Third 100' – Missing 1	---	A total of 4 RO dogwoods missing from planting area, meets performance standard	e

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count ^a		Comments	Notes
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard, < 4 foot on center,		
12		May/Oct 02	67	54	First 100' – Gap at 20' to 25'; Second 100' – Gap at 196' to 200' Third 100' – Gaps at 200' to 242' and 271' to 300'	---	A total of 20 RO dogwoods missing from planting area, does not meet performance standard, 7 plants needed to meet the performance standard	
13		May/Oct 02	59	47	---	Missing one plant	Meets performance standard	
14		Oct 02	48	38	---	Missing one plant	Meets performance standard	
15		May 02	10	8	---	Missing two plants	Meets performance standard	
16		Oct 02	18	14	---	Missing one plant	Meets performance standard	
17		Oct 02	27	22	---	All present	Meets performance standard	

Notes on Red-Osier Dogwood Surveys:

- a. Based on discussions with the Trustees during the 8/23/2001 monitoring event, it was agreed that individual counts of red-osier dogwood would not be made. Instead, based on visual observation, it would be identified which parts of the bank did not meet the original planting scheme of one plant every 4 feet. If that measure were not met, then remedial plantings would be utilized to establish the red-osier dogwood to that required density.
- b. No red-osier dogwoods were planted in this area.
- c. Joint GE/Trustee monitoring event.
- d. In this sequence of areas, 57 red-osier dogwoods were planted in Area 6 and 32 red-osier dogwood were planted in Area 8A, none were planted in Areas 6A and 8A.

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

- e. In this sequence of areas, 6 red-osier dogwoods were planted in Area 8, 32 red-osier dogwood were planted in Area 9A, 14 red-osier dogwoods were planted in Area 11, and 30 red-osier dogwoods were planted in Area 11A.

TABLE 4

RESULTS OF GRAPE VINE MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Wild Grapes or Grape Patches	Comments
					Non-stressed	Stressed	Total Vines			
5/31/2001	1	May 00	22	18	22	0	22	0	0	
8/23/2001 ^a	1	May 00	22	18	8	8	16	6	0	
5/20/2002 ^a	1	May 00	22	18	0	6	6	0	0	
	4B	June 01	22	18	0	5	5	0	0	
	9A	Oct 01	---	---	---	---	---	---	---	b
8/13/2002 ^a	1	May 00	22	18	0	0	0	0	6	
	4B	June 01	22	18	0	13	13	0	6	
	9A	Oct 01	---	---	---	---	---	---	>>18	b
5/28/2003 ^a	1	May 00	22	18	14	0	14	0	0	The number of planted grapes observed in this plot does not meet the performance criteria. No native plants observed in this plot to compensate.
	4B	June 01	22	18	9	0	9	0	1 wild plant and several plots	While the number of planted grapes plus the number of individual native grape plants noted in this planting area did not meet the performance criteria, several large plots with numerous plants did compensate for the lack of individual plants.
	12	Oct 02	22	18	13	0	13	0	3	The number of planted grapes plus the number of individual native grape plants noted in this planting area did not meet the performance criteria.
	14	Oct 02	22	18	19	0	19	0	0	Performance criteria met.
9/12/2003 ^a	1	May 00	22	18	4	1	14	0	23	The number of planted grapes observed in this plot does not meet the performance criteria. However a large number of wild grapes now growing. As such, exceeds performance standard.

TABLE 4

RESULTS OF GRAPE VINE MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Wild Grapes or Grape Patches	Comments
					Non-stressed	Stressed	Total Vines			
	4B	June 01	22	18	9	0	9	0	10 wild plants	The number of planted grapes plus the number of individual native grape plants noted in this planting area meet the performance criteria.
	12	Oct 02	22	18	6	0	6	0	20 grape patches	The number of planted grapes plus the number of individual native grape plants noted in this planting area meet the performance criteria.
	14	Oct 02	22	18	16	0	16	0	0	Performance criteria not met.

Notes on Grape Vine Surveys:

- a. Joint GE/Trustee monitoring event
- b. Due to limitations in stock, this area has not been planted with grape vine as scheduled.

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
8/23 2001 ^a	1	May 00	100%	First 100' ~50% coverage Second 100' ~80% coverage Third 100' ~85% coverage Final 60' ~50% coverage		
	2	May 00	100%	~75% coverage		
	3	May 00	100%	~85% coverage		
	4, Cell G1	Oct 00	100%	First 100' ~45% coverage Second 100' ~75% coverage Third 100' ~85% coverage		
	5	Oct 00	100%	70% coverage		
5/20 2002 ^a	1	May 00	100%	First 100' ~85% coverage Second 100' ~90% coverage Third 100' ~90% coverage Final 60' ~80% coverage		
	2	May 00	100%	~85% coverage		
	3	May 00	100%	~85% coverage		
	4A	Oct 00	100%	First 100' ~50% coverage Second 100' ~65% coverage Third 100' ~80% coverage		
	4B	June 01	100%	First 100' ~85% coverage Second 100' ~85% coverage Third 100' ~85% coverage Fourth 100' ~75% coverage Fifth 100' ~75% coverage		
	10	Oct 01	100%	First 100' ~85% coverage Second 100' ~85% coverage		
	5	June 01	100%	~75% coverage		
	6, 6A, 7, 8A	June Oct 01	100%	~70% coverage		

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' ~70% coverage Second 100' ~50% coverage Third 100' ~75% coverage Fourth 100' ~30% coverage		
8/13/2002 ^a	1	May 00	100%	Overall ~90% First 100' Upper bank: 0 to 33' interval ~50%; upper 67' foot ~95%; Lower bank: 0 to 35' interval ~80%; 35' to 65' interval ~95%; 80' interval ~95%; Second 100' 0 to 15' interval ~85%; 75' ~95%; Third 100' ~100% coverage Final 60' ~100% coverage		For some areas of herbaceous cover that are less than 100%, reason for lack of coverage appears to be related to dry weather and lack of rain, some areas had small patches (less than one square foot) that might be bare as a result of poor soil, only one location in the First 100 foot interval that will be handled through a response action to correct site conditions.
	2	May 00	100%	~90% coverage		Herbaceous cover in this area tends to be thinner towards the top of the slope; some of the lack of coverage appears to be because of lack of rain and poor soil. One area within this planting area should be addressed through a response action to correct the poor coverage.
	3	May 00	100%	~80% at top of slope, ~95% coverage at bottom of slope		Response actions are proposed for one segment of this planting area.
	4A	Oct 00	100%	First 100' ~75% coverage Second 100' ~75% coverage Third 100' ~75% coverage		Response actions are proposed for 4 segments of this planting area.
	4B	June 01	100%	First 100' ~85% coverage Second 100' ~93% coverage Third 100' ~100% coverage Fourth 170' ~95% coverage		Response actions are proposed for one segment of this planting area.
	10	Oct 01	100%	First 100' ~95% coverage Second 100' ~90% coverage Third 100' ~65% coverage		Response actions are proposed for 2 segments of this planting area.

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
	5	June 01	100%	~90% coverage overall; ~95% in eastern section, ~85% in the middle segment, with the western slope being thin with a lot of debris		Response actions are proposed for one segment of this planting area.
	6, 6A, 7, 8A	June/Oct 01	100%	First 100' ~85% with the top of slope being thin Second 100' ~85%		Response actions are proposed for one segment of this planting area.
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' ~90% coverage Second 100' ~65% coverage Third 100' ~90% coverage Fourth 100' ~80% coverage		Response actions are proposed for 2 segments of this planting area.
5/28 2003	1	May 00	100%	First 100' ~95% coverage Second 100' ~95% coverage Third 100' ~95% coverage Final 60' ~95% coverage		For some areas of herbaceous cover that are less than 100%, some areas had small patches (less than one square foot) that might be bare as a result of poor soil
	2	May 00	100%	~95% coverage		Herbaceous cover in this area still tends to be thinner towards the top of the slope
	3	May 00	100%	~95% coverage		Herbaceous cover shows definite improvement after response actions of previous year.
	4A	Oct 00	100%	First 100' ~90% coverage Second 100' ~90% coverage Third 100' ~90% coverage		Herbaceous cover shows improvement over previous year
	4B	June 01	100%	First 100' ~90% coverage Second 100' ~90% coverage Third 100' ~95% coverage Fourth 100' ~95% coverage Fifth 100' ~100% coverage Sixth 100' 95% coverage		
	10	Oct 01	100%	First 100' ~95% coverage Second 100' ~95% coverage Third 100' ~85% coverage		
	5	June 01	100%	~95% coverage		

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
	6, 6A, 7, 8A	June/Oct 01	100%	First 100' ~95% coverage Second 100' ~95% coverage Third 100' ~95% coverage Fourth 100' ~95% coverage		
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' ~100% coverage Second 100' ~95% coverage Third 100' ~95% coverage Fourth 100' ~90% coverage		
	12	May/Oct 02	100%	First 100' ~95% coverage Second 100' ~90% coverage		
	13	May/Oct 02	100%	~95% coverage		
	14	Oct 02	100%	~95% coverage		
	15	May 02	100%	~100% coverage		
	16	Oct 02	100%	~100% coverage		
	17	Oct 02	100%	~100% coverage		
9/12/2003*	1	May 00	100%	First 100' ~85% coverage Second 100' ~100% coverage Third 100' ~95% coverage Final 60' ~95% coverage	No, in certain sections	For areas of herbaceous cover that are less than 100%, the areas had small patches (less than one square foot) that might be bare as a result of poor soil
	2	May 00	100%	~85% coverage	No	Herbaceous cover in this area still tends to be thinner towards the top of the slope
	3	May 00	100%	~75% coverage	No	Herbaceous cover in this area still tends to be thinner towards the top of the slope
	4A	Oct 00	100%	First 100' ~70% coverage Second 100' ~90% coverage Third 100' ~95% coverage	No	Herbaceous cover shows improvement over previous year

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
	4B	June 01	100%	First 100' ~75% coverage Second 100' ~80% coverage Third 100' ~85% coverage Fourth 100' ~85% coverage Fifth 100' ~95% coverage Sixth 100' 95% coverage	No	For some areas of herbaceous cover that are less than 100%, the areas had bare patches of soil that might be bare as a result of poor soil conditions; much of the gaps in coverage were oriented towards the top of the bank
	10	Oct 01	100%	First 100' ~95% coverage Second 100' ~95% coverage Third 100' ~85% coverage	No	For some areas of herbaceous cover that are less than 100%, the areas had small patches (less than one square foot) that might be bare as a result of poor soil conditions
	5	June 01	100%	~90% coverage	No	
	6, 6A, 7, 8A	June/ Oct 01	100%	First 100' ~85% coverage Second 100' ~90% coverage Third 100' ~90% coverage	No	For some areas of herbaceous cover that are less than 100%, the areas had patches that might be bare as a result of poor soil conditions
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' ~90% coverage Second 100' ~90% coverage Third 100' ~85% coverage	No	For some areas of herbaceous cover that are less than 100%, the areas had bare patches of soil that might be bare as a result of poor soil
	12	May/Oct 02	100%	First 100' ~95% coverage Second 100' ~90% coverage Third 100' ~90% coverage	No	
	13	May/Oct 02	100%	~90% coverage	No	
	14	Oct 02	100%	~90% coverage	No	
	15	May 02	100%	~85% coverage	No	
	16	Oct 02	100%	~85% coverage	No	
	17	Oct 02	100%	~85% coverage	No	

Notes on Herbaceous Coverage Surveys:

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

- a. Joint GE/Trustee monitoring event.

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasive Species)	Monitoring Results (Percent Invasive Species)	Meets Performance Objectives (Yes/No)	Primary Observed Invasive Species	Notes
8/23/2001 ^a	1	May 00	< 5%			bittersweet, purple loosestrife, common mullein, bittersweet nightshade, buckthorn	
	2	May 00	< 5%			bittersweet, buckthorn, Norway maple, winged euonymus	
	3	May 00	< 5%			bittersweet, Morrow's honeysuckle, purple loosestrife	
	4, Cell G1	Oct 00	< 5%			bittersweet, Japanese barberry, Morrow's honeysuckle, bittersweet nightshade, Norway maple, buckthorn	
	5	Oct 00	< 5%			Japanese knotweed, bittersweet, Japanese barberry, purple loosestrife	
5/20/2002 ^a	1	May 00	< 5%	First 100' <5% Second 100' <5% Third 100' <5% Final 60' <5%		buckthorn, bittersweet, Japanese barberry, garlic mustard	
	2	May 00	< 5%	Approximately 5%		bittersweet, buckthorn, Morrow's honeysuckle, Norway Maple, cypress spurge	
	3	May 00	< 5%	Approximately 10%		bittersweet, buckthorn, Morrow's honeysuckle, cypress spurge	
	4A	Oct 00	< 5%	First 100' ~15% Second 100' ~10% Third 100' <5%		burning bush, multiflora rose, Norway maple, Morrow's honeysuckle, buckthorn	
	4B	June 01	< 5%	First 100' <10% Second 100' <10% Third 100' <10% Fourth 100' 0% Fifth 100' 0%		Norway maple, bittersweet and garlic mustard	
	10	Oct 01	< 5%	< 5%		None noted	
	5	June 01	< 5%	> 5%		Japanese knotweed, Morrow's honeysuckle, buckthorn, bittersweet, multiflora rose	
	6, 6A, 7, 8A	June/Oct 01	< 5%	< 5%		burning bush, garlic mustard, buckthorn	

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasive Species)	Monitoring Results (Percent Invasive Species)	Meets Performance Objectives (Yes/No)	Primary Observed Invasive Species	Notes
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' <5% Fourth 100' <5% Fifth 100' <5%		None noted	
8/13/ 2002 ^a	1	May 00	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5% Final 60' ~5%		buckthorn, bittersweet, garlic mustard, purple loosestrife	
	2	May 00	< 5%	~10%		cypress spurge	
	3	May 00	< 5%	~5%		bittersweet, buckthorn, Morrow's honeysuckle, cypress spurge	
	4A	Oct 00	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5%		Morrow's honeysuckle, buckthorn, bittersweet, purple loosestrife, cypress spurge	
	4B	June 01	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5% Fourth 170' <5%		Norway maple, purple loosestrife, bittersweet and garlic mustard,	
	10	Oct 01	< 5%	~5%		Purple loosestrife	
	5	June 01	< 5%	~5%		Japanese knotweed, Morrow's honeysuckle, buckthorn, bittersweet,	
	6, 6A, 7, 8A	June/ Oct 01	< 5%	First 100' ~5% Second 100' <5%		garlic mustard, bittersweet	
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' ~5% Fourth 100' <5%		purple loosestrife, bittersweet, garlic mustard, cypress spurge	

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasive Species)	Monitoring Results (Percent Invasive Species)	Meets Performance Objectives (Yes/No)	Primary Observed Invasive Species	Notes
5/28/2003	1	May 00	< 5%	First 100' ~5% Second 100' ~7% Third 100' ~5% Final 60' <5%		bittersweet, garlic mustard	
	2	May 00	< 5%	~10%		cypress spurge, bittersweet, garlic mustard	
	3	May 00	≤ 5%	~10%		bittersweet, cypress spurge, garlic mustard	
	4A	Oct 00	< 5%	First 100' ~10% Second 100' ~7% Third 100' <5%		bittersweet, cypress spurge, garlic mustard	
	4B	June 01	< 5%	First 100' ~10% Second 100' ~7% Third 100' <5% Fourth 170' <5% Fifth 100' <5% Sixth 100' <5%		bittersweet and garlic mustard	
	10	Oct 01	< 5%	First 100' <5% Second 100' >5% Third 100' ~5%		bittersweet and garlic mustard	
	5	June 01	< 5%	~7%		Japanese knotweed, Morrow's honeysuckle, barberry, bittersweet	
	6, 6A, 7, 8A	June/ Oct 01	< 5%	First 100' ~5% Second 100' <5% Third 100' ~5% Fourth 100' ~5%		garlic mustard, bittersweet	
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' >5% Third 100' >5% Fourth 100' >5%		bittersweet, garlic mustard, cypress spurge	
	12	May/Oct 02	≤ 5%	First 100' <5% Second 100' >5%		garlic mustard, bittersweet	

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasive Species)	Monitoring Results (Percent Invasive Species)	Meets Performance Objectives (Yes/No)	Primary Observed Invasive Species	Notes
	13	May/Oct 02	< 5%	>5%		garlic mustard, bittersweet	
	14	Oct 02	< 5%	<5%		garlic mustard, bittersweet	
	15	May 02	< 5%	>5%		garlic mustard, bittersweet	
	16	Oct 02	< 5%	>5%		garlic mustard, bittersweet	
	17	Oct 02	< 5%	>5%		garlic mustard, bittersweet	
9/12/2003*	1	May 00	< 5%	First 100' <5% Second 100' <5% Third 100' <5% Final 60' <5%	Yes	garlic mustard	
	2	May 00	< 5%	<5%	Yes	cypress spurge, buckthorn	
	3	May 00	< 5%	~5 - 10%	No	cypress spurge, buckthorn	
	4A	Oct 00	< 5%	First 100' <5% Second 100' <5% Third 100' <5%	Yes	bittersweet, cypress spurge, garlic mustard	
	4B	June 01	< 5%	First 100' <5% Second 100' <5% Third 100' <5% Fourth 170' <5% Fifth 100' <5% Sixth 100' <5%	Yes	purple loosestrife	
	10	Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' <5%	Yes	bittersweet and garlic mustard	
	5	June 01	< 5%	<5%	Yes	Japanese knotweed, bittersweet	
	6, 6A, 7, 8A	June/Oct 01	< 5%	First 100' ~5 - 10% Second 100' <5% Third 100' <5%	No, in part	garlic mustard, bittersweet	

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasive Species)	Monitoring Results (Percent Invasive Species)	Meets Performance Objectives (Yes/No)	Primary Observed Invasive Species	Notes
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' ~5-10%	No, in part	bittersweet, garlic mustard, cypress spurge	
	12	May/Oct 02	< 5%	First 100' <5% Second 100' <5%	Yes	garlic mustard, bittersweet	
	13	May/Oct 02	< 5%	<5%	Yes	garlic mustard, bittersweet	
	14	Oct 02	< 5%	<5%	Yes	garlic mustard, bittersweet	
	15	May 02	< 5%	<5%	Yes	garlic mustard, bittersweet	
	16	Oct 02	< 5%	<5%	Yes	garlic mustard, bittersweet	
	17	Oct 02	< 5%	<5%	Yes	garlic mustard, bittersweet	



Corporate Environmental Programs
General Electric Company
100 Woodlawn Avenue, Pittsfield, MA 01201

October 23, 2003

Dean Tagliaferro
On-Scene Coordinator
U.S. Environmental Protection Agency
c/o Weston Solutions
One Lyman Street
Pittsfield, MA 01201

**Re: GE Pittsfield/Housatonic River Site
Upper ½-Mile Reach Removal Action (GECD800)
Bank Erosion Inspection (Summer 2003)**

Dear Mr. Tagliaferro:

Consistent with requirements set forth in the final *Removal Action Work Plan – Upper ½-Mile Reach of Housatonic River* (Work Plan) (Blasland, Bouck & Lee, Inc. [BBL], August 1999), GE has performed monitoring activities for the restored banks of the Upper ½ Mile Reach to assess both the cleared and restored areas for evidence of erosion. This monitoring event (summer 2003) occurred on August 25, 2003 with representatives of the US Army Corps of Engineers (USACE) and BBL. The following people performed the inspection:

- Charlie Marney, USACE;
- Bruce Eulian, BBL.

During the bank monitoring event no new areas were identified with evidence of measurable erosion or impacts due to settlement or movement of rip rap. However, it was noted that the areas identified in the spring 2003 inspection (as documented in the June 24, 2003 trip report) had not yet been addressed. These repairs have subsequently been completed with USACE oversight.

GE will continue to conduct inspections in accordance with the requirements of the work plan which includes annual inspections to be performed in 2004 through 2007. If signs of erosion are observed during these inspections, GE will propose measures to address the areas and minimize future erosion.

Please contact me if you have any questions.

Sincerely,

Andrew T. Silfer, P.E.
GE Project Coordinator

ATS/dmn

Attachments

cc: T. Angus, MDEP
R. Bell, DEP
J. Bieke, Shea & Gardner
M. Carroll, GE
T. Conway, EPA
Mayor Hathaway, City of Pittsfield
S. Peterson, CDEP
R. Goff, USACE
M. Gravelding, BBL
H. Inglis, EPA
S. Messur, BBL
K.C. Mitkevicius, USACE
D. Young, EOE
B. Olson, EPA
S. Steenstrup, DEP
D. Jamros, Weston
A. Symington, DEP
Public Information Repositories

Attachment B

Photographic Logs

**2003 Annual Monitoring Report
Upper ½-Mile Reach of the Housatonic River**



Photograph 1: Spring 2003 vegetative monitoring event; Planting area 1



Photograph 2: Spring 2003 vegetative monitoring event; Planting area 10

**2003 Annual Monitoring Report
Upper ½-Mile Reach of the Housatonic River**



Photograph 3: Spring 2003 vegetative monitoring event; Planting area 5



Photograph 4: Spring 2003 vegetative monitoring event; Planting area 11A

**2003 Annual Monitoring Report
Upper ½-Mile Reach of the Housatonic River**



Photograph 5: Spring 2003 Restored Banks Erosion Inspection Area 1 Soil Erosion above Headwall



Photograph 6: Spring 2003 Restored Banks Erosion Inspection Area 1 Rip Rap Movement Downstream of Headwall

**2003 Annual Monitoring Report
Upper ½-Mile Reach of the Housatonic River**

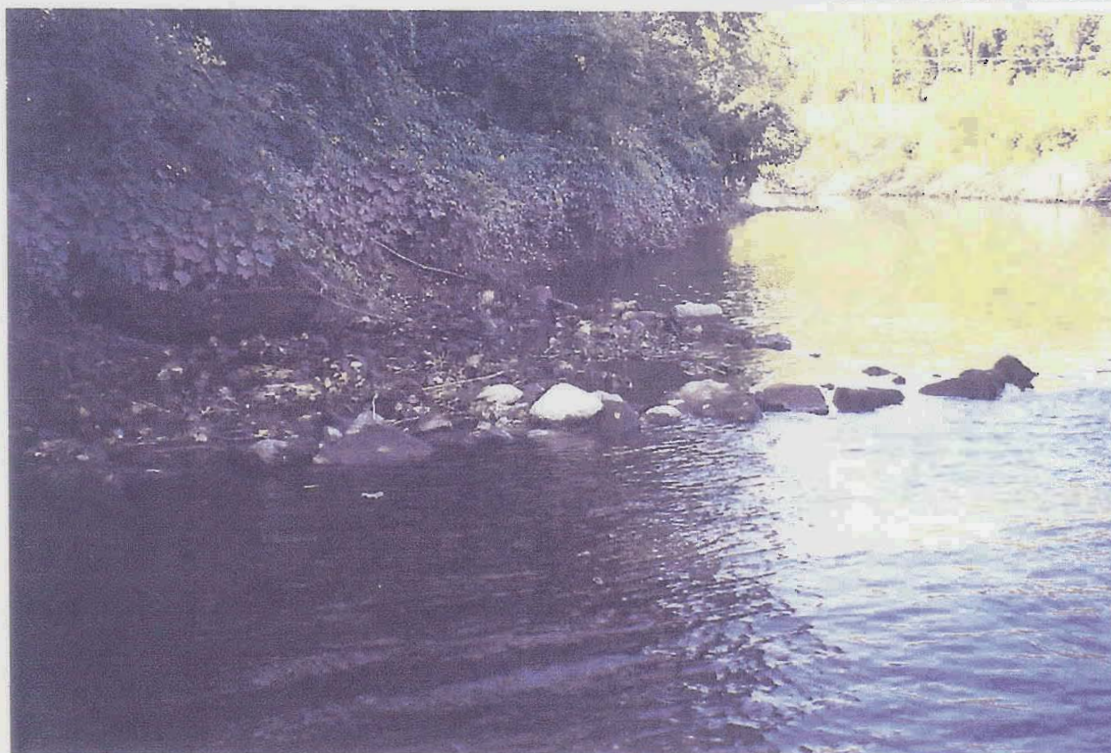


Photograph 7: Spring 2003 Restored Banks Erosion Inspection Settlement/Erosion Swale No. 11



Photograph 8: Spring 2003 Restored Banks Erosion Inspection Rip Rap Movement Swale No. 19 (middle)

**2003 Annual Monitoring Report
Upper ½-Mile Reach of the Housatonic River**



Photograph 9: 2003 Aquatic habitat structures monitoring event; Cell B Single Wing Deflector



Photograph 10: 2003 Aquatic habitat structures monitoring event; Cell C Boulder Cluster (note water-celery)



Photograph 11: 2003 Aquatic habitat structures monitoring event; Cell H2 Boulder cluster



Photograph 12: 2003 Aquatic habitat structures monitoring event; Cell I3/J3 Vortex rock weir

**2003 Annual Monitoring Report
Upper ½-Mile Reach of the Housatonic River**



Photograph 13: Late summer 2003 vegetative monitoring event; Planting area 1



Photograph 14: Late summer 2003 vegetative monitoring event; Planting area 3

**2003 Annual Monitoring Report
Upper ½-Mile Reach of the Housatonic River**



Photograph 15: Late summer 2003 vegetative monitoring event; Planting area 14



Photograph 16: Late summer 2003 vegetative monitoring event; Planting area 5

Attachment C

**Standard Operating Procedure for
Riverbank Vegetation Monitoring**

Standard Operating Procedure for Riverbank Vegetation Monitoring

The General Electric Company (GE) and the Massachusetts NRD Trustees (NRD Trustees) agreed to an approach to the restored bank vegetation monitoring methodology for the Upper ½-Mile Reach of the Housatonic River that was utilized in 2001 and refined for use in 2002. From these earlier monitoring methodologies a detailed approach to the monitoring program was created and utilized in 2003 as described below.

1. The monitoring team is to include representatives of GE and representatives of NRD Trustees. The team will assemble at the onsite construction trailer, or similar central location, on the day of the inspection in order to coordinate activities and cover any issues.
2. The stem count is to be performed; and data recorded, by GE. The representative for the NRD Trustees will observe to ensure the accuracy of the count. Specifically, the NRD's Trustees representative will: ensure agreement over species identification, assist with the determination of stressed species, assist with the identification of invasive plant species, assist with the determination of percent herbaceous and invasive cover, and advise on other technical issues as required. The certified arborist will assist in the assessment of the apparent health and vigor of installed plants. Copies of all data sheets will be provided to the NRD Trustee's representative at the conclusion of the monitoring event. The identification of all parties involved in an inspection event will be made in the results section of the report.
3. In general, the planting areas will be inspected beginning with the furthest upstream on the north side of the Housatonic River (planting area 1) and will proceed downstream. Once the north side of the river has been inspected, the monitoring team will move to the most upstream planting area on the south side of the Housatonic River (planting area 5) and proceed downstream.
4. If the inspection is being held in the spring, only planting areas planted up to the fall of the previous year will be inspected. Similarly, if the inspection is being held in the summer, only the planting areas planted up to the fall of the previous year will be inspected.
5. As a means of streamlining the inspection process, an agreement was made between GE and the NRD Trustee's representative concluding that planting areas 6, 6A, 7, and 8A would be inspected as a single unit and planting areas 8, 9, 9A, 11, and 11A would be inspected as a single unit. An easily identifiable landmark was noted as the boundary between these two composite areas. An easily identifiable landmark was also noted as the boundary between planting areas 4A and 4B.
6. Where the linear distance of the planting area exceeds 100 feet, the planting area will be divided into sections of 100 feet or shorter to increase the accuracy of the count. As of this date, that includes planting areas 1, 4A, 4B, composite planting area 6, 6A, 7, and 8A, and composite planting area 8, 9, 9A, 11, and 11A.
7. Where the riverbank width (slope length) is greater than 25 feet, and/or the density and height of vegetation obscures the observer's vision to clearly see the entire riverbank slope, a line or tape will be used to divide the bank into upper and lower bank areas to increase the accuracy of the count.

-
8. The areas of planting will be monitored by slowly walking from one end of a specific planting area to the other. As the team walks through an area, the counter will visually note the number of planted trees, shrubs, and vines based on observation of stems, as well as the number of resprouts of species consistent with those planted species. After the woody plants have been inspected in an area, the team will stop and estimate herbaceous cover and percent coverage of invasive species. The recorder will take down the inspection information as the team proceeds through a given planting area.
 9. The recorder will keep the tally of results on a field datasheet developed by GE for the monitoring program. On the tally sheet, woody vegetation will be listed as either live (either stressed or unstressed) or dead. Any additional general observations of the planting area will also be reported on the tally sheet.
 10. The decision as to whether some specimens are stressed will be based on visual observation of the plant and the agreed judgment of the two observers (representatives of GE and the NRD Trustees); however, to meet performance criteria, replanting needs are to be based on the number of dead specimens or those missing from the final count for a particular species. Stressed plants are still alive, but physical indicators such as leaf wilt, nutrient deficiency, bug infestation, die back, herbicide injury, and animal damage (e.g., woodchuck) may represent evidence of diminished vigor. Plants are also to be considered stressed if they are reduced in height (less than four feet for trees, though the plant may be a stump sprout following topping of the planted specimen from herbivorous activity or other action). Non-stressed plants show very limited signs of these stress indicators (<5%) and are growing vigorously as determined by the certified arborist based on such characteristic as annual growth, leaf color, stem integrity, and fruit and flower production.
 11. For the Red-osier dogwood band, it was determined that the ability to count individual stems was made problematic by the multiple-stem nature of the developing plant. Therefore, it has been decided that performance determination for the band would be made by visually determining, based on best professional judgment of the observers, whether the band in a planting area appears to meet the 4-foot on-center planting scheme. Areas of the band that were noted as not meeting the 4-foot on-center planting scheme were measured, and identified as to location, then noted on the tally sheets.
 12. Stump resprouts from trees and shrubs cut during clearing or cut by herbivorous actions are counted in the live-but-stressed column. If the stump has multiple resprouts, it is still counted as a single specimen.
 13. Canopy and understory stump resprouts from specimens cut during clearing activities are only to be counted as part of the tally if the stump was one of the species that was listed in the planting plan. However, if the specimen is a different species, it will be noted on the tally sheets for information purposes.
 14. Aerial herbaceous cover will be determined by walking through each planting area (or 100-foot section) and visually estimating the total cover to the nearest 5%. For riverbank areas that are predominately covered by vegetation, estimating the percentage of bare ground first, and then subtracting that from 100% most accurately determines herbaceous cover. Litter is considered to be bare ground. Minor gaps between herbaceous plant branches and the bare soil (mulch) beneath trees and shrubs are not counted as bare ground. Determination of the percentage of open/bare ground in a planting area will be made based on visual observation using best professional judgment of the two observers; agreement on the percentage is to be reached before the value is noted on the tally sheet.
 15. In addition to herbaceous coverage, an estimation of the percentage of significant areas of bare soil will be included in the tally. This is a qualitative assessment based on best professional judgment of those

significant areas of bare soil in which there is no plant growth of any kind. This is not intended to assess bare ground between individual plant stems, but large (>15-20 square feet) areas where herbaceous growth does not occur.

16. A determination of the percentage of invasive species will be made based on visual observation using the best professional judgment of the two observers, with agreement of the percentage to be reached before the value is noted on the tally sheet. Identification of the dominate invasive species in a given area will also be noted on the tally sheets. Areas of invasive species will be flagged if necessary to facilitate remediation.