



Connecticut River Watch Program

HOCKANUM RIVER STREAM WALK SUMMARY REPORT



Funded in part by the CT DEP through a US EPA Clean Water Act §319 nonpoint source grant



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Hockanum River Stream Walk Summary Report
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INTRODUCTION

During the summer and fall of 1999 the Connecticut River Watch Program (CRWP), in cooperation with the Hockanum River Watershed Association (HRWA) and the Tolland County Soil and Water Conservation District, conducted a Stream Walk Survey of the Hockanum River. Teams of volunteers walked, canoed or kayaked segments of the Hockanum River to collect visual information about its physical condition. The survey project was the first step in what we hope will become a long-term community-based monitoring and assessment program, designed to help insure the improvement and protection of this valuable resource. Survey goals included: to establish a baseline of physical conditions; to identify areas of the River in need of protection or restoration; and to raise community awareness of the River and the need to restore and protect it. The information collected will be used to plan and prioritize conservation and improvement efforts. The Stream Walk Survey was intended to build upon ongoing efforts to improve conditions in the watershed and raise public awareness of the river.

BACKGROUND

The Hockanum River Watershed

The Hockanum River is a major tributary of the Connecticut River located in north central Connecticut. From its beginning in Shenipsit Lake in Ellington, the Hockanum flows approximately twenty-five (25) miles to its confluence with the Connecticut River in East Hartford. The River's watershed comprises a seventy-seven (77) square mile area draining large portions of Ellington, Tolland, Vernon and Manchester, and smaller portions of Somers, Stafford, Bolton and East Hartford. While areas of the watershed are undeveloped, the Hockanum flows through an increasingly urbanized landscape as it travels downstream. The River also assimilates waste from three sewage treatment plants.

The Hockanum River is included in Connecticut's Unified Watershed Assessment as a category 1 (impaired) watershed, and was recommended for monitoring/assessment by the Department of Environmental Protection (DEP) ambient monitoring group. The River is on DEP's list of impaired waters (Vernon to Mouth), with impairments listed as aquatic life support, contact recreation/bacteria, and inadequate fish passage. Suspected causes of these water quality impairments include agriculture, landfills, highway maintenance and runoff, urban runoff and wet weather discharges. Shenipsit Lake is also included on the list due to flow modification from public water supply diversion.

Despite its water quality problems, the Hockanum River is a well-used recreational resource. An annual spring canoe race brings many enthusiasts to the river. The Hockanum River Linear Park not only protects areas of the river and riparian habitats, but also contains a network of riverside hiking trails. The trails provide casual hikers the opportunity to enjoy the natural beauty of the river, even in some bustling commercial areas. Further, the presence and use of the Linear Trail helps to promote stewardship of the river.

Hockanum River Restoration Efforts

The Hockanum River has been the focus of a number of local and regional efforts to improve its health. In 1995, the Tolland and Hartford County Soil and Water Conservation Districts initiated a watershed management project with funding from the DEP through a grant from the US Environmental Protection Agency (EPA) under Section 319 of the Clean Water Act. Activities undertaken as part of this project have focused on identifying and reducing pollution problems associated with storm water runoff, and restoring fish and wildlife habitat.

Seven different restoration and stabilization projects in the Hockanum River and tributaries have been funded through the DEP River Restoration Grant program, one in East Hartford, two in Vernon,

and four in Manchester. Two of these projects have been completed, and the rest are in the planning stages.

The Hockanum River Watershed Association (HRWA) sponsors periodic river clean-ups, in addition to other outreach and education activities, and town-based Hockanum River Linear Park committees in Manchester and Vernon create and maintain a network of trails. The CRWP monitoring program is intended to complement and enhance these efforts to improve conditions in the watershed and raise public awareness of the river by the HRWA, the Linear Park committees, the Tolland and Hartford County Conservation Districts, and the watershed municipalities.

The Connecticut River Watch Program

The Connecticut River Watch Program (CRWP) is a volunteer water quality monitoring, protection and improvement program for the Connecticut River and its tributaries. CRWP is sponsored by the Middlesex County Conservation District and was initiated in 1992 in cooperation with River Watch Network, a national organization based in Vermont.

Over its first eight years CRWP focused its monitoring activities on the lower Connecticut River main stem and two tributary watersheds, the Mattabesset and the Coginchaug. The program has generated an extensive water quality database for these rivers, and raised local awareness of river resources and water quality issues through public involvement and outreach activities. Information collected through CRWP has been used by towns to investigate potential sources of pollution, and by the state for planning purposes. It has become a model program, with wide support from the local communities and state and federal environmental officials. Funding for CRWP has come primarily from the DEP through grants from the US EPA under Section 319 of the Clean Water Act.

In 1999, CRWP expanded into new watersheds within the Connecticut River basin. The program has become a regional support service, whose focus is to initiate, support and coordinate community-based river monitoring, assessment and improvement programs in regional watersheds throughout the basin. Through the new program, CRWP will continue to put water quality and physical survey information into the hands of local communities, and support efforts to use that information to direct river and other watershed protection and improvement efforts.

PROJECT SUMMARY

Survey Goals

The Hockanum River Stream Walk Survey was undertaken as the first step in initiating a long-term community-based volunteer monitoring program in the Hockanum River watershed. Based on input from HRWA and the Tolland Conservation District, it was decided that the Hockanum River main stem would be the focus of this first year's effort. The goals of the survey activity include:

- ◆ Develop a baseline of information about the physical characteristics of the Hockanum River
- ◆ Identify areas of concern and potential pollution problems that can be used to plan conservation and improvement efforts
- ◆ Raise public interest in and knowledge of the Hockanum River, both about the resources it has to offer and the problems it faces
- ◆ Develop public awareness of water quality issues and human impacts on our rivers
- ◆ Build on the existing local constituency for the Hockanum River and expand the base of active volunteers
- ◆ Form the basis for more complex water quality monitoring activities that can be pursued in future years according to needs, level of interest, ability to commit time, and the availability of other resources

Survey Design and Methodology

A Stream Walk survey is a survey of the physical characteristics of a river corridor. The survey is a systematic way to observe and record information about the river channel (water and stream bottom), the stream banks, and the adjacent land. Physical characteristics of streams are important to the aquatic life that a stream supports – physical changes can degrade stream habitat (where a plant or animal lives naturally) and make the stream uninhabitable by naturally occurring plants and animals.

Stream surveys are designed to take place in late summer and early fall, when water flows are low and slower, making it both possible and safe for volunteers to walk through streams to record observations. At this time water temperatures also tend to be warmer and aquatic plant growth is at its most abundant. In addition, emergent plants are tall and trees and shrubs have their leaves, important for estimating the types of streamside vegetation.

Survey sheets were developed to collect visual information on the physical conditions of the Hockanum River and surrounding land, and to help identify possible areas of concern. The Hockanum survey form is adapted from the 1998 Mattabesset River Stream Walk Survey form.¹ Survey sheets include the main survey with questions about general stream corridor characteristics, including water depth and width, stream bank cover, width of riparian corridor, water color/clarity, aquatic vegetation, composition of substrate, adjacent land uses, potential sources of pollution, and recreational use. An additional sheet was used to further describe possible areas of concern (see Attachment A). Detailed instructions for completing the survey were also included on the survey sheet. Survey sheets were copied on waterproof paper for use in the field.

¹ The Mattabesset survey was adapted from those used for the Quinebaug and Norwalk River watershed stream surveys, developed by the Natural Resources Conservation Service (NRCS) and the New London and Windham County Soil & Water Conservation Districts.

The Hockanum River main stem was delineated into seventeen (17) segments for the Stream Walk Survey, primarily based on access and distance (see Table 1, below). Color topographic maps (8 ½" by 11") were produced for each segment, showing the beginning and end of the segment. These were designed to be used for reference in the field, and to record the approximate location of photographs and areas of concern.

Table 1. Hockanum River Stream Walk Segments

Town	Segment # and Location	Distance
Vernon	1 Main Street to Vernon Avenue	~ 5000 ft
Vernon	2 Vernon Avenue to Union Street	~ 4500 ft
Vernon	3 Union Street to Lower Butcher Road	~ 4000 ft
Vernon	4 Wapping Wood Road to Dart Hill Road	~ 6000 ft
Vernon	5 Dart Hill Road to Pleasant View Road	~ 7000 ft
Vernon	6 Pleasant View Drive to Kelly Road	~ 3000 ft
Vernon/Manchester	7 Kelly Road to Oakland Road	~ 6000 ft
Manchester	8 Oakland Road to Union Street	~ 5000 ft
Manchester	9 Union Street to North Main Street	~ 3000 ft
Manchester	10 North Main Street to Adams Street	~ 4500 ft
Manchester	11 Adams Street to Middle Turnpike Road	~ 6000 ft
Manchester	12 Middle Turnpike Rd. to I-84 Overpass	~ 5500 ft
East Hartford	13 I-84 Overpass to Walnut Street	~ 5200 ft
East Hartford	14 Walnut Street to Scotland Road	~ 6000 ft
East Hartford	15 Scotland Road to Hillside Street	~ 2000 ft
East Hartford	16 Hillside Street to Dam at Town Hall	~ 8500 ft
East Hartford	17 Dam at Town Hall to Connecticut River	~ 4500 ft

Volunteer Recruitment, Training and Participation

The Hockanum River Watershed Association and the Tolland Conservation District took primary responsibility for recruiting volunteers. A recruitment flyer, developed by CRWP, was sent to HRWA members, and Linear Trail Committee members, and other local contacts. Notices were also sent to local papers and the Hartford Courant.

Prior to conducting their surveys, volunteers were trained in assessment procedures. Twelve (12) people attended the Stream Walk training, held on July 31, 1999 at Mal Tool & Engineering in Manchester. Training included both indoor and field components, and was modeled after the

training format developed for the 1999 Shetucket River stream survey. Middlesex Conservation District staff conducted the training, with assistance from Tolland Conservation District staff.

The training agenda included: an introduction to the River Watch program, the Hockanum Watershed Management Project and the Hockanum River Watershed Association; an introductory video on Stream Walks²; a presentation on use of the topographic maps; and a review of survey questions and slide presentation illustrating stream characteristics and areas of concern. Etiquette and safety issues were also reviewed, as were the contents of volunteer packets (see below). Volunteers were offered the opportunity to sign up as Earth Team Volunteers, a volunteer program sponsored by the USDA Natural Resources Conservation Service, to receive coverage for tort claims and injuries incurred during volunteer activities.

The training included a guided stream walk; volunteers walked a stretch of an actual stream segment and instructors demonstrated hands-on techniques when conducting a survey, including substrate classification, describing river profile, estimating stream width and depth, and identifying vegetation and aquatic organisms. Preparation tips were given to the participants and questions were addressed.

Volunteers signed up for specific river segments and received needed materials and supplies. Volunteers were given a Stream Walk Training Manual, providing both instructions and background information on physical characteristics used to describe streams, and physical conditions indicative of water quality problems or stream habitat degradation. The training manual was adapted from the manual developed by NRCS and the Conservation Districts for the Quinebaug and Shetucket River surveys.

In addition to the survey sheets and training manual, volunteers received a packet of materials that included safety information, fact sheets about the Stream Walk Survey project and the Connecticut River Watch Program to give to interested residents, and color topographic maps of the area of the stream segment to be walked. They were also provided film and asked to take pictures of areas identified as potential areas of concern, as well as areas representative of the character of the stream.

Training staff recommended that volunteers walk their stream segments upstream to downstream. If possible, they were advised to walk their entire segment prior to recording any observations on survey sheets. This would allow them to define the different stream sections in their segment; a separate survey form was to be filled out every time there was an abrupt change in the physical characteristics of the stream, including slope, width, depth, substrate materials, streamside vegetation, channel pattern, etc.). The minimum length for a stream section was defined as 1000 feet.

Actual Stream Walks took place primarily in August and September. A few surveys were not completed until October, November and even January! Eighteen (18) people participated in the Stream Walks.

² This training video was produced for the Quinebaug-Shetucket Stream Walk Survey project by the New London and Windham Soil & Water Conservation Districts and the Natural Resources Conservation Service.

SURVEY RESULTS

Stream Walk survey results are summarized by segment in a table format (Attachment B). Of the seventeen (17) segments identified originally, sixteen (16) were surveyed. In all but one case, the entire segment was surveyed. One team actually surveyed an additional segment of the river that was thought to be too marshy to survey. Each segment summary includes data and notes recorded on the survey sheets.

Segment summaries are provided in sections, designated by volunteers when performing their surveys. As described above, a section is defined by the physical characteristics of the River, including slope, width, depth, substrate materials, streamside vegetation, channel pattern, etc. A separate survey form was filled out when volunteers noted an abrupt change in any of these characteristics, with a minimum length for a section of 1000 feet. In many cases, stream segments were surveyed as one section; these segments were apparently fairly uniform and did not warrant being divided into sections. A color topographic map showing the segment is included with each segment summary. Selected photographs are provided in Attachment C.

The summaries provide a good picture of the general condition of the River, existing and potential recreational uses, and possible sources of pollution and areas requiring restoration. As the technical expertise of the volunteers varies, so do the descriptions. Some volunteers were more thorough than others and noted additional information.

Observations about the River include:

- ◆ The River's profile is most commonly gently sloped (1-3%), with a glide flow or pool-riffle sequence. Exceptions included several cascade and step-pool sequences in Vernon.
- ◆ Stream bank cover varies considerably. Sections of the upper segments were more likely to have lawns as the abundant cover. Moving downstream, deciduous trees and small trees and shrubs were more abundant.
- ◆ Invasive non-native species, including multiflora rose, purple loosestrife and Japanese knotweed, were noted frequently throughout the River segments.
- ◆ Riparian buffers were commonly <25 feet in width, though in downstream areas where the Linear Park trails are located, buffer areas tended to be greater.
- ◆ The water condition was clear with no smell, with the exception of two segments where surveys were conducted a few days following Hurricane Floyd and water color was noted as "turbid", and turbidity noted downstream of the Vernon sewage treatment plant (segment 5).
- ◆ Algae and aquatic plants were noted most frequently as either "absent" or "in spots". Exceptions included Paper Mill Pond and Laurel Marsh, where aquatic plant growth was noted "everywhere", and in segment 10 (N. Main St. to Adams St. in Manchester), where algae was noted "everywhere".
- ◆ Substrate materials vary from segment to segment, with about 50% of the segments primarily sand or silt/clay, and the remaining primarily gravel or cobbles (frequent), or bedrock, boulders or organic material (few).
- ◆ Primary land uses include Undeveloped (forested), Suburban and Urban Residential, with some Agricultural, Commercial, Industrial and Recreational.
- ◆ Potential sources of pollution identified were primarily lawns/gardens, parking lots, roads, farms/nurseries, with some commercial dumpsters, litter and yard waste. Also noted were three sewage treatment plants, one landfill and one golf course.
- ◆ Known and potential recreational opportunities were plentiful, with the extensive network of existing trails and the ability to canoe or kayak on almost the entire length of the river.

- ◆ Reports of wildlife were varied, with many detailed listings and some surveys with no listings at all. Based on reports, the river supports a variety of wildlife, especially in relatively undeveloped areas where the Linear Trail is located.
- ◆ Though many observations suggest possible areas of concern, few were actually noted and described in further detail.

Stream Walk observations raise a number of issues related to water quality and watershed management:

- ◆ In areas where the width of riparian vegetation is less than twenty-five (25) feet, and where lawns are kept to the edge of the River, buffering from adjacent activities may not be adequate. In particular, if fertilizers, pesticides or herbicides are applied to adjacent lawns, these chemicals are likely to run off into streams and degrade aquatic habitat.
- ◆ The prevalence of non-native invasive plant species suggests the need for eradication and restoration projects (one of which is already in progress), as well as education about the harm caused by use of non-native invasives in landscaping.
- ◆ Nutrient loading to streams is evident in the growth of algae in the stream; sources could include chemical fertilizers, decomposing yard waste, manure from agricultural sources, and sewage treatment plant discharges.
- ◆ Erosion and sedimentation is likely where sand and silt comprise the majority of materials in the stream substrate. Sources could include road runoff, as well as stream bank soils, noted often as exposed. Increased water flow from impervious surface development (roads, parking lots, buildings), prevalent in the more urbanized areas of the watershed, increases the impacts to streams from road runoff.
- ◆ Sewage treatment plants on the Hockanum River may be creating problems for the river. In Vernon, downstream of the sewage treatment plant, treated sewage discharge appeared to be the source of turbidity in the river. In the area of the treatment plant in East Hartford, the sewage smell noted creates an unaesthetic atmosphere for boating and other forms of recreation.

RECOMMENDATIONS

The information collected from the Stream Walk Survey not only provides a baseline against which we can measure future changes, but also can be used for planning purposes for local and watershed-based improvement and protection efforts. A number of management considerations are raised by the results of the survey; many segments surveyed appear to be impacted adversely by human development, as evidenced by observations such as inadequate stream buffers, adjacent residential, commercial and industrial development, non-native invasive plant species, yard waste, algae growth, exposed stream bank soils, and sedimentation.

While certain observations suggest the need for restoration and improved management, others are quite positive. Though the river flows through an increasingly urbanized area as it makes its way downstream, it is somewhat protected from potential sources of pollution due to buffering provided by the Linear Park. The river also seems to support a diversity of wildlife, most notably in undeveloped areas where the Linear Trail is located. Further, many opportunities for additional recreational access and use were identified in the survey; while many already exist, development and use of new access areas will help to heighten awareness of the river's values and promote stewardship activities.

As a follow-up to the Hockanum River Stream Walk Survey, general recommendations include:

- ◆ Complete the collection of baseline information by surveying the one remaining Hockanum River segment, and by surveying new areas of the watershed;
- ◆ Investigate potential river access areas and determine feasibility of development;
- ◆ Develop and implement a community education program to inform residents and streamside property owners of the importance of maintaining naturally vegetated stream bank buffers, and about the detrimental effects of putting yard waste in streams;
- ◆ Investigate areas of concern identified to determine the extent of problems and to plan improvements;
- ◆ Identify areas for additional non-native species eradication and restoration projects, and educate residents, nurseries and landscapers about the harm caused by use of non-native invasives in landscaping;
- ◆ Investigate and address the impacts of sewage treatment plants;
- ◆ Community members concerned with the conditions of the River and other Hockanum River watershed streams should
 - contact their municipal government to urge education of residents, restoration of degraded areas, and improved river protection regulations (e.g. minimum setbacks)
 - support the efforts of the Hockanum River Watershed Association, an advocacy and educational organization working to improve the conditions in the watershed.
- ◆ Walk segments periodically to assess conditions (as is already done in Manchester). This could be accomplished through a stream segment adoption program whereby volunteers walk specific segments on an annual basis and file a written status report.

For assistance and further information, please contact:

*Middlesex County
Soil and Water Conservation District
deKoven House – 27 Washington Street
Middletown, CT 06457
860/346-3282*

*Tolland County
Soil and Water Conservation District
24 Hyde Avenue
Vernon, CT 06066
860/875-3881 x108*

ACKNOWLEDGEMENTS

The Hockanum River Watershed Stream Walk Survey would not have been possible without the assistance of numerous volunteers and cooperating agencies. Our sincere thanks to all of the following who contributed to the survey project. *Special thanks to Middlesex County Soil and Water Conservation District intern Joe Derisi, who assisted with various aspects of the Stream Walk project.*

Stream Walk Survey Team Volunteers

George Arthur
David Askew
Frank Belknap
Jim Clifton
Todd Clifton
Glenn Cornish
Ed Dresner
Jim Gregory
Sam Harrison
Jeff Joffray
John Karpinski
Roger Morgan
Jim Powell
Jessica Regele
Angela Santanella
Doug Smith
Betty Tedford
Edward Wait

Cooperating Organizations, Businesses and Municipalities

Hockanum River Watershed Association: Special thanks to *Doug Smith*, who assisted in recruiting volunteers for the Stream Walk, and arranging use of the Mal Tool facility for our training session.

Mal Tool & Engineering Co.: Special thanks to *Mr. Skip Kundahl*, Chief Executive Officer, for providing his facility for the training session, and to *Nancy* and *Susan*, who assisted in making the arrangements.

Municipality of Manchester: Special thanks to town staff for assembling and sending a mailing to prospective volunteers.

Natural Resources Conservation Services: Special thanks to *Javier Cruz*, who wrote the Quinebaug River Survey Streamwalk Training Manual that we adapted for our use; *Seth Lerman*, who provided us with a copy of the training video; and *Fernando Rincon*, who lent us slides for the training.

Tolland County Soil & Water Conservation District: Special thanks to *David Askew*, for his assistance in planning and publicizing the Stream Walk, coordinating Stream Walk volunteers, and gathering the completed surveys.

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Attachment A

Stream Walk Survey Form

HOCKANUM RIVER WATERSHED STREAM WALK SURVEY

NAME(S): _____ NAME OF STREAM: _____

_____ CURRENT WEATHER: _____

PHONE(S): _____ PREVIOUS 3 DAYS WEATHER: _____

DATE: _____

DID YOU SURVEY THIS WHOLE SECTION OF THE STREAM? YES NO – Which section(s) were not surveyed? Why?

Make all observations facing DOWNSTREAM.

NOTE: Items marked with an asterisk (*) may indicate an area of concern. If observed, you may need to describe further on the attached Areas of Concern sheet.

1. Segment code (e.g. 1A): _____ Locate starting point of segment on map, and label using segment code letter (e.g. – A)

Describe location and extent of segment (i.e. from ___ to ___). If possible, use landmarks and road names.

2. AVERAGE WATER DEPTH _____ feet AVERAGE WATER WIDTH _____ feet

3. HOW WOULD YOU DESCRIBE THIS SECTION OF THE STREAM? CHECK ANY THAT APPLY:

- A. _____ Cascade _____ Step-Pool sequence _____ Pool-Riffle sequence _____ Glide
- B. _____ Steep (slope > 3%) _____ High Gradient (1% ≤ slope ≤ 3%) _____ Flat (slope < 1%)
- C. _____ Closely associated with an inland or riverine wetland (marsh, meadow, swamp).
 _____ Flood control or water reservoir area or lake (>5ac.)
 _____ Piped* _____ Channeled* _____ Lined (stone, concrete)*
 _____ Other (Describe):

4. STREAM BANK COVER/VEGETATION:

<i>Type</i>	<i>Few</i>	<i>Common</i>	<i>Abundant</i>
Conifers (pines, higher than 20 ft.)	_____	_____	_____
Deciduous (oaks/maples, higher than 20 ft.)	_____	_____	_____
Small trees and shrubs (smaller than 20 ft.)	_____	_____	_____
Grasses/Emergent (cattails/rushes)	_____	_____	_____
Lawns*	_____	_____	_____
Natural Rock/Ledge	_____	_____	_____
Artificial (concrete/riprap/walls/buildings)*	_____	_____	_____
Non-native invasive plants (purple loosestrife, phragmites, other?)	_____	_____	_____

Are stream bank soils mostly exposed? Yes* No

Does vegetation appear natural or cultivated? _____

5. LOOKING DOWNSTREAM, ESTIMATE THE AVERAGE, UNINTERRUPTED, WIDTH OF RIPARIAN VEGETATION:

Right side: ___ <25'* ___ 25-100' ___ >100'
Left side: ___ <25'* ___ 25-100' ___ >100'

6. ESTIMATE THE NUMBER OF:

Impoundments (Small ponds, Dams)* _____ Discharge pipes* _____ Stream Crossings _____
*Height of Dam:

7. VISUALLY DESCRIBE WATER CONDITIONS:

___ Clear ___ Turbid* ___ Green* ___ Rusty - Red*
___ Yellow - Brown* ___ Foamy* ___ Oil Slicks* ___ Milky*

If water is a color other than clear, does anything appear to be affecting water quality?

YES* NO

COMMENTS:

8. DESCRIBE AQUATIC VEGETATION:

A. ALGAE GROWTH:

Where? ___ Absent* **What kind?** ___ Floating ___ Matted on substrate
 ___ In spots ___ Hairy ___ Brown
 ___ Everywhere ___ Scum ___ Green

B. Large Aquatic Plants:

Where? **What kind?**
___ Everywhere* ___ Floating free (duck weed) ___ Submerged rooted (eel grass)
___ In spots ___ Floating rooted (water lily) ___ Emergent (cattails, rushes)
___ Absent ___ Submerged free (coontail, milfoil)

Does anything appear to be contributing to the algae blooms (discharge pipes, runoff)?

YES* NO

COMMENTS:

9. APPROXIMATE COMPOSITION (%) OF SUBSTRATE MATERIALS (SUM SHOULD EQUAL 100%):

___ % Silt or Clay (smooth)* ___ % Sand (gritty)* ___ % Gravel (.1-2")
___ % Cobbles (2-10") ___ % Boulders (>10") ___ % Bedrock
___ % Concrete or Riprap ___ % Organic (Plant debris, muck, and shells)

Does anything appear to be contributing to excessive fine sediment deposits on the stream banks, or sediment deltas (storm pipe outlets, tributaries, or runoff)?

YES* NO

COMMENTS:

10. DESCRIBE THE SMELL OF WATER AND SEDIMENTS:

___ None ___ Rotten Eggs* ___ Sewage* ___ Musky
___ Oil/Gas* ___ Other (describe):

11. IMMEDIATELY ADJACENT LAND USES:

Label: 1 = most 4 = least 0 = none

- | | | | |
|--|--|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> Rural Residential | <input type="checkbox"/> Suburban | <input type="checkbox"/> Agricultural | <input type="checkbox"/> Industrial |
| <input type="checkbox"/> Urban Residential | <input type="checkbox"/> Forest | <input type="checkbox"/> Commercial | <input type="checkbox"/> Recreational |
| <input type="checkbox"/> Schools | <input type="checkbox"/> Non Residential Roads | | |

12. INDICATE SPECIFIC POTENTIAL SOURCES OF POLLUTION ALONG THE STREAM:

- | | | |
|---|--|--|
| <input type="checkbox"/> Lawns/Gardens | <input type="checkbox"/> Parking Lots | <input type="checkbox"/> Roads |
| <input type="checkbox"/> Commercial Dumpsters | <input type="checkbox"/> Farms/Nurseries | <input type="checkbox"/> Yard Waste |
| <input type="checkbox"/> Golf Courses | <input type="checkbox"/> Failing Septic System | <input type="checkbox"/> Other (describe): |

13. RECREATIONAL USE AND OPPORTUNITIES:

- Visible human activities as evidenced by litter, bike & hiking trails, roads, camping areas. Do you see people using the river for recreation? How many? Describe activities.
- Potential off road parking within 500 ft of the stream
- Existing or potential access to the stream without disturbance to residents.
- Watercourse is at least 10 feet wide and 1 foot deep, and for the most part is free of obstructions for non-powered boating. Describe any visible boating activity.

14. (Optional) FISH AND WILDLIFE - IF YOU ARE ABLE, LIST AND ESTIMATE NUMBERS OF ANY FISH AND WILDLIFE THAT YOU CAN IDENTIFY UNDER THE FOLLOWING CATEGORIES, AND MAKE NOTE OF NESTS AND NESTING BOXES:

- A. Birds of Prey (osprey, hawks, etc.)
- B. Water Fowl (wood ducks, mallards, Canada geese*, etc)
- C. Riverine Fur-Bearers (muskrat, beaver, otter, etc.)
- D. Water Birds (herons, egrets, etc.)
- E. Song Birds & Other Small Birds (black birds, robins , blue jays, etc.)
- F. Amphibians & Reptiles (salamander, snakes, etc.)
- G. Fish (trout, bass, alewife, etc.)
- H. Aquatic Insects (mayflies, stoneflies, caddisflies, etc.)

15. ADDITIONAL COMMENTS OR OBSERVATIONS:

Please return completed surveys and film to the Middlesex County Soil and Water Conservation District, P.O. Box 70, Haddam, CT 06438-0070

Further Description of Areas of Concern

Site Number	Type of Concern(s)	Description of Location (Locate & Label on Map)	Description of Site

Label: Assign a number to each impaired site you identify starting with the number 1.

Areas of Concern: Excessive algae growth, Barriers to fish passage (dams, culverts above low flows, obstructions higher than 8 inches), Litter, Sedimentation, Stream bank erosion, Lack of riparian vegetation, Discharges (from pipes or channels), Channelization or Stream bank manipulation, etc.

Location: Approximate distance and direction from nearest landmarks (i.e.- Roads, Buildings, Power lines, etc.).

Description: Describe conditions - water colors, smells, algae and large aquatic plant growth, adjacent land uses, potential sources of pollution, etc.

INSTRUCTIONS:

The purposes of this form are to collect information about the overall characteristics of a particular section of the stream, and to identify impaired sites where restoration efforts can be pursued. **A separate survey sheet should be filled out every time you observe abrupt changes in the physical characteristics of the stream** (gradient, width, depth, substrate materials, stream bank vegetation, channel pattern, etc.), which would indicate that you are in a different segment of the stream. Use questions 2, 3, and 4 as guidelines.

The minimum length of a stream segment should be **1000 feet**. Large ponds (>5 acres), lakes, or reservoirs should have a separate survey sheet.

Write the name of the stream as it appears on the topographic map. If the stream does not have a name, write **unnamed**, and describe its location. Use capital letters in alphabetical order to label stream segments as you survey the stream. Make sure to mark the segments on the topographic map. Because the survey may be conducted by canoeing or walking, **observations should be recorded facing downstream** to maintain consistency.

1. With as much detail as possible describe the location and the extent of the area that is being covered. When possible, use road names or landmarks.
2. Measure or estimate the average water width and depth of the stream.
3. Select the statements that best describe this section of the stream. If you do not feel it meets the provided descriptions, describe under *other*.

Cascade: narrow and steep channel, fast turbulent flows, rocky substrate. **Step:** Steep stairway pattern channel, fast turbulent flows, large substrate materials. **Riffle:** shallow fast running water, substrate mostly composed of cobble and gravel. **Pool:** slow flowing area, deeper than adjacent areas, but not wide enough to change the character of the stream (not a pond). **Glide:** section with smooth flowing deep water, substrate materials tend to have little influence on the flow of surface water.

4. Describe the presence and type of streamside cover. This description helps define the section's ecosystem and its health.
5. **Riparian** zones are areas adjacent to watercourses. Riparian vegetation refers to the plants that naturally occur in riparian zones. Lawns and mowed areas should not be considered natural riparian vegetation. Estimate the uninterrupted width of riparian vegetation on both sides of the stream.
6. As you walk, keep count of any discharge pipes, small ponds (<5 acres), and dams. At the end of the section, record the total numbers observed.
7. Color and clarity of water could indicate pollution problems in the stream. Also note floating foam or slicks in the water.
8. **Algae** are mostly single cell plants. They can color the water green, and they can grow in colonies that can form long filamentous bodies or can form a mat on the stream's substrate. Algae are usually green and slimy and do not have any visible structural characteristics. Algae growth can point to nutrient problems in the stream. **Aquatic plants** are visible to the naked eye and have distinct features such as stems, leaves, and flowers. Their presence is a sign of biological productivity and of slow water flows.
9. **Substrate:** the material that makes up the bottom (or floor) of a stream. There is a direct relationship between the stream's substrate and the rate of water flow. The composition of the substrate is indicative of fish habitat quality. Visually estimate in percentage the relative proportion of each of the substrate types listed.
10. **Odors-** Describe how the stream smells.
11. Adjacent land uses can impact the water quality of a stream, especially through storm water discharges. Concentrate on describing the areas closer to this section of the stream. Label the four most abundant land uses, use 1 for the most abundant land use and 4 for the least.
12. Indicate, from your observation, possible sources of pollution along the stream.
13. If people are currently using the stream, describe this. If you see opportunities for recreational use, please describe.
14. (Optional) If you are familiar with wildlife please fill out this section to the best of your ability.
15. Please make note of any additional observations not noted in the preceding spaces.

Additional Sheet: Impaired sites are sections of the stream where the physical characteristics are indicative of conditions adverse to aquatic life and human uses. The impairment should affect at least 50 feet of the stream. Use numbers to label every impaired site you identify starting with the number 1.

NOTE: Sewage spills should be immediately reported to town officials. Oil or chemical spills should be immediately reported to DEP at (860) 424-3338.

Attachment B

Summary of Survey Results

Connecticut River Watch Program
1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 1 – East Street to Vernon Avenue in Vernon
 Survey Date: 8/9/99 Weather: sunny, dry

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
1A East Street to un-named stream	30	½ foot	Glide Flat slope	Lawns (A) Deciduous trees (C) Small trees/ shrubs (C) Artificial (C) Purple Loosestrife*, Multiflora Rose* (C) Grasses/Emergents (F)	R < 25 L < 25	clear no smell	algae absent aquatic plants absent	Sand (85%) Silt/clay (10%) Gravel (5%)	Urban residential	Lawns/Gardens Roads		mallards
1B Un-named stream to west end of Grove Hill Cemetery	70	< ½ foot	Glide Flat slope	Lawns (A) Conifers (C) Deciduous trees (C) Artificial (C) Purple Loosestrife* (C) Soils mostly exposed	R < 25 L >100	clear no smell	algae absent aquatic plants in spots: coontail	Silt/clay (80%) Sand (10%) Gravel (10%)	Urban residential	Lawns/Gardens Roads	evidence of use potential access from cemetery	red tail hawk mallards small fish
1C West end of Grove Hill Cemetery to Grove Street (Paper Mill Pond)	200	6 feet	Glide Flat slope	Lawns (A) Deciduous trees (C) Conifers (F)	R < 25 L < 25	clear no smell	algae absent aquatic plants everywhere: coontail	Silt/clay (90%) Sand (10%)	Urban residential	Lawns/Gardens Parking Lots Roads	potential parking and access boating possible	mallards small fish
1D Grove Street to Court Street	20 (where visible)	½ foot	Channeled	Artificial (A)	NA	clear no smell	algae absent aquatic plants absent	NA - concrete channel	Industrial	Unknown		
1E Court Street to Vernon Ave.	15	½ foot	Cascade Steep slope	Deciduous trees (C) Artificial (C) Soils mostly exposed	R < 25 L < 25	clear no smell	algae absent aquatic plants absent	Cobbles (80%) Boulders (20%)	Commercial	Commercial dumpsters Parking Lots Roads Litter		

Connecticut River Watch Program
 1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 2 – Vernon Avenue to Union Street in Vernon
 Survey Date: 8/99 Weather: clear, dry

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
2A Vernon Avenue to River Road/West Main Street	8	8 inches	Cascade & Step-Pool Steep Slope Channeled (partially)	Deciduous trees (A) Small trees/ shrubs (C) Conifers (F) Grasses/Emergents (F) Artificial (F) Non-natives (F) Soils mostly exposed	R L	clear no smell	algae in spots: floating, matted aquatic plants absent	Sand (30%) Gravel (20%) Cobbles (20%) Boulders (20%) Silt/clay (10%)	Urban residential Suburban Industrial Recreational	Lawns/Gardens Parking Lots Roads	little used potential parking at apartment house	rats
2B River Road/West Main Street to Ellington Town line	15	1 foot	Glide Flat slope Cascade & Step Pool Steep Slope	Deciduous trees (A) Lawns (A) Small trees/ shrubs (C) Conifers (F) Grasses/Emergents (F) Natural Rock/Ledge (F) Artificial (F) Non-natives (F) Soils mostly exposed	R < 25 L 25-100	clear no smell	algae absent aquatic plants absent	Sand (50%) Silt/clay (40%) Gravel (10%)	Urban residential Industrial	Lawns/Gardens Roads	boating possible	waterfowl songbirds damselflies

Connecticut River Watch Program
1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 3 – East Street to Wapping Wood Road in Vernon

Survey Dates: 8/4, 8/17, 8/24/99

Weather: sunny, dry

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
3A Union Street to Vernon/Ellington Town Line	12	½ foot	Pool-Riffle Flat slope	Lawns (A) Conifers (F) Deciduous trees (F) Small trees/shrubs (F) Japanese Knotweed* (C) Soils mostly exposed	R < 25 L < 25	clear no smell	algae absent aquatic plants absent	Gravel (50%) Sand (40%) Cobbles (10%)	Suburban Agricultural Commercial	Lawns/Gardens Parking Lots Roads Yard Waste		sparrows dead trout
3B Vernon/Ellington Town Line to Natural Country Farm outbuilding	20	1 foot	Glide & Pool-Riffle Flat slope	Small trees/shrubs (C) Deciduous trees (F) Lawns (F) Purple Loosestrife*, Multiflora Rose*, Japanese Knotweed* (C) Soils mostly exposed	R < 25 L < 25	clear no smell	algae absent aquatic plants in spots: coontail	Sand (35%) Gravel (35%) Cobbles (30%)	Agricultural Suburban Commercial	Parking Lots Farms/Nurseries	evidence of use (litter) potential access from cemetery	song birds & other small birds
3C Natural Country Farm outbuilding to 2000 feet upstream of Lower Butcher Road	30	1 foot	Glide & Pool-Riffle Flat slope Sinuous	Deciduous trees (C) Small trees/shrubs (C) Purple Loosestrife*, Japanese Knotweed* (C)	R > 100 L > 100	clear no smell	algae in spots: matted on substrate aquatic plants absent	Gravel (55%) Sand (40%) Cobbles (5%)	Agricultural	Farms/Nurseries		song birds & other small birds
3D 2000 feet upstream of Lower Butcher Road to Lower Butcher Road	15	10 inches	Pool-Riffle Flat slope	Small trees/shrubs (C) Deciduous trees (F) Lawns (F) Purple Loosestrife*	R < 25 L < 25	clear no smell	algae in spots: matted on substrate aquatic plants absent	Sand (55%) Cobbles (30%) Gravel (15%)	Agricultural Rural residential	Lawns/Gardens Farms/Nurseries		song birds & other small birds
3E Lower Butcher Road to Windermere Road	15	½ foot	Glide Flat slope Associated with marsh Sinuous	Grasses/Emergents (C) Deciduous trees (F) Purple Loosestrife* (C) Soils mostly exposed	R < 25 L < 25	clear no smell	algae in spots: matted on substrate aquatic plants absent	Sand (75%) Gravel (20%) Cobbles (5%)	Agricultural	Farms/Nurseries	potential parking	song birds & other small birds

Connecticut River Watch Program
 1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 3 – East Street to Wapping Wood Road in Vernon (cont.)
 Survey Dates: 8/4, 8/17, 8/24/99

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
3F Windermere Road to Wapping Wood Road	2	1 foot	Glide Flat slope Associated with marsh Sinuous	Small trees/shrubs (C) Deciduous trees (F) Soils mostly exposed	R < 25 L < 25	clear no smell	algae absent aquatic plants absent	Gravel (60%) Silt/clay (40%)	Undeveloped (forested)	Litter/refuse	evidence of use (litter along old trolley line, unofficial trail) potential parking & access along trolley line boating possible	

Connecticut River Watch Program
1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 4 – Wapping Wood Road to Dart Hill Road in Vernon
Survey Dates: 9/14/99, 10/8/99 Weather: sunny, dry

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
4A Wapping Wood Road to pond by Vernon Gardens Apts.	8	2½ feet	Glide Flat slope Associated with marsh Sinuous	Deciduous trees (C) Grasses/Emergents Soils mostly exposed	R 25-100 L 25-100	turbid (4½" rain on 9/10) no smell	algae absent? aquatic plants: emergent	Silt/clay (80%) Sand (20%)	Suburban Industrial (sewer plant)	Parking Lots Sewage Treatment Plant	evidence of use (litter, Linear Trail) potential parking at Wapping Wood Road boating possible	mallards Canada geese great blue herons song birds & other small birds
4B Pond by Vernon Gardens Apts. to Werner Drive	25	½ foot	Glide Flat slope Associated with marsh Sinuous	Deciduous trees (C) Small trees/shrubs (C)	R 25-100 L 25-100	turbid (4½" rain on 9/10) no smell	algae absent? aquatic plants absent?	Silt/clay (80%) Sand (20%)	Suburban	Lawns/Gardens Parking Lots	evidence of use (litter, Linear Trail) boating possible	mallards Canada geese muskrat great blue herons song birds & other small birds
4C Werner Drive to Barbara Road	15	1 foot	Glide & Pool-Riffle Flat slope Associated with marsh	Deciduous trees (C) Small trees/shrubs (C) Lawns (F) Multiflora Rose* Soils mostly exposed	R < 25 L 25-100	turbid (4½" rain on 9/10) no smell	algae absent? aquatic plants: submerged rooted	Silt/clay (50%) Sand (30%) Gravel (10%) Cobbles (10%)	Suburban Commercial	Lawns/Gardens Parking Lots	evidence of use (litter, Linear Trail) boating possible	mallards song birds & other small birds
4D Barbara Road to Dart Hill Road	15	1 foot	Glide Flat slope Sinuous	Deciduous trees (C) Small trees/shrubs (C) Lawns (F) Multiflora Rose*, Japanese Knotweed* Soils mostly exposed	R >100 L >100	clear no smell	algae in spots: matted on substrate aquatic plants absent	Silt/clay (90%) Sand (10%)	Suburban	Lawns/Gardens Farms/Nurseries	evidence of use (Linear Trail) boating possible	song birds & other small birds

Connecticut River Watch Program
1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 5 – Dart Hill Road to Pleasant View Drive in Vernon
Survey Dates: 8/5/99 Weather: Dry, sunny

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
5A Dart Hill Road to southerly turn	20	1½ feet	Glide Flat slope Associated with wetland (forested floodplain)	Deciduous trees (A) Small trees/shrubs (C) Grasses/Emergents (C) Lawns (F) Natural Rock/Ledge (F) Artificial (F) Non-native invasives (F) Soils mostly exposed	R 25-100 L 25-100	turbid * (sewage grey) no smell * down-stream of STP, appeared to come in pulses	algae absent aquatic plants absent	Sand (70%) Silt/clay (30%)	Agricultural Commercial Industrial (sewer plant) Urban residential Undeveloped (forested)	Commercial dumpsters Parking Lots Farms/Nurseries Roads Stormwater (discharge at Transfer Station) Sewage Treatment Plant	evidence of use (trails) potential parking at Dart Hill Road boating possible (narrow in spots with overhanging vegetation, occasional obstruction from large woody debris)	
5B to Pleasant View Drive	20	1½ feet	Pool-Riffle & Glide High Gradient & Flat slope Associated with marsh Sinuous	Deciduous trees (A) Small trees/shrubs (A) Conifers (C) Grasses/Emergents (C) Lawns (C) Natural Rock/Ledge (F) Artificial (F) Non-native invasives (F)	R 25-100 L >100	clear no smell	algae in spots: hairy, green aquatic plants absent	Sand (60%) Cobbles (20%) Silt/clay (10%) Boulders (10%)	Urban residential Suburban Agricultural Commercial Non-residential roads Undeveloped (forested) Industrial	Lawns/Gardens Farms/Nurseries Roads Stormwater	evidence of use (trail) potential parking & access boating possible (shallow in spots, lots of woody debris)	

Connecticut River Watch Program
1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 6 – Pleasant View Drive to Kelly Road in Vernon
 Survey Date: 10/8/99 Weather: Sunny, dry (12 inches of rain in September)

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
6A Pleasant View Drive to last house on right bank on Riverside Drive	25	1 foot	Glide Flat slope	Deciduous trees (C) Lawns (F) Soils mostly exposed	R 25-100 L 25-100	clear sewage smell	algae in spots aquatic plants absent	Gravel (90%) Cobbles (10%)	Suburban Undeveloped (forested)	Lawns/Gardens Roads Litter/Refuse	evidence of use (litter, tires, shopping carts) potential access from Town land boating possible	song birds & other small birds
6B Last house on right bank on Riverside Drive to Vernon Circle shops	15	1½ feet	Pool-Riffle & Glide Flat slope	Deciduous trees (A) Small trees/shrubs (F) Grasses/Emergents (F) Soils mostly exposed	R >100 L >100	clear no smell	algae in spots aquatic plants absent	Gravel (60%) Silt/clay (20%) Sand (20%)	Undeveloped (forested)		boating possible	song birds & other small birds
6C Vernon Circle shops to Kelly Road	15	1½ feet	Pool-Riffle & Glide Flat Slope	Deciduous trees (A) Japanese Knotweed* (C) Soils mostly exposed	R >100 L 25-100	clear no smell	algae in spots aquatic plants absent	Silt/clay (40%) Sand (40%) Gravel (20%)	Commercial Urban residential	Lawns/Gardens Parking Lots Roads Commercial Dumpsters	evidence of use (litter, shopping carts) potential parking and access at Vernon Circle boating possible	song birds & other small birds

Connecticut River Watch Program
1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 7 – Kelly Road in Vernon to Deming Street in Manchester
Survey Dates: 10/15, 10/27/99, 9/99 Weather: Clear

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
7A Kelly Road to I-84 bridge	25	1½ feet	Glide Flat slope	Deciduous trees (C) Conifers (F) Japanese Knotweed* (C) Soils mostly exposed (on R bank)	R <25 L >100	clear sewage smell	algae absent aquatic plants absent	Sand (90%) Gravel (5%) Cobbles (5%)	Suburban Undeveloped (forested)	Litter/Refuse	potential parking boating possible	
7B I-84 bridge to Town line	25	2 feet	Pool-Riffle & Glide Flat slope Channeled	Small trees/shrubs (C) Lawns (A)	R L	clear no smell	algae absent aquatic plants absent	Gravel (50%) Cobbles (30%) Sand (20%)	Commercial Recreational	Parking Lots Roads Lawns/Gardens Golf Courses	potential parking and access boating possible	
7C Town line to I-84 ramp upstream of Deming Street	35	1½ feet	Pool-Riffle Flat Slope associated with wetland	Small trees/shrubs (A) Deciduous trees (C) Grasses/Emergents (C) Conifers (F) Artificial (F) Purple Loosestrife*, Phragmites*, Japanese Knotweed* (C)	R 25-100 L <25	clear, yellow-brown, slightly turbid no smell	algae in spots: hairy, matted on substrate, green aquatic plants in spots: floating free, rooted, submerged	Cobbles (40%) Gravel (30%) Sand (20%) Silt/clay (10%)	Commercial Undeveloped (forested)	Parking Lots Roads Commercial Dumpsters	known uses (Linear Trail, fishermen, canoeists) potential parking at Courthouse Plus (Manchester town line) boating possible	red tail hawks mallards, Canada geese muskrat, otter green & great blue heron, kingfisher baltimore orioles, cardinals, red wing blackbirds, catbirds, robins, goldfinch, warblers blacksnake, garter snake, frogs trout, carp aquatic insects

Connecticut River Watch Program
1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 8 – Deming Street to Union Street in Manchester
 Survey Dates: 1/2000 Weather: Clear

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation *invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
8A Deming Street to entrance of Union Pond	35	3 feet	Pool-Riffle High gradient Steep banks	Deciduous trees (A) Natural Rock/Ledge (A) Small trees/shrubs (F) Soils mostly exposed	R <25 L 25-100	clear no smell	algae in spots: hairy, green aquatic plants absent	Bedrock (90%) Boulders (5%) Cobbles (5%)	Commercial Industrial Agricultural Schools	Commercial Dumpsters Parking Lots Roads	visible activities (hiking, fishing, canoeing) potential parking at paved lots good access boating possible, canoeing in rapids noted	hawks wood ducks, mallards, Canada geese muskrat herons black birds, robins, blue jays salamanders, snakes trout, bass
8B Union Pond	1300 (1000-1600)	7 feet (3-10 feet)	Pond (dammed)	Deciduous trees (A) Small trees/shrubs (C) Conifers (F) Grasses/Emergent (F) Lawns (F) Purple Loosestrife*, Phragmites* (F)	R 25-100 L 25-100	clear no smell	algae absent aquatic plants in spots: floating free, floating rooted, submerged free, emergent	Sand (50%) Gravel (25%) Silt/clay (20%) Organic (5%)	Undeveloped (forested) Suburban Urban Residential Schools Recreational	Parking Lots Roads Lawns/Gardens Yard Waste	visible activities (hiking, fishing, boating) potential parking and access boating possible	osprey, hawks wood ducks, mallards, Canada geese, (swan in summer) muskrat, beaver, otter herons, egrets black birds, robins, blue jays salamanders, snakes trout, bass
8C Union Pond dam to Union Street	90	2 feet	Step-Pool High gradient	Small trees/shrubs (F) Artificial (A) – concrete dam and riprap Soils mostly exposed	R <25 L <25	clear no smell	algae absent aquatic plants absent	Boulders (40%) Bedrock (20%) Cobbles (20%) Concrete/riprap (10%)	Suburban Undeveloped (forested) Recreational	Parking Lots Roads Lawns/Gardens	visible activities (fishing, canoeing – portage) potential parking and access boating possible	osprey, hawks wood ducks, mallards, Canada geese, muskrat herons, egrets black birds, robins, blue jays salamanders trout, bass

Connecticut River Watch Program
 1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 9 – Union Street to North Main Street in Manchester
 Survey Dates: 10/1999 Weather: Clear

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
9 Union Street to North Main Street	30	6 inches to 3 feet	Pool-Riffle & Glide Flat slope Lined (behind power plant)	Deciduous trees (A) Small trees/shrubs (A) Grasses/Emergents (F) Lawns (F) Natural Rock/Ledge (F) Artificial (F) – concrete wall behind power plant Japanese Knotweed*	R 25-100 L 25-100	clear no smell	algae in spots: hairy, matted on substrate, green aquatic plants absent	Gravel (60%) Sand (33%) Bedrock (2%) Boulders (2%) Cobbles (2%) Concrete (1%)	Undeveloped (forested) Commercial Industrial	Lawns/Gardens Parking Lots Roads Commercial Dumpsters Farms/Nurseries Storm Drains	evidence of use (hiking trails) potential parking next to Union St. potential access boating possible, canoes and kayaks noted	hawks wood ducks, Canada geese muskrat herons song birds & other small birds trout

Connecticut River Watch Program
 1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 10 – North Main Street to Adams Street in Manchester
 Survey Dates: 8/22/99 Weather: Clear

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
10 North Main Street to Adams Street	30	1½ feet	Pool-Riffle & Glide Flat slope	Deciduous trees (A) Conifers (C) - gorge Small trees/shrubs (C) Natural Rock/Ledge (C) - gorge Grasses/Emergent (F) Artificial (F) – R.R. trestle Purple Loosestrife* (F) Soils mostly exposed	R L	clear no smell	algae everywhere: scum, brown, green aquatic plants absent	Cobbles (74%) Bedrock (20%) Sand (5%) Boulders (1%)	Undeveloped (forested) Recreational Commercial Industrial Urban residential Non residential roads	Parking Lots Roads	known activities (hiking on Linear Trail, fishing, bird watching) potential parking and access boating possible, canoes and kayaks used, annual canoe race in April	hawks, owls mallards muskrat, otter blue herons, kingfisher black birds, robins, woodpeckers, chickadees, crows fish deer, fox, coyote, skunks, racoons

Connecticut River Watch Program
 1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 11 – Adams Street to Middle Turnpike West in Manchester
 Survey Dates: 9/99 Weather: Clear

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation *invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
11 Adams Street to Middle Turnpike West	35	2 feet	Pool-Riffle Flat slope Note: Many islands are developing and becoming permanent	Deciduous trees (A) Conifers (F) Grasses/Emergent (F) Lawns (F) Phragmites*, Japanese Knotweed* - lower section Note: Hemlocks are abundant behind E. Catholic H.S.	R >100 L >100	clear no smell	algae in spots: hairy, green aquatic plants in spots: floating free	Gravel (50%) Cobbles (30%) Sand (10%) Silt (10%) Note: more cobbles and gravel in upper section, more sand and silt in lower section	Undeveloped (forested) Commercial Urban residential Recreational	Lawns/Gardens Parking Lots Roads Commercial dumpsters Yard waste	known activities (hiking on Linear Trail, fishing, canoeing), litter potential parking (town and commercial lots) and access boating possible, annual canoe race in April	hawks, owls wood ducks, mallards, Canada geese, merganser muskrat, otter blue herons, kingfisher black birds, robins, blue jays snakes, turtles trout, minnows

Connecticut River Watch Program
 1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 12 – Middle Turnpike West to I-84 Overpass (Laurel Marsh) in Manchester
 Survey Dates: 9/24/99 Weather: Sunny

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
12 Middle Turnpike West to I-84 Overpass (Laurel Marsh)	30	2 feet	Glide Flat slope Closely associated with wetland Stone-lined by landfill	Grasses/Emergent (A) Small trees/shrubs (C) Conifers (F) Deciduous trees (F) Phragmites*, Japanese Knotweed* (A) Stream bank soils partially exposed	R >100 L >100	clear no smell	algae absent aquatic plants everywhere: emergent & submerged free	Sand (40%) Silt/clay (40%) Organic (15%) Gravel (5%)	Undeveloped (forested) Industrial Commercial Non-residential roads Recreational	Parking Lots Roads Sewage Treatment Plant Landfill	known activities (hiking on Linear Trail, biking, canoeing) existing access boating possible, annual canoe race in April	hawks, turkey vultures wood ducks, mallards, Canada geese, swans, merganser, teal muskrat, otter blue and green herons, egrets, cormorant, kingfisher, yellow legs, sandpipers, seagulls oriole, indigo bunting, rose-breasted grosbeak, warblers, waxwings, kinglets, swallows, flycatchers, hummingbirds, black birds pheasant deer, fox frogs, snakes, painted and snapping turtles rainbow trout, carp, minnows freshwater clams

**Connecticut River Watch Program
1999 Hockanum River Stream Walk – Summary of Survey Data**

Segment 13 – I-84 Overpass in Manchester to Walnut Street in East Hartford
Survey Dates: 9/18/99 Weather: Clear (following Hurricane Floyd)

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation *invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
13A I-84 Overpass to Manchester/ East Hartford line	50	1½ feet	Glide Flat slope Channeled under I-84	Deciduous trees (C) Small trees/shrubs (C) Grasses/Emergents (C) Purple loosestrife* (F)	R >100 L <25	turbid & yellow-brown no smell	algae absent aquatic plants absent	Sand (90%) Silt/clay (10%)	Undeveloped (forested) Urban residential	Roads	visible activities (biking, trail) boating possible (survey done by canoe)	
13B Manchester/ East Hartford line to dam	50	3 feet	Glide Flat slope Closely associated with wetland	Deciduous trees (C) Small trees/shrubs (C) Grasses/Emergents (C)	R 25-100 L <25	turbid & yellow-brown no smell	algae absent aquatic plants absent	Sand (90%) Silt/clay (10%)	Undeveloped (forested) Urban Residential Industrial	Roads Yard Waste Lawns/Gardens	evidence of use (litter) boating possible (survey done by canoe)	
13C Dam to Walnut Street	40	1½ feet	Glide Flat slope Closely associated with wetland	Deciduous trees (A) Small trees/shrubs (C) Note: tree canopy covers river	R <25 L <25	turbid & yellow-brown no smell	algae absent aquatic plants absent	Sand (90%) Silt/clay (10%)	Undeveloped (forested) Non-residential roads Urban residential	Roads	boating possible (survey done by canoe)	

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Segment 14 – Walnut Street to Scotland Road in East Hartford
Survey Dates: 9/18/99 Weather: Clear (following Hurricane Floyd)

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
14A Walnut Street to impoundment	45	3 feet	Glide Flat slope Closely associated with wetland	Deciduous trees (C) Small trees/shrubs (C) Lawns (F) Natural Rock/Ledge (F)	R <25 L 25-100	turbid & yellow-brown no smell	algae absent aquatic plants absent	Sand (90%) Silt/clay (10%) Note: some bedrock 200 ft. downstream of footbridge	Urban residential Non-residential roads Recreational Undeveloped (forested)	Parking lots	visible activities (Labor Field - recreational field) potential parking and access boating possible (survey done by canoe)	waterfowl, swans water birds
14B Impoundment to Scotland Road		2½ feet	Glide Flat slope Flood control/water reservoir area	Deciduous trees (C) Small trees/shrubs (C) Grasses/Emergents (C) Non-native invasives (C)	R >100 L >100	turbid & yellow-brown no smell	algae in spots: floating in clumps, green filament aquatic plants in spots: floating free, floating rooted, emergent Note: water hyacinth (?) just upstream of dam	Silt/clay (95%) Organic (5%)	Undeveloped (forested) Schools Non-residential roads	Parking lots Roads	potential parking and access boating possible (survey done by canoe)	Canada geese, swans, wood ducks and many other ducks evidence of beaver great blue heron (common) song birds & other small birds

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Segment 15 – Scotland Road to Hillside Street in East Hartford
 Survey Dates: 11/6/99 Weather: Clear

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
15 Scotland Road to Hillside Street	40	4½ feet (3-6 feet)	Pool-Riffle Flat slope Channeled	Deciduous trees (A) Small trees/shrubs (C) Conifers (F) Grasses/Emergents (F) Lawns (F) Natural Rock/Ledge (F) Artificial (F) Stream bank soils mostly exposed (water level low)	R 25-100 L 25-100	clear/yellow -brown?, foamy downstream of dams no smell	algae absent aquatic plants absent	Organic (50%) Boulders (20%) Sand (10%) Silt/clay (5%) Gravel (5%)	Urban residential Non- residential roads Recreational Undeveloped (forested)	Yard waste Litter Parking lots Roads	visible activities (walking on Linear Trail, drinking alcohol) potential parking and access boating possible	evidence of beaver herons

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 1999 Hockanum River Stream Walk – Summary of Survey Data

Segment 17 – I-84 to Connecticut River in East Hartford
 Survey Dates: 11/6/99 Weather: Clear

<i>Section Code & Location</i>	<i>Avg. Width (feet)</i>	<i>Avg. Depth</i>	<i>Profile</i>	<i>Stream Bank Cover/ Vegetation</i> <i>*invasive species</i>	<i>Buffer Width (feet)</i>	<i>Water Condition</i>	<i>Aquatic Vegetation</i>	<i>Substrate Materials</i>	<i>Primary Land Uses</i>	<i>Potential Pollution Sources</i>	<i>Recreation</i>	<i>Wildlife</i>
17 I-84 to Rte. 2 (Rte. 2 to Connecticut River not accessible)	30	2 feet	Glide Flat slope Note: some swampy areas	Deciduous trees (A) Conifers (F) Small trees/shrubs (F) Grasses/Emergents (F) Lawns (F) Natural Rock/Ledge (F) Artificial (F) Non-native invasive species (F) Stream bank soils mostly exposed (water level low)	R 25-100 L 25-100 Note: some areas of <25 feet	turbid no smell Note: sewage smell in air	algae in spots: hairy, matted, green aquatic plants absent	Organic (80%) Boulders (5%) Sand (5%) Silt/clay (5%) Gravel (5%)	Undeveloped (forested) Non-residential roads Industrial Commercial Rural residential	Parking lots Roads Sewage treatment plant	evidence of use (drinking alcohol, trash, basketballs) potential access boating possible but trees down	wood duck evidence of beaver heron fish deer

Attachment C

Stream Walk Photographs



In this upstream segment of the Hockanum River in Ellington, purple loosestrife – a non-native invasive plant species – can be seen growing on the stream bank.



Along a Hockanum River segment in Manchester, this erosional gully was formed on the stream bank as a result of runoff from a storm drain. The greenish tinge to the water is due to an algae bloom that occurred during the summer drought.



An abundance of algae can be seen growing on the stream bottom in this segment of the river in Manchester.



In this downstream segment of the river in East Hartford, a surveyor bushwhacks through a dense growth of Japanese knotweed, another non-native invasive plants species common in riverside areas of the Hockanum.