Salmon River Watershed
Rapid Bioassessment Summary Report 2008

The Salmon River Watershed Partnership

in association with

The Nature Conservancy, Connecticut Chapter

The Nature Conservancy
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Connecticut River Coastal Conservation District, Inc

Connecticut River Watch Program

TABLE OF CONTENTS

EXECUTIVE SUMMARY 2

BACKGROUND 3

PROJECT SUMMARY 4

RESULTS 6

RECOMMENDATIONS 9

ACKNOWLEDGEMENTS 10

ATTACHMENTS

- Attachment A – DEP Assessment Results
- Attachment B – RBV Organism List
- Attachment C – RBV Field Data Sheet
- Attachment D – Site Map
- Attachment E – RBV Data Summary

Salmon River Watershed Rapid Bioassessment Summary Report 2008

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October 2009

Prepared for, and with funding from, the Salmon River Watershed Partnership
In cooperation with the Connecticut Department of Environmental Protection

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EXECUTIVE SUMMARY

In the fall of 2008 the Salmon River Watershed Partnership, led by the Connecticut Chapter of The Nature Conservancy, initiated a rapid bioassessment of streams in the Salmon River watershed. The bioassessment was planned in collaboration with other watershed stakeholders, with guidance and support from the DEP and the Connecticut River Watch Program. The RBV is intended to complement and enhance existing monitoring activities, as well as education and conservation efforts associated with the Salmon River Watershed Partnership. It is hoped that this community-based monitoring and assessment effort will continue long-term to help insure the protection and improvement of this valuable resource.

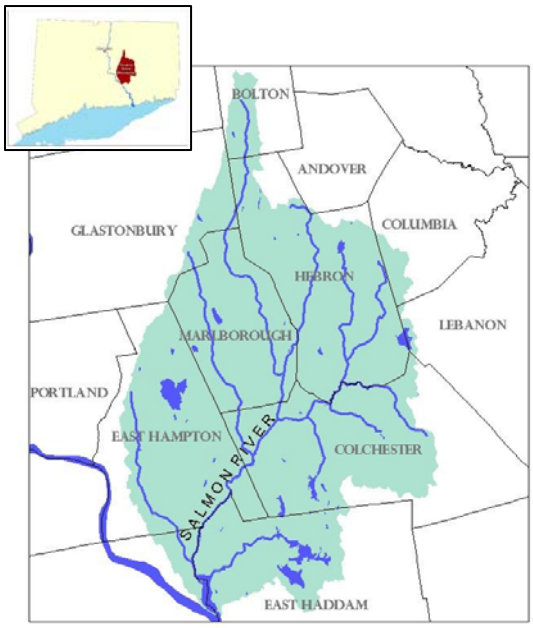
Teams of volunteers, including land use commissioners, members of the Salmon River Anglers' Association, and people from the community assisted with the bioassessment, a survey of the benthic macroinvertebrate community following the DEP protocol: *Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors (RBV)*. Seven streams were included in the study: Blackledge River, Fawn Brook, Jeremy River, Judd Brook, Meadow Brook, Moodus River and Pine Brook (Colchester).

Key findings and recommendations include:

- The 2008 Rapid Bioassessment results demonstrate the overall excellent health of the Salmon River watershed relative to other streams monitored statewide, with higher than average numbers of the most pollution sensitive organisms documented at most sites.
- Based on the results, the Fawn Brook sites, Judd Brook, Blackledge River, and Pine Brook sites all have excellent water quality, and the Moodus River site has very good water quality.
- Potential water quality concerns are raised by the lack of pollution sensitive organisms at the Meadow Brook site; additional monitoring and investigation is warranted, and will help determine whether these concerns are in fact real.
- Information collected from the bioassessment provides a baseline against which future changes can be measured, and also points to the need to conduct additional monitoring to refine results and validate conclusions. Ongoing monitoring will also help assess changes in water quality and stream health over time.

BACKGROUND

The Salmon River Watershed



The Salmon River, a major tributary of the Connecticut River located in the Tidelands Region of the lower Connecticut, begins at the confluence of the Jeremy and Blackledge Rivers in Colchester, and flows ten miles to the Connecticut River in East Haddam. The watershed is a 125 square mile area draining portions of Bolton, Glastonbury, Hebron, Columbia, Lebanon, Marlborough, East Hampton, Colchester, Haddam and East Haddam. With its relatively clean and quick flowing streams and an extensive freshwater tidal marsh, the watershed provides important fish spawning areas, is used by the State for Atlantic Salmon restoration, and provides habitat for migrating and wintering ducks. The watershed also supports a variety of water-based recreational uses. Due to its high quality, the Salmon is used by DEP as a reference stream.

The Salmon River Watershed Partnership

The Salmon River Watershed Partnership was launched by The Nature Conservancy in 2007 to address the need for a regional plan to conserve and protect the Salmon River while also supporting social and economic growth. Elected officials from the watershed towns were convened to kick off the effort in January. Over the next six months a broad group of agency representatives, scientists, and conservation organizations provided input on conservation targets and critical threats, and worked together to develop a set of strategic actions to conserve water quality and quantity, restore and reconnect rivers and habitats, and strengthen collaboration and investment in the Salmon River watershed. One of the recommended actions was to establish a volunteer-based water quality monitoring program.[1]

The Connecticut River Watch Program

Connecticut River Watch Program (CRWP) is the Connecticut River Coastal Conservation District's citizen monitoring protection and improvement program for the Connecticut River and tributaries. Begun in 1992, CRWP initiates, supports and coordinates community-based river monitoring, protection and improvement efforts throughout the Connecticut River Basin. Program goals are to collect scientifically credible data to use to identify and correct water quality problems; and build public awareness of local river resources and water quality issues. CRWP information has been used by municipalities to investigate potential sources of pollution, by the state for planning purposes, and by local groups in river protection and management efforts.[2]

DEP Assessment

Recent DEP monitoring results reported in the *2008 State of Connecticut Integrated Water Quality Report*[3] include fifteen stream segments and nine lakes/ponds in the Salmon River Watershed, evaluated for support of designated uses (aquatic life, recreation, and fish consumption). Most of these waterbodies were in full support of the uses evaluated; exceptions are one stream segment and three lakes/ponds that did not support recreation, and two stream segments that did not support aquatic life, all of which are on the State's Impaired Waters List. DEP assessment results are summarized in Attachment A.

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[1] "A Partnership for the Salmon River Watershed," The Nature Conservancy, December 2007

[2] For more information about CRWP, go to www.conservect.org/ctrivercoastal

[3] www.ct.gov/dep/lib/dep/water/water_quality_management/305b/2008_final_ct_integratedwqr.pdf

PROJECT SUMMARY

Goals

The Salmon River Watershed Rapid Bioassessment was undertaken as the first step in initiating a watershed-wide volunteer-based monitoring program. The overall goals include:

- Learn more about the condition of Salmon River tributaries and develop a baseline of bioassessment information
- Identify possible water quality threats and concerns that can be used to plan conservation and improvement efforts
- Raise public interest in and knowledge of the Salmon River Watershed, both about the resources it has to offer and the need to protect it
- Develop public awareness of water quality issues and human impacts on our rivers
- Build a local constituency for the Salmon River and promote local stewardship
- Form the basis for more complex water quality monitoring activities that can be pursued in the future according to needs and interests, ability to commit time, and availability of resources

Study Design and Methodology

The DEP's Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors (RBV) is a benthic macroinvertebrate assessment protocol designed specifically for volunteer programs. Benthic macroinvertebrates are bottom dwelling aquatic organisms that can be seen with the unaided eye, such as stonefly, mayfly and caddisfly nymphs. They are good indicators of water quality for several reasons: many are sensitive to pollution, the composition of the community is a good reflection of long-term water quality (since they live there year-round), they cannot easily escape pollution, and they are relatively easy to collect. In addition, there are many established methods for using macroinvertebrate data to assess water quality and stream health. Benthic macroinvertebrates are collected from shallow riffle areas by disturbing the stream bottom and catching the dislodged organisms in a net. The DEP uses the riffle-dwelling benthic macroinvertebrate community as the primary indicator of biological integrity of freshwater streams.

The RBV protocol is designed to help identify streams with pollution sensitive benthic macroinvertebrate communities. It is not a definitive assessment procedure; data are used primarily for screening purposes, to identify streams with either very high or very poor water quality. There are twenty-six organisms included in the RBV protocol (see list, Attachment B). They are easily identified due to their distinct shape, structure, color, or behavior. Each also provides key ecological information about the stream environment. RBV organisms are categorized in one of three groups:

- *Most Wanted* – The most sensitive to pollution, requiring a narrow range of environmental conditions. When abundant they are a sign of a non-impaired stream;
- *Moderately Wanted* – Less sensitive to pollution and found in a variety of water quality conditions. When abundant, more information is needed about upstream conditions to infer water quality;
- *Least Wanted* – Least sensitive to pollution and tolerant of the widest range of conditions. When they make up the majority of a sample, they indicate some level of water quality impairment.

RBVs are generally conducted in the fall, during October and November, to document the condition of macroinvertebrate communities following the summer, a "high stress" time for streams due to lower flows and higher water temperatures.

Volunteers receive training in the RBV protocol in an indoor session prior to conducting the assessment. Sampling and analysis equipment and supplies, as well as reference materials to aid in identification of organisms are provided by the DEP. Benthic macroinvertebrates are collected using a large flat-bottom net 12" high X 18" wide with a mesh size no large than a #30 sieve (0.59 mm). Volunteers collect three replicate samples, each consisting of two one square meter collections or "kicks", sort and identify the organisms in the field, and document occurrence of key organisms on RBV field data sheets (see Attachment C). Volunteers also keep a representative voucher collection consisting of at least one of each type of organism found, preserved in 91% isopropyl alcohol. The voucher collection is returned to the DEP along with the data sheets.[4]

Eight tributary sites were included in this first year's study (see Table 1 below, and Site Map in Attachment D). Aside from one upstream-downstream comparison (Fawn Brook), sites were selected in downstream locations to of each tributary to gain information about the overall health of the stream given any upstream impacts. Sites were also intended to complement existing DEP monitoring sites.

Table 1. Salmon River Watershed RBV Sites

Stream	Location
Blackledge River	South Main Street crossing in Colchester, upstream of confluence with Lyman Brook
Fawn Brook (upstream)	Route 66, Hebron
Fawn Brook (downstream)	South Main Street at Kellogg Road, Marlborough
Jeremy River	Adjacent to the Route 2 commuter lot, Colchester
Judd Brook	Off of Judd Brook Road (down old road/trail), Colchester
Meadow Brook	At confluence with Jeremy River, Colchester
Moodus River	At North Moodus Road, East Haddam
Pine Brook	At mouth, on Colchester Fish and Game Club property, Colchester

Volunteer Participation

Volunteers were recruited by the Director of TNC's Lower CT River Program Salmon River Project, Shelley Green, and training was conducted by DEP Volunteer Monitoring coordinator Mike Beauchene. Twenty-two (22) people attended the training session, held on October 4, 2008 at the East Hampton public library. The agenda included an introduction to the Salmon River Watershed Partnership and Conservation Action Plan; and a training presentation on the RBV protocol.

After the training volunteers were grouped into seven teams[5], each assigned a specific river site. Teams were provided with sampling and analysis equipment and supplies: a kicknet, gloves, white plastic trays, forceps, hand lenses, ice cube trays (for sorting), field identification cards, a data sheet, and a vial filled with 91% isopropyl alcohol for the voucher collection.

Teams proceeded to their sites to complete their fieldwork. They first identified three different locations in the riffle where samples would be collected, then completed their collections. Samples were then sorted and organisms identified. Presence of each organism was recorded on the RBV data sheet, and at least one of each type of organism found was placed in the alcohol-filled vial for the voucher collection.

[4] DEP website: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325608&depNav_GID=1654

[5] The Pine Brook site bioassessment was completed at a later date by DEP

RESULTS

RBV data sheets were reviewed and voucher collections examined by the DEP Volunteer Monitoring Coordinator. A list of all organisms included in the voucher collection was generated for each sample site, and an overall assessment of the health of the river was made based on the data collected.[6] Rapid bioassessment results are summarized in a table format (Attachment E). The table includes information about RBV organisms, as well as additional organisms included in the voucher.

Overall, the Salmon River watershed RBV data show good representation from the *moderately wanted* category (3-7 per site), with more limited representation from the *most wanted* (0-4 per site) and *least wanted* (0-2 per site) categories, as seen in Table 2. The best representation of *most wanted* organisms was found at the Judd Brook and downstream Fawn Brook sites (four each). At the Pine Brook, Blackledge River, upstream Fawn Brook, and Jeremy River sites, three *most wanted* organisms were found, and at the Moodus River two were found. No *most wanted* organisms were found at the Meadow Brook site.

The most commonly collected RBV organisms (found in at least five of the eight sites) were:

- *Isonychia* (Panel 2 – Minnow Mayfly – Most);
- Perlidae (Panel 5 – Common Stonefly – Most);
- Hydropsychidae (Panel 9 – Common Netspinner Caddisfly - Moderate);
- *Chimarra* (Panel 10 – Fingernet Caddisfly – Moderate);
- *Psephenus* (Panel 12 – Water Penny Beetle Larva – Moderate);
- *Nigronia* (Panel 13 – Fishfly Larva – Moderate);
- Odonata (Panel 14 – Dragonfly & Damselfly Nymphs – Moderate).

Table 2. Occurrence of different types of organisms in each RBV category by site, compared with a high quality reference site. Sites with 1-3 organisms in the *most wanted* category—the most sensitive to pollution—are considered by DEP to have very good water quality; sites with 3-4 *most wanted* organisms are considered to have excellent water quality; and sites with 5 or more organisms in the *most wanted* category are considered to have exceptional water quality.[7]

Stream Site	Most	Moderate	Least	Total #
Judd Brook	4 (36%)	5 (46%)	2 (18%)	11
Fawn Brook (downstream)	4 (33%)	7 (58%)	1 (8%)	12
Pine Brook	3 (43%)	3 (43%)	1 (14%)	7
Blackledge River	3 (33%)	4 (45%)	2 (22%)	9
Fawn Brook (upstream)	3 (30%)	6 (60%)	1 (10%)	10
Jeremy River	3 (27%)	7 (64%)	1 (9%)	11
Moodus River	2 (33%)	4 (67%)	0	6
Meadow Brook	0	4 (100%)	0	4
REFERENCE [8]	7 (47%)	6 (40%)	2 (13%)	15

[6] According to the RBV protocol, only organisms in the voucher collection can be confirmed as present at the site and are considered in the assessment.

[7] Data interpretation information from RBV Field Data Sheet

[8] Reference statistics compiled and provided by Mike Beauchene, CT DEP, based on DEP collected data from high quality streams around the state, including the Natchaug River, Eightmile River, Sandy Brook, Salmon River, Saugatuck River, Green Fall River and Whitford Brook. Median percentages for each category are reported here.

Higher representation of organisms in the *most wanted* category—the most sensitive to pollution—is an indicator of better water quality, though in general, streams with representation from all RBV categories indicate good water quality.[9] Based on the numbers of *most wanted* organisms found, one can infer that the Judd Brook, Pine Brook, Blackledge River, Jeremy River and both Fawn Brook sites all have excellent water quality, and the Moodus River site has very good water quality. The lack of *most wanted* organisms at the Meadow Brook site may indicate degraded water quality, although additional assessment would be necessary to determine whether this is the case.

Included in the voucher collections were five additional (non-RBV) organisms. One has a tolerance value of 2, *most wanted* in RBV terms, and the remaining have tolerance values of 3 or 4, *moderately wanted* in RBV terms. Diversity (the number of different types of organisms found, including RBV and non-RBV), as shown in Table 3, varies between a high of fourteen (14) at the downstream Fawn Brook site, and a low of five (5) at the Meadow Brook site.[10]

Table 3. Occurrence of different types of RBV and non-RBV organisms by site, with total diversity for each

Stream Site	RBV #	Non RBV #	Total #
Fawn Brook (downstream)	12	2	14
Judd Brook	11	1	12
Fawn Brook (upstream)	10	1	11
Jeremy River	11	0	11
Blackledge River	9	0	9
Pine Brook	7	0	7
Moodus River	6	0	6
Meadow Brook	4	1	5

Differences between the results at the seven sites are not likely significant, with the possible exception of the missing *most wanted* organisms at the Meadow Brook site, and the relatively few organisms collected there altogether. These differences may also be due to sampling and observation techniques, as well as the level of care taken to ensure that all types of organisms collected were included in the voucher collection; future rapid bioassessments will help determine whether they reflect actual differences in the benthic macroinvertebrate communities.

Overall, the Salmon RBV results compare favorably with similar volunteer bioassessments done around the state in 2008, with five of the seven sites above average with respect to *most wanted* organisms (>2), one average with 2 *most wanted* organisms, and one below average (<2). As shown in the 2008 RBV summary report, *Rapid Bioassessment in Wadeable Streams and Rivers By Volunteer Monitors-Annual Summary Report #10 2008*, 4 or more *most wanted* organisms were found in 12 of the 87 fall voucher collections (14%); 3 *most wanted* organisms were found at 18 sites (21%); 2 *most wanted* organisms (the median and the mode) were found at 29 sites (33%); 1 *most wanted* organism was found at 16 sites (18%); and 0 *most wanted* organisms were found at 12 sites (14%). Two sites have the distinction of being in the "4 or more" group, and three just missed with 3 *most wanted* organisms.

[9] Written communication from Mike Beauchene, CT DEP, November 2002.

[10] In general terms, the greater the number, the healthier the community.

According to the report, the DEP monitoring staff is confident that sites with four or more *most wanted* organisms are in full support of the state water quality standard for aquatic life, the reason they are highlighted in the report. However, sites with fewer than 4 *most wanted* organisms do not definitively indicate impairment or degradation. In these cases, the DEP conducts additional assessment to verify species present, determine possible impacts of upstream land use characteristics, and evaluate the possibility of errors in conducting the RBV.[11]

Though it is of interest to compare RBV results from around the state, it is important to qualify these comparisons due to the inherent variability between volunteer groups and their application of the RBV protocol. There are many places in the procedure where level of experience, effort and attention to detail could affect results—while sampling, picking organisms from the tray, sorting and identifying, and transferring organisms to the vials for preservation. Weather conditions can also affect results.

[11] The RBV report is on DEP's website at www.ct.gov/dep/lib/dep/water/volunteer_monitoring/rbv_report.pdf

RECOMMENDATIONS

As a follow-up to this first year's monitoring effort in the Salmon River watershed, general recommendations include:

- Conduct a Rapid Biological Assessment on an annual basis;
- Investigate possible upstream/upgradient impacts to Meadow Brook that may be degrading water quality by conducting intensive stream corridor and upland assessments[12];
- If concerns about impacts to watershed streams arise and as resources permit, consider initiating additional river monitoring activities, including benthic macroinvertebrate surveys at new sites (e.g. for upstream-downstream comparison), analysis of water samples for chemical, physical and biological indicators of water quality, surveys of physical characteristics (Stream Walk Surveys), and periodic visual observations[13]. These additional monitoring activities could be used to help pinpoint sources of pollution affecting stream reaches with identified water quality concerns, for example those included on the DEP Impaired Waters List, or to monitor areas where water quality threats have been identified. Designing the study—determining what, where, how and when to monitor—should be done with input from the watershed towns, the DEP and other stakeholders with specific goals in mind prior to getting started[14].

For assistance and further information, please contact:

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[12] Recommended protocols include the Center for Watershed Protection's Unified Stream Assessment (USA) and Unified Subwatershed Site Reconnaissance (USSR); more information can be found at www.cwp.org, or from the Connecticut River Coastal Conservation District

[13] For information about monitoring activities and protocols, go to http://conservect.org.microsoft2008hosting.com/ctrivercoastal/riverwatch/services.htm

[14] Several good resources for designing water quality studies are available from River Network (www.rivernetwork.org/marketplace), including *Testing the Waters: Chemical & Physical Vital Signs of a River*

ACKNOWLEDGEMENTS

The Salmon River Watershed Rapid Bioassessment would not have been possible without the assistance of numerous volunteers and cooperating agencies. Our sincere thanks are extended to all of the following who contributed to the bioassessment project.

Volunteers

Michelle Avery, Colchester
David Boule, East Hampton
Bob Fradette, Colchester
Homer Hobbs, Avon
Stephanie Hobbs, Avon
Ron Ingram, Berlin
Katherine Kosiba, Colchester
George McFatter, East Hampton
Brian O'Connell, Hebron
Brittany O'Connell, Hebron
Colleen O'Leary, Enfield
Mike O'Leary, Enfield
Dan Quinn, Colchester
Mollie Quinn, Colchester
Brent Ramsey, Columbia
Kristin Shumbo, East Hampton
Bob Stowe, South Windsor
Chuck Toal, Colchester
Walter Tokarz, Columbia
Chris Tolsdorf, Columbia
Katherine Tolsdorf, Columbia
Shannon Worcester, Columbia

Cooperating Organizations, Businesses and Municipalities

Special thanks to the Salmon River Watershed Partnership for supporting this effort, as well as the town of East Hampton for hosting the volunteer training.

Special thanks to Mike Beauchene, Connecticut Department of Environmental Protection, for assistance with planning the study and selecting monitoring sites; conducting the training and assisting volunteer teams in the field; and reviewing results, performing quality assurance checks on voucher collections, and providing the final data for this report.

Funders

Funding for this project was provided by the towns of Bolton, Colchester, East Haddam, East Hampton, Haddam, Hebron and Marlborough through the Salmon River Watershed Partnership.

Attachments

A – DEP Assessment Results

B – RBV Organism List

C – RBV Field Data Sheet

D – Site Map

E – Data Summary

Attachment A – DEP Assessment Results

2008 DEP 305b Assessment Results: Salmon River Watershed Stream Segments

ID305B	NAME	LOCATION	MILES	AQUATIC LIFE	RECREATION	FISH CONSUMPTION
CT4700-00_01	Salmon River-01	Mouth at Connecticut River, East Haddam, US to headwaters at confluence of Blackledge and Jeremy Rivers, Colchester.	10.41	FULL	NOT	FULL*
CT4703-00_01	Meadow Brook (Colchester)-01	From mouth at confluence with Jeremy River (parallel to Route 2, US of Prospect Hill Road crossing), US to Lincoln Lake outlet dam on Levy Pond (just US of Levy Road crossing), Colchester.	3.07	FULL	U	FULL*
CT4703-00_02	Meadow Brook (Colchester)-02	From INLET to Levy Pond (just DS of Middletown Road (Route 16) crossing), US to HW at confluence of Cabin Brook and Nelkin Brook (adjacent to Lakeview Court), Colchester.	0.81	U	U	FULL*
CT4703-01_01	Cabin Brook-01	From mouth at confluence with Nelkin Brook (in marsh DS of Cabin Road crossing), US under Route 2/Route 11 interchange to confluence with small tributary near exit 20 ramp, Colchester.	1.53	NOT	U	FULL*
CT4703-01_02	Cabin Brook-02	From confluence with small tributary near exit 20 ramp (US of Route 2/Route 11 interchange), US to headwaters on south side of Parum Road (Route 354), north of Dutton Swamp (US of McDonald Road crossing), Colchester.	1.02	U	U	FULL*
CT4705-00_01	Jeremy River-01	From mouth at confluence with Blackledge River, at head of Salmon River, US to Norton Paper Company Dam (just US of Route 149 crossing), North Westchester (Colchester).	1.17	U	U	FULL*
CT4705-00_02	Jeremy River-02	From Norton Paper Company Dam (just US of Route 149 crossing), North Westchester (Colchester), US to headwaters at Holbrook Pond, Hebron.	9.09	U	U	FULL*
CT4707-00_01	Blackledge River-01	From mouth at confluence with Jeremy River, at head of Salmon River (near River Road), Colchester, US to headwaters (near Converse Road, just off Birch Mountain Road), Bolton.	16.35	FULL	U	FULL*
CT4707-02_01	French Brook (Bolton)-01	From mouth at confluence with Blackledge River (segment-01) DS of French Road crossing, US to Tinker Pond outlet Dam (US of Tinker Pond Road crossing), Bolton.	1.00	FULL	U	FULL*
CT4707-06_01	Flat Brook (Marlborough)-01	From mouth at Blackledge River (DS of Standish Drive crossing), Marlborough, US to headwaters at Diamond Lake, Glastonbury.	2.04	FULL	U	FULL*
CT4707-12_01	Lyman Brook-01	From mouth at Blackledge River, just US of South Main Street crossing (DS of Route 2, exit 15 offramp), US to headwaters, Marlborough.	3.82	U	U	FULL*
CT4709-00_01	Pine Brook-01	From mouth at Salmon River, Haddam, US to confluence with Pocotopaug Creek.	3.18	U	U	FULL*
CT4709-00_02	Pine Brook-02	From confluence with Pocotopaug Creek, US past Route 66 crossing, to headwaters just US of Clark Hill Road crossing, East Hampton.	4.51	U	U	FULL*
CT4709-04_01	Pocotopaug Creek-01	From mouth at Pine Brook (US of Route 151 crossing AND North of Wilkes Road), US to Old Chestnut Hill Road crossing, East Hampton.	1.74	U	U	FULL*
CT4709-04_02	Pocotopaug Creek-02	From Old Chestnut Hill Road crossing, East Hampton, US to Pocotopaug Lake outlet dam (just US of Route 66 crossing).	2.66	NOT	U	FULL*

Use Support: **FULL**=Designated use supported; **NOT**=Designated use Not Supported, See 303d listing for details. **U**=Unassessed, data not sufficient for assessment.
FULL*=Refer to Connecticut Department of Environmental Protection Angler's Guide, or online at www.ct.gov/dep for more information about fish consumption advisories.

2008 DEP 305b Assessment Results: Salmon River Watershed Lakes/Ponds

ID305B	NAME	LOCATION	ACRES	AQUATIC LIFE	RECREATION	FISH CONSUMPTION
CT4700-02-1-L1_01	Day Pond (Colchester)	Impoundment and headwaters of Day Pond Brook. Day Pond Road, Colchester (east of Rte. 149).	7.35	U	FULL	FULL*
CT4704-00-1-L3_01	Babcock Pond (Colchester)	South of Rte16, southeastern Colchester. Within Babcock Pond Wildlife Management Area.	122.76	FULL	FULL	FULL*
CT4705-00-1-L1_01	Holbrook Pond (Hebron)	Northeast corner of Hebron; northeast of Rte 85.	68.67	FULL	U	FULL*
CT4707-00-2-L2_01	Gay City Pond (Hebron)	Gay City State Park. Impoundment of Blackledge River. NW corner of Hebron.	5.14	U	NOT	FULL*
CT4708-00-1-L1_01	Terramuggus, Lake (Marlborough)	Intersection of Routes 2 & 66, northwest corner of Marlborough.	81.29	FULL	FULL	FULL*
CT4709-04-1-L1_01	Pocotopaug Lake (East Hampton)	North of Rte 66, East Hampton.	502.28	FULL	NOT	FULL*
CT4710-00-1-L1_01	Bashan Lake (East Haddam)	North Central East Haddam, drains to Moodus Reservoir.	265.54	FULL	FULL	FULL*
CT4710-00-1-L2_01	Moodus Reservoir (East Haddam)	Northeast East Haddam.	440.74	FULL	FULL	FULL*
CT4710-06-1-L1_01	Pickerel Lake (Colchester/East Haddam)	Southeast corner of Colchester, extending slightly into E. Haddam. Drains to Moodus Reservoir	82.11	FULL	NOT	FULL*

Use Support: **FULL**=Designated use supported; **NOT**=Designated use Not Supported, See 303d listing for details. **U**=Unassessed, data not sufficient for assessment. **FULL***=Refer to Connecticut Department of Environmental Protection Angler's Guide, or online at www.ct.gov/dep for more information about fish consumption advisories.

Salmon River Waterbodies on the CT 2008 Impaired Waters List (303d Listing)

Waterbody	Impaired Use	Cause	Potential Source
Salmon River (headwaters to mouth)	recreation	*E. coli* bacteria	unknown
Cabin Brook in Colchester	aquatic life	unknown	unknown
Pocotopaug Creek in East Hampton	aquatic life	unknown	unspecified urban storm water, source unknown, industrial discharge
Gay City Pond in Hebron	recreation	*E. coli* bacteria	waterfowl
Pocotopaug Lake in East Hampton	recreation	chlorophyll-a, excess algal growth, and nutrients	unknown
Pickerel Lake in Colchester/Haddam	recreation	non-native aquatic plants	unknown

Attachment B – RBV Organism List

Rapid Bioassessment for Volunteers – Organism List

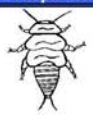
RBV Panel #	Genus	Family	Order	Common Name	RBV Category	Tolerance Value
1	*Drunella*	Ephemerellidae	Ephemeroptera	Body-Builder Mayfly	MOST	0
2	*Isonychia*	Isonychidae	Ephemeroptera	Minnow Mayfly		2
3	*Epeorus*	Heptageniidae	Ephemeroptera	Flat-headed Mayfly		0
4		Peltoperlidae	Plecoptera	Roach-like Stonefly		0
5		Perlidae	Plecoptera	Common Stonefly		1
5	*Pteronarcys*	Pteronarcyidae	Plecoptera	Giant Stonefly		0
5		Miscellaneous	Plecoptera	Stonefly		1
6	*Apatania*	Limnephilidae	Trichoptera	Cornucopia Case Maker		0
6	*Glossosoma*	Glossomatidae	Trichoptera	Mini-stone Case Maker		0
7	*Rhyacophila*	Rhyacolphilidae	Trichoptera	Michelin-Man Caddisfly		0
8	*Brachycentrus*	Brachycentridae	Trichoptera	Mid-size Plant Case Builder		1
8	*Lepidostoma*	Lepidostomatidae	Trichoptera	Mid-size Plant Case Builder		1
9		Hydropsychidae	Trichoptera	Common Netspinner	MODERATE	4
10	*Chimarra*	Philopotamidae	Trichoptera	Fingernet Caddisfly		3
11	*Stenonema*	Heptageniidae	Ephemeroptera	Flat-headed Mayfly		4
12	*Psephenus*	Psephenidae	Coleoptera	Water Penny Beetle Larva		4
13	*Corydalus*	Corydalidae	Megaloptera	Dobsonfly Larva		6
13	*Nigronia*	Corydalidae	Megaloptera	Fishfly Larva		4
14		Aeshnidae Gomphidae Coenagrionidae	Odonata	Dragonfly, Damselfly Nymphs		3
15		Amphipod	Amphipoda	Scud	LEAST	8
15			Oligochaeta	Aquatic Earth Worm		9
15		Isopod	Isopoda	Sowbug		8
15		Simulidae	Diptera	Black Fly Larva		6
15			Hirudinea	Leech		8
15		Chironomidae	Diptera	Midge Fly Larva		6
15			Gastropoda	Snail		7

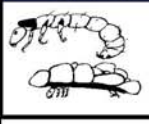
Attachment C – RBV Field Data Sheet

RAPID BIOASSESSMENT IN WADEABLE STREAMS AND RIVERS BY VOLUNTEER MONITORS
FIELD DATA SHEET
SUBMIT DATA TO: MIKE BEAUCHENE (mike.Beauchene@po.state.ct.us)

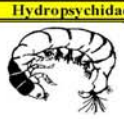
PHONE (860) 424-4185

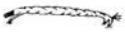
WATERBODY NAME:		COLLECTION DATE:	COLLECTION TIME:
LOCATION DESCRIPTION:		COLLECTORS NAMES:	
TOWN:	NOTES/COMMENTS:		

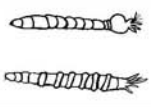
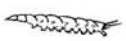
	1	2	3	4	5A	5 B	5 C
MOST	Body builder mayfly Drunella	Minnow mayfly Isonychia	2-tailed flat head mayfly Epeorus	Roach-like stonefly Peltoperlidae	Common stonefly Perlidae	Giant stonefly Pteronarcys	Misc Stonefly
							
Locs 1&2							
Locs 3&4							
Locs 5&6							

	6A	6 B	7	8A	8 B
MOST	Saddle-Case caddis Glossosoma	Cornucopia Case caddis Apatania	Michelin Man caddis Rhyacophila	Mid-size plant case caddis Brachycentrus	Lepidostoma
					
Locs 1&2					
Locs 3&4					
Locs 5&6					

DATA INTERPRETATION	
# OF TYPES OF THE "MOST"	WATER QUALITY
5 OR MORE	EXCEPTIONAL
3 TO 4	EXCELLENT
1 TO 3	VERY GOOD
0	MORE INFO NEEDED TO ASSESS

	9	10	11	12	13 A	13 B	14
MODERATE	Common net-spinner Hydropsychidae	Fingernet Caddis Chimarra	Flat Head mayfly Stenonema	Water Penny Psephenus	Dobsonfly Corydalus	Fishfly Nigronia	Dragonfly & Damselfly Odonata
							
Locs 1&2							
Locs 3&4							
Locs 5&6							

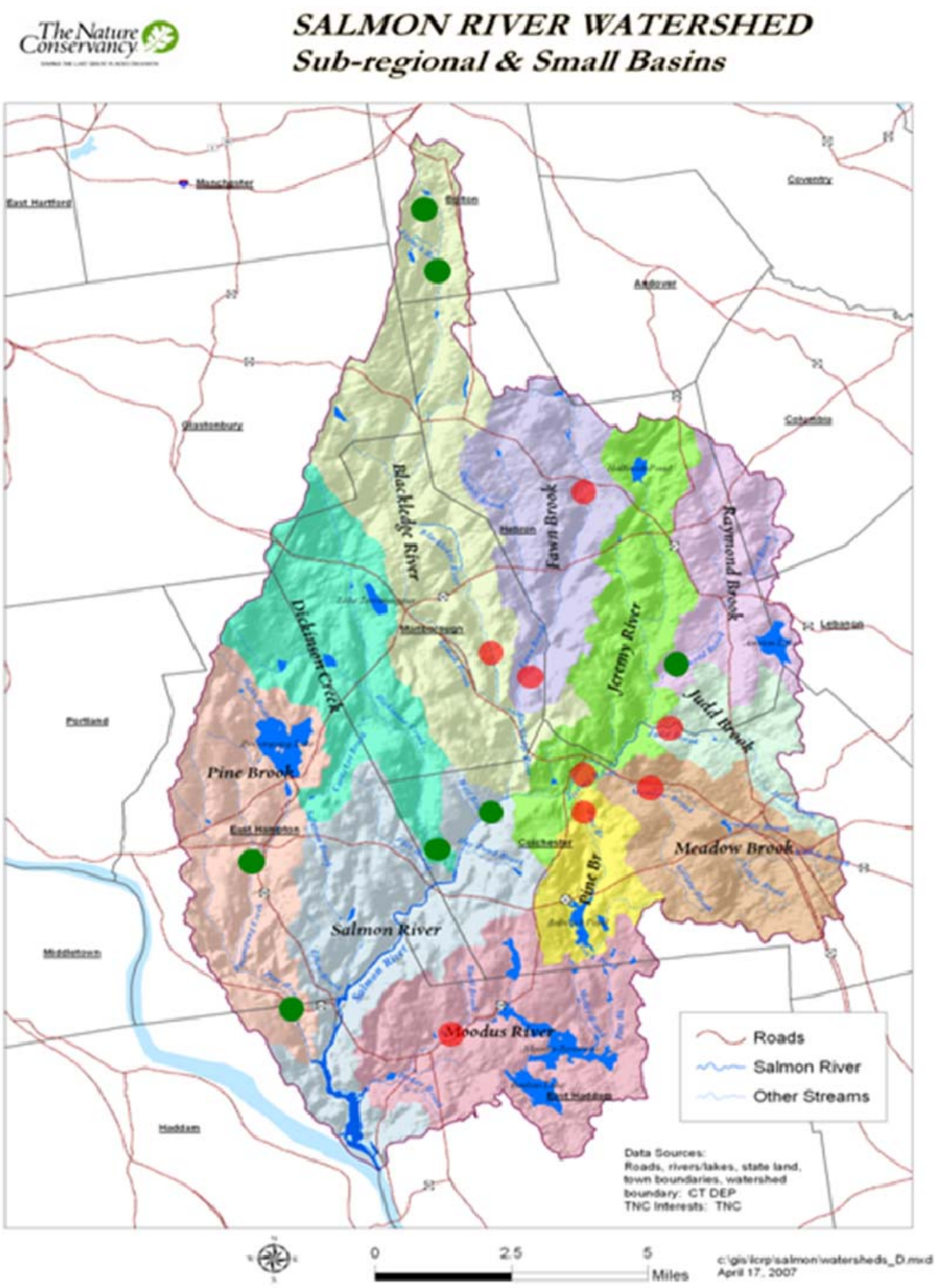
	15 A	15 B	15 C	15 D	15 E	15 F	15 G
LEAST	Amphipod	Isopod	Leech	Midge	Black fly	Snail	Worm
							
Locs 1&2							
Locs 3&4							
Locs 5&6							

	OTHER COMMONLY COLLECTED RIFFLE-DWELLING MACROINVERTEBRATES						
OTHERS	Crayfish	Crane fly larvae	Riffle Beetle adult/larva	Small minnow mayfly	Water snipe fly	Planaria	Fingernail clam/ mussel
							
Present							

ALL RBV MATERIALS ARE AVAILABLE AT: http://dep.state.ct.us/wtr/volunmon/volopp.htm

PLEASE NOTE: BE SURE TO INCLUDE AT LEAST 1 OR 2 OF EACH ORGANISM IN YOUR VOUCHER COLLECTION!! INCLUDE A SPECIMEN FROM EVERY TYPE YOU THINK IS A DIFFERENT, EVEN IF IT IS NOT PICTURED ON THIS DATASHEET. **IF AN ORGANISM IS NOT INCLUDED IN THE VOUCHER COLLECTION IT WILL NOT BE INCLUDED IN THE FINAL DATA ASSESSMENT!!**

Attachment D – Site Map



Key:
Red = new site, included in 2008 bioassessment
Green = ongoing DEP/other site, not included in 2008 bioassessment

Attachment E – Salmon River Watershed Rapid Bioassessment – Summary of Organism Data from 10/4/08

RBV Panel #	Genus	Family	Order/Class	Common name	RBV Category	Tolerance Value	Blackledge River	Fawn Brook S. Main St	Fawn Brook Route 66	Jeremy River	Judd Brook	Meadow Brook	Moodus River	Pine Brook
2	*Isonychia*	Isonychidae	Ephemeroptera	Minnow Mayfly	MOST	2	x	x	x	x	x			
4		Peltoperlidae	Plecoptera	Roach-like Stonefly		0		x						x
5		Perlidae	Plecoptera	Common Stonefly		1	x	x	x	x	x		x	x
6	*Glossosoma*	Glossosomatidae	Trichoptera	Saddle Case Maker		0	x	x					x	
7	*Ryacophila*	Ryacophilidae	Trichoptera	Michelin-man Caddisfly		0					x			x
8	*Brachycentrus*	Brachycentridae	Trichoptera	Mid-size Plant Case Builders		1			x		x			
8	*Lepidostoma*	Lepidostomatidae	Trichoptera	Mid-size Plant Case Builders						x				
9		Hydropsychidae	Trichoptera	Common Netspinner	MODERATE	4	x	x	x	x	x	x	x	x
10	*Chimarra*	Philopotamidae	Trichoptera	Fingernet Caddisfly		3	x	x	x	x	x	x		x
11	*Stenonema*	Heptageniidae	Ephemeroptera	Flat-head Mayfly		4		x	x	x			x	
12	*Psephenus*	Psephenidae	Coleoptera	Water Penny Beetle Larva		4		x	x	x	x	x		
13	*Corydalus*	Corydalidae	Megaloptera	Dobsonfly Larva		4	x	x		x			x	
13	*Nigronia*	Corydalidae	Megaloptera	Fishfly Larva		4		x	x	x	x	x	x	x
14		Aeshnidae Gomphidae Coenagrionidae	Odonata	Dragonfly, Damselfly Nymphs		3[15]	x	x	x	x	x			
15		*Chironomidae*	Diptera	Midge Fly Larva	LEAST	6					x			x
15			Gastropoda	Snail		7	x			x				
15			Oligochaeta	Aquatic Earth Worm		9	x	x			x			

Additional Organisms in Voucher Collection (not on RBV list)

RBV Panel #	Genus	Family	Order/Class	Common name	RBV Category	Tolerance Value	Blackledge River	Fawn Brook S. Main St	Fawn Brook Route 66	Jeremy River	Judd Brook	Meadow Brook	Moodus River	Pine Brook
	Atherix	Athericidae	Diptera	Water Snipe Fly	NA	2		x						
	Hexatoma	Tipulidae	Diptera	Crane Fly Larva		3			x					
--		Baetidae	Ephemeroptera	Small Minnow Mayfly Larva		4		x						
--	*Tipula*	Tipulidae	Diptera	Crane Fly Larva		4						x		
		Elmidae	Coleoptera	Riffle Beetle Larva		4					x			

[15] The RBV protocol assigns these organisms an overall tolerance value of 3. The families found have the following tolerance values: Aeshnidae, 3; Gomphidae, 1; Coenagrionidae, 9.