

Appendix 1

Outstanding Resource Value Report: Water Quality

Eightmile River Watershed Management Plan

Eightmile River Watershed Outstanding Resource Value: **Water Quality**

May 25, 2005

The Importance of High Water Quality

The myriad of sustainable resources that a healthy river system provides are only as good as the water quality flowing through the system. Whether the river is supporting unique plants and animals, offering recreational opportunities such as swimming, boating or fishing or, providing drinking water supply, good water quality is a must for sustaining these resource values.

At the state and national level the importance of achieving and maintaining high water quality led to the federal Clean Water Act and in turn the State of Connecticut's Water Quality Standards, with the overall goal to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Major objectives of the state and federal efforts include the elimination of discharge of all pollutants into the navigable waters of the country, and achieving a level of water quality that provides for the protection and propagation of fish, shellfish, and wildlife, as well as providing for recreation.¹

Surface and ground water quality can be impacted in many ways. Land use near a river has a significant impact on water quality. Forest land, farm land, residential land and industrialized land, all have the potential to impact local water quality in different ways. The physical attributes of the stream and whether it is dammed, diverted, or piped underground, can play a key role in long-term water quality. And, pollutants such as mercury or nitrogen can be carried through the air, over the land, or through the soil ultimately being deposited in local water ways. Healthy rivers and streams not only offer a myriad of resources but also face a myriad of pressures affecting long-term water quality. It is only through continued diligence and care that high water quality can be sustained.

Indicators of Water Quality Conditions in the Eightmile River Watershed

Connecticut Water Quality Classifications

The State of Connecticut Water Quality Classifications provides the state with a policy for managing its rivers, streams, lakes, groundwater and coastal waters. The Classifications include: standards that identify desired uses and provide guidance on avoiding degradation of water quality; criteria that describe specific goals and the allowable levels of a variety of variables that affect goal attainment; and classifications for all surface and groundwater in Connecticut. While not a direct measurement of water quality, the classifications do clearly indicate the State policy towards managing individual water bodies. The primary differences between Class AA, A, and B waters are that AA waters are for active or proposed drinking water supply, A waters are considered potential drinking water supply and B waters cannot be used for drinking water supply. Also, only waters classified as B or lower, are allowed to accept industrial or municipal sewage treatment plant discharges. See Appendix A for details on the state water quality classifications and their designated uses.

¹ Federal Water Pollution Control Act, Title 1, Sec. 101(a)(1-2)

The criteria used in the Connecticut Water Quality Classifications to assess overall water quality include: physical attributes such as water temperature, sediment load, flow, and color; chemical attributes including dissolved oxygen, pH, nutrients, and phosphorus; and biological data representing aquatic life such as insects.

Currently 92% of the perennial river and streams in the Eightmile River Watershed are considered Class A. Another 8% of perennial waters are considered Class B with a goal of A. These Class B waters are primarily classified as such due to past leachate issues with the Salem Landfill along the East Branch of the Eightmile River. The leachate issues have been contained and are being monitored. Water quality downstream of this old landfill (which has been closed) continues to rank at levels consistent with Class A, however because of the existence of the landfill State standards require that these waters be considered Class B. Monitoring results have shown slight impacts to the water from iron, ammonia, nitrate, and manganese, however these are considered minor and have not caused the river stretch to be classified as impaired.

Hamburg Cove is entirely classified as either a Class B or Class SB resource, along with 2 small ponds at the end of Falls Brook before they enter the Cove. Water classifications beginning with "S" are tidal waters, including 116 acres of lower Hamburg Cove.

Virtually all of the groundwater in the Eightmile Watershed, 99.84%, is considered Class GA or better. See Table 1 for summary of water classifications within the watershed.

The 2004 Water Quality Report to Congress published by CT DEP reports that both the East Branch and the mainstem of the Eightmile River fully support all designated use goals including aquatic life, cold water trout fishery, and primary contact recreation such as swimming. Statewide only 76% of assessed river miles were fully supporting for aquatic life use and only 69% fully supported recreation use.²

See Map 17 (Management Plan Volume 1) and map A in this section - Eightmile River Watershed, State of Connecticut, Water Quality Classifications.

² CT DEP 2004 Water Quality Report to Congress Prepared Pursuant to Clean Water Act Section 305 (b), April 2004

Table 1. Water Quality Classifications – Eightmile River Watershed

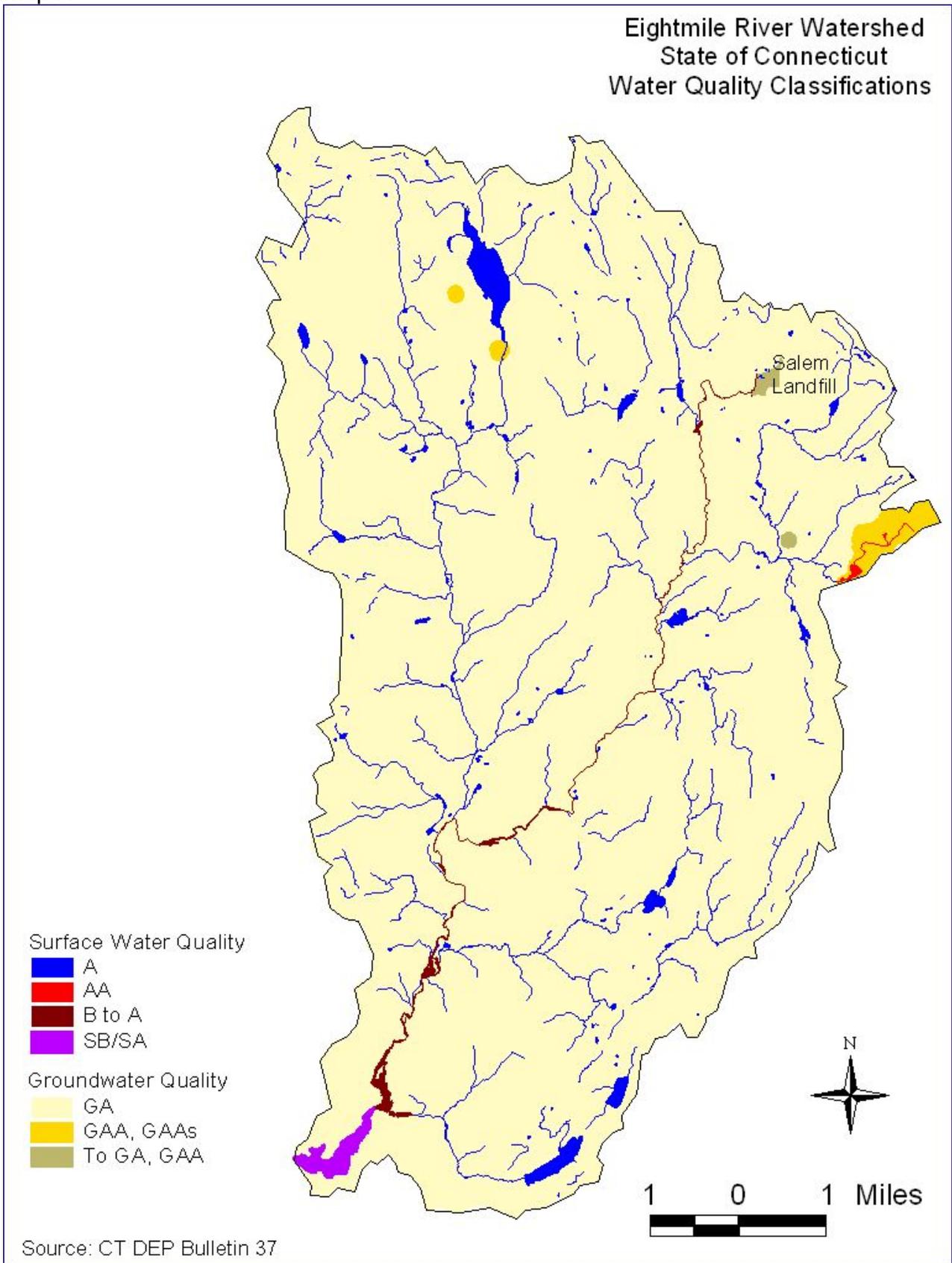
Rivers/Streams/Surface Water Perennial	Miles	% Total Miles
Class AA	0.61	0.56%
Class A	100.84	91.39%
Class B to A	8.88	8.05%
Total	110.34	100%
Rivers/Streams/Surface Water Intermittent	Miles	% Total Miles
Class AA	0.61	2.46%
Class A	24.18	97.54%
Class B to A	0.00	0.00%
Total	24.79	100%
Ground Water	Acres	% Total Acres
Class GA	38,875	99.02%
Class GAA, GAAs	319	0.81%
To GA (GA Impaired)	64	0.16%
Total	39,258	100%
Lakes/Ponds Surface Water	Acres	% Total Acres
Class AA	10	1.79%
Class A	461	82.32%
Class B to A	89	15.89%
Total	560	100%
Coastal Surface Waters - Hamburg Cove	Acres	% Total Acres
Class SB to SA	116	100%

Source: CT DEP Water Quality Classifications Data, DEP Bulletin 37

CT Unified Watershed Assessment

In 1998 the Department of Environmental Protection and the USDA Natural Resources Conservation Service conducted a *Unified Watershed Assessment* to determine how our water resources measured up to state water quality goals. The Eightmile was one of only two major basins in the lower Connecticut River watershed to receive the “in need of protection” designation. This is significant considering that 70% of the state’s major basins are designated “in need of restoration.” This analysis included consideration of whether a water body was meeting its water quality use attainment goals and whether any water quality impairment existed. By fully achieving its water quality goals and having no impairments the Eightmile River Watershed’s “in need of protection” designation signifies unique watershed conditions, including high water quality.

Map A



Biological Information

Of the biological criteria considered, aquatic insects, also known as benthic macroinvertebrates, are one of the most efficient indicators of biological integrity and overall water quality. The CT DEP reports they use the aquatic macroinvertebrate community as their primary indicator of biological integrity noting "The macroinvertebrate community in a stream or river is very sensitive to stress; and thus its characteristics serve as a useful tool for detecting environmental perturbation resulting from introduced point and non-point sources of pollution."³ In addition, the U.S. Environmental Protection Agency recognizes the advantages of using aquatic macroinvertebrate sampling for assessing water quality for the following reasons:

- Macroinvertebrates are found in almost every type of aquatic habitat even those with very low water quality.
- Methods for sample collection, processing, and data analyses are widely accepted, established, and documented.
- Collectors can capture a representative sample of the macroinvertebrate community with relative ease, over a short period of time, and with relatively inexpensive equipment.
- Macroinvertebrate populations recover rapidly from repeated sampling.
- Knowledge of changes in the community structure and function of benthic macroinvertebrates helps to indicate water quality status and trends in the aquatic environment.⁴

Both the CT DEP and the Connecticut River Coastal Conservation District (CRCCD) have collected benthic macroinvertebrate data over the past 5 years that provide a clear picture of the high water quality found within the Eightmile River Watershed.

The CT DEP Bureau of Water Management reported that macroinvertebrate "monitoring data collected during 1998-1999 indicate exemplary ecological conditions for the Eightmile River and very good conditions for the East Branch Eightmile River. These conditions are representative of "best attainable" water quality and aquatic life situations for reference stations across the state."⁵ (see Appendix B) Reference stations are specific sites that are exemplary by being minimally impaired and providing expected ecological conditions for a waterbody in a region. Being "best attainable" for reference stations across the state reflects conditions as good as any of these exemplary sights across Connecticut.

In addition to the DEP data, CRCCD has sponsored volunteer monitoring activities in the Eightmile River watershed beginning in 1999. Two stream walk surveys and three rapid bioassessments have been conducted over the last five years to collect baseline information about the condition of the Eightmile River and its tributaries, among other objectives. The bioassessments followed the CT DEP protocol *Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors* (RBV), which is used to assess the health of benthic macroinvertebrate communities.

³ Rapid Bioassessment in Wadeable Streams & Rivers, by Volunteer Monitors Part 1: Program Description, Michael Beauchene and Guy Hoffman, June 2000

⁴ <http://www.epa.gov/ceisweb1/ceishome/atlas/bioindicators/invertsasindicators.html>

⁵ Letter from Mike Beauchene, CT DEP, November 13, 2003

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. RBV organisms are categorized in one of three groups: *most wanted* (most sensitive to pollution, requiring a narrow range of environmental conditions); *moderately wanted* (less sensitive to pollution and found in a variety of water quality conditions); *least wanted* (least sensitive to pollution and tolerant of the widest range of conditions).

According to the RBV protocol, good representation (3 or more) of organisms in the *most wanted* category—the most sensitive to pollution—is an indicator of very good water quality. Sites with 5 or more organisms in the *most wanted* category are considered by DEP to be among the exceptional sites, with reference conditions and in full support of the water quality standards for aquatic life. Based on the RBV organisms found in the Eightmile River, East Branch Eightmile River and Beaver Brook, especially the abundance of *most wanted* organisms, one can infer that these streams are of reference quality.

A 2002 DEP statewide assessment of all volunteer monitored sites noted the Eightmile River Watershed had good to excellent representation of the “most wanted” aquatic organisms with a good to optimal diversity of organisms. As a result, water quality was inferred to be very good and supportive of the aquatic life water quality standard.⁶

Potential Threats to Water Quality

Water quality can be assessed not only by empirical data, but also by the presence or absence of stressors that cause known impacts to water conditions. Point source pollution and nonpoint source pollution are two of the primary ways that water quality is impacted.

Point Source Discharges

Point source pollution comes from known points where pipes from facilities such as sewage treatment or industrial plants discharge directly into a water body. Since the passage and implementation of the federal Clean Water Act, great progress has been made in the permitting and monitoring of these discharges to meet state water quality standards.

The Eightmile River Watershed has no point source discharges, eliminating a major potential threat to overall water quality.

Nonpoint Source Discharges

Nonpoint source discharges come from diffuse sources typically carried by stormwater runoff across and under the ground. Such runoff can carry with it sediment, pesticides, fertilizers, car drippings and whatever else may be on road ways, parking lots, residential lawns and agricultural fields, ultimately ending up in local streams or wetlands. The U.S. EPA's most recent National Water Quality Inventory⁷ noted non-point source pollution as the leading source of river impairment nationwide.

⁶ CT DEP Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors Year 2002 Summary Report

⁷ US EPA - National Water Quality Inventory 2000 8 of 22

A key indicator of impacts from stormwater runoff is the level of impervious surfaces in a watershed. Impervious surfaces are things such as roads, parking lots and rooftops that block rainwater from infiltrating into the ground, causing it to run overland and into local water bodies and wetlands. Scientific research suggests that in watersheds of up to 10 square miles stream quality can degrade when impervious cover is just 10% of the total watershed area. For certain sensitive aquatic species, such as brook trout, impervious cover of as little as 4% can cause major population declines.⁸

One of the key resources affected by impervious surfaces is soil function. Of the many services soils provide, there are two that figure prominently to the maintenance of water quality. They are briefly described here: (1) Soils regulate the water regime in the watershed: Water flows over the land and through the soil, regulating base flow in streams and maintaining a constant and clean supply of water; and (2) Filtering capacity: The minerals and microbes in soils are responsible for filtering, buffering, degrading, immobilizing and detoxifying organic and inorganic materials from industrial, commercial and residential pollutants and atmospheric deposition.

The ability of soils to provide these services is impacted by their natural spatial extent, the landscaper relationships between different soils, and the human influences and management that impact their ability to function. This can happen through modification of soil characteristics by site alteration or through the complete loss of soil function through the creation of impervious surfaces. Soil services cannot be replaced when they are covered over and water quality degradation results.

A summary of impervious cover for the 84 sub-watersheds within the Eightmile River Watershed is in Table 2.

Table 2. Impervious Cover Eightmile River Subwatersheds

Impervious Cover	# of Subwatersheds	Total Area Square Miles	% of Total Watershed Represented
0 – 1 %	0	0	0.0%
1.1 – 2%	12	6.7	10.7%
2.1 – 3%	35	29.7	47.7%
3.1 – 4%	19	14.6	23.4%
4.1 – 5%	7	5.8	9.2%
5.1 – 6%	4	4.1	6.6%
6.1 – 7%	3	1.3	2.1%
7.1 – 8%	1	0.1	0.1%
8.1 – 9%	1	0.1	0.2%
9.1 – 10%	1	> 0.01	0.0%
> 10%	1	> 0.01	0.0%
Total	84	62.4	100%

⁸Center for Watershed Protection Impacts of Impervious Cover on Aquatic Systems, Watershed Protection Research Monograph No. 1, March 2003

All of the subwatersheds in the Eightmile River Watershed are less than 4.6 square miles in size, with 94% under 2 square miles in size. Of these, 80 subwatersheds, representing 99.7% of the watershed area have imperviousness levels of less than 7%. Forty-seven of the subwatersheds representing over 58% of the total watershed area have impervious cover levels of less than 3%. When considering the entire 62 square mile watershed, current imperviousness totals 3%.

As can be seen none of the Eightmile River Watershed is being impacted by high levels of impervious cover, indicating stream quality to be potentially high.

Riparian Corridor/Land Cover

When impervious cover is less than 10% in a watershed, The Center for Watershed Protection reports its effect is “relatively weak compared to other potential watershed factors, such as percent forest cover, riparian continuity, historical land use, soils, agriculture, acid mine drainage or a host of other stressors.”⁹

A healthy riparian corridor—or buffer—involves a natural setting of native trees, shrubs and tall grasses along local rivers and streams. Generally, a 100 foot buffer of native vegetation can act as a “living filter,” trapping sediments, nutrients, and other soluble pollutants carried by rainfall or snow melt. Buffers also provide critical wildlife habitat and serve as migratory corridors for many species. The leaves, logs, and branches that fall into the water provide important cover habitat for fish and help support the aquatic food chain. And along the banks, shade trees help moderate water temperature keeping conditions healthier for fish and other aquatic life. Healthy trees and shrubs with strong root systems provide structural support to stream and river banks, holding soil in place. Without soil stability, sediment from eroding banks can cause significant turbidity and can bury critical aquatic habitat used by fish, insects, and other water dependent organisms.

When impervious surface data for the Eightmile River Watershed is coupled with forest cover and riparian corridor quality, the picture of high water quality conditions becomes even clearer. The Eightmile River Watershed is over 80% forest cover compared to the rest of Connecticut that is overall less than 60% forest cover. Only 7% of the watershed is considered developed, while statewide development stands at nearly 19%. When looking closer at the riparian corridor land area within 100 feet of the 160 miles of rivers and streams in the watershed, only 6% is considered developed, with 4% in grass or agriculture and 89% in essentially a natural undisturbed condition.¹⁰ See Table 3 Eightmile River vs. State of CT Land Cover 2002.

⁹ Ibid

¹⁰ UCONN CLEAR Data 2002

Table 3. Eightmile River vs. State of CT Land Cover 2002.

Land Cover Type	% of Watershed	% of State of CT
Developed	6.74%	18.70%
Turf/Grass	0.74%	4.50%
Grass/Agriculture	8.57%	12.00%
Deciduous Forest	72.46%	46.80%
Coniferous Forest	4.01%	9.00%
Water	1.98%	3.00%
Wetlands	0.46%	0.50%
Forested Wetlands	4.02%	3.50%
Tidal Wetlands	0.00%	0.50%
Barren	0.65%	1.20%
Utility ROW	0.38%	0.30%
TOTAL	100.00%	100.00%

Source: UCONN Center for Land Use Education and Research

In addition, The CT River Coastal Conservation District in 1999 and 2000 led a volunteer stream corridor survey effort that visually surveyed approximately 69% of the Eightmile and East Branch Eightmile river sections. Their findings on both sections of river showed riparian buffers commonly to be greater than 100 feet in width, with stream bank cover primarily trees and shrubs, further confirming the undisturbed conditions of the riparian corridors of the Eightmile River Watershed.¹¹

Other land uses such as agriculture and turf/grass (lawns) can be significant sources of non-point source pollution from the effects of excessive fertilizer, pesticide, and herbicide applications being washed off into rivers and streams. The low levels of these land use activities in the Eightmile Watershed compared to the statewide average is another good indicator stresses to water quality are minimal.

Overall, land uses that are the major cause of nonpoint source pollution, including impervious surfaces, agricultural activities, suburban lawns and degraded stream buffers are at comparatively very low levels in the Eightmile River Watershed. It is clear that any potential impacts from these leading causes of water pollution nationwide are minimal and circumstances that support high water quality conditions are strong.

Instream Flow

A natural flow regime in a river is important to sustaining high water quality. Natural instream flow conditions help regulate various water quality conditions such as water temperature, dissolved oxygen, and sedimentation.¹² In the Eightmile River Watershed

¹¹ CRCCD May 2000, December 2001 Eightmile and East Branch Eightmile Stream Walk Reports

¹² Table 1 from Appendix A - Water Allocation Task Force Report 7/2/02 Draft, Ecological Needs Section
 ECOLOGICAL NEEDS - NEED FOR A CT INSTREAM FLOW STANDARD- DRAFT VERSION (excerpt of sections 1

there are no consumptive surface water diversions and only one groundwater diversion of 150,000 gallons per day that is likely not causing major alterations to natural flow conditions based on its location in bedrock, its distance from the river and strong permit conditions that cause reductions in withdrawal rates during low flow situations. Overall the existing natural flow regime within the Eightmile River Watershed is consistent with conditions that support high water quality.

Nitrogen Loading

As a part of the U.S. Geological Survey National Water-Quality Assessment Program an assessment of nitrogen yields and loads from basins draining to Long Island Sound was completed for the years 1988-1998. As an unmonitored basin, estimates were created for the Eightmile River Watershed through modeling to determine that the Watershed had the lowest nonpoint nitrogen yield as measured in pounds per square mile per year of any basin in the CT River watershed. This may be a reflection of the large undisturbed natural landscape.

Leachate and Wastewater Discharge

The State of Connecticut maintains a database on leachate and wastewater discharge sites (lwds) statewide that includes surface and groundwater discharges that (1) have received a wastewater discharge permit from the state or (2) are historic and now defunct waste sites or (3) are locations of accidental spills, leaks, or discharges of a variety of liquid or solid wastes.¹³ The database includes over 3,100 distinct active or historic leachate and wastewater discharge sites. The Eightmile River Watershed has only 7 lwds sites all associated with historic spills or leaks (as discussed above there are no direct point source discharges in the Eightmile River Watershed). None of the lwds sites are actively impairing water quality in the Eightmile Watershed and active monitoring and remediation are going on where necessary. See Appendix C for a summary.

Summary

In summarizing the water quality of the Eightmile River Watershed it can be said:

- 92% of the rivers and streams and 99% of the ground water is class A or better
- All waterbodies in the watershed evaluated by the state are fully attaining their water quality use goals.
- None of the water bodies in the watershed are impaired from meeting their water quality use goals
- Studies of the benthic macroinvertebrates within the watershed found conditions that represent the best attainable results when compared to any of the state's reference sites.
- There are no point source discharges in the watershed.
- Impervious cover in 58% of Eightmile River Watershed's subwatersheds is under 3%, with 99.7% having less than 7% impervious cover.
- Riparian corridors are essentially intact and continuous.
- A natural flow regime exists.
- 80% of the watershed is forested with less than 7% developed, in comparison to the state as a whole with less than 60% forested cover and 18% developed area.

and 2) - Prepared by: James G. MacBroom, P.E., Milone & MacBroom, Inc. and Richard A. Jacobson, C.F.S., Department of Environmental Protection

¹³ <http://dep.state.ct.us/gis/dataguides/dep/layers/lwds.htm>

- The Eightmile River Watershed is one of only two major basins in the lower Connecticut River watershed to receive the “in need of protection” designation in the *CT Unified Watershed Assessment*.
- There are no leachate sites impairing water quality.

This substantial amount of information represents data that provides direct indication of high water quality, as well as data that underscores the pristine condition in which this river system exists and remains relatively free from water quality threats. As such it is clear the water quality of the Eightmile River Watershed is exemplary in the State of Connecticut and an outstanding resource value for the watershed ecosystem.

Appendix A - Summary of State of Connecticut Water Quality Standards and Classifications – CT DEP Website September 2004.

The Water Quality Standards and Criteria are an important element in Connecticut's clean water program. The WQS set an overall policy for management of Connecticut's surface and groundwaters in accordance with the directives provided by Section 22a-426 of the General Statutes and Section 303 of the Federal Clean Water Act.

The WQS have several purposes; they are to:

- provide guidance about existing water quality in the state as well as DEP's goals for maintaining or improving that quality;
- indicate the general types of discharges allowed;
- ensure the segregation of drinking water supplies from waters used for waste assimilation;
- show areas of conflict between usages, and areas where ground and surface waters are degraded;
- provide the standards for toxicity consideration to protect aquatic life;
- provide a framework for the establishment of priorities for pollution abatement, dispensation of State funding, remediation goals; and finally;
- provide clear guidance for location decisions for business and industry as well as other economic developments.

The WQS do not stand alone as a regulatory means of protecting public health and the environment. These standards are integrally related to, and applied by DEP simultaneously with, other statutory and regulatory requirements governing water and waste management. As an example of how these pieces fit together, the following may be of assistance.

- Section 22a-430 of the General Statutes allows and sets procedures for the permitting of discharges of treated wastewaters to the waters of the State.
- The WQS set forth the types of wastewater that can be discharged in various classifications in order to meet statutory goals. In addition, the WQS provide the guiding principles concerning waste assimilation, aquatic toxicity and the goals for receiving waters.
- If the type of discharge is allowed, then the details of application procedures and requirements for treatment, monitoring and reporting of the specific discharge are provided by Sections 22a-430-1 through 4 of the Regulations of Connecticut State Agencies.

THREE FUNDAMENTAL ELEMENTS

Element One. First, the *water quality standards* describe DEP's general policies and goals for maintaining or restoring specified levels of quality for each classification. The Standards describe discharges to ground and surface water consistent with DEP's goals for each classification. The Standards also define the concept of a *zone of influence* for such discharges; this concept is covered in more detail below. Other key provisions of the standards include policies for protecting ground and surface water whose actual quality exceeds that quality associated with its classification. These policies are known as the *anti-degradation principles*. There are also policies and procedures that define the methods by which DEP may alter an assigned classification. The Standards also include important appendices which provide guidance on anti-degradation, definitions, lake trophic classifications, bathing water standards and numerical criteria for aquatic toxicity.

Element Two. The second element is the *water quality criteria* which: (i), describes the uses DEP has designated as appropriate for each water quality classification, and, (ii), establishes narrative

and numerical factors used by DEP to determine whether goals established in the standards are being met.

Criteria are divided into groups with surface fresh waters having the designations AA, A, B, C, and D. Saline waters are assigned classes SA, SB, SC and SD. It should be noted that C, D, SC, and SD are **never** acceptable goals; these classifications reflect certain problems, usually a distinct and difficult situation.

Element Three. *Classifications* and the *classification maps* are the third element. Classifications are assigned to surface and groundwater in all areas of the state. These assignments are based on both the use or potential use of such waters as well as on their known or presumed quality. The individual water quality classifications are described in more detail below.

WATER QUALITY CLASSIFICATIONS

Classifications are shown on water quality classification maps. In cases where the actual quality of groundwater does not meet the assigned classifications criteria, the water quality classification maps reflect that fact by means of color coding or a split designation on older maps, such as GA/GB, indicating that the existing groundwater quality in the subject area may be GB quality but the goal is the higher GA criteria.

Significantly, over 90% of the State is classified at the highest levels of protection, as suitable for drinking without treatment. A little more than 6% of the land area is classified as GB, indicating historically urbanized areas. A very small area of the State is classified as GC, having demonstrated hydrogeologic characteristics suited for waste disposal.

Inland surface water classifications.

Class AA

Designated uses: existing or proposed drinking water supply, fish and wildlife habitat, recreational use (may be restricted,) agricultural and industrial supply.

Discharge restricted to: discharges from public or private drinking water treatment systems, dredging and dewatering, emergency and clean water discharges.

Class A

Designated uses: potential drinking water supply; fish and wildlife habitat; recreational use; agricultural and industrial supply and other legitimate uses including navigation.

Discharge restricted to: same as allowed in AA.

Class B

Designated uses: recreational use: fish and wildlife habitat; agricultural and industrial supply and other legitimate uses including navigation.

Discharge restricted to: same as allowed in A and cooling waters, discharges from industrial and municipal wastewater treatment facilities (providing Best Available Treatment and Best

Management Practices are applied), and other discharges subject to the provisions of section 22a-430 CGS.

Class C

Indicates unacceptable quality, the goal is Class B or Class A. Designated uses: same as for B. One or more of the class B uses is not fully supported due to problems that can and will be corrected by normal DEP programs. A good example is the intermittent water quality problems caused by combined sewer overflows.

Discharges restricted to: same as for Classes B or A .

Class D

Indicates unacceptable quality, the goal is Class B or Class A. Designated uses: same as for B. One or more of the designated uses for class B is not fully supported due to an intractable or very difficult pollution problem. An example is the PCB contaminated bottom sediments in the Housatonic River.

Discharges restricted to: same as for Classes B or A.

Coastal and Marine Surface Waters.

Class SA

Designated uses: marine fish, shellfish and wildlife habitat, shell fish harvesting for direct human consumption, recreation and all other legitimate uses including navigation.

Discharge restricted to: same as for AA or A surface waters.

Class SB

Designated uses: marine fish, shellfish and wildlife habitat, shellfish harvesting for transfer to approved areas for purification prior to human consumption, recreation, industrial and other legitimate uses including navigation.

Discharge restricted to: same as for B surface waters.

Classes SC or SD

Indicates unacceptable quality, the goal is Class SB or Class SA. Designated uses: same as for Classes C or D surface waters.

Discharge restricted to: same as for Classes C or D surface waters

Groundwater Classifications.

Class GAA

Designated uses: existing or potential public supply of water suitable for drinking without treatment; baseflow for hydraulically connected surface water bodies.

Discharges limited to: treated domestic sewage, certain agricultural wastes, certain water treatment wastewaters.

Class GA

Designated uses: existing private and potential public or private supplies of water suitable for drinking without treatment; baseflow for hydraulically connected surface water bodies.

Discharge restricted to: as for GAA and discharge from septage treatment facilities subject to stringent treatment and discharge requirements, and other wastes of natural origin that easily biodegrade and present no threat to groundwater.

Class GB

Designated uses: industrial process water and cooling waters; baseflow for hydraulically connected surface water bodies; presumed not suitable for human consumption without treatment.

Discharge restricted to: same as for A (Note; same treatment standards apply), certain other biodegradable wastewaters subject to soil attenuation.

Class GC

Designated uses: assimilation of discharge authorized by the Commissioner pursuant to Section 22a-430 of the General Statutes. As an example a lined landfill for disposal of ash residue from a resource recovery facility. The GC hydrogeology and setting provides the safest back up in case of technological failure.

Discharge restricted to: potential discharges from certain waste facilities subject to extraordinary permitting requirements.

Appendix B - Letter From CT DEP Re: State Water Quality Data and Interpretation for Eightmile Watershed

Kevin M. Case
National Park Service
P.O. Box 395
100 East River Road
Pleasant Valley, CT 06063

November 13, 2003

Mr. Case,

This letter is in response to your request for interpretation of water quality data collected from the Eightmile regional basin in Lyme, Connecticut. The Connecticut Department of Environmental Protection (CT DEP), Bureau of Water Management (BWM) is responsible for the collection, analysis and reporting of water quality of rivers and streams within the state as required by section 106 of the Federal Clean Water Act. To meet this obligation, BWM collects a variety of water quality data including quarterly water chemistry and macroinvertebrate community structure. The analysis and interpretation of these data are presented in the 305b Report to Congress as the degree of support for each designated use. This process is described in the consolidated assessment listing methodology (CALM) and is available on the CT DEP web page at: http://www.dep.state.ct.us/wtr/wq/calm/2002_calm.htm.

Monitoring Stations:

There are 3 monitoring stations in the Eightmile River regional basin. Two stations were established as part of the Rotating Basin Strategy (<http://www.dep.state.ct.us/wtr/wq/rotbasinplan.pdf>). The Eightmile River station (#203) is located immediately upstream of the confluence with the East Branch Eightmile River. The East Branch Eightmile River (# 204) station is immediately upstream of the mouth. Available data for these 2 stations include quarterly chemistry, quarterly indicator bacteria, and macroinvertebrate community structure for 1998-1999.

Commencing in 2002 a station was established as part of a statewide probabilistic monitoring project. Sixty-one stations were randomly selected statewide. One of the selections is on the Eightmile River, 150 meters below the confluence with the East Branch Eightmile River. Data are currently being collected at this station and will include quarterly chemistry, as well as, macroinvertebrate, fish and periphyton community structure.

Data interpretation:

Data for the rotating basin stations have been assessed according to designated uses and are available in the 2002 Report to Congress (http://www.dep.state.ct.us/wtr/wq/305b/2002_305b.htm). The assessment for both of the rotating basin stations fully supports aquatic life use and primary contact. The criteria for each level of use support are presented in the CALM document.

AQUATIC LIFE USE ASSESSMENT DATA SOURCES:

Macroinvertebrate Bioassessment: Macroinvertebrate community structure methods follow EPA Rapid Bioassessment Protocol III (<http://www.epa.gov/owow/monitoring/rbp/>). This method compares the benthic community to that of a reference community. A reference community is a community with diverse representation of sensitive taxa. It is selected based on best professional judgment and is used to represent the best attainable water quality condition for a major basin. The difference between the 2 communities infers a level of water quality impairment. At the 2 rotating basin stations both communities are considered to be high quality with a diverse assemblage of taxa sensitive to water quality perturbation. The Eightmile River macroinvertebrate community is 95% (non-impaired) and the East Branch Eightmile 71% (slightly impaired) of the reference community at the Salmon River in Colchester. Both conditions exceed water quality standards for aquatic life.

Individual macroinvertebrate metrics: Statewide 191 fall macroinvertebrate samples were collected as part of the RBS. Three common metrics EPT index, Taxa Richness, and HBI are included in the RBPIII assessments and are generally considered reliable indicators of water quality when looked at independently. EPT index is the total number of taxa that belong to 1 of 3 insect orders, ephemeroptera, plecoptera, and trichoptera. In general representatives of these 3 orders are very sensitive to impairments. Taxa Richness is the total number of unique taxa identified in the sample. HBI is the Hilsenhoff Biotic Index. Each taxon is assigned a tolerance value indicating its sensitivity to organic pollution. Values range from 0, most sensitive, to 10, most tolerant. Taxa considered to be most sensitive are assigned 0 and those most tolerant 10. The HBI is a weighted mean calculated by multiplying the tolerance value of a taxa by the number of that taxa. This product is then divided by the total number of organisms. HBI values close to 0 indicate a community dominated by sensitive organisms. The HBI value for the Eightmile River is 2.52 and is in the upper quartile for sites statewide and approximately at the median for reference sites. The East Branch value (3.48) ranks in the upper half of sites statewide. Both sites have HBI values below 3.50 that Hilsenhoff uses as a cutoff for indicating organic enrichment. The Eightmile River has an exemplary community with the maximum EPT index in the data set and is fourth highest in total Taxa Richness. While not as high, the East Branch Eightmile is well above the 75 percentile for both EPT index and taxa richness.

Although the RBS was designed to increase monitoring coverage, sites included those historically monitored because of known water quality issues and permitted discharges. Therefore there may be some bias in the data set toward selection of impaired and waste receiving streams. However, as part of the RBP III protocol, each sampling season, a series of reference streams are sampled in order to compare communities. Comparison of the Eightmile and East Branch Eightmile to these reference values shows that both streams are close to or exceed mean values for reference stations.

Values for 3 community structure metrics for the Eightmile River and East Branch Eightmile River monitoring stations for samples collected in the fall of 1998.

Station	Taxa richness	EPT index	HBI
Eightmile River #203	49	31	2.52
East Branch Eightmile River #204	41	24	3.48

Distribution of data for 3 community structure metrics collected as part of the RBS data set and the reference station data set.

Metric name: Data set /Number samples	Maximum	75%	Median	25%	Minimum
Taxa Richness:					
Statewide N=191	52	34	26	19	7
Reference N=34	44	40	33	29	20
EPT index:					
Statewide N=191	31	19	13	8	2
Reference N=34	30	25	19	17	13
HBI:					
Statewide N=191	7.64	4.75	3.93	3.30	1.50
Reference N=34	3.79	3.18	2.56	2.41	1.75

Other community structure parameters also indicate that the Eightmile River supports a reference quality benthic community. These include high values for % intolerant individuals, % intolerant taxa and low values for % tolerant individuals and taxa. The Eightmile River also supports an array of rare taxa (found at <10%

of the rotating basin sites) and includes mayflies *Rhithrogena* spp. and *Leucrocota* spp., and caddisflies *Diplectrona modesta*, *Brachycentrus numerosus*, *Helicopsyche borealis*, and *Lype* spp.

Quarterly Grab Chemistry and field measurements: There were no exceedances of CT WQS for any of the samples collected at either the Eightmile or East Branch Eightmile River stations. All chemistry data was consistent with reference station chemistry values.

PRIMARY CONTACT USE ASSESSMENT DATA SOURCE:

Indicator Bacteria:

Evaluation of primary contact use support is based on comparison of indicator bacteria counts to CT Water Quality Standards (WQS) <http://www.dep.state.ct.us/wtr/wq/wqs.pdf>. Appendix B, of the WQS, lists the numeric criteria for standard exceedances. The use support is determined based on Table 6 in the CALM document. For the 1999-2000 cycle, no indicator bacteria exceedances were documented at either the Eightmile River or East Branch Eightmile River stations.

In summary, BWM monitoring data collected during 1998-1999 indicate exemplary ecological conditions for the Eightmile River and very good conditions for the East Branch Eightmile River. These conditions are representative of "best attainable" water quality and aquatic life situations for reference stations across the state.

Please feel free to contact me at your convenience if you have any questions regarding the material presented above.

Mike Beauchene
CT DEP, Bureau of Water Management
Planning and Standards Division
Phone 860-424-4185

Appendix C – Leachate and Wastewater Discharge Sites – Eightmile River Watershed

Leachate and Wastewater Discharge (LWDS)

Sites in the Eightmile River Watershed

Source: CT DEP Bulletin No. 37

LWDS #	Status	Flow Direction	Name	Type of LWDS	Description
4802001	ACTIVE	GROUND	Town of Salem	LANDFILL	active mixed waste landfill
4801001	ACTIVE	GROUND	Town of Salem	SALT STORAGE -COVERD	covered salt storage and covered sand/salt on bareground
4801002	ACTIVE	GROUND	Town of Salem	SALT STORAGE -COVERD	covered salt storage on bareground and covered sand/salt on bare ground
4801003	INACTIVE	GROUND	Salem General Store	OIL/CHEMICAL SPILLS	petroleum spill
4801004	INACTIVE	GROUND	Hendel's Gas Station	OIL/CHEMICAL SPILLS	petroleum spill
4801005	ACTIVE	GROUND	Sid's Auto Salvage/Used Parts Inc.	AUTO JUNKYARD	auto junkyard
4803001	ACTIVE	GROUND		SEPTAGE LAGOON	Septage disposal

