Basin 9

White River Watershed
Water Quality & Aquatic Habitat
Assessment Report

Agency of Natural Resources
Department of Environmental Conservation
Water Quality Division

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Contents

General Description of the Basin *

The White River Basin encompasses 710 square miles or approximately 454, 400 acres in Vermont draining portions of Addison, Orange, Rutland, Washington, and Windsor Counties. The White River itself is approximately 50 miles long. It originates in the Town of Ripton on the slope of Battell Mountain then flows southerly and easterly before emptying into the Connecticut River at White River Junction in the town of Hartford. We have a count of 457 waterbody miles for the watershed, which includes two mainstem segments (VT09-01 and VT09-02) and five subbasins (VT09-03 through VT09-07).

The White River has five major tributaries: the First Branch with a length of 24 miles and drainage area of 103 square miles; the Second Branch with a length of 20 miles and a drainage area of 74 square miles; the Third Branch with a length of 19 miles and a drainage area of 136 square miles; Locust Creek with a length of 11 miles and a drainage area of 26 square miles; and the Tweed River with a length of 10 miles and a drainage area of 51 square miles.

The dominant land cover in the White River watershed according to data from the Vermont Satellite Land Cover project (1997) is forested land with 385,189 acres or 84% of the watershed area either deciduous, coniferous or mixed forest. Agricultural land including row crops, hay, permanent pasture, and other agricultural uses occupy 32,553 acres or 7% of the watershed area. Developed land, including residential, commercial, industrial, transportation and utilities, covers about 21,145 acres or about 5% of the watershed. Of the developed land area, 86% is transportation or utility uses. Surface water covers 13,708 acres or 3% of the basin and wetland only cover 3,205 acres or 0.7% according to the satellite data analysis. The other two categories identified were brush or transitional (749 acres) and barren land (201 acres). This breakdown of land cover type is useful for comparisons between the major basins of the state as well as for comparing gross changes in each watershed's land cover over time. The numbers at least over-represent the amount of forested land in a watershed and under represent the amount of developed land because scattered individual homes in wooded areas are not identified as residential but lumped with forested. Scattered residential development is a common land use in many parts of the state and can have significant water quality consequences so additional data sources need also to be drawn upon to refine the above information.

* Some of this general description comes from the 1975 White River Basin Management Plan.

Riparian Buffer Strips

Infrared Photo Analysis

The presence or absence of a minimum bufferstrip in the White River riparian corridor was analyzed using the 1992-1994 infrared photographs. Each shoreline along the approximately 53 mile long mainstem was examined and buffers of greater than or equal to 50 feet were distinguished from buffers that were less than 50 feet to nonexistent. This information was then transferred from the infrared photos onto paper maps. The length of the segments with buffers greater than or equal to 50 feet and the segments with buffers less than 50 feet were measured and summed for each of three different mainstem segments and then for the whole mainstem. Percentages of the banks with 50 foot plus buffers and with less than 50 foot buffers were generated. (See Table I below).

Table I. Buffer Vegetation on the White River mainstem

	Widths of the White River Shoreline Buffer			
	Left Bank		Right Bank	
Mainstem Waterbody i.d.	>=50 ft.	<50 ft.	>=50 ft.	<50 ft.
VT09-07: headwaters to West Branch	54%	46%	49%	51%
VT09-02: West Branch down to Third Branch	43%	57%	40%	60%
VT09-01: Third Branch down to mouth	29%	71%	74%	26%
Total mainstem	40%	60%	57%	43%

Overall, along the left bank, approximately 60% of the shore length had a bufferstrip of natural vegetation that was less than 50 feet wide and thus only 40% of this shore's length had a bufferstrip at least 50 feet wide or wider. The right bank was somewhat better protected with 57% having a bufferstrip 50 feet or wider and 43% of the shore length having a bufferstrip less than 50 feet wide. These estimates show that the loss of riparian vegetation along the White River mainstem is substantial and is a significant threat to, if not already having an impact on, the water quality and aquatic habitat of the river. Riparian vegetation removal along the White River is the result of a number of land use activities including agriculture, road placement and maintenance, and development.

Upper White River Stream Enhancement Project

The Upper White River Stream Enhancement Project was undertaken in 1997 by the White River Partnership which is a group consisting of watershed citizens, local officials, non-profit organizations, and state and federal agency personnel. The project involved work at six different sites from May to October 1997 and included streambank stabilization, bufferstrip re-establishment and instream fish habitat activities. The result of the work was a total of 4,525 feet of shoreline being stabilized and/or enhanced for fisheries and riparian habitat. Five of the six project sites involved re-establishment of a 25 foot wide bufferstrip of vegetation. Additional projects have been identified for the 1998 growing season.

Floodplain Communities

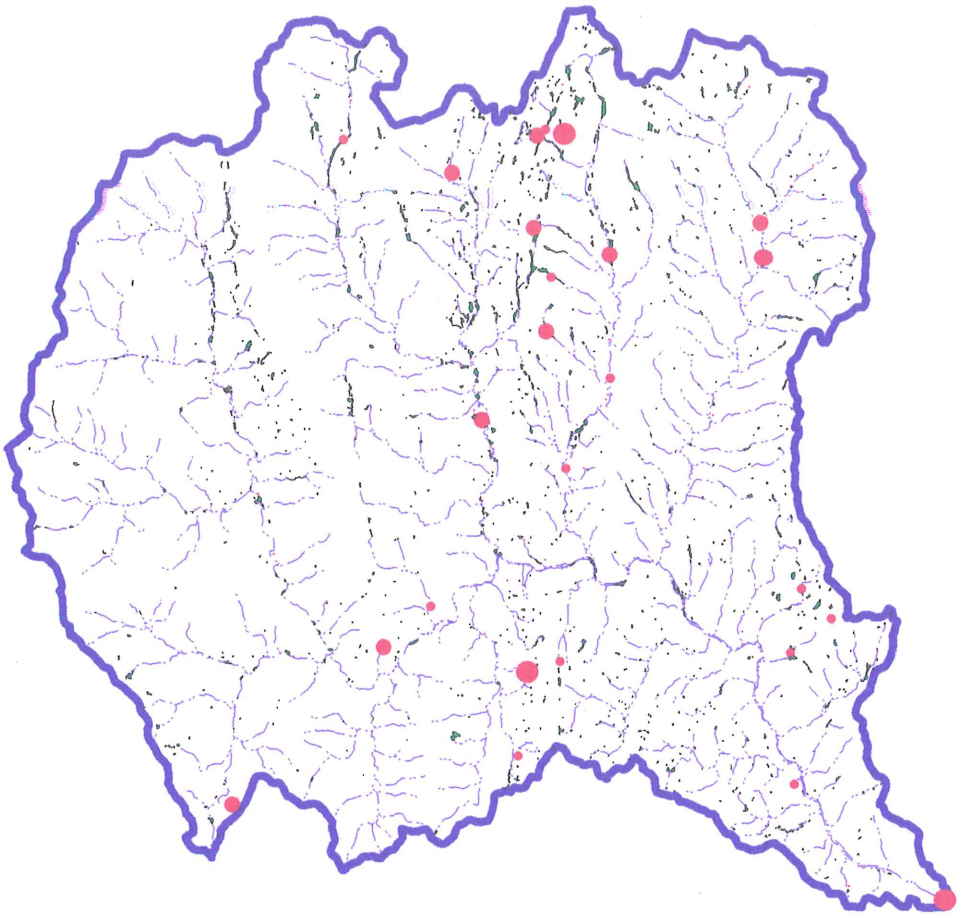
An inventory and study of the state's floodplain forest communities was conducted by the state Natural Heritage Program in 1997. Initial identification of potential intact communities was done using the 1992-1994 infrared photographs also used for the bufferstrip analysis. Approximately 514 acres of floodplain forest along the White River, the Third Branch of the White River, and the West Branch of the White River were identified as potential high quality floodplain forest. Along the Third Branch, from Gilead Brook upstream to above Randolph Village, there is a stretch of almost continuous floodplain forest. This 5.5 mile length of floodplain vegetation may be an important wildlife corridor as well as buffer for the aquatic habitat. (See Appendix B for a list of the White River watershed floodplain sites.)

Lakes, Ponds, and Wetlands of the Basin

There are eight lakes and ponds greater than 20 acres in the watershed. These include Silver Lake (84 acres), Mitchell Lake (28 ac.), Colton Pond (27 ac.), Lamson (24 ac.), Macintosh (23 ac.), Sunset (25 ac.), Rood (23 ac.), and North (24 ac.) Ponds.

There are approximately 3830 acres of National Wetland Inventory mapped or Class I and II wetlands in the White River basin, which is a relatively small area of wetlands for a watershed. Based on project data kept since 1990, approximately 15 acres of wetland (either Class I, II, or III) have been altered or lost. (See Figure I on the following page).

White River Basin
Wetlands and Wetland Projects



White River Basin
456,752 Acres
3,834 Acres of Class Two Wetlands

5 0 5 10 Miles

Impacts (acres)
- 0
- 0 - 0.1
- 0.1 - ½
- ½ - >1

Exceptional Uses and Values of Basin Rivers and Streams

The entire length of the main stem of the White River, at approximately 50 miles, is the longest free-flowing large river in the state because of the lack of flow-regulating dams. The river and its tributaries play an important role in the Atlantic salmon restoration program, due to the presence of gravel beds and its free-flowing nature.

The White River has one of the longest uninterrupted kayak runs on a major river in New England and is known nationally for this fact. From Stockbridge to Bethel, the river is considered a classic Vermont whitewater run. The first three miles from Stockbridge contains intermittent Class II rapids. The last three miles to Bethel are quickwater. From Bethel to the Connecticut River, the river is mostly quickwater, but there are a variety of short drops and narrows and Class II rapids.

The first portion of the First Branch below Chelsea is Class II with a low Class III segment, and is a nice whitewater run. The next segment downstream contains a mile of interesting ledges, followed by a nice touring section. The segment contains a total of 5 ledges from 2' to 4' high.

The Third Branch of the White River is boatable from Roxbury to Randolph. Whitewater boating also takes place on the Hancock Branch, from its confluence with the Robbins Branch to the White River. The Hancock Branch is hydrologically distinguished by being the smallest stream in the state known to be used as a whitewater run. It is a Class II run with some Class III spots, lots of rocks and current.

An abundance of swimming holes are located in the White River basin. The White River mainstem contains many large holes with jumping ledges, including Big Parker Swimming Hole in Bethel, Twin Bridge Swimming Hole in Gaysville, Little Parker in Stockbridge, plus many other unnamed holes along its entire length. Tubing is also popular along the river, with at least one tube rental establishment in Gaysville. An important swimming hole is located on the Tweed River, near its mouth in Stockbridge. There are swimming holes on the Third Branch in Braintree, and on Locust Creek in Bethel. Wading takes place on the Third Branch at its mouth at the town park in Bethel.

Waterfalls, cascades and gorges are abundant in the basin. One of the most well known waterfalls, Moss Glen Falls I, is located on Deer Hollow Brook in Granville Gulf Natural Area. It is actually a high-angle cascade that drops approximately 30' over a rock face 15' to 25' wide. It is a popular scenic attraction on Route 100. Another and equally well-known waterfall is Texas Falls on the Hancock Branch in Hancock. It is a small gorge and cascade with a small falls and some nice pools. The area has been developed by the U.S. Forest Service with trails and picnic areas. Another important waterfall and cascades in the White River basin is Web Falls and Granville Cascade Chain on Sandusky Brook in Granville.

Cascades, waterfalls, gorges and pools occur in the headwaters of many streams in the basin, including the White River in the Green Mountain National Forest in Granville, on Thatcher Brook in Granville, and on Fletcher Brook in Stockbridge.

Permitted Discharges

Four wastewater treatment facilities (Bethel, Royalton, Chelsea, Randolph) and two fish hatcheries discharge to waters of the White River basin. There are also twenty-one permitted stormwater discharges in the watershed. Seven of the stormwater discharges go to the White River mainstem (waterbodies VT09-01, VT09-02, and VT09-06); seven go to small tributaries that flow to the lower White River (VT09-03); and the remaining seven go to either the First Branch, Second Branch, or Third Branch (VT09-04 to VT09-06). Infiltration swales or vegetated infiltration areas are the dominant treatment required for these permitted stormwater discharges.

A combined sewer overflow (CSO) separation project in Randolph illustrates the complexity of addressing water quality problems today. Pipes carrying domestic wastewater and those carrying stormwater are now separated. The water quality benefit is that the pathogens and organic matter from domestic sewage do not go directly to the river during storm events. However, stormwater from the downtown area of Randolph, the first flush of which used to go to the wastewater treatment facility, now goes directly to the Third Branch following a storm. The pipes carrying this stormwater with its attendant pollutants (oil, grease, heavy metals, organics, silt, sand, bacteria, warm temperatures...) discharge in two locations to the river. Downstream sections of the Third Branch should be monitored closely to determine the level of impact from these discharges.

Causes and Sources of Impairment or Threats to Water Quality or Aquatic Life

The greatest cause of partial or non-support of one or more of the designated uses of Vermont's waters in the White River watershed is sedimentation (siltation), which is also the most significant cause of impairment to rivers and streams statewide. As shown in the table IV below, sedimentation has an impact on at least 31 miles of basin 9 waters and it threatens 97 more miles. The sources of these sediments include the top sources listed in Table V: streambank de-stabilization (often first through loss of riparian vegetation), agriculture, and, likely, road maintenance and runoff and land development.

Thermal modification or increased water temperature is the second greatest impact and second greatest threat to aquatic biota and habitat in the watershed. An increase in water temperatures results primarily from the loss of riparian vegetation that, when intact, shades the river and streams keeping water temperatures in a range to which the fish and aquatic organisms have adapted. Warmer water can also be a consequence of stormwater runoff from paved areas or occur in portions of the river where channelization has resulted in wider, shallower waters and fewer pools and riffles.

Nutrients are the third greatest impact and threat to the White River and its tributaries and the source of the nutrients is primarily agricultural land runoff especially where there are no bufferstrips.

Turbidity and pathogens are next in the list of top causes of impact and threats although these are less widespread problems than those discussed above.

As mentioned above, the top three sources of impairment or threat to water quality and aquatic habitat based on information compiled by the Agency of Natural Resources Water Quality Division are streambank de-stabilizatioon, removal of riparian vegetation, and agriculture. Road maintenance and runoff and land development are not listed as the sources of actual impacts but are listed as threatening many miles of river and stream. It is likely that these land uses are resulting in sedimentation, buffer vegetation loss, and thermal modifications, however, we have little documentation of the direct impact to date.

Table IV. Causes of Impairments or Threats to Water Quality

Code	Cause	High Impact (miles)	Moderate or Slight impact (miles)	Total Impact (miles)	Threats (miles)
1100	Siltation	13.5	17.5	31.0	97.2
1400	Thermal modifications	---	27.5	27.5	52.5
900	Nutrients	---	27.5	27.5	38.0
2500	Turbidity	1.5	11.0	12.5	35.0
1700	Pathogens	---	11.0	11.0	38.0
0	Cause unknown	3.0	---	3.0	---
1600	Other habitat alterations	1.0	---	1.0	---
2400	Total toxics	---	---	---	24.0
2600	Exotic species	---	---	---	24.0
500	Metals	---	---	---	8.0
1000	pH	---	---	---	7.5
300	Priority organics	---	---	---	0.6
800	Other inorganics	---	---	---	0.5

Table V. Sources of Water Quality Problems or Threats

Code	Source	High impact (miles)	Moderate or Slight (miles)	Total Impact (miles)	Threats (miles)
7700	Streambank de-stabilization	29.0	---	29.0	55.7
7600	Removal of riparian vegetation	---	27.5	27.5	47.0
1000	Agriculture	---	27.5	27.5	---
8300	Road maintenance and runoff	---	1.0	1.0	55.0
7100	Channelization	1.0	---	1.0	---
7200	Dredging	1.0	---	1.0	---
7800	Drainage/filling of wetlands	---	1.0	1.0	---
3200	Land development	---	---	---	40.0
9000	Unknown source	3.0	---	3.0	12.5
8100	Atmospheric deposition	---	---	---	7.5
8600	Natural sources	---	---	---	5.7
7250	Onstream pond construction	---	---	---	2.5
1700	Aquaculture	---	---	---	2.5
8700	Recreational activities	---	---	---	1.0
6300	Landfills	---	---	---	0.5
6600	Hazardous waste	---	---	---	0.1

Growth in Watershed Towns

Most of the towns in the White River watershed experienced high population and housing growth rates between 1970 and 1980 as well as between 1980 and 1990. The land use changes that are a result of the growing number of houses and people are important in terms of potential and actual water and aquatic habitat impacts. Two tables showing population and housing information for the towns that wholly or primarily occur in the White River watershed are in Appendix B. The rates of population growth in all of the watershed towns from 1970 to 1980 were very high with the lowest growth rate at 11% and the highest in Brookfield and Pittsfield at 58.2% and 59% respectively. From 1980 to 1990, the pace of growth slowed somewhat with the low being the growth rate in Pittsfield of -1.8% and the high in Sharon at 46.2%. Overall, the population of the watershed grew approximately 28.1% between 1970 and 1980 and 12.8% between 1980 and 1990. The approximate number of housing units in the watershed increased 24.0% from 1980 to 1990.

Status of Support of Designated Uses

Aquatic biota and habitat is the most affected designated use in the White River basin with approximately 104 miles threatened and 31 miles partially impaired. It follows that aquatic habitat, which sustains the web of aquatic life in the White River and its tributaries, is threatened and somewhat impaired because sedimentation and temperature increases top the list of potential or actual problems. Pathogens are affecting swimming as a use or are a threat to this use in some locations and could be affecting more miles although the data aren't currently available to show this. Toxics, which would affect support of the other uses more are less an issue in this basin.

Table VI. Designated Use Support Status

Use	Miles fully supported	Miles with threats	Miles partially supported	Miles not supported
Overall	317.1	106.2	31.0	3.0
Aquatic biota/habitat	319.6	103.7	31.0	3.0
Fish consumption	457.3	0	0	0
Swimming	389.9	40.0	27.5	0
Secondary contact recreation	430.3	24.0	0	3.0
Drinking water	436.2	21.1	0	0
Agriculture water supply	436.3	21.0	0	0

Discussion, Information Needs and Recommendations

Summary of Major Issues

The White River and its tributaries are important waters for both aquatic life and habitat as well as for people's use and enjoyment of its fishery, swimming holes, boating runs, and aesthetic. The mainstem is a unique river in that it is the only free flowing river of its size in the state. The White River is also a working river providing an opportunity for assimilating wastewater, transporting stormwater, and meeting agricultural water needs.

The major threats and impacts to the White River system include: siltation from eroding streambanks, road runoff and other adjacent land uses, which fills in portions of the stream bed affecting macroinvertebrate and fish habitat; riparian vegetation removal that results in water temperature increases, bank instability, loss of the buffer filtration function, and habitat effects (instream and riparian); and diminished physical habitat for a healthy, self-sustaining fishery due to the sediment inputs mentioned above as well as past instream disruptions such as gravel mining and channelization following flood events. The White River system may be in a state of adjustment and recovery from extensive gravel removal in years past but affecting that recovery are the new sources of sediment filling in riffles and pools and altering channel capacity and dynamics.

The current causes of problems to the White River and its tributaries are largely the cumulative effect of many, widespread changes in the watershed. The population growth rate from 1970 to 1980 was very high in a number of watershed towns and still quite high from 1980 to 1990. The number of housing units in the watershed grew 24% from 1980 to 1990. The effects of many, new, scattered houses, driveways, private roads, stream crossings, sheds, and lawns on a watershed are difficult to gauge. However, a report done for the Agency of Natural Resources that reviewed literature on watershed hydrology summarizes the multiple effects of landuse changes in a watershed: "watershed scale changes such as urbanization, logging, and/or agriculture change the natural rainfall-runoff regime in such a way that large floods begin to occur more frequently and a stream's hydrologic regime becomes more "flashy" - peak discharges get larger, and baseflow becomes lower. These hydrologic changes generate significant geomorphic adjustments as stream channels tend to get larger ... and wider, and transport a greater volume of sediment as accelerated soil erosion also tends to occur with the development of watersheds... As a result of development, smaller magnitude precipitation events now generate similar levels of geomorphic impact that had been previously associated with more extreme precipitation events of the pre-settlement period."

The impact of many acres of roads, highways, and other transportation uses is also something difficult to determine, but this land use category covers over 18,000 acres in the White River watershed. In addition to the amount of land covered by transportation and utilities, the location of the roads and to a much less degree, railroads, is often a threat or source of impacts to rivers and streams. The White River mainstem has a road along its entire length and for much of its length, it has a road on both sides. Roads cross the mainstem 22 times, the First Branch 23

times, the Second Branch 21 times, and the Third Branch 12 times (1984 Vermont Atlas and Gazeeteer). In other watersheds it has been observed that there is almost always sand and debris reaching the river at the base of a road bridge abutment.

The issue of separating pipes that convey wastewater and stormwater such that all wastewater gets treated at a Wastewater Treatment Facility (WWTF) even during a storm and stormwater is discharged without treatment to a river or stream is not an issue confined to the White River watershed. Stormwater management and treatment is a key issue in many watersheds throughout the state and needs to be addressed early on while there are the best opportunities to plan for mitigating its impact on surface waters.

Information Needs and Recommendations

Addressing the two major causes of water quality and aquatic habitat impairment in the White River watershed is difficult because of the widespread nature of the problem, however, a low technology, relatively straightforward means of addressing both siltation and temperature impacts exists in the action of re-establishing adequate bufferstrips of native vegetation. The infrared photograph analysis, the opinions of fisheries biologists and other professionals, and the results of forums held by the White River Partnership all highlighted the need for riparian vegetation re-establishment. Projects such as those implemented by the White River Partnership should be given be full support.

It would be worthwhile to systematically examine the plans and zoning regulations of the White River watershed towns to assess the adequacy of local recognition and protection of surface waters and riparian areas. There should be an effort to educate local commissions about the value of buffers and good land management and to advocate for local protections of rivers, streams, wetlands and ponds.

Although temperature impacts are inferred from loss of riparian vegetation and aquatic life impacts, the degree and extent of temperature changes in the watershed are not well known. A relatively thorough investigation of the temperature conditions of the White River and its major tributaries should be conducted to determine if there are ongoing violations of temperature standards.

Although we do not know specifically what degree of land alteration in a watershed triggers what level of channel, sinuosity, and erosion change in a river, we do know that at some point, development (especially poorly executed development that doesn't address stormwater) and other land uses will eventually cause hydrologic change. A watershed survey on the main tributaries to the White River during or closely following storm events might reveal some of the locations of major, uncontrolled runoff or improperly placed or sized stormwater structures. In addition, a study that assessed the physical characteristics of the major tributaries of the White and compared the results to what they might have been without roads, development, forest cover removal, and instream modifications could be revealing. A study that captured the current physical condition of the river would also be valuable information for the future.

Threats, and potentially impacts, from local roads, as well as state highways and roads, are widespread. Much of the problem seems to come from maintenance procedures that are not sensitive to water quality. A procedure that involves outreach and education for following up on local situations where there are no current water quality violations but where road practices threaten adjacent brooks, streams, or rivers, would be ideal. On the state level, there should be a review of Agency of Transportation (AOT) maintenance procedures to insure that their procedures are not contributing to water quality problems. Specifically, there have been reports of AOT workers sweeping sand off bridges into rivers in the spring and concerns brought up by the public on issues such as this need to be pursued.

Another potential impact on which we need to follow-up is the consequence of discharging stormwater directly into rivers from downtown areas following CSO separation. The stretches of the Third Branch below the stormwater pipes from Randolph need to be monitored well.

No one agency or organization can tackle alone the multiple, complex water quality problems or threats in a watershed. Organizations such as the White River Partnership and an ongoing exchange of information and knowledge such as that which this assessment and reporting process hopes to foster are the types of approaches that will lead to watershed level protection of our rivers and streams.

The White River is a unique resource because it is the only large river in the state without dams affecting its flow. This free-flowing characteristic should be protected in perpetuity.

Appendix A

White River Floodplain Communities

Vermont Floodplain Forest Inventory Master List
Nongame and Natural Heritage Program, 1997

WHITE RIVER WATERSHED

Site #	Town	Quad.	Site/Location	Priority	Description	Source	Aerial Recon.	Site Visit 1997
1 White	Hartford	4307263	Centerville Floodplain	M	40 acres of young floodplain forest between railroad tracks and river; some shrubby, some open water	NWI, CIR	Y	Y
2 White	Hartford	4307264	White River Floodplain at Dimick Brook	M-H	5 acre floodplain forest in apparent undisturbed condition at mouth of Dimick Brook; upstream end of forest extends under I-89; upland buffer generally intact	NWI, CIR	Y	Y
3 White	Hartford	4307264	West Hartford Floodplain	M	10-12 acres of floodplain forest on point bars and mid-channel island; nice rock outcrops along shoreline	NWI, CIR	Y	Y
4 White	Sharon	4307274	White River WMA Floodplain	H	45 acres of high quality floodplain forest on both sides of river over 1.5 mile stretch; forest is dominated by silver maple and cottonwood	NWI, CIR	Y	Y
5 White	Royalton	4307275	South Royalton Floodplain	H	40 acres of floodplain forest on both banks of river and on two islands; some adjacent ag. land; southern area is young forest	NWI, CIR	Y	Y
6 White	Royalton	4307275	Royalton Floodplain	M	15 acres of floodplain forest on point bars and islands; roads and residential development adjacent	NWI, CIR	Y	Y
7 White	Royalton	4307275	North Royalton Floodplain	M	25 acres of floodplain forest in small, narrow bands along edge of river and on a 10 acre mid-channel island; ag. fields, roads, and residential development abut the riverside remnants	NWI, CIR	Y	N
8 White	Bethel	4307276	Bethel Confluence Floodplain	M	12 acres of floodplain forest in narrow strip on north side of river with railroad tracks adjacent, and on west side of Third Branch at base of steep slope; both area young forest of boxelder	NWI, CIR	Y	Y
9 White	Bethel	4307276	Lower Third Branch Floodplain	H	25 acres of floodplain forest on both sides of river; nice riverine complex with larger units of forest 6-8 acres	NWI, CIR	Y	Y
Note: There are extensive areas (200 + acres) of nearly continuous floodplain forest along the Third Branch White River from its confluence with Gilead Brook upstream to above Randolph village. This stretch is best considered one site although it extends for nearly 5.5 miles. Some forests appear young. As a corridor, this may be a very important site. For convenience in reporting, it is separated into subsites 10 White through 15 White.								
10 White	Bethel	4307286	Bethel Bends Floodplain	H	20 acres of floodplain forest associated with several oxbows; some adjacent ag. fields, one unit with intact upland buffer	NWI, CIR	Y	Y
11 White	Bethel/ Randolph	4307286	Third Branch Townline Floodplain	H	35 acres of floodplain forest on meanders and oxbows; some of meanders have resulted in abandonment of adjacent ag. land; several areas with steep, forested upland buffers	NWI, CIR	Y	Y
12&13 White	Randolph	4307286	Golf Course Floodplain	M	55 acres of floodplain forest on meanders and oxbows; ag. land and golf course adjacent, separating most areas from the upland buffer; largest forested unit 12 acres	NWI, CIR	Y	Y

14 White	Randolph	4307286	Third Branch Floodplain at Ayers Brook	L	10 acres of shrubby floodplain forest just upstream of Randolph village; some conifer component	NWI, CIR	Y	N
15 White	Randolph	4307286	Randolph Village Floodplain	H	80 acres of floodplain forest from confluence with Ayes Brook upstream to Braintree town line; several areas with intact forests and upland buffers are 20+ acres; provides a corridor through Randolph village	NWI, CIR	Y	Y
15.5 White	Braintree	4307286	East of Campground Floodplain	L	less than 5 acres of floodplain forest; intact upland buffer of mature forest	aerial reconn.	Y	N
16 White	Braintree	4307286	Third Branch at Rifford Brook South	M	15 acres of low and high terrace floodplain forest; old river channel on north side; intact uplland buffer; much of floodplain and terrace has been recently logged	NWI, CIR	Y	Y
17 White	Braintree	4307286	West Braintree Floodplain	M	9 acres of floodplain forest on upper portion of Third Branch; two small units on east side have intact upland buffers, but all areas are yougn forest	NWI, CIR	Y	N
18 White	Bethel	4307276	White River Fish Hatchery Floodplain	L	8-10 acres of floodplain forest in narrow band along river	NWI, CIR	N	N
19 White	Bethel	4307276	Townline Floodplain	L	8 acres of young floodplain forest just north of Stockbridge town line	NWI, CIR	N	N
20 White	Stockbridg	4307276	Gaysville Floodplain	M	20 acres of young floodplain forest with high water channels and extensive gravel bars	NWI, CIR	N	Y
21 White	Rochester	4307277	Talcville Floodplain	L	6 acres of young floodplain forest with disturbance from farm road and ag. field within the floodplain	NWI, CIR	N	N
22 White	Rochester	4307277	West Branch White River Floodplain	M	7-8 acres of young floodplain forest and more mature high terrace forest on meander of lower West Branch; intact upland buffer, but small ag. field upstream	NWI, CIR	N	Y
23 White	Rochester	4307277	Thunder Head South Floodplain	L	20 acres of shrubby floodplain forest with one acre interior pool	NWI, CIR	N	N

This list of floodplain forest sites has been generated based on information gathered by the Vermont Nongame and Natural Heritage Program during initial reconnaissance and during detailed site surveys conducted during the summer and fall of 1997. Sites on private property were only visited with specific landowner approval. More detailed information on individual sites is available from the Vermont Nongame and Natural Heritage Program; contact Eric Sorenson by phone (802-241-3714) or e-mail (esorenson@fpr.anr.state.vt.us). This project was funded by a U.S. E.P.A. State Wetlands Protection Grant.

Appendix B

Population and Housing Data

Population of Watershed Towns

Town	1970 population	1980 population	1970-80 increase	1990 population	1980-90 increase
Brookfield	606	959	58.2%	1089	13.6%
Chelsea	983	1091	11.0%	1166	6.9%
Washington	667	855	28.2%	937	9.6%
Granville	255	288	12.9%	309	7.3%
Braintree	751	1065	41.8%	1174	10.0%
Randolph	3882	4689	20.8%	4764	1.6%
Tunbridge	791	925	16.9%	1154	24.8%
Hancock	283	334	18.0%	340	1.8%
Rochester	884	1054	19.2%	1181	12.0%
Bethel	1347	1715	27.3%	1866	8.8%
Royalton	1399	2100	50.1%	2389	13.8%
Sharon	541	828	53.0%	1211	46.2%
Pittsfield	249	396	59.0%	389	-1.8%
Stockbridge	389	508	30.6%	618	21.7%
Barnard	569	790	38.8%	872	10.4%
Pomfret	620	856	38.1%	874	2.1%
Hartford	6477	7963	22.9%	9404	18.1%
Chittenden	646	927	43.5%	1102	18.9%
Watershed	21,339	27,343	28.1%	30,839	12.8%

Housing Units of Watershed Towns

Town	1980 housing units	1990 housing units	1980-90 increase
Brookfield	457	565	23.6%
Chelsea	510	610	19.6%
Washington	384	447	16.4%
Granville	201	210	4.5%
Braintree	507	570	12.4%
Randolph	1669	1830	9.6%
Tunbridge	499	655	31.3%
Hancock	198	201	1.5%
Rochester	662	737	11.3%
Bethel	823	888	7.9%
Royalton	975	1161	19.1%
Sharon	413	578	40.0%
Pittsfield	298	401	34.6%
Stockbridge	413	488	18.2%
Barnard	555	607	9.4%
Pomfret	404	490	21.3%
Hartford	3483	5026	44.3%
Chittenden	449	538	19.8%
Watershed	12,900	16,002	24.0%

Appendix C

Individual Waterbody Reports

Lower White River Main Stem

Assessment Report

Waterbody No: VT09-01 **Basin:** 09-White

River Length (mi.): 26 **Classification:**

Description: Main Stem - Mouth to Confluence with Third Branch

Location Identifiers

County: Windsor **NRCS District:** 10

ANR Enforcement District: 3 **Regional Planning Commission:** TWO

Fish & Wildlife District: 4

Assessment Information

Assessment Date: 9707

Date Last Updated: 8/26/1997

Assessment Category: E

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? Y

Assessment Types

Information from local residents

Land use information and location of sources

Fixed station chemical/physical monitoring-conventional and toxic pollutants

Biological Monitoring

Aquatic Contamination

None detected

Toxics Testing

Organics in water column

Metals in water column

Other inorganics in water column

Waste Management Zone - Miles: **Description:** Bethel WWTF to confluence with Second Branch

Assessment Comments

THREATENED MILES

White River: 21.0 - upstream from mouth to First Branch - threats to clarity, aesthetics, ag. water supply, drinking water supply, aquatic biota/habitat, and contact rec. (swimming) due to sedimentation, nutrient enrichment, metals, toxic substances, turbidity and pathogens from land development, streambank and cropland erosion, streambank vegetation removal, highway maintenance, and closed, unlined landfill. c(900,1100,1700,2500) s(1000,3200,6300,7600,7700,8300)

COMMENTS

The Bethel/Royalton landfill, from which groundwater flows to the White River and Second Branch, was capped in October 1993. Earlier sampling (1980 and 1981, 1990 and 1991) had shown exceedances of iron and manganese and organic compounds. Exceedances of groundwater enforcements standards of arsenic, iron, manganese, benzene and vinyl chlkorine in shallow, groundwater well. Monitoring will continue twice a year. (9707)

The Quechee Mobil site (#890310), which was on the Hazardous Waste list of sites with surface water impacts, apparently does not have surface water impacts. It is three quarters of a mile from the White River and is a low priority.

The Johnson & Dix site (#890437), which is also on the above-mentioned list, is high priority and remediation has begun. Two underground storage tanks were removed in 1989. A petroleum plume exists on the central portion of this site, which was though to be a threat to the river. Based on groundwater sampling though concerns were diminished. The consultants responsible for sampling haven't done it for a year or so now and need to be contacted again. (9707)

Observations made by two anglers, who have known the White River for over 20 years each, include the following. Since the state put an end to gravel mining, the river has started to recover - gravel bars are forming and the channel stabilizing. However, habitat is still lacking and one of the anglers felt that land use practices upstream including removal of riparian vegetation, construction, roads, some agriculture are

resulting in the loss of pools and riffles (or pools and riffles inability to re-establish post-gravelling) and warmer temperatures. Fewer and fewer wild trout are being found (reproduction is down) and hatchery fish dominate.

South Royalton WWTF is in compliance with all permit requirements and has been in the recent past. Previous assessment comments mentioned nutrient enrichment (periphyton growth) below the plant but the source of the enrichment is not necessarily straightforward.

An analysis of the vegetation present along this section of the White river mainstem using the infrared photos found that on the northern or eastern river edge, approximately 29% of the shoreline had a buffer 50 feet or greater and 71% of the shoreline had a buffer less than 50 feet. On the southern or western river edge, approximately 74% of the shoreline had a buffer 50 feet or greater and 26% of the shoreline had a buffer less than 50 feet.

INFORMATION SOURCES

Peter Desmeules, Angler and Environmental Attorney - made observations on the health of the White River especially since gravel mining has stopped (but with a 20 year perspective)

Vt. DEC Ambient Biomonitoring Program - evaluation of 1992 data produces a community assessment of "excellent" at 1.9 miles and "good" at 21.8 miles above the mouth of the river.

River Watch Network data - 2/6 samples in 1990, 8/10 samples in 1992, and 2/3 samples in 1993 had water quality E. coli standards violations. (9401)

Water Quality Division infrared photo collection

Bryan Harrington and Solid Waste section reports/files, Vt DEC Waste Management Division - provided information on the Bethel/Royalton landfill (9401 & 9707)

Richard Spiese and Hazardous Materials section reports/files, Vt DEC Waste Management Division - provided information on Quechee Mobil (#890310) and Johnson & Dix (#890437) sites. (9707)

Bob Scaronski, owner of a fly tackle business - discussed changes to the White River and especially the declining wild trout population. (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	5.0	21.0	0.0	0.0	0.0
20	Aquatic biota	5.0	21.0	0.0	0.0	0.0
21	Fish consumption	26.0	0.0	0.0	0.0	0.0
42	Contact recreation	5.0	21.0	0.0	0.0	0.0
44	Noncontact recreation	26.0	0.0	0.0	0.0	0.0
50	Drinking water supply	5.0	21.0	0.0	0.0	0.0
62	Aesthetics	5.0	21.0	0.0	0.0	0.0
72	Agriculture water supply	5.0	21.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	26.0

Impairment Cause	Mag	Size (mi.)
Priority organics	T	0.50
Metals	T	0.50
Other inorganics	T	0.50
Nutrients	T	21.00
Siltation	T	21.00
Pathogens	T	21.00
Turbidity	T	21.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	21.00
Land development	T	21.00
Landfills	T	0.50
Removal of riparian vegetation	T	21.00
Streambank modification/destabilization	T	21.00
Highway maintenance and runoff	T	21.00

Point Source Description	NPDES No.
WWTF - Bethel	VT0100048
White River National Fish Hatchery	VT0020711
Royalton WWTF 0.07mgd	VT0100854
CSO - Hartford WRJ Bridge Stteet	VT0101010
3 permitted stormwater discharges	sw

Nonpoint Source Name	Description
Bethel Landfill	Unlined landfill - Royalton

Middle White River Main Stem

Assessment Report

Waterbody No: VT09-02 **Basin:** 09-White

River Length (mi.): 24 **Classification:**

Description: Main Stem - Confluence of Third Branch to West Branch

Location Identifiers

County: Windsor **NRCS District:** 10

ANR Enforcement District: 3 **Regional Planning Commission:** TWO

Fish & Wildlife District: 4

Assessment Information

Assessment Date: 9707

Date Last Updated: 8/11/1997

Assessment Category: E

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? N

Assessment Types

Land use information and location of sources

Biological Monitoring

Aquatic Contamination

None detected

Toxics Testing

Waste Management Zone - Miles: **Description:**

Assessment Comments

THREATENED MILES

White River mainstem: 24.0 - whole length from confluence of Third Branch to confluence of West Branch - threats to aquatic biota/habitat, secondary contact recreation (fishing), and aesthetics due to sediments, thermal modification, Japanese knotweed, and possibly nutrients and toxics from removal of riparian vegetation, road runoff and maintenance, a golf course on the river with little to no buffer, and agricultural land uses with little to no buffer. c(900,1100,1400,2400,2600) s(1000,7600,8300,8700)

INFORMATION SOURCES

Jerry McArdle & Cathy Kashanski, Vt. DEC Water Quality Division - noted the lack of buffers, proximity of roads to the river, erosion along roadsides near the river, extensive patches of Japanese knotweed on the banks, and a golf course, pasture and cropland near river without buffers during separate investigations (9707).

Water Quality Division infrared photo collection (9707).

Steve Fiske, Vt DEC Aquatic Biomonitoring Network - macroinvertebrate data

COMMENTS

Aquatic biomonitoring site at 32.4 miles (off route 107 up a private road) showed full support of aquatic biota in 1993, 1994, 1995, and 1996.

An analysis of the vegetation present along the White River mainstem using infrared photos found that on the northern or eastern river edge approximately 43% of the shoreline had a buffer 50 feet or greater and 57% had a buffer less than 50 feet. On the southern or western river edge, approximately 40% of the shoreline had a buffer 50 feet or greater and 60% had a buffer less than 50 feet.

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	24.0	0.0	0.0	0.0
20	Aquatic biota	0.0	24.0	0.0	0.0	0.0
21	Fish consumption	24.0	0.0	0.0	0.0	0.0
42	Contact recreation	24.0	0.0	0.0	0.0	0.0
44	Noncontact recreation	0.0	24.0	0.0	0.0	0.0
50	Drinking water supply	24.0	0.0	0.0	0.0	0.0
62	Aesthetics	0.0	24.0	0.0	0.0	0.0
72	Agriculture water supply	24.0	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	24.0

Impairment Cause	Mag	Size (mi.)
Siltation	T	24.00
Thermal modifications	T	24.00
Total toxics	T	24.00
Exotic species	T	24.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	2.00
Removal of riparian vegetation	T	12.00
Highway maintenance and runoff	T	15.00
Recreational activities	T	0.50

Point Source Description	NPDES No.
none	

Nonpoint Source Name	Description
	none

Minor Tributaries - Lower White R. mainstem

Assessment Report

Waterbody No: VT09-03 **Basin:** 09-White

River Length (mi.): 54.5 **Classification:**

Description: Minor tributaries on the lower White River mainstem from the mouth to the Third Branch

Location Identifiers

County: Windsor **NRCS District:** 10

ANR Enforcement District: 3 **Regional Planning Commission:** TWO

Fish & Wildlife District: 4

Assessment Information

Assessment Date: 9707

Date Last Updated: 8/12/1997

Assessment Category: E

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? N

Assessment Types

Surveys of fish and game biologists or other professionals

Land use information and location of sources

Aquatic Contamination

Toxics Testing

Waste Management Zone - Miles: **Description:**

Assessment Comments

PARTIAL SUPPORT
Unnamed trib to White R.: 1.5 - mouth upstream for 1.5 miles along Jericho Road - partial impairment of aquatic biota/habitat due to turbidity and siltation from slumping banks. c(1100,2500) s(7700)

THREATENED MILES
Mill Brook: 12.5 - threats to aquatic biota/habitat from sedimentation. c(1100), s(9000).
Broad Brook: 1.0 - threats to aquatic biota/habitat due to sedimentation from bank slumping. c(1100), s(7700)

INFORMATION SOURCES
John Claussen, Vt Dept of Fish & Wildlife - noted that Mill Brook is a major spawning stream threatened by the above disturbances (9401). The culvert that had precluded passage of fish has been fixed. The wild and rainbow trout populations are diminished though and John doesn't know why (9707).
Cathy Kashanski, Vt DEC Water Quality Division - noted slumping banks on Broad Brook (9401).
Kevin Kaija, NRCS - noted impairment on unnamed trib (9401).

COMMENTS
Roads cross Mill Brook at least twelve times along its length and the points of crossing could be one of the sources of sediment to the brook.

Minor Tributaries - Lower White R. mainstem **VT09-03**

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	39.5	13.5	1.5	0.0	0.0
20	Aquatic biota	39.5	13.5	1.5	0.0	0.0
21	Fish consumption	54.5	0.0	0.0	0.0	0.0
42	Contact recreation	54.5	0.0	0.0	0.0	0.0
44	Noncontact recreation	54.5	0.0	0.0	0.0	0.0
50	Drinking water supply	54.5	0.0	0.0	0.0	0.0
62	Aesthetics	52.0	1.0	1.5	0.0	0.0
72	Agriculture water supply	54.5	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	54.5

Impairment Cause	Mag	Size (mi.)
Siltation	H	1.50
Siltation	T	13.50
Turbidity	H	1.50

Impairment Source	Magnitude	Size (mi.)
Streambank modification/destabilization	H	1.50
Streambank modification/destabilization	T	1.00
Unknown source	T	12.50

Point Source Description	NPDES No.
7 permitted stormwater discharges	sw

Nonpoint Source Name	Description
	none

First Branch - White River

Assessment Report

Waterbody No: VT09-04 **Basin:** 09-White

River Length (mi.): 61.9 **Classification:**

Description: Mouth to Headwaters & Tributaries

Location Identifiers

County: Orange **NRCS District:** 10

ANR Enforcement District: 3A **Regional Planning Commission:** TWO

Fish & Wildlife District: 4

Assessment Information

Assessment Date: 9707

Date Last Updated: 8/12/1997

Assessment Category: E

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? Y

Assessment Types

Surveys of fish and game biologists or other professionals

Chemical/physical monitoring

Biological Monitoring

Aquatic Contamination

Toxics Testing

Organics in water column

Waste Management Zone - Miles: **Description:**

Assessment Comments

NON-SUPPORT MILES

Jones Pond Brook: 3.0 - whole length - non-support of aquatic biota for unknown reason. c(0000) s(9000)

THREATENED MILES

First Branch White River: 14.0 - from mouth upstream to below Chelsea Village - threats to aquatic biota/habitat, water clarity, and contact rec. (swimming) from thermal pollution, sedimentation, turbidity, and nutrients, from loss of vegetated bufferstrips, streambank erosion, cropland erosion, road runoff, and land development. c(900,1100,1400,2500) s(1000,3200,7600,7700,8300)

INFORMATION SOURCES

John Claussen, Vt Dept of Fish & Wildlife - noted elevated water temperatures and some sediment from Chelsea downstream to mouth (9401). John also found that Dickerman, Bicknell, Crams, Jenkins, Jail, and Hart Hollow Brooks were all in excellent condition after shocking the brooks. Populations were better than in 1953 when last shocked. Jones Pond Brook had NO fish, however, for unknown reasons (9601).

Dan Koloski, Natural Resource Conservation Service (9401)

Steve Fiske - Vt. DEC Ambient Biomonitoring Network - site at 14.6 miles sampled in 1992 had a community assessment rating of "good" - full support of aquatic biota (9401).

Richard Spiese, Vt DEC Waste Management Division - noted that the VOCs that had been found in surface water samples from the Campbell's Garage oil waste spill were no longer detected after the treatment system was installed (9707).

First Branch - White River VT09-04

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	44.9	14.0	0.0	3.0	0.0
20	Aquatic biota	44.9	14.0	0.0	3.0	0.0
21	Fish consumption	61.9	0.0	0.0	0.0	0.0
42	Contact recreation	47.9	14.0	0.0	0.0	0.0
44	Noncontact recreation	58.9	0.0	0.0	3.0	0.0
50	Drinking water supply	61.9	0.0	0.0	0.0	0.0
62	Aesthetics	47.9	14.0	0.0	0.0	0.0
72	Agriculture water supply	61.9	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	61.9

Impairment Cause	Mag	Size (mi.)
Cause unknown	H	3.00
Nutrients	T	14.00
Siltation	T	14.00
Thermal modifications	T	14.00
Pathogens	T	14.00
Turbidity	T	14.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	14.00
Land development	T	14.00
Removal of riparian vegetation	T	14.00
Streambank modification/destabilization	T	14.00
Highway maintenance and runoff	T	14.00
Unknown source	H	3.00

Point Source Description	NPDES No.
Chelsea WWTF 0.055mgd	VT0100943
1 permitted stormwater discharge	sw

Nonpoint Source Name	Description
Tunbridge Landfill	Landfill - High Priority/SWI

Second Branch - White River

Assessment Report

Waterbody No: VT09-05 **Basin:** 09-White

River Length (mi.): 50.5 **Classification:**

Description: Mouth to Headwaters & Tributaries

Location Identifiers

County: Orange Windsor **NRCS District:** 10

ANR Enforcement District: 3A **Regional Planning Commission:** TWO

Fish & Wildlife District: 4

Assessment Information

Assessment Date: 9707

Date Last Updated: 8/12/1997

Assessment Category: E

Water Quality Limited?

On 303(d) List? Y

Monitored for Toxics? N

Assessment Types

Surveys of fish and game biologists or other professionals

Land use information and location of sources

Aquatic Contamination

Toxics Testing

Waste Management Zone - Miles: **Description:**

Assessment Comments

PARTIAL SUPPORT MILES

Second Branch: 16.5 - above Williamstown/Brookfield border to 1.0 mile before junction at White River - partial support of biota, aesthetics and contact recreation due to nutrients and sediments from ag. related runoff, lack of buffers and streambank erosion. c(900,1100,1400), s(1000,7600,7700)

Snows Brook: 1.0 - from mouth upstream one mile - partial support of aquatic biota/habitat due to siltation from poor gravel road maintenance and streambank erosion. c(1100) s(7700,8300)

INFORMATION SOURCES

John Claussen, Vt Dept of Fish & Wildlife - noted agriculture related runoff and streambank erosion on Second Branch (9401,9601).

Stan Corneille, Vt DEC Waste Management Division - Wheatley Farm (#941693) hazardous waste site about 1000 feet from the Second Branch. Site for Unifirst waste disposal. Solvents or fuel detected in monitoring wells (PCEs, tetrachlorethene). Remedial investigation/feasibility analysis completed and remedy selected.

Jerry McArdle, Vt DEC Water Quality Division - noted headwater section of the Second Branch looked good but threats or impacts from nutrients and sediments from streambank erosion, road runoff, agricultural land use exist downstream. Siltation and heavy algae growth on rocks were two common observations. Jerry also noted impacts to Snows Brook.

COMMENTS

Jerry also looked at Sunset Brook, Peak Brook, Penny Brook, Osgood Brook.

Second Branch - White River **VT09-05**

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	33.0	0.0	17.5	0.0	0.0
20	Aquatic biota	33.0	0.0	17.5	0.0	0.0
21	Fish consumption	50.5	0.0	0.0	0.0	0.0
42	Contact recreation	34.0	0.0	16.5	0.0	0.0
44	Noncontact recreation	50.5	0.0	0.0	0.0	0.0
50	Drinking water supply	50.5	0.0	0.0	0.0	0.0
62	Aesthetics	34.0	0.0	16.5	0.0	0.0
72	Agriculture water supply	50.5	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	50.5

Impairment Cause	Mag	Size (mi.)
Nutrients	S	16.50
Siltation	M	17.50
Thermal modifications	S	16.50

Impairment Source	Magnitude	Size (mi.)
Agriculture	M	16.50
Removal of riparian vegetation	M	16.50
Streambank modification/destabilization	H	16.50
Highway maintenance and runoff	M	1.00

Point Source Description	NPDES No.
2 permitted stormwater discharges	sw

Nonpoint Source Name	Description
	none

Third Branch - White River

Assessment Report

Waterbody No: VT09-06 **Basin:** 09-White

River Length (mi.): 95 **Classification:**

Description: Mouth to Headwaters & Tribs

Location Identifiers

County: Orange Washington **NRCS District:** 10

ANR Enforcement District: 3A **Regional Planning Commission:** TWO

Fish & Wildlife District: 4

Assessment Information

Assessment Date: 9707

Date Last Updated: 8/12/1997

Assessment Category: E

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? Y

Assessment Types

Surveys of fish and game biologists or other professionals

Land use information and location of sources

Biological Monitoring

Aquatic Contamination

Toxics Testing

Organics in water column

Waste Management Zone - Miles: 1.20 **Description:** from Randolph WWTF down to Smith Brook

Assessment Comments

PARTIAL SUPPORT MILES

Third Branch of White River: 11.0 - Ayers Brook down to Bethel - partial support of aquatic biota/habitat, aesthetics and contact recreation due to sedimentation, turbidity, nutrients, thermal modifications, and pathogens due to severe streambank erosion, stormwater runoff, ag. land erosion and runoff, livestock watering instream, animal waste management problems, and riparian vegetation loss. c(900,1100,1400,1700,2500) s(1000,7600,7700)

Batchellor Brook: 1.0 - partial support of aquatic biota and aesthetics due to siltation and physical alterations from beaver dam removal, stream channelization, and dredging by the Agency of Transportation. c(1100,1600) s(7100,7200,7800)

THREATENED MILES

Third Branch of White River: 2.5 - below Roxbury Fish Hatchery - threats to aesthetics and swimming from nutrient enrichment due to fish hatchery. c(900) s(1700)

Ayers Brook: 0.5 - 3/4 mile upstream of confluence with Cold Brook - threats to aquatic habitat, contact recreation (swimming) due to thermal modifications and pathogens from beaver dam built in brook. c(1400,1700) s(8600)

Ayers Brook: 0.1 - near Wright-Bessette property hazardous waste site (below Braintree/Randolph town line and a subset of the length below) - threats to aquatic biota and drinking water supply due to improperly applied/disposed dry cleaners sludge. c(300) s(6600)

Ayers Br.: 5.5 - Randolph to Snowville (East Braintree) - threats to aquatic biota/habitat due to siltation from streambank erosion. c(100) s(7700)

INFORMATION SOURCES

John Claussen, Vt Dept of Fish & Wildlife - partial support of Third Branch from Bethel to Ayers Brook due to nutrients, sediments, thermal impacts still valid (from 94 assessment). John also noted a threat to the river from the two new pipes that discharge stormwater directly to the Third Branch with no treatment. The rainbow

trout population is diminished from Roxbury to Randolph. There is extensive beaver activity in this stretch. (9601).

Dan Koloski, NRCS - noted heavy sediment load in Third Branch due to severe streambank erosion (9401).

Stan Corneille, Vt. DEC Waste Management Division - noted that groundwater samples from the site still show significant levels of tetrachloroethylene. No surface water samples have shown problems, but groundwater flows toward Ayers Brook (9401). More groundwater monitoring wells are being put in to find out how far away from the site groundwater is contaminated. Surface water (Howard Hill Brook) was sampled in July 1997 by Johnson Company. No results as of this record update. The State will take over sampling after this year. (9707).

Dennis Borchardt, George Aiken RC&D - noted that eroding streambanks are a significant problem between Bethel and Randolph resulting in loss of fish habitat (9601).

Steve Fiske, Vt DEC Water Quality Division - biomonitoring data on four sites sampled in 1993 (milepoints 9.5,9.9,10.2,18.1) showed full support based on macroinvertebrate communities. Site 9.5 data indicated a threat to aquatic biota due to nutrient enrichment.

Jerry McArdle, Vt DEC Water Quality Division - noted horse pasture with little or no buffer on Third Branch just upstream of Batcheldor Brook: a large gravel operation just above the confluence of Riford Brook; and eroding streambanks from confluence of Ayers Brook down to Randolph. (9707).

COMMENTS

When the sewer and stormwater systems were separated in Randolph downtown (about 25 acres of paved area) directly to the Third Branch with no treatment. There is a 4 foot pipe above the Route 12 bridge and a smaller one below. Warm water, oil and grease, heavy metals in the runoff from the downtown are all discharged to the river.

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	74.5	8.5	12.0	0.0	0.0
20	Aquatic biota	77.0	6.0	12.0	0.0	0.0
21	Fish consumption	95.0	0.0	0.0	0.0	0.0
42	Contact recreation	81.5	2.5	11.0	0.0	0.0
44	Noncontact recreation	95.0	0.0	0.0	0.0	0.0
50	Drinking water supply	94.9	0.1	0.0	0.0	0.0
62	Aesthetics	80.5	2.5	12.0	0.0	0.0
72	Agriculture water supply	95.0	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	95.0

Impairment Cause	Mag	Size (mi.)
Priority organics	T	0.10
Nutrients	M	11.00
Nutrients	T	2.50
Siltation	H	12.00
Siltation	T	5.50
Thermal modifications	M	11.00
Thermal modifications	T	0.50
Other habitat alterations	H	1.00
Pathogens	S	11.00
Pathogens	T	0.50
Turbidity	S	11.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	M	11.00
Aquaculture	T	2.50
Hazardous waste	T	0.10
Channelization	H	1.00
Dredging	H	1.00
Removal of riparian vegetation	M	11.00
Streambank modification/destabilization	H	11.00
Streambank modification/destabilization	T	5.50
Drainage/filling of wetlands	M	1.00
Natural sources	T	0.50

Point Source Description	NPDES No.
Randolph WWTF 0.40mgd	VT0100285
Fish Hatchery - Roxbury - VT DF&W	3-0362
4 permitted stormwater discharges	sw

Nonpoint Source Name	Description
Randolph CSO	CSO - Ayers Br. - Pump Sta. Overflow
Randolph CSO	CSO - Third Branch - Headworks Overflow
Bethel Mills Hydro	Hydropower Dam - Priv - R-O-R/Min Flows

Upper White River Watershed

Assessment Report

Waterbody No: VT09-07 **Basin:** 09-White

River Length (mi.): 145.4 **Classification:**

Description: Mainstem from confluence of West Branch to headwaters and tributaries

Location Identifiers

County: Windsor Addison **NRCS District:** 10

ANR Enforcement District: 3 **Regional Planning Commission:** TWO

Fish & Wildlife District: 4

Assessment Information

Assessment Date: 9707

Date Last Updated: 9/2/1997

Assessment Category: E

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? N

Assessment Types

Surveys of fish and game biologists or other professionals

Biological Monitoring

Aquatic Contamination

Toxics Testing

Waste Management Zone - Miles: **Description:**

Assessment Comments

THREATENED MILES

White River: 9.0 - from Alder Meadow Brook confluence down to West Branch confluence - threats to aquatic biota/habitat and water clarity due to sedimentation, turbidity, and thermal changes from agricultural land uses, streambank erosion, and removal or riparian vegetation. c(1100,1400) s(1000,7700)

White River: 3.5 - from confluence with Alder Meadow Brook to headwaters and

Clark Brook: 2.0 - from mouth to headwaters - both streams have threats to aquatic biota/habitat due to acidity, metals, and habitat modification from acid deposition and logging. c(500,1000,1100,1600) s(2000,8100

Hancock Branch: 2.0 - from Texas Br. confluence to headwaters - threats to aquatic biota/habitat, and water clarity due to sedimentation, turbidity, metals and acidity from atmospheric deposition, and natural streambank erosion. c(500,1000,1100) s(7700,8100,8600)

Tweed River: 2.5 - upstream from confluence with White River to Pittsfield Village - threats to aquatic biota, water clarity and contact recreation from sedimentation, thermal changes and potentially pathogens from land development (primarily residential), road maintenance and agricultural land uses. c(1100,1400,1700) s(1000,3200,8300)

Hancock Branch: 0.2 (chosen to represent scattered areas of erosion noted by White R. Citizen Monitoring Program) - threats to aquatic biota/ habitat due to sedimentation from natural and human-caused streamside erosion. c(1100), s(7700,8600)

Bingo Brook: 0.5 (chosen to represent scattered erosion areas noted by White R. Citizen Monitoring Program) - threats to aquatic biota/habitat due to sedimentation from natural and human-made streambank erosion. c(1100), s(7700,8600)

Brandon Brook: 0.5 (chosen to represent scattered erosion areas noted by White R. Citizen Monitoring Program) - threats to aquatic biota due to sedimentation from natural streambank erosion. c(1100), s(7700,8600)

Locust Creek: 2.0 - from the Royalton town line to the confluence with the Silver Lake drainage - threats to aquatic biota/habitat due to sedimentation from erosion at 5-10 sites within the two mile stretch. c(1100) s(7700,8600)

Tweed River: 0.5 - a stretch just downstream of Colton Pond - threats to aquatic biota/habitat and aesthetics due to nutrient enrichment likely from golf course runoff. c(900) s(8700)
Tweed River: 2.5 - upstream from Townsend Brook confluence - threats to aquatic biota/habitat and aesthetics from sedimentation and thermal changes due to residential development, road runoff, instream ponds on the tribs. c(1100,1400) s(3200,7350,8300)

COMMENTS
Site investigation done in June 1989 at Weyerhauser Corporation hazardous waste site. Nothing found in surface water and no groundwater samples taken. (9401) EPA did a site investigation in 1994. Not much found in groundwater - no risk and no further remedial action planned. Site closed. (9707)
Review of the infrared photographs for the White River mainstem from the headwaters to the confluence of the West Branch found that 54% of the northern or eastern shoreline had a buffer of vegetation greater or equal to 50 feet and 46%had a buffer less than 50 feet. Of the southern or western shoreline, 49% had a buffer of vegetation 50 feet or greater and 51% of the length had a buffer less than 50 feet.
Macroinvertebrate community data for Austin Brook and Bear Wallow Brook sampled in 1994, 1995, and 1996 showed full support for aquatic biota.

INFORMATION SOURCES
White River Citizen Monitoring Program Final Report, October 31, 1989. Benthic invertebrate sampling was done between late June and late September in 1987, 1988, 1989 and 25 miles of streams were walked to identify current or potential water quality problems. Benthic sampling found that the diversity of the invertebrate communities was good to fair at the 8 sites sampled.
Vt. DEC Hazardous Materials files.
John Claussen - Vt. F&W District Fisheries Manager - noted that all tribs are uniformly excellent for fishing and provide trout spawning and juvenile Atlantic Salmon habitat. However, in several tribs, notably the Tweed River, trout populations have declined significantly and salmon fry production have declined over the past 20 years to unknown causes.
Dan Koloski - SCS - noted the erosion on Locust Creek
Water Quality Division infrared photograph collection (9707)
Steve Fiske, Vt DEC Water Quality Division - macroinvertebrate biomonitoring data (9707)
Jim Kellogg, Vt DEC Water Quality Division - noted that the streams threatened by acid precipitation haven't been monitored recently "but based on precipitation pH levels, there is no reason to assume any improvement. " (9707)
Jerry McArdle, Vt DEC Water Quality Division - noted "fuzzy" rocks and the threats from residential development, road runoff to the Tweed River.
Bob Burt, GMNF - there is a Clark Brook III timber sale but it is a winter only logging sale. If there are mid-winter thaws then the operations are stopped. They have regular timber sale administration on all their logging jobs - checks on the operation about once a week. Steve Roy looks at the brooks for the Environmental Assessment that is done on each timber sale and then monitors the brooks. No reason for Clark Brook or the upper White River to be singled out for threatened status (CRK). (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	120.2	25.2	0.0	0.0	0.0
20	Aquatic biota	120.2	25.2	0.0	0.0	0.0
21	Fish consumption	145.4	0.0	0.0	0.0	0.0
42	Contact recreation	142.9	2.5	0.0	0.0	0.0
44	Noncontact recreation	145.4	0.0	0.0	0.0	0.0
50	Drinking water supply	145.4	0.0	0.0	0.0	0.0
62	Aesthetics	128.9	16.5	0.0	0.0	0.0
72	Agriculture water supply	145.4	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	145.4

Impairment Cause	Mag	Size (mi.)
Metals	T	7.50
Nutrients	T	0.50
pH	T	7.50
Siltation	T	19.20
Thermal modifications	T	14.00
Pathogens	T	2.50

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	11.50
Land development	T	5.00
Upstream impoundment	T	2.50
Streambank modification/destabilization	T	14.20
Atmospheric deposition	T	7.50
Highway maintenance and runoff	T	5.00
Natural sources	T	5.20
Recreational activities	T	0.50

Point Source Description	NPDES No.
4 permitted stormwater discharges	sw

Nonpoint Source Name	Description
Rochester Septic-1	Indirect Discharge - 3-8,000 gal. tanks
Rochester Septec-2	Indirect Discharge - 30,000 gal. tank
Rochester Septic-3	Indirect Discharge - 12,000 gal. tank