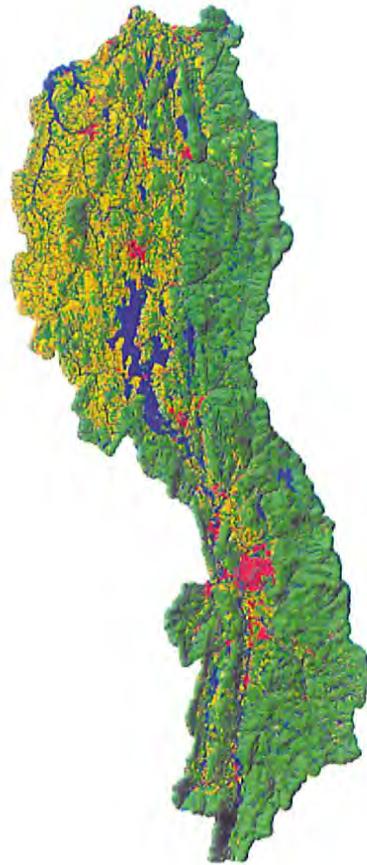


# Basin 3

## Otter, Little Otter, Lewis Creek Watersheds Water Quality & Aquatic Habitat Assessment Report



Agency of Natural Resources  
Department of Environmental Conservation  
Water Quality Division

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## **General Watershed Description\***

The Otter Creek Basin or Basin 3 consists of the Otter Creek watershed plus the watersheds of Lewis Creek and Little Otter Creek, which drain directly to Lake Champlain. The watershed description that follows is only that of the Otter Creek watershed itself.

The Otter Creek watershed encompasses an area that is 936 square miles draining portions of Bennington, Rutland and Addison counties. The Otter Creek mainstem is approximately 100 miles long. It originates in the Town of Dorset at Emerald Lake and the wetlands south of the lake and from here meanders northerly from Dorset through Mt. Tabor and Wallingford to the town of Clarendon. In Clarendon, Otter Creek is joined by the Mill River from the east.

The Mill River is a flashy stream with its headwaters in the town of Mt. Holly. It is 16 miles long and has a drainage area of 67 square miles. From its origins in the southeastern corner of Mt. Holly, the Mill River flows in a northwesterly direction through Wallingford, Shrewsbury and Clarendon to its confluence with Otter Creek.

The Otter Creek continues to flow in a northerly direction in a wider valley through the town of Clarendon. Its meandering nature has resulted in numerous oxbows and pools cut off from the main river. Just north of North Clarendon, the Cold River enters the Otter Creek through this wider valley.

The Cold River rises in the Coolidge Range in Shrewsbury and flows in a westerly direction through Shrewsbury and the northern part of Clarendon before entering the Otter Creek. The Cold River is a flashy stream 12 miles long with a drainage area of 38 square miles.

The Otter Creek continues in a northerly direction and in the City of Rutland, East Creek enters the mainstem.

East Creek originates in the town of Mendon and flows northwesterly into Lefferts Pond and Chittenden Reservoir. From Chittenden Reservoir, it flows southwestly then southerly through Chittenden, the eastern edge of Pittsford and into Rutland Town. It flows westerly then southerly through Rutland Town and finally Rutland City before entering Otter Creek.

From the East Creek confluence, the Otter Creek flows westerly through Center Rutland where it is joined by the Clarendon River entering from the southwest.

The Clarendon River originates at Chipman Lake in the southeast corner of Tinmouth. It flows north as Tinmouth channel, a meandering stream with extensive associated wetlands, through Tinmouth becoming the Clarendon River in the town of Clarendon. It continues north to West Rutland where it then heads northeast and empties into Otter Creek.

From the Clarendon River confluence, the Otter Creek flows northerly through Proctor and Proctor Village where it cascades over Sutherland Falls. It continues northerly through Pittsford in a relatively broad valley and then meanders through Brandon northerly and westerly. Extensive wetlands, including Brandon Swamp, are associated with the river in Brandon. Flowing north into Leicester from Brandon, the Leicester River joins the Otter Creek.

The Leicester River originates at Lake Dunmore and flowing through Salisbury and Leicester in a southwesterly direction before entering Otter Creek. The river is associated with the extensive Salisbury Swamp for much of its length.

Otter Creek meanders northerly from the Leicester River confluence forming the border between Leicester and Whiting and Salisbury and Cornwall. This 10 mile plus stretch of the river is surrounded by swamps and other wetland communities. Just north of the Middlebury town border, the Middlebury River flows into Otter Creek from the east.

The Middlebury River originates on the west slopes of the Green Mountains as the Middle Branch and South Branch in the towns of Ripton and Hancock. The Middle and South Branches flow westerly from their origins and join in the village of Ripton forming the Middlebury River. The river flows westerly in a steep, narrow valley and paralleled by route 125. It comes out of the foothills into the Champlain Valley near East Middlebury then meanders generally west entering Otter Creek upstream of the former Three Mile Bridge.

Otter Creek continues its northerly flow up through Middlebury passing over the dam in the town and then two dams downstream before the New Haven River enters from the east.

The headwaters of the New Haven River flow down the slopes of Bread Loaf Mountain, Mt. Cleveland and Mt. Grant in Ripton and Lincoln. The New Haven River flows northwesterly through the villages of South Lincoln, Lincoln, and West Lincoln before turning west for a short stretch in the valley also containing route 116 that heads into Bristol. In Bristol, the river turns abruptly south and flows in a southwesterly direction through Bristol Flats, New Haven Mills and Brooksville before joining Otter Creek. The New Haven River has a drainage area of 113 square miles and is 25 miles long. It is the largest tributary to Otter Creek.

The Otter Creek flows generally west passing over two dams and dropping some 75 feet. Following a large meander south then north, the Lemon Fair River joins Otter Creek from the south. This confluence is 6.3 miles downstream from the New Haven River confluence.

The Lemon Fair River originates at the outlet of Johnson Pond in Orwell. It is a slow, meandering stream for almost all of its 27 mile length. The Lemon Fair flows northerly through the villages of East Shoreham and Richville in the town of Shoreham, then through Bridport, Cornwall, and Weybridge towns before joining Otter Creek. Agricultural land is the dominant adjacent land use in these towns.

Otter Creek flows in a northerly direction after the Lemon Fair confluence forming the eastern border of Addison and Panton and the western border of Waltham. In the City of Vergennes it passes over a dam dropping 37.6 feet. Below this point, the Otter Creek water level is influenced by Lake Champlain's variations. Flowing northwesterly from Vergennes the Otter Creek is joined by Dead Creek from the south, a distance of 12.6 miles from the Lemon Fair confluence with Otter Creek.

Dead Creek is a slow, often stagnant, stream affected by many wildlife management dams. It is about 20 miles long and has a drainage area of 60 square miles. It flows north from a plateau in the Town of Bridport through Addison and Panton to the Otter Creek. From the Dead Creek confluence, the Otter Creek flows 3.5 miles through part of Ferrisburg to Lake Champlain at Fort Cassin Point.

The dominant land cover type in the Otter Creek watershed according to data from the Vermont Satellite Land Cover project (1997) is forested land with 425,336 acres or 60% of the watershed either deciduous, coniferous or mixed forest. Agricultural land including orchards, row crops, hay, pasture and other agricultural uses occupy 162,854 acres or 23% of the watershed area. Developed land, including residential, commercial, industrial, transportation and utilities covers about 38,948 acres or 5.5% of the basin's land area. Of the developed land, 66% is transportation and utility use. There are 37,420 acres of wetland (5.3% of the watershed) and 37,295 acres of surface water (also 5.3% of the basin) in the Otter Creek drainage. Two other categories of land use identified were brush or transitional land (1989 acres) and barren land (1223 acres).

There are a total of 23 lakes and ponds in the Otter Creek watershed that are 20 acres in size or larger. The seven largest include Lake Dunmore (985 acres), Chittenden Reservoir (702 acres), Winona Lake (248 acres), Danyow Pond (192 acres), Cedar Lake (123 acres), Richville Pond (129 acres), and Silver Lake in Leicester (101 acres).

\*Much of the watershed description above came from the Otter Creek Basin Water Quality Management Plan April 1975 done by the then-named Agency of Environmental Conservation.

### **Floodplain Forest Communities**

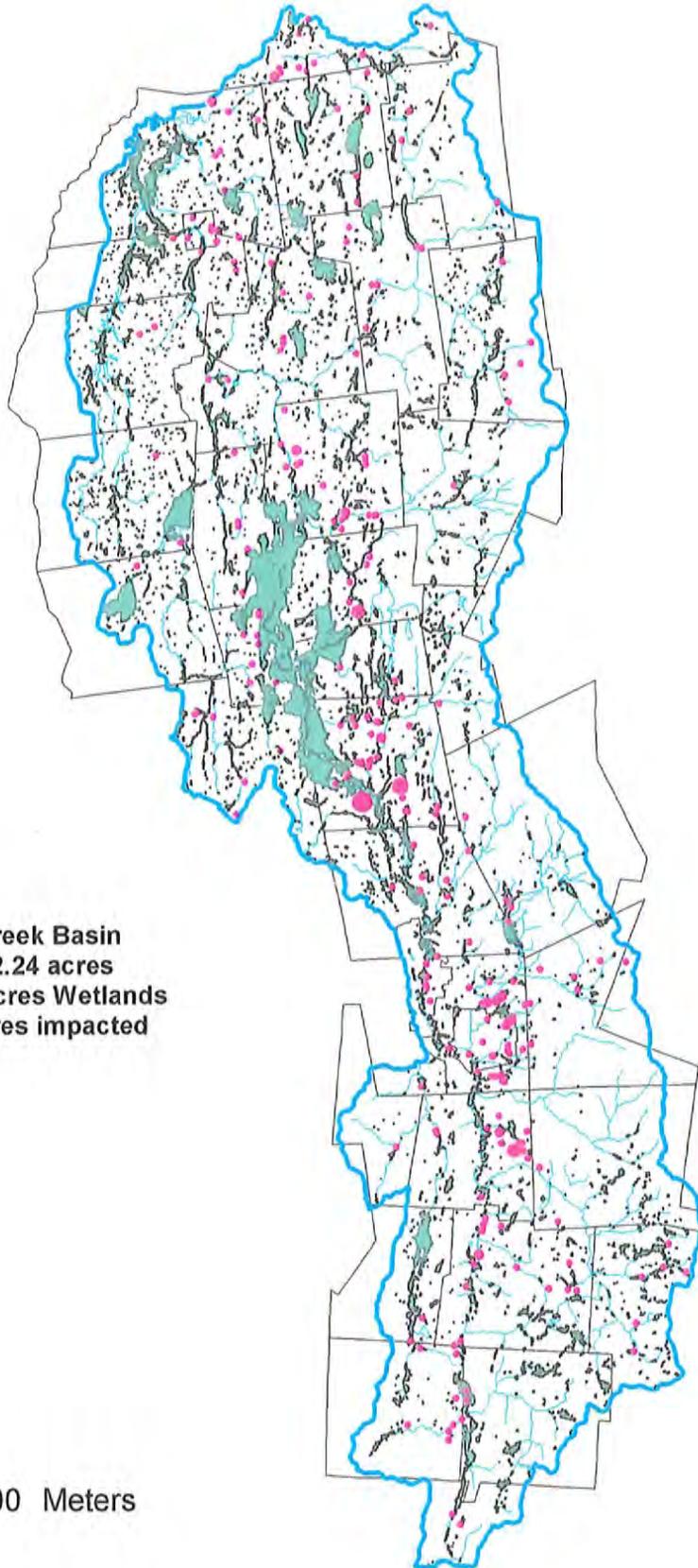
An inventory and study of the state's major floodplain forest communities was conducted in 1997 by the Vermont Natural Heritage Program. Initial identification of potential intact communities was done using the 1992 - 1994 infrared photographs then most of those identified were checked by aerial reconnaissance. Detailed site surveys were done at six of the sixteen sites originally identified. The sites are summarized in the table in Appendix A.

## **Wetlands**

There are approximately 45,579 acres of National Wetland Inventory mapped (Class II) wetlands in the Otter Creek Basin, which is about 6 1/2% of the basin area (probably more accurate than the value given above from the satellite data because this information came from maps at a larger scale). Based on project data kept from 1990 to 1997, approximately 144 acres of wetland (Class II or III) have been altered or lost (see Figure I on page 4).

There are a number of large, important wetland complexes in the Otter Creek basin including the Tinmouth Channel wetlands, Brandon Swamp, Long Swamp, Salisbury Swamp, Whiting Swamp, Cornwall Swamp, Dead Creek Marsh, the marsh and swamp at the mouth of Otter Creek and Little Otter/Lewis Creek Marsh. Scanlon Bog, located in Brandon, supports four endangered and threatened plant species.

These vast and fascinating wetland systems are valuable natural areas and often support uncommon or unusual plant and animal species. For example, at the mouths of Lewis Creek and Little Otter Creek, there are over 400 acres of deep emergent marsh with adjacent lakeshore floodplain and bottomland forests. The marshes provide habitat for rare breeding birds including the least bittern, common moorhen, and black tern in addition to numerous more common birds. The bottomland forest consists of silver maple, swamp white oak, shagbark hickory and the rare black gum. In the extensive marshes of the Dead Creek basin, there are black terns, soras, common moorhens, least bitterns, northern harriers, and wintering raptors such as the short-eared owl, rough-legged hawk and gyrfalcon. During the migration huge flocks of snow geese and many duck species are on the adjacent fields and open water. When the mudflats are exposed, sandpipers, plovers, and wading birds use the area as a stopover.



**Otter Creek Basin**  
**705,062.24 acres**  
**45,579.24 acres Wetlands**  
**144.33 acres impacted**



## **Exceptional Uses and Values of Basin Rivers and Streams**

The entire length of the main stem of Otter Creek, at 100.4 miles, is the longest flatwater boating segment in the state. Much of this boating takes place in scenic segments from Vergennes to Lake Champlain, from Proctor to Middlebury, and from North Dorset to Wallingford. There are some Class II-III rapids for whitewater boating below Huntington Falls, Weybridge Dam and Middlebury Lower Dam. Important Class III summer rapids occur below Beldens Dam. Battell Gorge in New Haven on Otter Creek is one of the two undisturbed gorges on large rivers in Vermont and Battell is the more scenic of the two. A highly used fishing spot is located below Beldens Dam in New Haven.

Boating on rivers in scenic corridors also takes place on the south end of Dead Creek; on Lewis Creek, from No. Ferrisburg to Lake Champlain, and from Prindle Corners to North Ferrisburg; on Tinmouth Channel, from the northern access to Noble Cemetery; and on the New Haven, from Lincoln Gap Road to West Lincoln. Scenic riparian ledges and bedrock and an abundance of swimming holes, cascades and gorges occur on the Middlebury River from Ripton to East Middlebury and on the New Haven River from West Lincoln to Rocky Dale Dam. Scenic ledges and bedrock also occur on the New Haven River, from Dog Team Tavern to the mouth.

There are a number of state owned and managed wildlife areas in the Otter Creek Basin often centered on wetland complexes. These include the Dead Creek Wildlife Management Area, Lewis Creek Wildlife Management Area, Otter Creek Wildlife Management Area, Tinmouth Channel, Brandon Swamp Wildlife Management Area, Cornwall Swamp Wildlife Management Area, Little Otter Creek Wildlife Management Area and Richville Wildlife Management Area.

As mentioned above, numerous swimming holes are located in the upper reaches of the New Haven and Middlebury rivers. Swimming holes are also found on Mill Brook in Danby, Big Branch in Mt. Tabor, Mill River (Clarendon Gorge) in Clarendon, Cold River in Shrewsbury, the South Branch of the Middlebury River in Ripton, Sucker Brook (Lana Falls) in Salisbury, Muddy Branch in New Haven, and on Lewis Creek in Starksboro, Monkton and Charlotte. Only one swimming hole of any significance is found on Otter Creek - in South Wallingford.

The basin also contains many waterfalls, cascades and gorges. In addition to those previously mentioned (Battell and Clarendon Gorges and Lana Falls), there are Sutherland Falls on Otter Creek in Proctor, Middlebury Gorge on the Middlebury in Ripton, New Haven River Gorge on the New Haven in Bristol, Beldens Falls in Weybridge and New Haven, Falls of Little Otter Creek in Ferrisburg, and Bristol Memorial Forest Park Gorge in Bristol.

## **Recent Special Studies or Water Quality Protection Efforts**

### *Lewis Creek Assessment and Conservation Strategies*

In 1993, the Otter Creek Natural Resource Conservation District (NRCD) and the USDA Natural Resource Conservation Service began a watershed assessment and planning process for Lewis Creek. The project was ultimately guided by a Lewis Creek Steering Committee that consisted of NRCD staff, farmers and other land owners in the watershed, a town Conservation Commissioner, and a representative from the Lewis Creek Association. As part of this process, there was some initial data collection and assessment work done in the watershed and written up in a report entitled Lewis Creek Watershed: Preliminary Assessment, October, 1994.

As part of their assessment work, NRCS personnel walked 5.5 miles or 29,300 continuous feet along Lewis Creek and following are some of their field observations. The upper portion of the reach walked had forested cover and streambank stability in these areas was excellent. Below the forested stretch, the land use adjacent to Lewis Creek is primarily agricultural and in either cropland, hayland, or pasture. Between the cropland/hayland areas and the stream, there was generally a 15-30 foot buffer that had a dense cover of grasses and shrubs with some scattered trees. In the areas where pasture was the land use adjacent to the stream, there was commonly little or no riparian vegetation and streambank erosion is occurring. In areas where livestock are fenced away from the stream edge, there were still streambank problems although they were less severe than in the areas that are not fenced. The problems persisted where there was fencing because the fencing is placed right at the top of the bank and so livestock can still eat vegetation and their weight de-stabilizes the bank.

Nine action or strategy recommendations were made as a result of NRCS and Lewis Creek Steering committee work and they are detailed in the publication Conservation Strategies for Lewis Creek Watershed from which the above information also came. Among the strategies are education, purchase of easements or land, regulation, demonstration practices and watershed planning. Under each recommendation is a discussion of the idea, potential lead groups, and support groups, skills, and resources available.

### *Rutland County NRCD Public Awareness Project*

The Rutland County Natural Resources Conservation District (NRCD) has received funding from the Lake Champlain Basin Program (LCBP) to work with the LCBP, state, regional, and local officials and the print media to "create greater public awareness of the need to protect, preserve and enhance the quality of water courses." To accomplish this, the NRCD will: produce a monthly newspaper column on water quality issues and the responsibilities of different sectors of society in protecting water quality; issue press releases on conservation events as well as county activities that might affect natural resources; organize a Rutland County information base in their offices on nonpoint source pollution; and survey Rutland County households over the course of the one year project to see if the media and other efforts are successfully raising public awareness on water protection topics. A summary of this organization's work and that of other groups in Basin 3 can be found in the table in Appendix 4.

### *Rutland City CSO Abatement*

Rutland City has a three pronged approach in its CSO Abatement Strategy, which is to: 1) do sewer separation where practical and feasible (over half a dozen projects have been completed to date); 2) implement a number of best management practices (BMPs) with a goal of reducing the stormwater inputs to the sewer system; and 3) increase the peak flow capacity at the plant in order to increase the facility's ability to treat all first flush CSO flow.

The City has implemented a number of measures since 1989 aimed at eliminating unplanned current or possible future inputs into the sewer system or at preserving or increasing the capacity of the existing combined sewer system. Some of these measures include: viewing the inside of the sewer mains which cross beneath brooks to investigate inflow from the brooks; conducting a citywide leak detection survey by listening on the fire hydrants at night; development of a policy requiring developers to install stormwater collection systems with subsurface infiltration chambers and overflows to capture first flush flows onsite; and conducting a survey and inventory of roof drain leader connections to the combined sewer, among other activities. These activities have resulted in the discovery and repair of leaks and inflow into the system which have corrected; the identification of 615 buildings with roof drain connections which will be targeted for disconnection; and an increased ability to send more flow to the treatment plant from one of the CSOs and pump stations among other accomplishments.

### *Phosphorus Reduction in Lake Champlain Tributary Basins*

The Otter Creek watershed is one of twelve Lake Champlain segment watersheds in Vermont for which phosphorus loadings to Lake Champlain were calculated. The Otter Creek watershed is also one of the top three Vermont watersheds targeted for substantial phosphorus reduction. The 1991 phosphorus load to Lake Champlain from Otter Creek was 121.7 metric tons/year as measured by the Lake Champlain Diagnostic - Feasibility Study. The point source contribution was 62.8 metric tons/year and nonpoint source contribution was 58.9 metric tons. In 1995, the phosphorus loadings were generated again, however, they were based only on estimates from effluent monitoring data for point sources and on the 1991 measured loads minus phosphorus load credits for implemented agricultural best management practices. The targeted load for Otter Creek is 56.1 metric tons (7.1 metric tons/year as the point source target and 49.0 metric tons as the nonpoint source target), which is a 5.1 metric ton reduction of phosphorus for this watershed from the 1995 estimated loads. To achieve the targeted phosphorus load will require significant improvements in point source treatment as well as substantial control of nonpoint source runoff.

## **Dams**

Numerous dams exist on Otter Creek and its tributaries. According to the Agency of Natural Resources Facilities Engineering Division dam inventory, there are ninety-three (93) dams on rivers and streams in the Otter Creek watershed. Of these, seventeen (17) are in place to either generate power, provide storage, or divert flows for hydroelectric power production. The other seventy-six (76) dams in the basin are for fish and wildlife ponds, fire ponds, irrigation, recreation or water supply. Many of these dams are forty or more years old.

All seven of the hydroelectric dams on the mainstem of the Otter Creek are licensed by the Federal Energy Regulatory Commission (FERC). Hydroelectric dams impound over 13 miles of river between Middlebury and Vergennes; only about one third of the river remains free-flowing in this reach. Four of these dams, all owned by Vermont Marble (Center Rutland, Proctor Station, Beldens, and Huntington Falls), have been relicensed since 1980 and have been brought into compliance with Vermont Water Quality Standards as a result. The other three dams, two owned by Central Vermont Public Service (Middlebury Lower and Weybridge) and one owned by Green Mountain Power (Vergennes) are currently undergoing federal relicensing and are expected to be brought into compliance with the next two years. Relicensing of these older projects provides, in most cases, the first opportunity to review projects under the Federal Clean Water Act. The Silver Lake Project, in the Leicester River watershed, is also in federal licensing review at this time. Unlicensed projects exist on both the Leicester River and East Creek and have not yet been brought into compliance with the Vermont Water Quality Standards.

## **Permitted Discharges**

Eight wastewater treatment facilities (Wallingford, Vergennes, Pittsford, Brandon, Middlebury, West Rutland, Rutland City, and Proctor) discharge to waters of the Otter Creek basin. In addition, ten other industries or entities have direct discharge permits in this watershed according to the Agency of Natural Resources Wastewater Management Division's permit tracking system. There are a large number of permitted stormwater discharges in this basin - seventy-six (76) in all. Twenty-six (26) of these occur in the East Creek subwatershed in Rutland.

The Middlebury Wastewater Treatment Facility will be replacing and relocating their treatment plant with the construction of a new facility north of town. The new WWTF will have phosphorus removal. The current facility was not used to capacity nor considered for the phosphorus removal addition due to site issues and limitations.

The West Rutland Wastewater Treatment Facility is also planning an expansion.

## **Growth in Watershed Towns**

Examination of population and housing growth data provides an additional perspective on current water quality impacts and threats as well as on possible future impacts and threats as agricultural and forested land becomes developed land (see Appendix B for population and housing unit data for each watershed town). From 1970 to 1980, most towns in the Otter Creek basin experienced very high rates of population growth with Starksboro (100%), Ripton (74.4%), Monkton (57.0%), Clarendon (54.3%), Shrewsbury (51.9%) and Tinmouth (51.5%) growing the fastest. In this period, a few towns, Proctor, Rutland City, and West Rutland, lost population. Unfortunately it was the current urban areas losing population and the more rural or remote areas experiencing the high rates of growth. Overall, the population of the watershed grew approximately 13.5% from 1970 to 1980. From 1980 to 1990, there were still high rates of population growth in most watershed towns but the rates were less than the decade before: more than half the towns grew between 10 and 20 % from 1980 to 1990 compared to more than half growing between 20 and 100% from 1970 to 1980. The overall watershed population growth was 8.2% from 1980 to 1990. Housing unit growth between 1980 and 1990 was also high - a 16.4% growth rate watershed-wide.

## **Causes and Sources of Impairment<sup>1</sup> or Threat to River Water Quality and Aquatic Habitat**

The major cause of impairment and the largest threat to rivers and streams in Basin 3 is siltation or sedimentation, which is also the largest cause of impairment and threat statewide. As shown in Table I below, siltation or sedimentation affects 88 miles of river and stream in the Otter Creek watershed. This cause threatens another 152 miles. Streambank erosion is the source that impairs the most river or stream miles (79) and is the second greatest threat to rivers and streams in this basin (92) and this large source of surface water impact explains why sedimentation is the primary cause of impacts and threats. Streambank erosion itself is likely the result of agricultural, residential, and mixed urban land uses and the attendant riparian vegetation removal and streambank de-stabilization.

Pathogens are the second greatest cause of impact (66 miles) and threaten the third greatest number of miles (72) in the Otter Creek basin. This cause along with nutrients, which are the fourth greatest cause of impact (55 miles) and third greatest threat (81 miles), are likely the result of the high percentage of land in agricultural uses (23% of the basin area). Agriculture is the second greatest source of impairment (75 miles) and greatest threat (95 miles) to use support in basin waters. A number of urban and urbanizing areas and beaver activity also account for some of the impacts and threats from nutrients and pathogens.

Turbidity follows pathogens as the third largest cause of water quality impacts (56 miles). Streambank erosion and agricultural runoff would both likely contribute to this cause of impairment.

Organic enrichment is the fifth largest cause of impairments and fourth largest threat to basin waters. Organic enrichment is found as a problem or threat mainly in the lower reaches of Otter Creek and its lower tributaries where the agricultural lands uses have a relatively widespread impact and where slow moving rivers and impounded waters influence this cause. Suspended solids follow as the sixth greatest cause.

Metals are the seventh greatest cause of impact to river and stream miles in this basin in large part due to mercury contamination of the walleye population and other fish from atmospheric deposition. Mercury contamination has resulted in the recommendation that women of childbearing age and children 6 years and younger eat no walleye. Restrictions exist for other portions of the human population and on other fish species.

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<sup>1</sup>River or stream stretches where one or more uses are not fully supported (i.e. either partially supported or not supported) are considered impaired (Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement, September 1997). Use support determinations are made using both quantitative (monitored) or qualitative (evaluated) information including data from sampling, modelling results or best professional judgements. These waters are not to be confused with 303(d) impaired waters, which are listed solely if there are monitored data.

Other causes of impact or threats include flow alterations, thermal modifications and physical habitat alterations. Sources, in addition to those mentioned above include flow modification, removal of riparian vegetation, impoundments, land development, road maintenance and runoff.

Currently, the latter two sources, land development and road runoff, are relatively low on the list of sources of impact, however, they threaten a large number of miles (69 and 42 miles respectively). A direct connection between water quality or aquatic life/habitat impairment and land development or road runoff is difficult to make.

*Table I. Causes of Impairments or Threats to River Water Quality.*

Code	Cause	High Impact (miles)	Moderate or Slight Impact (miles)	Total Impact (miles)	Threats (miles)
1100	Siltation	53.5	34.9	88.4	151.8
1700	Pathogens	39.4	27.1	66.5	72.4
2500	Turbidity	---	56.1	56.1	26.0
900	Nutrients	21.4	33.5	54.9	81.1
1200	Organic enrichment	---	49.4	49.4	36.0
2100	Suspended solids	25.5	21.4	46.9	15.0
500	Metals	35.6	6.7	42.3	15.0
1500	Flow alterations	31.8	1.4	33.2	6.6
1400	Thermal modifications	3.0	17.2	20.2	31.5
1600	Other habitat alterations	3.0	7.1	10.1	33.5
2200	Noxious exotic plants	---	7.5	7.5	---
300	Priority organics	---	6.7	6.7	8.0
200	Pesticides	---	---	---	20.5
100	Unknown toxicity	---	---	---	14.5
1900	Oil and grease	---	---	---	10.5

*Table II. Sources of Basin 3 River Water Quality Problems or Threats*

Code	Source	High Impact (miles)	Moderate or Slight Impact (miles)	Total Impact (miles)	Threats (miles)
7700	Streambank destabilization	4.0	75.2	79.2	92.1
1000	Agriculture	74.7	---	74.7	94.6
8600	Natural sources	25.5	14.3	39.8	15.0
8100	Atmospheric deposition	35.6	---	35.6	---
7410	Flow modification - hydroelectric	28.8	---	28.8	---
7600	Removal of riparian vegetation	---	26.0	26.0	62.6
4000	Urban runoff/ storm sewers	6.6	12.3	18.9	53.6
7350	Upstream impoundment	6.6	7.5	14.1	---
3200	Land development	13.6	---	13.6	68.6
200	Municipal point sources	7.0	---	7.0	0.5
8400	Spills	---	7.0	7.0	---
8200	Storage tank leaks	---	7.0	7.0	---
8300	Highway maintenance and runoff	---	6.6	6.6	41.6
400	Combined sewer overflow	---	3.8	3.8	13.0
1300	Specialty crop production	---	---	---	20.5

### Causes and Sources of Impairment or Threats to Lake Water Quality

The major cause of partial or non-support on lakes of this basin is lake level manipulation. Other causes affecting large number of acres are metals (mercury and its effect on fish consumption), nutrients, dissolved oxygen levels and excessive levels of aquatic plants. The major sources of impairment are the manipulation of water level on those lakes with artificial control, atmospheric deposition, unspecified sources and agriculture.

*Table III. Causes of Impairments or Threats to Basin 3 Lake Water Quality*

Code	Cause	Major Impact (acres)	Moderate/Minor Impact (acres)	Total Impact (acres)	Threats (acres)
1500	Flow alteration	1871	3	1874	---
500	Metals	---	985	985	---
900	Nutrients	429	79	508	229
1200	Organic enrichment/DO	377	---	377	45
2210	Aquatic plants - algae	166	88	254	39
2200	Aquatic plants - native	165	61	226	66
1100	Siltation	72	14	86	75
1000	pH	64	---	64	183
2600	Exotic species	12	25	37	589

*Table IV. Sources of Impairments or Threats to Basin 3 Lake Water Quality*

Code	Source	Major Impact (acres)	Moderate/Minor Impact (acres)	Total Impact (acres)	Threats (acres)
7400	Flow regulation	1871	3	1874	---
8100	Atmospheric deposition	64	789	853	183
9070	Unknown nps	508	---	508	---
8600	Natural sources	13	410	423	361
1000	Agriculture	387	16	403	71
7700	Streambank modification	129	5	134	21

## Status of Support of Designated Uses on Rivers

Overall 78% of the assessed miles in the Otter Creek basin are fully supported for all uses based on the information used in this assessment process. Of the fully supported river miles, there are threats to one or more uses on 135 or 28% of the miles. One or more uses are partially supported on 83 miles (13%) and not supported on about 54 miles (9%).

Aquatic biota and habitat is the most affected designated use in the Otter Creek watershed with 100 miles of river or stream (16%) impaired for this use. Another 135 miles (22%) are threatened. The impairment of aquatic biota and habitat follows from the large number of miles affected by sedimentation.

Swimming (contact recreation) is the second most affected designated use: 101 miles or 16% of the assessed miles in the basin are only partially supported or are not supported for swimming. Another 84 miles are threatened. That swimming is impaired and threatened substantially in the Otter Creek basin follows from the high number of miles affected or threatened by pathogens.

*Table V. Designated Use Support Status*

	Full support (miles)	Threats (miles)	Partial support (miles)	Non-support (miles)	Not assessed (miles)
Overall	354.4	135	82.9	54.2	12.0
Aquatic life/habitat	391.2	134.9	63.1	37.3	12.0
Fish consumption	583.8	6.6	27.0	8.6	12.5
Swimming	442	83.9	66.4	34.2	12.0
Secondary contact recreation	557.6	40.9	7.4	20.6	12.0
Aesthetics	419.5	117.7	59.0	29.8	12.0
Drinking water supply	432.1	41.5	0	6.6	158.3
Agricultural water supply	430.1	43.5	0	6.6	158.3

### Status of Support of Designated Uses of Basin 3 Lakes<sup>2</sup>

Of the lake acres in the Otter Creek watershed that were assessed, 2458 acres (71%) did not fully support one or more designated uses. Of the 1024 acres that fully supported all designated uses, 503 acres (or 49%) are threatened.

Aquatic life support is the most affected designated use of lakes in the Otter Creek watershed as was the case with river miles. There are 249 lake acres (70%) impaired for this use. Another 509 acres (15%) are threatened.

Secondary contact recreation (boating and/or fishing) is the second most affected use: 1237 acres or 36% of the assessed acres in the basin are only partially supported or are not supported for one or both of these recreational activities.

*Table VI. Basin 3 Lake Designated Use Support Status*

Use	Full Support (acres)	Threatened (acres)	Partial Support (acres)	Non-support (acres)	Acres not assessed
Overall	521	503	2048	410	3
Aquatic life support	515	509	2039	410	12
Fish consumption	2455	0	985	0	45
Swimming	2425	513	386	149	12
Secondary contact recreation	1723	513	1088	149	12
Aesthetics	1920	513	891	149	12
Drinking water supply	13	0	0	0	20
Agricultural water supply	20	0	0	0	3465

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<sup>2</sup> The cause, source and use support status tables for lakes were generated in fall 1997 and reflect the information the DEC Water Quality Division had at that time. The river tables were re-run in June 1998 and reflect our knowledge as of that point in time.

## **Discussion, Information Needs and Recommendations**

### *Summary of Major Issues*

The Otter Creek watershed is the second largest watershed in Vermont after the Winooski River and it drains an area of 936 square miles. If the Little Otter Creek and Lewis Creek watersheds, which are considered part of Basin 3 - Otter Creek even though they drain directly to Lake Champlain are included, then this basin is the largest in the state. A number of relatively large rivers including the New Haven, Lemon Fair and Middlebury, are tributaries to Otter Creek and so the number of river and stream miles in this watershed (638 in the assessment to date) as well as the land area affecting the Otter Creek is substantial.

A large portion of the watershed, 23%, is agricultural land use and the watershed includes the second most populated city in the state among its many other land uses. These factors help explain why the major causes of impairment or threats to designated uses are siltation and sedimentation, nutrients, pathogens and organic enrichment. Streambank de-stabilization from both agricultural land use and developed land activity, other agricultural activities, atmospheric deposition, and urban runoff are the dominant sources of these pollutants.

Population and housing growth have been high in the past two decades in this watershed and this shift from agricultural and forested land to developed land with all the additional impervious surfaces, changes in natural topography and drainage, and loss of riparian vegetation has likely resulted in additional stormwater runoff, change in runoff quality, and watershed hydrology changes. Many of the towns that have experienced high growth rates are those with higher elevation, steeper land and often in the upper portion of the watershed. The other towns with some of the highest growth rates also include those covering the watersheds of Little Otter Creek and Lewis Creek where suburban sprawl from the Burlington area is spreading south. A number of the towns losing growth or with small growth rates are the cities or centers that are already quite developed and where it seems most logical to continue to concentrate growth.

Urban runoff, especially from intensively developed areas like Rutland City, is a significant problem in the Otter Creek watershed. Stormwater runoff containing toxic materials, sediment, heated water and other pollutants is impairing the aquatic community as well as other designated uses of these streams. Twenty-six stormwater discharges have been permitted for the East Creek watershed alone and these are only the discharges from developments with a certain amount of impervious surface - areas that are already developed and smaller projects don't require a state stormwater permit. As mentioned earlier, Rutland City is attempting to address stormwater issues through a number of strategies and the information gained from their efforts will be valuable.

The number of dams in this watershed is especially high largely due to dams in place to create waterfowl habitat in addition to the high number of dams for hydroelectric production. The hydroelectric dam impacts (flow fluctuations, low flows) are largely being addressed through the re-licensing process, however, the impacts from the fish and wildlife impoundments are not. State management strategy has been to encourage waterfowl production in Dead Creek and several other Lake Champlain Valley streams associated with wetlands and the further enriched waters are

considered by many a worthy trade-off for the abundant waterfowl especially during the migration.

### *Information Needs and Recommendations*

The size of the Otter Creek watershed alone makes efforts at assessing in detail the impacts of land use and determining measures to eliminate or minimize the impacts very difficult and time-consuming. Time spent flying over the Otter Creek mainstem and the watershed tributaries especially following a storm event would be revealing and may be an efficient way to target further investigations or implementation projects. The broad public awareness campaign of the Rutland County NRCD may be a valuable approach for widespread water quality protection and should be watched for its success.

The large number of nonpoint source pollution impacts or threats attributed to agriculture warrant a focus of resources for the farming community in this watershed. An assessment of the management practices in place and needed on those farms adjacent to the major rivers and streams would be important. Technical assistance and funding for agricultural landowners should be targeted to this basin and especially to the subwatershed where there are citizen groups such as the Lewis Creek Association who are willing to help with projects such as streambank stabilization and riparian zone re-establishment on farms.

A focus on the strength and potential enhancement of the municipal plans and zoning regulations with respect to surface water and wetland protection, floodplain protection, stormwater runoff, and watershed hydrology may be one of the best strategies for water quality protection in the non-agricultural areas. Without proper planning and good implementation, impacts from the rapidly growing populations and substantial numbers of new houses in many of the basin towns could result in further degradation of surface waters or cause serious threats to currently good water quality. Infill development, community redevelopment and other urban/suburban land management techniques should be explored with Rutland and other urban areas if they have not yet been considered. Standards that promote working with the natural topography, minimizing soil disturbance, preventing erosion and minimizing impervious surfaces through overlay districts or other zoning means are important in the towns with higher elevation land and steeper slopes especially.

As mentioned earlier, the impacts from hydroelectric dams that are licensed by FERC have been or will be addressed through the relicensing process. Unlicensed projects on the Leicester River and East Creek have yet to be addressed and should be at some point in the future. Discussions need to occur about the condition and classification of waters above and below the fish and wildlife and recreation dams where these dams exacerbate water quality problems resulting from agricultural land uses and other sources. Dams for which we have no status information should be field checked and the stretches of river or stream above and below them should be assessed.

The large area of the Otter Creek watershed with its diversity of river and stream types and range of point and nonpoint pollution sources means that protection and restoration efforts need to be addressed at more local levels - by towns, regional planning commissions, watershed groups, and farms. Financial and technical backing needs to be provided by the Agency of Natural Resources, the Dept. of Agriculture, the Natural Resource Conservation Service, and U.S. Fish & Wildlife Service.

## References and Resources\*

- 1) Conservation Strategies for Lewis Creek Watershed, January 1996, Lewis Creek Steering Committee.
- 2) Lewis Creek Watershed: Preliminary Assessment, October 1994, Natural Resources Conservation Service.
- 3) Beyond Sprawl: Land Management Techniques to Protect the Chesapeake Bay, October 1997, Chesapeake Bay Program and the U.S. Environmental Protection Agency.
- 4) Town of Ferrisburg Priority Wetlands site reports, Advanced Identification Project, VT DEC Water Quality Division, Wetlands Program.
- 5) Otter Creek Basin Water Quality Management Plan, April 1975, Agency of Environmental Conservation, Water Quality Division.
- 6) Opportunities for Action: An Evolving Plan for the Future of the Lake Champlain Basin, October 1996, Lake Champlain Management Conference.
- 7) Health Alert, July 1997, Vermont Department of Health Toxicology and Risk Assessment Program.

\* Numerous other references and resources especially with respect to causes and sources of pollution and use support status can be found in the "Information Sources" section of the individual waterbody reports (see Appendix C).

## **Appendix A**

### **Floodplain Forest Communities of the Watershed**

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

OTTER CREEK WATERSHED

Site #	Town	Quad	Site/Location	Priority	Description	Source	Aerial Recon.	Site Visit 1997
1	Otter	Ferrisburg 4407323	Kellogg Bay / Lower Otter Creek Floodplain	H	Extensive floodplain forests on levees along lower 5.5 miles of Otter Creek; black willow, silver maple, cottonwood, and sycamore, <i>Arisaema dracontium</i> ; species list, but no releve	PZ '82, GMF ML '93, GMF NWI, CIR	N	Y
2	Otter	Weybridge 4407312	Otter Creek Hackberry	M	Narrow band of hackberry-silver maple co-dominated floodplain forest; southern portion of site wider with mature trees; large silver maple, basswood, American elm; no releve	MD '86, GMF NWI, CIR	N	Y
3	Otter	Cornwall 4307382	Cornwall Swamp	H	Narrow band of floodplain forest on levee extending for nearly two miles along both sides of river; best area at northern end on west side of river; 20 acre rectangular area of forest on east side of river identified during flyover	BE, ML '93, GMF NWI, CIR	Y	Y
4	Otter	Whiting 4307382	Whiting Swamp	H	Narrow band of floodplain forest on levee with lower, wetter, shrubby floodplain forest away from river; mature trees in levee forest	ML '93, GMF NWI, CIR	Y	Y
5	Otter	Leicester 4307381	Salisbury Swamp	M-H	B-ranked floodplain forest adjacent to Leicester River; red and hybrid maples, green ash, and winterberry; distinction between floodplain forest and flooded swamp unclear; ML releve '93	ML '93, GMF NWI, CIR	Y	N
6	Otter	Panton 4407323	Panton River Woods	M	Large floodplain forest and shrubby backswamp forest on west side of Otter Creek; forest has many exotics; southern unit is a drier high terrace with conifers and <i>Carex grayii</i> ; no releve	ET '90, ML '93, GMF, NWI, CIR	Y	N
7	Otter	Addison 4407313	Otter Creek Floodplain-Addison East	L	5 acres of floodplain forest at bend in river; conifers at edge; ag. field adjacent	NWI, CIR	N	N
8	Otter	Weybridge 4407312	Otter Creek Floodplain North of Lemon Fair River	H	60 - 70 acres of floodplain forest and shrub and forested swamp interior with old meander scars and flooded oxbow; floodplain forest adjacent to river is high quality; ag. fields adjacent	NWI, CIR	Y	N
9	Otter	Weybridge 4407312	Otter Creek Big Bend Floodplain	M	20 acres of floodplain forest with open canopy in places; younger forest on outer portion of meander, and more mature forest at base of meander	NWI, CIR	Y	N
10	Otter	Weybridge 4407312	Otter Creek Floodplain at New Haven River	L	Small area of floodplain forest on primarily upland island with narrow bordering marsh	NWI, CIR	Y	N
11	Otter	Middlebury 4407382 4407312	Middlebury South Floodplain	M	20-30 acres of floodplain forest and interior shrub swamp and marsh; some adjacent ag. disturbance; bordered to west by Rutland Railroad	NWI, CIR	Y	Y
12	Otter	Middlebury 4407382	Farmingdale Swamp	L	The northern portion of this large swamp shows definite meander scars with forests apparently on mineral soil levees leafing out earlier than trees in the swamp	NWI, CIR	Y	N

Vermont Floodplain Forest Inventory - Otter Creek Watershed - Page 2

13	Otter	Middlebury	4407382	Otter Creek Floodplain at Middlebury River	M	20 acres of relatively undisturbed floodplain forest on a meander at the confluence of the two rivers; ag. fields adjacent, but forest appears intact	NWI, CIR	Y	N
14	Otter	Whiting	4307372	Leicester Junction Swamp North	M	½ mile band of floodplain forest at bend in river; old ag. fields adjacent are reverting; best area of forest is at very south end of meander	NWI, CIR	Y	N
15	Otter	Leicester Brandon	4307372	Leicester Junction / Brandon Swamp Floodplain Forest	M	1 mile long band of floodplain forest, primarily on east side of river; ag. disturbance adjacent; northern portion appears most intact	NWI, CIR	Y	Y
16	Otter	Brandon	4307372	Brandon Swamp South Floodplain	L	10-15 acres of very young floodplain forest at bend in river; swamp to north and ag. fields to east and west; Rt 73 separates floodplain forest from Otter Creek; road floods annually?	NWI, CIR	Y	N
17	Otter	Brandon	4307371	Brandon Village SW Floodplain	M	20 acres of floodplain forest grading into flooded shrub swamp; the floodplain forest near the river appears to have not been disturbed recently	NWI, CIR	Y	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 for Watershed Towns**

*Table B.I. Population of Watershed Towns*

Town	1970 population	1980 population	1970-80 increase (%)	1990 population	1980-90 increase (%)
Addison	717	889	24.0	1023	15.1
Brandon	3697	4194	13.4	4223	0.7
Bridport	809	997	23.2	1137	14.0
Bristol	2744	3293	20.0	3762	14.2
Chittenden	646	927	43.5	1102	18.9
Clarendon	1537	2372	54.3	2835	19.5
Cornwall	900	993	10.3	1101	10.9
Danby	910	992	9.0	1193	20.3
Ferrisburg	1875	2117	12.9	2317	9.4
Goshen	120	163	35.8	226	38.6
Ira	284	354	24.6	426	20.3
Leicester	583	803	37.7	871	8.5
Lincoln	599	870	45.2	974	11.9
Mendon	743	1056	42.1	1049	-0.7
Middlebury	6532	7574	16.0	8034	6.1
Monkton	765	1201	57.0	1482	23.4
Mt. Holly	687	938	36.5	1093	16.5
Mt. Tabor	184	211	14.7	214	1.4
New Haven	1039	1217	17.1	1375	13.0
Orwell	851	901	5.9	1114	23.6
Panton	416	537	29.1	606	12.8
Pittsford	2306	2590	12.3	2919	12.7
Proctor	2095	1998	-4.6	1979	-0.9
Ripton	187	327	74.9	444	35.8

Rutland City	19,293	18,436	-4.4	18,230	-1.1
Rutland Town	2248	3300	46.8	3781	14.6
Salisbury	649	881	35.7	1024	16.2
Shoreham	790	972	23.0	1115	14.7
Shrewsbury	570	866	51.9	1107	27.8
Starksboro	668	1336	100.0	1511	13.1
Tinmouth	268	406	51.5	455	12.1
Vergennes	2242	2273	1.4	2578	13.4
Wallingford	1676	1893	12.9	2184	15.4
Waltham	265	394	48.7	454	15.2
West Rutland	2381	2351	-1.2	2448	4.1
Weybridge	618	667	7.9	749	12.3
Whiting	359	379	5.6	407	7.4
Watershed:	63,679	72,271	13.5%	78,228	8.2%

*Table B.II. Housing Units of Watershed Towns*

Town	1980 Housing Units	1990 Housing Units	1980-90 Increase (%)
Addison	465	523	12.5
Brandon	1519	1654	8.9
Bridport	432	503	16.4
Bristol	1225	1471	20.1
Chittenden	449	538	19.8
Clarendon	931	1172	25.9
Cornwall	341	416	22.0
Danby	468	618	32.0
Ferrisburg	1023	1261	23.3
Goshen	111	121	9.0
Ira	146	184	26.0
Leicester	548	577	5.3
Lincoln	456	516	13.2
Mendon	535	623	16.4
Middlebury	2234	2687	20.3
Monkton	434	565	30.2
Mt. Holly	618	801	29.6
Mt. Tabor	99	109	10.1
New Haven	425	544	28.0
Orwell	471	535	13.6
Panton	216	254	17.6
Pittsford	1077	1289	19.7
Proctor	745	818	9.8
Ripton	281	278	-1.0

Rutland City	7341	8083	10.1
Rutland Town	1154	1520	31.7
Salisbury	550	566	2.9
Shoreham	441	511	15.9
Shrewsbury	374	481	28.6
Starksboro	607	678	11.7
Tinmouth	273	291	6.6
Vergennes	824	970	17.7
Wallingford	804	956	18.9
Waltham	139	176	26.6
West Rutland	903	1018	12.7
Weybridge	245	295	20.4
Whiting	135	164	21.5
Watershed:	29,314	34,123	16.4%

## **Appendix C**

### **Individual Waterbody Reports**

**Lower Otter Creek  
Assessment Report**

**Waterbody No:** VT03-01 **Basin:** 03-Otter  
**River Length (mi.):** 29.7 **Classification:**  
**Description:** Main Stem - Mouth to Confluence with Middlebury River

**Location Identifiers**

**County:** Addison **NRCS District:** 3  
**ANR Enforcement District:** 9 **Regional Planning Commission:** ADD  
**Fish & Wildlife District:** 2

**Assessment Information**

**Assessment Date:** 9807 **Assessment Types**  
**Date Last Updated:** 7/7/1998 Surveys of fish and game biologists or other professionals  
**Assessment Category:** E Land use information and location of sources  
**Water Quality Limited?** Fish tissue analysis  
**On 303(d) List?** Y Discharger self-monitoring data (effluent)  
**Monitored for Toxics?** N

**Aquatic Contamination**

**Toxics Testing**

Restricted consumption for general population  
 No consumption for subpopulation (e.g. children...)

**Waste Management Zone - Miles:** 2.00 **Description:** 2 WMZs below Vergennes & Middlebury WWTFs

**Assessment Comments**

**NON-SUPPORTED MILES**

Otter Creek: 2.5 - below Weybridge dam; 0.1 - below Middlebury Lower dam;  
 0.1 - below Vergennes dam - all do not support aquatic biota/habitat, non-contact recreation and aesthetics due to flow alterations and thermal modifications due to hydro electric facilities. c(1400,1500) s(7410)

Otter Creek: 7.6 - from Lake Champlain to Vergennes - non-support of aesthetics and contact recreation (swimming) due to high sediment loads, aquatic weeds, very turbid conditions, suspended solids, nutrient & organic enrichment, and pathogens caused by agricultural land uses (especially ag. waste & field nutrient management, cropland erosion & loss of buffer strips) WWTF discharges, and streambank erosion. c(900,1100,1200,1700,2100,2200) s(200,1000,7700)

Otter Creek: 7.6 - from Lake Champlain up to Vergennes (overlaps with the 7.6 miles above) - non-support of fish consumption due to mercury contamination from atmospheric deposition (suspected). c(500) s(8100)

**PARTIAL SUPPORT MILES**

Otter Creek: 8.5 - from Vergennes to Otter Creek/ Lemon Fair confluence - partial support of aquatic biota/habitat, aesthetics, and contact recreation (swimming) due to high sediment loads, turbid conditions, suspended solids, nutrient & organic enrichment, and pathogens caused by agricultural land uses (especially waste management, field nutrient management, cropland erosion, and lack of buffer strips), streambank erosion, and natural causes. c(900,1100,1200,1700,2100) s(1000,7700,8600)

Otter Creek: 1.5 - from Weybridge dam upstream to confluence with New Haven River - partial support of aquatic biota/habitat, aesthetics, and contact recreation (swimming) due to same causes & sources as above plus flow alteration from hydro development. c(900,1100,1200,1500,1700,2100) s(1000,7410,7700,8600)

Otter Creek: 3.8 - upstream from confluence of Otter Ck./New Haven R. to Middlebury WWTF - partial support of aquatic biota/habitat and non-contact recreation due to flow alteration, nutrient & organic enrichment, sediment & turbidity, and suspended solids caused by ag. land uses, 2 hydro facilities, urban runoff, CSOs, streambank erosion, and natural causes. c(900,1100,1200,1500,2100) s(

**Lower Otter Creek**

VT03-01

00,1000,4000,7410,7700,8600)

Otter Creek: 4.0 - from Middlebury River downstream to below Pulp Mill bridge (through Middlebury)(overlap with threatened miles below) - partial support of swimming due to pathogens from agricultural runoff and possibly failed septic systems. c(1700) s(1000,6500)

**THREATENED MILES**

Otter Creek: 4.0 - from Middlebury River downstream to below Pulp Mill bridge (overlap with PS miles above) - threats to aquatic biota/habitat, and aesthetics from sedimentation, turbidity, and nutrients from agricultural land uses, land development, and streambank erosion. c(900,1100) s(1000,3200,7700)

Otter Creek: 9.0 - from Pulp Mill bridge below Middlebury to Route 17 bridge - threats to swimming due to pathogens from agricultural runoff and possibly failed septic systems. c(1700) s(1000,6500)

**INFORMATION SOURCES**

Paul Vachon, formerly SCS - noted higher velocity and less turbid than Lemon Fair or Dead Creek, clay soils, ag. runoff problems, warm water fishery turbid plumes from Dead Creek & Lemon Fair. (8801)

Jim Northrup, formerly USFS - noted ag. runoff as major contributor. (8801)

Tom Meyers & Brian Chipman, Vt. Fish & Wildlife Dept. biologists - noted fishing popularity from lake to Vergennes; very turbid conditions; clay soils. (8801)

Stan Wass, canoe guide - noted turbid conditions, in-stream grazing, ag. ditches, clay soils. (8801)

Dave Callum, Vt. Dept. of Fish & Wildlife fisheries biologist - noted poor agricultural practices below Lemon Fair. (8801)

Hydro Assessment Vt.DEC, May 1987: Vergennes #9 - siltation problem due to daily water level fluctuation, suspect DO problems during impoundment; Weybridge - lack of minimum flows at dam & downstream impairs aesthetics and recreation, heavy siltation in impoundment, erosion of agricultural land; Beldens - lack of minimum flows site impair aesthetic and recreation values; Middlebury Lower - lacks minimum flows at dam, aesthetic and recreation values impaired, suspect assimilative capacity impaired.

Lower Otter/Dead Ck. Watershed, Vt. A Watershed Plan for Water Quality Improvement Under PL83-566. USDA/SCS, August 1981 - noted nutrient contributions, soil losses from cropland, intensive cropping to field edge, estimates 69,000 tons of soil loss per year.

Ag Runoff from Selected Vt. Watersheds. USDA/SCS, February 1983 - estimates 95% of annual total phosphorus load originates from agricultural nonpoint sources.

Vt. Growth Areas Research Project Report. Vt. Law School, June 1985 - Middlebury undergoing rapid growth.

Jeff Cueto, Vt. DEC Hydrogeologist - noted that water is released into the bypass below Huntington Falls dam now - uses supported there. (9001) Vergennes, Weybridge, and Middlebury Lower are all in the relicensing process now. (9707)

The Otter Creek River Watch 1993-1997 data and reports - showed high E. coli during both dry and wet weather sampling in the mile downstream of the Middlebury River. (9807)

Jerry McArdle, Vt DEC Water Quality Division - noted turbidity, algae on rocks, slow flow of Otter Creek below Vergennes hydro down to mouth in a July 1997 field visit. (9707)

Vt DEC Wastewater Division permit files and compliance files - information on the Vergennes WWTF discharges. (9807)

**COMMENTS**

The Vermont Dept. of Health issued a health advisory warning in April 1996 limiting walleye consumption due to mercury contamination. No meals for pregnant women and children age 6 and under and no more than one meal per month for all others. Walleye are found in Otter Creek up to Vergennes early in the season (Dave Callum, Dept. of F&W). (9707)

The mouth of Otter Creek (by the boat launch) was one of four sites sampled for deformed leopard frogs in fall 1996. Of the 26 frogs collected, 23% were deformed. At this time, the cause of the deformities is unknown. Extensive survey work and study will occur this year (1997). (9707)

The Vergennes WWTF has had ongoing and large discharges of partially treated, unchlorinated wastewater due to excessive flows to the facility from inflow and infiltration. The plant is under a 1272 order that requires compliance with the WQS by 12/31/99. (9807)

Otter Creek phosphorus loads at the mouth estimated from 1995 are 61.2 metric tons/year (59.1 nps and 9.8 ps). The target for the mouth of Otter Creek is 56.1 mt/yr.

## Lower Otter Creek

VT03-01

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	4.3	17.8	7.6	0.0
20	Aquatic biota	9.2	4.0	13.8	2.7	0.0
21	Fish consumption	22.1	0.0	0.0	7.6	0.0
42	Contact recreation	8.1	0.0	14.0	7.6	0.0
44	Noncontact recreation	23.2	0.0	3.8	2.7	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	29.7
62	Aesthetics	6.1	4.0	13.4	6.2	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	29.7
82	Industry water supply	0.0	0.0	0.0	0.0	29.7

Impairment Cause	Mag	Size (mi.)
Metals	H	7.60
Nutrients	H	21.40
Nutrients	T	4.00
Siltation	H	21.40
Siltation	T	4.00
Organic enrichment/Low D.O.	S	21.40
Thermal modifications	S	2.70
Flow alterations	H	8.00
Pathogens	H	20.10
Suspended solids	M	21.40
Noxious aquatic plants	M	3.50

Impairment Source	Magnitude	Size (mi.)
Municipal point sources	H	7.00
Combined sewer overflows	M	3.80
Agriculture	H	21.40
Agriculture	T	4.00
Land development	T	4.00
Urban runoff/storm sewers	S	3.80
Onsite wastewater systems (septic tanks)	M	4.00
Onsite wastewater systems (septic tanks)	T	9.00
Flow mod. - hydroelectric	H	8.00
Streambank modification/destabilization	M	21.40
Streambank modification/destabilization	T	4.00
Atmospheric deposition	H	7.60
Natural sources	M	13.80

Point Source Description	NPDES No.
Vergennes WWTF 0.66mgd	VT0100404
Middlebury WWTF 2.20mgd	VT0100188
Middlebury WWTF CSO (9)	VT0100188
2 permitted stormwater discharges	sw

Nonpoint Source Name	Description
Weybridge hydro	Hydropower Dam - CVPS
Middlebury hydro	Hydropower Dam - CVPS
Beldens hydro	Hydropower Dam - Vt. Marble Co.
Huntington hydro	Hydropower Dam - Vt. Marble Co.
Vergennes #19 hydro	Hydropower Dam - GMP

### Minor Tribs - Lower Otter Creek

### Assessment Report

Waterbody No: VT03-02

Basin: 03-Otter

River Length (mi.): 12

Classification:

Description: Minor Tribs Draining into Lower Otter Creek

#### Location Identifiers

County: Addison

NRCS District:

3

ANR Enforcement District: 9

Regional Planning Commission:

ADD

Fish &amp; Wildlife District: 2

#### Assessment Information

Assessment Date: 9707

Assessment Types

Date Last Updated: 9/29/1997

Assessment Category: E

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? N

Aquatic Contamination

Toxics Testing

None detected

Waste Management Zone - Miles:

Description:

#### Assessment Comments

No information on these unnamed tributaries to lower Otter Creek of Panton, Addison, Waltham. They are low gradient, small streams and come through agricultural land and Vergennes so likely there are at least threats but no one had information on them.

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	0.0	0.0	0.0	12.0
20	Aquatic biota	0.0	0.0	0.0	0.0	12.0
21	Fish consumption	0.0	0.0	0.0	0.0	12.0
42	Contact recreation	0.0	0.0	0.0	0.0	12.0
44	Noncontact recreation	0.0	0.0	0.0	0.0	12.0
50	Drinking water supply	0.0	0.0	0.0	0.0	12.0
62	Aesthetics	0.0	0.0	0.0	0.0	12.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	12.0
82	Industry water supply	0.0	0.0	0.0	0.0	12.0

Point Source Description	NPDES No.
4 permitted stormwater discharges	SW

**Mid-Main Stem Otter Creek  
Assessment Report**

**Waterbody No:** VT03-03 **Basin:** 03-Otter  
**River Length (mi.):** 34.1 **Classification:**  
**Description:** Main Stem - Confluence of Middlebury River to Furnace Bk.

*Location Identifiers*

**County:** Addison Rutland **NRCS District:** 3  
**ANR Enforcement District:** 9 **Regional Planning Commission:** ADD  
**Fish & Wildlife District:** 2

*Assessment Information*

**Assessment Date:** 9707 **Assessment Types**  
**Date Last Updated:** 5/26/1998 Surveys of fish and game biologists or other professionals  
**Assessment Category:** E  
**Water Quality Limited?** Y  
**On 303(d) List?** N  
**Monitored for Toxics?** N  
**Aquatic Contamination** **Toxics Testing**  
None detected

**Waste Management Zone - Miles:** 0.00 **Description:**

**Assessment Comments**

**THREATENED MILES**

Otter Creek: 34.1 - the whole length of VT03-03 from Furnace Brook down to confluence of Middlebury River - partial support of aesthetics, and threats to aquatic biota/habitat, contact recreation and non-contact recreation from sediments & turbidity, nutrients, habitat modifications and pathogens caused by agricultural land uses, fairly severe streambank erosion, removal of riparian vegetation, land development, urban and road runoff, industrial sources. c(900,1100,1700,2500) s(100,1000,3200,4000,7600,7700,8300)

**INFORMATION SOURCES**

William Forbes, Rutland NRCD - noted streambank destabilization, erosion and resulting siltation from trees uprooting as well as a log jam causing the river current to change leading to new areas of erosion. He has seen these eroding banks from Furnace Brook to the Addison/Rutland county line. (9807)

Phil Benedict, Vt. Dept. of Agriculture - Fox/Lawes Ag Service has re-built facility in response to Dept. of Ag. comments. Soil was removed and there is no contamination as far as they know. (9601)

Paul Cummings, Vt. DEC Enforcement Division - had no changes during the 9601 assessment. Questioned the "municipal point sources" we had coded and mentioned, which are likely the industrial point sources listed instead.

Jerry McArdle, Vt DEC Water Quality Division - looked at two stretches of this river reach and noted the cloudy, turbid water. Canopy cover in the areas he looked at was 50 to 60%.

## Mid-Main Stem Otter Creek

VT03-03

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	34.1	0.0	0.0	0.0
20	Aquatic biota	0.0	34.1	0.0	0.0	0.0
21	Fish consumption	34.1	0.0	0.0	0.0	0.0
42	Contact recreation		34.1	0.0	0.0	0.0
44	Noncontact recreation	0.0	34.1	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	34.1
62	Aesthetics	0.0	34.1	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	34.1
82	Industry water supply	0.0	0.0	0.0	0.0	34.1

Impairment Cause	Mag	Size (mi.)
Nutrients	T	34.10
Siltation	T	34.10
Pathogens	T	34.10
Turbidity	M	34.10

Impairment Source	Magnitude	Size (mi.)
Industrial point sources	T	5.00
Agriculture	T	34.10
Land development	T	34.10
Urban runoff/storm sewers	T	34.10
Removal of riparian vegetation	T	34.10
Streambank modification/destabilization	M	34.10
Highway maintenance and runoff	T	34.10

Point Source Description	NPDES No.
Omya West	VT0020770
Omya East - process ww marble	VT0000434

**Tributaries to Mid Mainstem Otter Creek  
Assessment Report**

**Waterbody No:** VT03-04 **Basin:** 03-Otter  
**River Length (mi.):** 33 **Classification:**  
**Description:** Tributaries draining to the Mid Mainstem of Otter Creek including the Leicester River and Neshobe River

*Location Identifiers*

**County:** Addison Rutland **NRCS District:** 3  
**ANR Enforcement District:** 9 **Regional Planning Commission:** ADD  
**Fish & Wildlife District:** 2

*Assessment Information*

**Assessment Date:** 9707 **Assessment Types**  
**Date Last Updated:** 9/29/1997 Surveys of fish and game biologists or other professionals  
**Assessment Category:** E Benthic macroinvertebrate surveys  
**Water Quality Limited?**  
**On 303(d) List?** Y  
**Monitored for Toxics?** N  
**Aquatic Contamination** **Toxics Testing**

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

**Assessment Comments**

**NON-SUPPORT MILES**

Sucker Brook: 4.2 - below Sugar Hill Reservoir  
Silver Lake Brook: 0.6 - below dam  
Leicester River: 6.0 - upstream from confluence with Otter Creek to Lake Dunmore  
All the above do not support aquatic habitat/biota and non-contact recreation due to no, low, or fluctuating flows due to flow regulation. c(1500), s(7410)  
Arnold Brook: 0.1 - 1.7 miles upstream from mouth - non-support of aquatic biota due to nonpoint pollution possibly agriculture c(0000), s(9000)

**THREATENED MILES**

Neshobe River: 4.5 - upstream from confluence with Otter Creek - threats to aquatic biota/habitat, aesthetics and water clarity from sedimentation, turbidity, and habitat modifications from streambank erosion, ag land use, and urban runoff. c(1100,1600) s(1100,4300,7700)

**COMMENTS**

Partial support below Brandon WWTF removed because dechlorination process in operation April 1990.  
Logan Sunoco (#880197), Route 7, Pittsford is on the list from the Hazardous Waste section of 'Sites with Surface Water Impacts' and so information was pursued. In May 1988, petroleum was found in a drainage swale of the Village Manor Retirement home and a petroleum sheen was in a downgradient stream that ultimately drains to Otter Creek. Absorbant pads were placed in the swale to soak up the "free-product". Free product hasn't been seen since late 1988, however, the site isn't closed because MTBE levels in 2 of the 5 wells exceed the Vermont Health Advisory of 40 ppb.  
The impacts we had listed to an unnamed tributary in Pittsford from "marble finishing operations" were removed. Paul Cummings, former Vt DEC Enforcement Officer had told us in 96 that there was no longer a marble business. Carole Fowler and the Assistant Town Clerk of Pittsford confirmed that there is no marble

## Tributaries to Mid Mainstem Otter Creek

VT03-04

finishing operation in Pittsford.

The unlicensed hydroelectric facilities in this waterbody are in the process of being licensed and flow will be improved in some of the brooks and rivers. (9801)

## INFORMATION SOURCES

Steve Fiske, VT. DEC Ambient Biomonitoring Network - noted non-support in Arnold Brook (9201)

Virginia Little, Vt. DEC Permits & Compliance Division - noted Brandon WWTF dechlorination (9201)

Tony Stout, Act 250 Coordinator - noted erosion/sedimentation to lower Neshobe river from stream relocation and destabilization (8801)

Dennis Borchardt, RC&D - noted streambank erosion and development encroachment to lower Neshobe River; road encroachment to river. (8801)

Paul Cummings, Vt DEC Water Resources Investigator - noted stream alteration by individual to gain additional farmland; erosion and sediment. (8801)

Winston Seely, chair Natural Resource Conservation Council - noted soil & streambank erosion from Forest Dale down to Neshobe River. (8801)

Hydro Assessment, Vt DEC 5/87 - 5 unlicensed hydro facilities in waterbody; in all cases no, low, or severely reduced flow have an impact on fisheries, aesthetics, and recreation.

Carole Fowler, Vt DEC Wastewater Management Division - no marble finishing businesses on permits list. (9707)

Asst. Town Clerk of Pittsford - no marble finishing business in Pittsford. (9707)

Jim Surwilo, Vt DEC Waste Management Division - noted that the Pittsford landfill listed in past assessments is closed and is now a transfer station. The landfill is on the edge of a wetland but not connected to a stream. No monitoring done. (9707)

John Schmeltzer, Vt DEC Waste Management Division - provided information on the Logan Sunoco site. (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	17.1	5.0	0.0	10.9	0.0
20	Aquatic biota	17.6	4.5	0.0	10.9	0.0
21	Fish consumption	32.5	0.0	0.0	0.0	0.5
42	Contact recreation	33.0	0.0	0.0	0.0	0.0
44	Noncontact recreation	22.2	0.0	0.0	10.8	0.0
50	Drinking water supply	33.0	0.0	0.0	0.0	0.0
62	Aesthetics	28.0	4.5	0.0	0.0	0.0
72	Agriculture water supply	33.0	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	33.0

Impairment Cause	Mag	Size (mi.)
Cause unknown	H	0.10
Siltation	T	4.50
Flow alterations	H	10.80
Turbidity	T	4.50

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	4.50
Other urban runoff/stormwater	T	4.50
Flow mod. - hydroelectric	H	10.80
Streambank modification/destabilization	T	4.50
Unknown source	H	0.10

Point Source Description	NPDES No.
Brandon WWTF Neshobe River 0.70 mgd	VT0100056
Otter Valley UHS San WW 0.025 mgd	VT0020842
Omya Middlebury - Foster Brook 6 permitted stormwater discharges	sw

## Tributaries to Mid Mainstem Otter Creek

VT03-04

Nonpoint Source Name	Description
Sugar Hill Res. Dam	Hydropower Dam - CVPS - min. flow
Sucker Brook Div Dam	Hydropower Dam - CVPS
Silver Lake Hydro	Hydropower Dam - CVPS
Lake Dunmore	
Salisbury Dam	Hydropower Dam - CVPS
Pittsford Landfill	Landfill (inactive)

**Upper Main Stem Otter Ck.  
Assessment Report**

**Waterbody No:** VT03-05 **Basin:** 03-Otter  
**River Length (mi.):** 14 **Classification:**  
**Description:** Main Stem - Confluence of Furnace Bk. to Mill River

*Location Identifiers*

**County:** Rutland **NRCS District:** 2  
**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT  
**Fish & Wildlife District:** 2

*Assessment Information*

**Assessment Date:** 9707 **Assessment Types**  
**Date Last Updated:** 9/29/1997 Surveys of fish and game biologists or other professionals  
**Assessment Category:** E Land use information and location of sources  
**Water Quality Limited?** Y  
**On 303(d) List?** Y  
**Monitored for Toxics?** N  
**Aquatic Contamination** **Toxics Testing**

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

**Assessment Comments**

**NON-SUPPORT MILES**

Otter Creek: 0.1 - below Proctor Dam - do not support aquatic biota/habitat and noncontact recreation due to flow alterations from a hydroelectric facility. c(1500) s(7410)

**PARTIAL SUPPORT MILES**

Otter Creek: remaining 13.4 - partial support of aquatic biota/habitat, aesthetics, and contact recreation due to siltation and turbidity from de-stabilized streambanks. c(1100,2100) s(7700)

**THREATENED MILES**

Otter Creek: same 13.4 miles as above - threats to these miles from sedimentation, turbidity, organic enrichment, metals and other toxics due to urban runoff, CSOs, land development. c(100,500,1100,1200,2500) s(400,3200,4000)

Otter Creek: 0.5 - below Rutland City WWTF - threats to aquatic biota due to organic enrichment from Rutland City WWTF. c(1200) s(200)

**COMMENTS**

Center Rutland Dam was re-licensed by FERC in 1995 and there is a new flow management plan now. The 0.4 miles of non-support attributed to the dam was removed in the 1996 assessment.

Hazardous spill #911174 which was nonspecifically referred to in past assessments as waste storage tank leaks & spills has been cleaned up so threats no longer exist from this source. Also marble industry in this area has gone out of business so threats from the milling process were removed.

The river below the Rutland City WWTF has greatly improved since 1985 when the aquatic community was severely stressed from organic enrichment.

Rutland City will be doing a number of BMPs over the next 5 years trying to reduce the stormwater portion of the CSOs. They will be unhooking roof drains and street sweeping among other efforts in order to reduce or eliminate overflows and direct discharges. It is not feasible for Rutland to separate its sewer and stormwater pipes. (9707)

## Upper Main Stem Otter Ck.

VT03-05

## INFORMATION SOURCES

Steve Fiske, Vt DEC Ambient Biomonitoring Program - data and information on Otter Creek mile 71.5 site. (9707)

Peter LaFlamme, Vt. DEC Water Quality - noted that assimilative capacity problems to Otter Creek from WWTFs dependent on creek flows. (8801)

William Forbes, SCS - noted development; increases of impervious surfaces more 'flashy' nature of streams; increased sediment loads. Also noted de-stabilized banks from uprooted trees. (9601)

Hydro Assessment Vt DEC 5/87 - Center Rutland hydro impairs fishery by 'holding back' stream flow during low flows; lacks minimum flow below project; may impair Otter Creek's assimilative capacity. Proctor dam impairs fishery - lacks minimum flow below dam.

Jeff Cueto, Vt. DEC Water Quality Division - provided information on the re-licensing of the Center Rutland dam. (9601)

Richard Spiese, Vt. DEC Waste Management Division - noted closure on hazardous spill project #91176

Don Gallus, Vt. DEC Enforcement Division - also noted no storage tank leaks, status of marble industry, still CSO problems. (9601)

Mike Young, Vt DEC Waste Management Division - noted the closure of the CVPS site in Clarendon. (Earlier sediment sampling at the site found PCBs). The buried coal ash that contained the PAHs has been removed. (9707)

Carole Fowler, Vt DEC Wastewater Management Division - noted that Deermont Corporation, Vt. Plating (#3-1109) was in significant non-compliance for the period 10/1/96 - 3/31/97 for cyanide monthly average violations in January and February 1997. (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.4	0.5	13.0	0.1	0.0
20	Aquatic biota	0.4	0.5	13.0	0.1	0.0
21	Fish consumption	14.0	0.0	0.0	0.0	0.0
42	Contact recreation	1.0	0.0	13.0	0.0	0.0
44	Noncontact recreation	13.9	0.0	0.0	0.1	0.0
50	Drinking water supply	1.0	13.0	0.0	0.0	0.0
62	Aesthetics	1.0	0.0	13.0	0.0	0.0
72	Agriculture water supply	1.0	13.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	14.0

Impairment Cause	Mag	Size (mi.)
Unknown toxicity	T	13.00
Metals	T	13.00
Siltation	M	13.00
Siltation	T	13.00
Organic enrichment/Low D.O.	T	13.50
Flow alterations	H	0.10
Turbidity	M	13.00
Turbidity	T	13.00

Impairment Source	Magnitude	Size (mi.)
Municipal point sources	T	0.50
Combined sewer overflows	T	13.00
Land development	T	13.00
Urban runoff/storm sewers	T	13.00
Flow mod. - hydroelectric	H	0.40
Streambank modification/destabilization	M	13.00

Point Source Description	NPDES No.
Proctor WWTF 0.325	VT0100528
Rutland City WWTF 6.6 mgd	VT0100871
Rutland City WWTF CSO (Calvary Cemeter)	VT0100871
14 permitted stormwater discharges	sw

**Minor Tribs - Upper Main Stem Otter Ck.  
Assessment Report**

**Waterbody No:** VT03-06 **Basin:** 03-Otter  
**River Length (mi.):** 11 **Classification:**  
**Description:** Minor Tribs Draining into Upper Main Stem including Moon Brook

*Location Identifiers*

**County:** Rutland **NRCS District:** 2  
**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT  
**Fish & Wildlife District:** 2

*Assessment Information*

<b>Assessment Date:</b> 9707	<b>Assessment Types</b>
<b>Date Last Updated:</b> 9/29/1997	Chemical monitoring of sediments
<b>Assessment Category:</b> M	RBP III or equivalent benthos surveys
<b>Water Quality Limited?</b>	RBP V or equivalent fish surveys
<b>On 303(d) List?</b> Y	
<b>Monitored for Toxics?</b> Y	
<b>Aquatic Contamination</b>	<b>Toxics Testing</b>
Sediment contamination	Organics in sediment
	Metals in sediments

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

**Assessment Comments**

**NON-SUPPORT MILES**

Moon Brook: 3.6 and Mussey Brook & other trib: 3.0 - upstream from Otter Creek - non-support of aquatic biota/habitat, aesthetics, contact recreation, drinking & ag. water supplies (as well as threats to fish consumption) due to sediments, toxics (metals and organics), turbidity, nutrients, bacteria and habitat alterations from land development, urban runoff (roads, parking areas, gasoline stations...), stormwater discharges, onstream ponds, and a closed, unlined landfill on Gleason Road in Rutland City. c(300,500,1100,1200,1600,1700), s(3200,4000,7350,8300).

**INFORMATION SOURCES**

Steve Fiske, Rich Langdon, Jim Pease, Vt. DEC Water Quality Division, Biomonitoring and Aquatic Studies Section- data that provided non-support designation of Moon Brook and tribs

Diane Conrad, Vt. DEC Hazardous Sites Section Chief

Vt. DEC Waste Management Division files - Proctor Town Dump - solid waste (and potentially hazardous waste) disposal in a wetland in Pittsford just north of Proctor/Pittsford town line. The Potential Hazardous Waste Site Preliminary Assessment Report done in October 1987 by the Vt. DEC Waste Management Division concluded that "[d]ue to the lack of documentation of hazardous substances disposed of at the dump, the site is given a low priority for Site Inspection."

Jim Surwilo, Vt DEC Waste Management Division - noted that the Proctor Town Dump site is closed. Also reported an impact to Moon Brook from Gleason Road unlined, closed landfill. Surface water monitoring detected low level volatile organics and iron.

**COMMENTS**

In 1988, Moon Brook was intensively monitored at four sites to determine the extent of impairment detected in 1986. Both the fish and macroinvertebrate communities were sampled. At the lower sites (in these 3 miles)

## Minor Tribes - Upper Main Stem Otter Ck.

VT03-06

both poor habitat conditions (from sand), non-point urban runoff and the onstream ponds have created the poor environmental conditions in the brook. The invertebrate community was poor in total species and sensitive EPT species, low in density and had moderate-high BI values (enrichment values). Moon Brook was sampled again in September 1991, October 1993, September 1994, and September 1996. The results have all been non-support of aquatic biota due primarily to urban runoff.

In addition, Moon Brook was one of the streams included in a study of Lake Champlain toxic sources characteristics. At Moon Brook as well as 9 other Vermont urban watersheds, caged mussels were used as biomonitors, sediment was collected and analyzed for priority pollutant metals and organic contaminants; fish were collected and analyzed for metals; and extraction samplers were deployed and their contents analyzed for PCBs, chlorinated pesticides and PAHs. Low levels of arsenic were found in the 63mm (fine fraction) sediment samples. Copper and lead were also found in the fine fraction sediment samples above quantification levels. Mercury in the fine fraction was above the NOAA low effect level. (9601)

Howe Richardson scale (#770072) recently closed as a site. Ongoing monitoring. (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	4.4	0.0	0.0	6.6	0.0
20	Aquatic biota	4.4	0.0	0.0	6.6	0.0
21	Fish consumption	4.4	6.6	0.0	0.0	0.0
42	Contact recreation	4.4	0.0	0.0	6.6	0.0
44	Noncontact recreation	4.4	6.6	0.0	0.0	0.0
50	Drinking water supply	4.4	0.0	0.0	6.6	0.0
62	Aesthetics	4.4	0.0	0.0	6.6	0.0
72	Agriculture water supply	4.4	0.0	0.0	6.6	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	11.0

Impairment Cause	Mag	Size (mi.)
Priority organics	M	6.60
Metals	M	6.60
Siltation	H	6.60
Other habitat alterations	M	6.60
Pathogens	S	6.60

Impairment Source	Magnitude	Size (mi.)
Land development	H	6.60
Urban runoff/storm sewers	H	6.60
Upstream impoundment	H	6.60
Highway maintenance and runoff	M	6.60

Point Source Description	NPDES No.
15 permitted stormwater discharges	sw

**Little Otter Creek  
Assessment Report**

**Waterbody No:** VT03-07 **Basin:** 03-Little Otter  
**River Length (mi.):** 87.5 **Classification:**  
**Description:** Mouth to Headwaters & Tribs

*Location Identifiers*

<b>County:</b> Addison	<b>NRCS District:</b>	3
<b>ANR Enforcement District:</b> 9	<b>Regional Planning Commission:</b>	ADD
<b>Fish &amp; Wildlife District:</b> 2		

*Assessment Information*

<b>Assessment Date:</b> 9807	<b>Assessment Types</b>
<b>Date Last Updated:</b> 7/8/1998	Occurrence of conditions judged to cause impairment
<b>Assessment Category:</b> M	RBP III or equivalent benthos surveys
<b>Water Quality Limited?</b>	RBP V or equivalent fish surveys
<b>On 303(d) List?</b> Y	
<b>Monitored for Toxics?</b>	

**Aquatic Contamination**

**Toxics Testing**

Restricted consumption for general population  
 No consumption for subpopulation (e.g. children...)

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

**Assessment Comments**

**NON-SUPPORT MILES**

Little Otter Creek: 1.0 - from mouth upstream (a subset of 9 miles below) - non-support of fish consumption due to mercury contamination from atmospheric deposition. c(500) s(8100)

Little Otter Creek: 1.0 - half mile above & below milepoint 15.9 - non-support of aquatic biota due to nutrients and silt from agricultural land uses. c(900,1100) s(1000)

**PARTIAL SUPPORT MILES**

Little Otter Creek: 9.0 - from mouth upstream to Little Otter Falls - partial support of aquatic biota, aesthetics and contact recreation due to silt, sand, turbidity, nutrients, and algae from agricultural land uses and eroding streambanks. c(900,1100,2200,2500) s(1000,7700)

**INFORMATION SOURCES**

Vt. Dept. of Health, Toxicology and Risk Assessment Program - fish consumption warning due to mercury in walleye and other species, April 1996.

Christopher Clark, Vt. Dept. of Fish and Wildlife Game Warden - has walked the stretch of Little Otter below the slaughterhouse a number of times (it is a walleye spawning area) and hasn't seen any sign of the slaughterhouse waste reported by Lionel Fisher during 8801 assessment. Mentioned the water clarity (or lack thereof). (9601)

Peter Lossman, NRCS - Middlebury - noted that most of the farms in the watershed have manure pits but a few still need them. Some cattle are excluded from the creek but others are not. The existence of riparian vegetation also varies along the creek. (9601)

Steve Fiske and Rich Langdon, Vt. DEC Biomonitoring and Aquatic Studies Section - biomonitoring data and interpretation. (9807)

Paul Cummings, Vt. DEC Enforcement Division - no knowledge of the septic system failure comments of 8801

## Little Otter Creek

VT03-07

assessment. (9601)

Sean McVeigh, Vt. DEC Enforcement Division - has not done a septic system survey in Ferrisburgh. (9601)

Jim Surwilo, Vt DEC Waste Management Division - reported that there are 2 unlined landfills in Bristol: one on Burpee Road and one on Pine Street. Both are on unnamed tributaries to Little Otter Creek. There are no known impacts to surface water. (9707)

Chuck Schwer, Vt DEC Waste Management Division - reported 2 hazardous waste sites in this waterbody: Palmer's Garage in Ferrisburgh (#911130) and the 7 & 17 Corner Store in New Have (#931477). An investigation is completed at Palmer's Garage. Corrective action continues at 7 & 17. No known impacts to surface waters. (9707)

Jerome McArdle, Vt DEC Water Quality Division - noted turbidity, silt and sediment, algae growth on lower part of Little Otter Creek and in some of the unnamed tributaries after field visits. (9707)

Addison County Regional Planning Commission and the Addison County NRCS Office's Little Otter Creek Watershed Project, 1997 - supported first year of E. coli, phosphorus, temperature and pH sampling on Little Otter. Also produced maps showing watershed land use and locations of eroding streambanks.

## COMMENTS

Removed the threat due to allegedly failed septic systems from the 8801 assessment because there was no information source for that allegation.

Biomonitoring results at mile 4.1 indicated partial support of aquatic biota due to nutrients, silt, and sand (1993); results at 9.0 miles indicate partial support due to nutrients and sediments (1990); results at 12.7 miles indicate support but threatened due to nutrients (1996); and results at 15.9 miles indicate partial support due to nutrients and silt (1995). Steve and Rich (see info sources above) noted that there is a lot of agriculture above and below the 4.1 sample station: pasture, cows with access to the stream, riparian vegetation gone. Noted lots of filamentous algae, high productivity (3x more bugs/area than normal). Also noted turbidity.

A number of the more significant tributaries to Little Otter Creek as well as portions of Little Otter itself flow through or are bordered by wetlands. In these areas, the creeks are slow moving, silty, often turbid. It is not clear in these lowland situations with clay soils what a healthy, natural stream condition is.

The Little Otter Creek Project field work found 7 1/2 miles of eroding streambank out of 24.6 miles evaluated. Instream sampling on Mud Creek (2 sites) and Little Creek (3 sites) found high E. coli numbers (3/5, 5/5, 5/5, 3/5, 5/5 samples well above standard in 1997 samples. This data is not added above because it is only a year's worth of data and distances are not yet known.

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	76.5	0.0	2.0	9.0	0.0
20	Aquatic biota	82.5	0.0	5.0	0.0	0.0
21	Fish consumption	86.5	0.0	0.0	1.0	0.0
42	Contact recreation	78.5	0.0	9.0	0.0	0.0
44	Noncontact recreation	87.5	0.0	0.0	0.0	0.0
50	Drinking water supply	87.5	0.0	0.0	0.0	0.0
62	Aesthetics	78.5	0.0	9.0	0.0	0.0
72	Agriculture water supply	87.5	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	87.5

Impairment Cause	Mag	Size (mi.)
Metals	H	1.00
Nutrients	M	11.00
Siltation	M	11.00
Organic enrichment/Low D.O.	M	5.00
Turbidity	M	9.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	H	11.00
Atmospheric deposition	H	1.00

Point Source Description	NPDES No.
2 permitted stormwater discharges	sw

**Lewis Creek  
Assessment Report**

**Waterbody No:** VT03-08 **Basin:** 03-Lewis  
**River Length (mi.):** 40 **Classification:**  
**Description:** Mouth to Headwaters & Tribs

*Location Identifiers*

**County:** Addison      Chittenden **NRCS District:** 3  
**ANR Enforcement District:** 9 **Regional Planning Commission:** ADD  
**Fish & Wildlife District:** 4

*Assessment Information*

**Assessment Date:** 9807 **Assessment Types**  
**Date Last Updated:** 6/22/1998      RBP III or equivalent benthos surveys  
**Assessment Category:** M      RBP V or equivalent fish surveys  
**Water Quality Limited?**      Bacteria water column sampling by quality-assured volunteer program  
**On 303(d) List?** Y  
**Monitored for Toxics?** N  
**Aquatic Contamination** **Toxics Testing**

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

**Assessment Comments**

**PARTIAL SUPPORT MILES**

Pond Brook: 1.5 - upstream from confluence with Lewis Creek - partial support of aquatic habitat/biota, aesthetics, water clarity, and swimming from sedimentation & turbidity, nutrient & organic enrichment, and pathogens caused by agricultural land uses (especially grazing, crop production and animal waste management), streambank erosion, lack of bufferstrips, and removal of riparian vegetation. c(900,1100,1200,1600,1700) s(1000,7600,7700)

Lewis Creek: 11.3 - from Lewis Creek Farm footbridge to lower covered bridge in Charlotte (river mile 7.3) - partial support of contact recreation due to pathogens from agricultural runoff (and other sources?) c(1700) s(1000)

**THREATENED MILES**

Lewis Creek: 7.0 - upstream from mouth to 2.5 mile mark and also scattered areas above 10.5 miles - threats to aesthetics, water clarity, and aquatic biota due to sedimentation, turbidity, nutrients, and organic enrichment from agricultural land uses, loss of riparian vegetation and streambank erosion. c(900,1100,1200) s(1000,7600,7700)

Lewis Creek: 8.3 - for at least a mile above the Lewis Creek footbridge and downstream of the lower covered bridge in Charlotte - threats to contact recreation due to pathogens from agricultural runoff (and other sources). c(1700) s(1000)

**COMMENTS**

Three sites have been sampled twice each for fish and macroinvertebrate communities in the last four years and the data have shown full support at the sites. Mile 0.5 was sampled in October 1993 and 1994; mile 3.5 was sampled in October 1993 and 1994; and mile 21.4 was sampled in September 1995 and 1996. However, there are sections of the Creek where agricultural activities present a threat and the creek is moderately enriched. It is a productive stream but the productivity hasn't compromised the diversity - there are good numbers of generalists and specialists in the biological community.

## Lewis Creek

VT03-08

Data from 19 stations and from 1992 - 1997 gathered by the Lewis Creek Association's lay monitoring program found a number of E. coli violations. At the Lewis Creek Farm footbridge and ball park sites in Starksboro; the Tyler Bridge site in Monkton; and from Silver Street to Baldwin Road Bridge in Hinesburg, the E. coli numbers were very high.

## INFORMATION SOURCES

Steve Fiske and Rich Langdon, Vt. DEC Biomonitoring and Aquatic Studies Section - provided aquatic biota assessment based on monitoring data (9707)

Steve Parren, Vt. F & W Biologist - noted impairments (foam mats and turbidity) to Pond Brook primarily from agricultural land uses

Lewis Creek Association - volunteer monitoring data on E. coli for 1992 - 1997 (9807)

Paul Cummings, Vt. DEC Enforcement Division - thought assessment of Lewis Creek and Pond Brook were accurate (9601)

Jim Surwilo, Vt DEC Waste Management Division - reported the presence of a closed, unlined landfill near Lewis Creek in Starksboro. There are no known impacts to surface waters. (9707)

Jerome McArdle, Vt DEC Water Quality Division - noted silt on stream bottom and algae in lower ten miles of Lewis Creek. (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	20.4	8.3	11.3	0.0	0.0
20	Aquatic biota	31.5	7.0	1.5	0.0	0.0
21	Fish consumption	40.0	0.0	0.0	0.0	0.0
42	Contact recreation	20.4	8.3	11.3	0.0	0.0
44	Noncontact recreation	40.0	0.0	0.0	0.0	0.0
50	Drinking water supply	40.0	0.0	0.0	0.0	0.0
62	Aesthetics	31.5	7.0	1.5	0.0	0.0
72	Agriculture water supply	40.0	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	40.0

Impairment Cause	Mag	Size (mi.)
Nutrients	M	1.50
Nutrients	T	7.00
Siltation	M	1.50
Siltation	T	7.00
Organic enrichment/Low D.O.	S	1.50
Organic enrichment/Low D.O.	T	7.00
Pathogens	H	11.30
Pathogens	T	8.30

Impairment Source	Magnitude	Size (mi.)
Agriculture	H	11.30
Agriculture	T	8.30
Removal of riparian vegetation	M	1.50
Removal of riparian vegetation	T	7.00
Streambank modification/destabilization	M	1.50
Streambank modification/destabilization	T	7.00

Point Source Description	NPDES No.
1 permitted stormwater discharge	sw

## Dead Creek Assessment Report

Waterbody No: VT03-09

Basin: 03-Otter

River Length (mi.): 20

Classification:

Description: Mouth to Headwaters &amp; Tribs

### Location Identifiers

County: Addison

NRCS District:

3

ANR Enforcement District: 9

Regional Planning Commission:

ADD

Fish &amp; Wildlife District: 2

### Assessment Information

Assessment Date: 9707

#### Assessment Types

Date Last Updated: 9/29/1997

Surveys of fish and game biologists or other professionals

Assessment Category: E

Occurrence of conditions judged to cause impairment

Water Quality Limited?

On 303(d) List? Y

Monitored for Toxics? N

Aquatic Contamination

#### Toxics Testing

None detected

Waste Management Zone - Miles:

Description:

#### Assessment Comments

##### NON-SUPPORTED MILES

Dead Ck.: 4.0 - upstream from confluence with Otter Ck. - does not support aesthetics, water clarity, and contact rec.(swimming) due to sediment & turbidity, suspended solids, nutrient enrichment, algal production, and pathogens from agricultural land uses (esp. cropland erosion, waste management & grazing), streambank erosion, and loss of riparian vegetation. c(900,1100,1700,2100,2200) s(1000,7600,7700,8600,8800)

##### PARTIAL SUPPORT MILES

Dead Ck.: 1.0 - between Brileya Ponds and Stone Bridge Pond - partially supports aesthetics, water clarity, and contact rec.(swimming) due to sediment, turbidity, suspended solids, and pathogens from ag. land uses, streambank erosion, and natural causes (waterfowl). c(1100,1700,2100) s(1000,7700,8600)

##### THREATENED MILES

West Branch: 8.0 and East Branch: 7.0 - both have threats to aesthetics, water clarity, aquatic biota/habitat, and contact recreation (swimming) from sediment loads & turbidity, suspended solids, nutrient & organic enrichment, thermal modifications, and pathogens from agricultural land uses, natural causes, streambank erosion, loss of riparian vegetation. c(900,1100,1200,1400,1700,2100) s(1000,7600,7700,8600)

##### INFORMATION SOURCES

Bill Crenshaw, Vt.F&W Dead Creek WMA Supervisor - noted all unswimmable & very turbid; poor agricultural waste management practices, flooding effects.

Lower Otter/Dead Creek Watershed. Vt. A Watershed Plan for Water Quality Improvement Under PL83-566. USDA/SCS 8/81 - notes high turbidity to Dead Creek tribs, cropland erosion, poor ag. waste mgmt., decreased aesthetic, recreation, ecological, wildlife habitat values; estimates 37 tons of soil loss per year above impoundments; 8.5 tons soil loss per year below impoundments.

Ag. Runoff from Selected Vt. Watersheds, USDA/SCS, 2/83 - estimates 95% of annual total phosphorus

## Dead Creek

VT03-09

loading from Lower Otter/Dead Creek has an agricultural origin.

Jim Surwilo, Vt DEC Waste Management division - reported on an unlined, closed landfill near Dead Creek in Bridport. There are no known surface water impacts.

Jerome McArde, Vt DEC Water Quality Division - noted the slow moving, turbid, enriched (abundant algae) condition of the creek and two branches. (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	0.0	15.0	1.0	4.0	0.0
20	Aquatic biota	0.0	15.0	1.0	4.0	0.0
21	Fish consumption	20.0	0.0	0.0	0.0	0.0
42	Contact recreation	0.0	15.0	1.0	4.0	0.0
44	Noncontact recreation	20.0	0.0	0.0	0.0	0.0
50	Drinking water supply	20.0	0.0	0.0	0.0	0.0
62	Aesthetics	0.0	15.0	1.0	4.0	0.0
72	Agriculture water supply	20.0	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	20.0

Impairment Cause	Mag	Size (mi.)
Nutrients	M	4.00
Nutrients	T	15.00
Siltation	H	5.00
Siltation	T	15.00
Organic enrichment/Low D.O.	T	15.00
Thermal modifications	T	15.00
Other habitat alterations	T	15.00
Pathogens	H	5.00
Pathogens	T	15.00
Suspended solids	H	5.00
Suspended solids	T	15.00
Noxious aquatic plants	M	4.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	H	5.00
Agriculture	T	15.00
Upstream impoundment	S	4.00
Removal of riparian vegetation	M	4.00
Removal of riparian vegetation	T	15.00
Streambank modification/destabilization	M	5.00
Streambank modification/destabilization	T	15.00
Natural sources	H	5.00
Natural sources	T	15.00

Point Source Description	NPDES No.
none	

## Lemon Fair River Assessment Report

**Waterbody No:** VT03-10 **Basin:** 03-Otter  
**River Length (mi.):** 76 **Classification:**  
**Description:** Mouth to Headwaters & Tribs

### Location Identifiers

<b>County:</b> Addison	<b>NRCS District:</b>	3
<b>ANR Enforcement District:</b> 9	<b>Regional Planning Commission:</b>	ADD
<b>Fish &amp; Wildlife District:</b> 2		

### Assessment Information

<b>Assessment Date:</b> 9707	<b>Assessment Types</b>
<b>Date Last Updated:</b> 9/29/1997	Surveys of fish and game biologists or other professionals
<b>Assessment Category:</b> E	Land use information and location of sources
<b>Water Quality Limited?</b>	Occurrence of conditions judged to cause impairment
<b>On 303(d) List?</b> Y	RBP III or equivalent benthos surveys
<b>Monitored for Toxics?</b> N	

#### Aquatic Contamination

None detected

#### Toxics Testing

#### Waste Management Zone - Miles:

#### Description:

#### Assessment Comments

##### NON-SUPPORT MILES

Lemon Fair: 6.0 - from confluence with Otter Creek to confluence with Beaver Branch - non-support of contact recreation (swimming), aquatic biotat, aesthetics, and water clarity due to high sediment loads, turbidity, suspended solids, and pathogens from agricultural land uses (esp. ag. waste management, cropland erosion & animal grazing), streambank erosion, a loss of riparian vegetation/no buffer strips. c(1100,1700,2100) s(1000,7600,7700)

##### PARTIAL SUPPORT MILES

Lemon Fair: 27.0 - whole length - partial support of fish consumption due to mercury contamination of smallmouth bass likely due to atmospheric deposition. c(500) s(8100)

Lemon Fair: 14.5 - from confluence with Beaver Branch upstream to Richville Pond dam - partial support of water clarity, aesthetics, aquatic biota, and contact recreation (swimming) due to high sediment loads & turbidity, suspended solids, nutrient & organic enrichment, and thermal modifications from agricultural land uses (esp. ag. waste management, animal grazing, & cropland runoff), streambank erosion, and loss of vegetated buffer strips. c(900,1100,1200,1400,1700,2100) s(1000,7600,7700)

Ledge Creek: 1.0 - below the "Perry Jackson pond" - partial support of aquatic biota, aesthetics, contact and non-contact recreation due to a private dam and onstream pond limiting downstream flow. c(1500) s(7350)

Beaver Brook: 2.5 - from Otter Creek upstream to the confluence with Ledge Creek - partial support of aquatic biota due to nutrients and limited flow from agriculture and upstream impoundment on Ledge Creek. c(900,1500) s(1000,7350)

##### THREATENED MILES

Beaver Branch: 3.0 and

Lemon Fair: 3.5 - above Richville Pond - threats to aesthetics, water clarity, aquatic biota, and contact

**Lemon Fair River**

VT03-10

recreation (swimming) due to sedimentation & turbidity, pathogens, thermal & habitat modifications from agricultural land use and natural causes (beaver). c(1100,1400,1600,1700) s(1000,7600,8600)

Lemon Fair: 20.5 - overlaps with the 6 and 14.5 miles in non- and partial support categories above - threats to aquatic biota, contact recreation, agricultural and drinking water supplies due to herbicides from aerial spraying of orchards. c(200) s(1300)

**COMMENTS**

In the summer of 1997, the Agency of Natural Resources identified about 50 discharges of raw sewage to three ditches that flow to the Cedar Swamp in Shoreham. Corrections to the situation are being discussed with the municipality. (9707)

**INFORMATION SOURCES**

Densmore Gaiotti, Vt Dept. of Fish & Wildlife Game Warden - noted warm water fishery and very turbid conditions to Lemon Fair; turbidity caused by clay particles in suspension & ag. runoff. (8801)

Paul Vachon, formerly SCS - noted regular flooding to area, ag-related impacts, higher temps., loss of riparian vegetation, speciality crop production and pesticides. (8801)

Robert Collins, SCS - noted natural muddy conditions as river cut into clay banks; identifies Lemon Fair as most severely impacted river by nonpoint source pollution in the county. (8801)

Dave Callum, Vt.F&W Fisheries Biologist - noted ag. related impacts to water quality - esp. after rains. (8801)

Lemon Fair River Watershed Plan. USDA/SCS. 2/85 - noted excessive phosphorus loading and sheet/till cropland erosion, primary project measures as erosion controls and agricultural waste management systems; about 90% of the watershed's agricultural waste is mis-managed; reduced quality and quantity of fishery.

Ag. Runoff from Selected Vt. Watersheds. USDA/SCS 2/83 - estimates 90% of annual total phos. NPS loads from ag. sources

Jeff Comstock, Vt Dept. of Agriculture - sampling was done on the Lemon Fair and Otter Creek in April, May, June, July 1993 for herbicides, nitrates, and phosphorus. Total phosphorus was in the range 49 - 135 ppb. No herbicides or nitrates found. (9707)

Vt. Dept. of Health, Toxicology and Risk Assessment program, April 1996 Health Alert - fish advisory for smallmouth bass among others. The Lemon Fair is a warmwater fishery with smallmouth bass. (9707)

Steve Fiske, Vt DEC Water Quality Division - macroinvertebrate community data and analysis for Beaver Brook and Beaver Branch. (9707)

Jerome McArdle, Vt DEC Water Quality division - noted conditions of the Lemon Fair and Beaver Branch. Observed the large pond restricting flows on Ledge Creek. (9707)

Memo to Wallace McLean, Water Quality Division Director from Gary Schultz, DEC Chief of Operations dated July 9, 1997 - info on Shoreham Village raw sewage discharges.

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	36.5	6.5	27.0	6.0	0.0
20	Aquatic biota	45.5	6.5	18.0	6.0	0.0
21	Fish consumption	49.0	0.0	27.0	0.0	0.0
42	Contact recreation	48.0	6.5	15.5	6.0	0.0
44	Noncontact recreation	75.0	0.0	1.0	0.0	0.0
50	Drinking water supply	55.5	20.5	0.0	0.0	0.0
62	Aesthetics	48.0	6.5	15.5	6.0	0.0
72	Agriculture water supply	55.5	20.5	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	76.0

Impairment Cause	Mag	Size (mi.)
Pesticides	T	20.50
Metals	H	27.00
Nutrients	M	17.00
Siltation	H	20.50
Siltation	T	6.50
Organic enrichment/Low D.O.	M	14.50
Thermal modifications	S	14.50
Thermal modifications	T	6.50
Other habitat alterations	T	6.50
Pathogens	M	20.50
Pathogens	T	6.50
Suspended solids	H	20.50

## Lemon Fair River

VT03-10

Impairment Source	Magnitude	Size (mi.)
Agriculture	H	23.00
Agriculture	T	6.50
Specialty crop production	T	20.50
Upstream impoundment	M	3.50
Removal of riparian vegetation	M	20.50
Removal of riparian vegetation	T	6.50
Streambank modification/destabilization	M	20.50
Atmospheric deposition	H	27.00
Natural sources	H	20.50

Point Source Description	NPDES No.
Town of Cornwall - GW reclamation	3-1332

**New Haven River  
Assessment Report**

**Waterbody No:** VT03-11 **Basin:** 03-Otter  
**River Length (mi.):** 49.4 **Classification:**  
**Description:** Mouth to Headwaters & Tribs

*Location Identifiers*

**County:** Addison **NRCS District:** 3  
**ANR Enforcement District:** 9 **Regional Planning Commission:** ADD  
**Fish & Wildlife District:** 2

*Assessment Information*

**Assessment Date:** 9707 **Assessment Types**  
**Date Last Updated:** 9/30/1997 Surveys of fish and game biologists or other professionals  
**Assessment Category:** E Occurrence of conditions judged to cause impairment  
**Water Quality Limited?**  
**On 303(d) List?** N  
**Monitored for Toxics?** Y

**Aquatic Contamination** **Toxics Testing**  
None detected

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

**Assessment Comments**

**NON-SUPPORT MILES**

New Haven River: 1.0 - from mouth upstream (subset of 11 miles in threats) - non-support of contact recreation (swimming) due to pathogens likely from agricultural runoff. c(1700) s(1000)

**THREATENED MILES**

New Haven River: 7.0 - from river mile 1.0 to river mile 8.0 - threats to contact recreation (swimming) due to pathogens likely from agricultural runoff. c(1700) s(1000)

New Haven River: 11.0 - upstream from confluence with Otter Ck. - threats to aquatic biota/habitat and aesthetics due to sedimentation, turbidity, and nutrients from agricultural land uses (esp crop production, ag waste management), and streambank erosion. c(900,1100,2500) s(1000,7700)

Muddy Branch: 5.0 - upstream from confluence with New Haven R. - threats to aesthetics and aquatic biota from turbidity, siltation, and nutrient enrichment due likely to agricultural activities. c(900,1100) s(1000)

Seth Hill Brook: 0.2 - below Bristol Water Dept. water supply outtake - threats to aquatic biota, aesthetics due to low or no flow due water supply withdrawals. (0.2 miles and T status arbitrarily chosen until more information is available). c(1500) s(7430)

Beaver Meadow Brook: 0.2 - threats to aquatic biota due to sedimentation from Lincoln town garage sand and gravel piles, which are on the streambank. c(1100) s(8300)

**INFORMATION SOURCES**

Dennis Borchardt, RC&D - noted ag land uses and stream gravel removal along New Haven; test section of river - fishery impaired. (8801)

Winston Seeley, Chair N.R. Conservation Council - noted streambank erosion along New Haven below Bristol. (8801)

Kathy Fallon & Water Supply Division information - location of stream water supply withdrawal (9601)

## New Haven River

VT03-11

New Haven River Watch 1993-1997 data - indicates high E. coli and phosphorus levels during and after storm events which are probably from agricultural activities. (9807)

Vt DEC Wastewater Management Division - Polymer Inc. (Speciality Filament) hasn't violated its permit conditions in the last 8 years at least. Temperatures at intake and outflow discharge not much different if at all. Removed comments from past assessments about possible temperature permit violations.

Vt. DEC Waste Management Division - noted that there is a closed, unlined landfill in Lincoln on a tributary to Beaver Meadow Brook. Monitoring shows no evidence of impacts to surface water. (9707)

Jerry McArdle, Vt DEC Water Quality Division - Bristol has a sand filter sewage system that serves the downtown area. It was installed in 1993. Jerry also noted threats to Beaver Meadow Brook and the information below. (9707)

## COMMENTS

Field visits in late summer 1997 found clear water and a natural appearing substrate in Derbourn Brook (So. Lincoln), Cota Brook (Lincoln), Isham Brook, Baldwin Creek (Starksboro) and a number of unnamed tributaries. (9707)

Looked at a point where Quarry Road crosses Muddy Branch. Not a good spot for macroinvertebrate sampling. There was a lot of plant growth in the stream. (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	32.0	16.4	0.0	1.0	0.0
20	Aquatic biota	33.0	16.4	0.0	0.0	0.0
21	Fish consumption	49.4	0.0	0.0	0.0	0.0
42	Contact recreation	41.4	7.0	0.0	1.0	0.0
44	Noncontact recreation	49.4	0.0	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	49.4
62	Aesthetics	33.2	16.2	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	49.4
82	Industry water supply	0.0	0.0	0.0	0.0	49.4

Impairment Cause	Mag	Size (mi.)
Nutrients	T	16.00
Siltation	T	16.20
Flow alterations	T	0.20
Pathogens	H	1.00
Pathogens	T	7.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	H	1.00
Agriculture	T	16.00
Flow mod.- water supply water withdrawal	T	0.20
Streambank modification/destabilization	T	11.00
Highway maintenance and runoff	T	0.20

Point Source Description	NPDES No.
Speciality Filaments Dow Pond 0.14 mgd	VT0000761
Speciality Filaments Muddy Branch	VT0000761
2 permitted stormwater discharges	sw

Nonpoint Source Name	Description
Water withdrawal	Bristol Water Dept. supply withdrawal

**Middlebury River  
Assessment Report**

Waterbody No: VT03-12

Basin: 03-Otter

River Length (mi.): 33.1

Classification:

Description: Mouth to Headwaters &amp; Tribs

*Location Identifiers*

County: Addison

NRCS District:

3

ANR Enforcement District: 9

Regional Planning Commission:

ADD

Fish &amp; Wildlife District: 2

*Assessment Information*

Assessment Date: 9807

**Assessment Types**

Date Last Updated: 7/8/1998

Surveys of fish and game biologists or other professionals

Assessment Category: E

Occurrence of conditions judged to cause impairment

Water Quality Limited?

Chemical/physical monitoring

On 303(d) List? N

Chem/physical monitoring data by quality-assured volunteer program

Monitored for Toxics? N

Aquatic Contamination

Toxics Testing

**Waste Management Zone - Miles:****Description:****Assessment Comments****NON-SUPPORT MILES**

Middlebury River: 2.0 - from mouth upstream - non-support of contact recreation due to pathogens from agricultural lands uses and possibly failed septic systems. c(1700) s(1000,6500)

**PARTIAL SUPPORT MILES**

Halnon Brook Trib 1: 0.5 - partial support of aquatic biota/habitat due to limited habitat. c(1600) s(8600)  
 South Branch Middlebury River: 1.4 - from water withdrawal point located at the confluence of the South Branch and the stream from Pleiad Lake to the point where Goshen Brook comes in - partial support of aquatic biota/habitat due to reduced flow from snowmaking withdrawals. c(1500) s(7420)

**THREATENED MILES**

Middlebury River: 4.0 - from Ripton through East Middlebury - threats to aquatic biota and aesthetics due to turbidity and sedimentation, flow alteration, other habitat alterations, and thermal modification from streambank modification/destabilization, flooding, and channelization. c(1100,1400,1500,1600) s(7100,7700,8650)

Middlebury River: 4.0 - from East Middlebury downstream - threats to aquatic biota/habitat (fisheries) and aesthetics due to nutrients, turbidity, sedimentation and habitat alteration due to erosion of streambanks from flooding and agricultural land uses (crop production, animal waste management and cattle in and around the river causing erosion). Also threats to aquatic biota (coldwater fishery) due to elevated temperatures. c(900,1100,1400,1600) s(1000,7700,8650,9000)

**INFORMATION SOURCES**

Steve Fiske, Vt. DEC Water Quality Division, Ambient Biomonitoring Program - provided 1993 data on mile 3.7 site of Middlebury River which showed full support (9607)

Bob Collins, USDA/SCS District Conservationist

Dave Callum, Vt. F&W Fisheries Manager

Keith Hartline, NRCS - noted eroding sites from 3/4 mile from mouth of Middlebury River upstream about 2

## Middlebury River

VT03-12

miles. Cows in and around stream. Cattle exclusion and alternative water systems will be installed. (9607)

Otter Creek River Watch 1993-1997 data - high E. coli counts taken during both dry and wet weather sampling conditions so nonpoint source pollution runoff and possibly failed septic systems are implicated.

Sampling points occur in lower 4 miles downstream of East Middlebury. Their data also indicated temperature threats to the lowest 4 miles. (9807)

Paul Cummings, Environmental Enforcement Division - didn't know of any failed systems on the Middlebury River or North Branch. (9601)

Jim Surwilo, Vt DEC Waste Management Division - reported that monitoring at an open, unlined landfill on Halnon Brook in Salisbury reveals no impacts to surface waters. (9707)

Vt DEC Waste Management Division files - possible petroleum contamination from Middlebury Beef & Grocery Supply (#962028). Additional investigation will take place (groundwater monitoring wells presumably installed spring 1997). (9707)

Jerome McArdle, Vt DEC Water Quality Division - reported on field observation of Middlebury River watershed. Observations confirmed other reports on the Middlebury River stretches. Noted clear water and unimpacted substrate on Crystal Brook, Brandy Brook, and unnamed tributary near Bread Loaf, and Sparks Brook.

Rich Langdon, Vt DEC Water Quality Division - provided biomonitoring data and interpretation on fish population in Halnon Brook tributary. The tributary winds through a de-watered beaver pond and hence the reduced habitat. (9807)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	23.2	6.0	1.9	2.0	0.0
20	Aquatic biota	23.2	8.0	1.9	0.0	0.0
21	Fish consumption	33.1	0.0	0.0	0.0	0.0
42	Contact recreation	31.1	0.0	0.0	2.0	0.0
44	Noncontact recreation	33.1	0.0	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	33.1
62	Aesthetics	25.1	8.0	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	33.1
82	Industry water supply	0.0	0.0	0.0	0.0	33.1

Impairment Cause	Mag	Size (mi.)
Nutrients	T	4.00
Siltation	T	8.00
Thermal modifications	T	8.00
Flow alterations	M	1.40
Other habitat alterations	S	0.50
Other habitat alterations	T	4.00
Pathogens	H	2.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	H	2.00
Onsite wastewater systems (septic tanks)	M	2.00
Channelization	T	4.00
Flow mod. - snowmaking water withdrawal	M	1.40
Streambank modification/destabilization	T	8.00
Natural sources	S	0.50
Floods	T	8.00

Point Source Description	NPDES No.
Vt. Dept. F&W fish culture effluent	VT0020966
2 permitted stormwater discharges	sw

**Furnace Brook and tribs  
Assessment Report**

Waterbody No: VT03-13

Basin: 03-Otter

River Length (mi.): 61

Classification:

Description: Furnace Brook from mouth to headwaters and tributaries including Sugar Hollow, Little, Kiln, and Baker Brooks.

*Location Identifiers*

County: Rutland

NRCS District:

9

ANR Enforcement District: 1

Regional Planning Commission: RUT

Fish &amp; Wildlife District: 2

*Assessment Information*

Assessment Date: 9707

**Assessment Types**

Date Last Updated: 6/24/1997

Surveys of fish and game biologists or other professionals

Assessment Category: M

RBP III or equivalent benthos surveys

Water Quality Limited?

On 303(d) List?

Monitored for Toxics? N

Aquatic Contamination

**Toxics Testing**

None detected

Waste Management Zone - Miles: 0.00 Description:

**Assessment Comments****THREATENED MILES**

Unnamed trib to Furnace Bk.: 0.5 - upstream from confluence with Furnace Bk. - threats to aquatic habitat/biota, aesthetics and contact rec. (swimming) from pathogens, sediment, siltation and turbidity, some organic enrichment caused by ag. land use, gravel pit operations. c(1100,1200,1700) s(1000,5100)

Baker Brook: 0.5 - from milepost 1.0 down about a half mile - threats to aquatic biota due to logging. c(1100) s(2000)

Kiln Brook: 0.2 - below Proctor water department water supply withdrawal point - threats to aquatic biota, aesthetics, and non-contact recreation due to water withdrawal for water supply. (0.2 miles arbitrarily assigned until further study of this group of impacts) c(1500) s(7430)

**INFORMATION SOURCES**

Addison Cty RPC, Middlebury NRCD and district fisheries biologist noted threats to unnamed tributary. Steve Fiske, Vt.DEC, Biomonitoring and Aquatic Studies Section - provided data and assessment of Baker Brook. Biomonitoring data from 9/94, 9/95, and 9/96 showed threats due to sand from logging activity at station 1.0 miles. The station at 2.7 miles sampled those same 3 years indicates full support.

Kathy Fallon, Vt.DEC, Water Quality Division - noted Kiln Brook is a surface water public water supply

## Furnace Brook and tribs

VT03-13

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	59.8	1.2	0.0	0.0	0.0
20	Aquatic biota	59.8	1.2	0.0	0.0	0.0
21	Fish consumption	61.0	0.0	0.0	0.0	0.0
42	Contact recreation	60.5	0.5	0.0	0.0	0.0
44	Noncontact recreation	60.8	0.2	0.0	0.0	0.0
50	Drinking water supply	61.0	0.0	0.0	0.0	0.0
62	Aesthetics	60.3	0.7	0.0	0.0	0.0
72	Agriculture water supply	61.0	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	61.0

Impairment Cause	Mag	Size (mi.)
Siltation	T	1.00
Organic enrichment/Low D.O.	T	0.50
Flow alterations	T	0.20
Pathogens	T	0.50

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	0.50
Silviculture	T	0.50
Surface mining	T	0.50
Flow mod.- water supply water withdrawal	T	0.20

Point Source Description	NPDES No.
Pittsford WWTF 0.070mgd	VT0100692
Pitt. Nat'l Fish Hatch 7.5mgd	VT0000451

**East Creek  
Assessment Report**

Waterbody No: VT03-14

Basin: 03-Otter

River Length (mi.): 29.5

Classification:

Description: Mouth to Headwaters &amp; Tribs

*Location Identifiers*

County: Rutland

NRCS District:

3

ANR Enforcement District: 1

Regional Planning Commission:

RUT

Fish &amp; Wildlife District: 2

*Assessment Information*

Assessment Date: 9707

**Assessment Types**

Date Last Updated: 9/30/1997

Surveys of fish and game biologists or other professionals

Assessment Category: E

Occurrence of conditions judged to cause impairment

Water Quality Limited?

Chemical/physical monitoring

On 303(d) List? Y

RBP III or equivalent benthos surveys

Monitored for Toxics? Y

Aquatic Contamination

**Toxics Testing**

Organics in sediment

**Waste Management Zone - Miles:****Description:****Assessment Comments****NON-SUPPORTED MILES**

East Creek: 7.0 - 4 miles below Chittenden Reservoir Dam (East Pittsford Project) and 3 miles below Glen Dam - non-support of aquatic biota, contact rec.(swimming), aesthetics, and non-contact recreation due to no, low, or fluctuating flows, desilting operations, thermal modification, DO problems (hypolimnetic withdrawal), metals & organics (0.1 miles) and sedimentation & turbidity from 3 hydro facilities, urban runoff, land development, and storage/spills of oils laden with PCBs (0.1 miles).  
c(300,500,1100,1200,1500) s(3200,4000,7410,8200,8400)

**PARTIAL SUPPORT MILES**

East Creek: 0.2 (below Lefferts) - partially supports aquatic biota, aesthetics, contact (swimming) and non-contact recreation due to low/inadequate flows below hydroelectric impoundment. c(1500) s(7400)

East Creek: 2.4 - below Patch Pond dam to confluence with Otter Creek - partial support of aquatic biota, aesthetics, contact and non-contact recreation due to no, low, and fluctuating flows, desilting operations. c(1100,1500) s(7410) Also threats to the lower 1.5 miles of this stretch due to toxics and sediments from urban runoff. c(100,1100) s(4000)

Mendon Brook: 3.3 - from Pico's snowmaking withdrawal point just below the National Forest boundary to the mouth of Brewers Brook - partial support of aquatic biota/habitat due to ski area water withdrawal. (Overlaps with 6.0 miles below). c(1500) s(7420)

**THREATENED MILES**

Mendon Brook: 6.0 - upstream from confluence with East Ck. - threats to unfiltered water supply, aquatic biota, aesthetics, and contact rec. due to turbidity & sedimentation, oils & organics, and habitat modifications from land development, recreational activities, and underground storage tanks. c(300, 1100,1600,1900) s(3200,8200,8700) Threats to aquatic biota due to City of Rutland water supply withdrawal- arbitrarily assigned 0.2 miles until threat or impact determined if any. c(1500) s(7430)

## East Creek

VT03-14

Hewitt Brook.: 3.0 - upstream from Chittenden Reservoir - threats to aquatic habitat and biota, aesthetics from sediment, siltation and turbidity caused by ski area related development and road/bridge construction activities. c(1100) s(3100,3200)

Tenney Brook: 2.0 - upstream from confluence with East Creek - threats to aquatic biota/habitat, aesthetics, all water supplies and contact recreation due to sedimentation & turbidity, habitat modifications, metals and organics from land development, urban runoff, and municipal landfill leachate. c(300,400,1100,1600) s(3200,4000,6300)

Tenney Brook: 0.2 - below Gleason Road water supply withdrawal - threats to aquatic biota and aesthetics due to flow alteration from water supply withdrawal. c(1500) s(7430)

## INFORMATION SOURCES

Hydro Assessment Vt.DEC 1987 - notes impairments to water quality, fisheries, aesthetic and recreation uses on East Creek from Lefferts Pond dam, Chittenden Reservoir/East Pittsford hydro, Glen dam hydro, and Patch Pond hydro. Low to no flows main cause of impairment.

Paul Cummings, Vt.DEC Water Resources Investigator - noted lack of good erosion controls on construction sites; impacts to Mendon Bk. (8801)

Dave Callum, Vt.F&W Fisheries Biologist - noted no flows to East Creek below Reservoir and above East Pittsford Dam. (8801)

Jim Pease, Vt.DEC Biomonitoring and Aquatic Studies Section - noted urban runoff threats to Tenney Brook and East Creek (9601)

Steve Fiske, Vt. DEC Biomonitoring and Aquatic Studies Section - provided macroinvertebrate sampling data and analysis (9601)

Kathy Fallon, Vt. DEC Water Quality Division - provided information on location of two surface water supply sources. (9601)

Designated Use Support Analysis for Vermont Ski Resorts, 1996 - miles of partial support due to Pico snowmaking withdrawal.

Stan Corneille, Vt DEC Waste Management Division - provided updated information on the former Rutland City Gas Works site (#770137). (9707)

Jim Surwilo, Vt DEC Waste Management Division - reported on the sampling results from Rutland Town unlined landfill on Post Street, Rutland. A spring 1997 water quality report showed "no obvious impacts to the surface water from the landfill."

## COMMENTS

The former Rutland City Gas Works site was a site where electrical capacitors and transformers were stored and serviced. Oils containing PCBs were also stored at this site. Sampling in May 1996 found PCBs and PAH in the sediments - none in the water column.

Ambient biomonitoring data on Tenney Brook at milepost 2.7 and 2.8 from June 1993 found support of the aquatic community. These sampling sites seemed to be above the areas with more urban impacts.

Could not find any specific information about the 15+ underground storage tanks over 20 years old that Tony Stout noted in a past assessment (8801). No tanks over 1100 gallons (and thus tracked by the Hazardous Materials section) were on the GIS map for the upper Mendon watershed. Any number of smaller heating oil tanks could be present however (500-1000 gallon types).

Note the large number of permitted stormwater discharges in this waterbody.

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	5.4	11.2	5.9	7.0	0.0
20	Aquatic biota	5.4	11.2	5.9	7.0	0.0
21	Fish consumption	29.5	0.0	0.0	0.0	0.0
42	Contact recreation	11.9	8.0	2.6	7.0	0.0
44	Noncontact recreation	19.9	0.0	2.6	7.0	0.0
50	Drinking water supply	23.5	6.0	0.0	0.0	0.0
62	Aesthetics	8.7	11.2	2.6	7.0	0.0
72	Agriculture water supply	21.5	8.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	29.5

## East Creek

VT03-14

Impairment Cause	Mag	Size (mi.)
Unknown toxicity	T	1.50
Priority organics	M	0.10
Priority organics	T	8.00
Nonpriority organics	T	2.00
Metals	M	0.10
Siltation	M	9.40
Siltation	T	11.00
Organic enrichment/Low D.O.	S	7.00
Flow alterations	H	12.90
Flow alterations	T	6.20
Other habitat alterations	T	8.00
Oil and grease	T	6.00

Impairment Source	Magnitude	Size (mi.)
Highway/road/bridge construction	M	3.00
Land development	H	7.00
Land development	T	11.00
Urban runoff/storm sewers	M	8.50
Urban runoff/storm sewers	T	2.00
Landfills	T	2.00
Flow mod. - hydroelectric	H	9.60
Flow mod.- snowmaking water withdrawal	M	3.30
Flow mod.- water supply water withdrawal	T	0.40
Waste storage/storage tank leaks	S	7.00
Spills	S	7.00

Point Source Description	NPDES No.
Rutland City WWTF 6.6 mgd	VT0100871
Killington Ltd return & cooling water	3-1259
26 permitted stormwater discharges!	sw

Nonpoint Source Name	Description
Pico ski area	Snowmaking water withdrawal

## Clarendon River Assessment Report

Waterbody No: VT03-15

Basin: 03-Otter

River Length (mi.): 17

Classification:

Description: Mouth to Headwaters &amp; Tribs

### Location Identifiers

County: Rutland

NRCS District: 2

ANR Enforcement District: 1

Regional Planning Commission: RUT

Fish &amp; Wildlife District: 2

### Assessment Information

Assessment Date: 9707

#### Assessment Types

Date Last Updated: 9/30/1997

Land use information and location of sources

Assessment Category: E

Occurrence of conditions judged to cause impairment

Water Quality Limited?

On 303(d) List? N

Monitored for Toxics? N

Aquatic Contamination

#### Toxics Testing

None detected

Waste Management Zone - Miles: 1.20

Description: below West Rutland WWTF

### Assessment Comments

#### THREATENED MILES

Clarendon River: 2.0 - upstream from mouth - threats to aquatic biota/ habitat, contact recreation, aesthetics, drinking and agricultural water supplies due to sediments and turbidity, metals, oil and grease from road and industrial area runoff. c(500,1900) s(4000,8300)

Clarendon River: 1.0 - downstream of Clarendon Springs - threats to aquatic biota/habitat, aesthetics due to silt and temperature increases from streamside vegetation removal and residential encroachment. c(1100,1400) s(3200,7700)

Clarendon River: 1.0 - Chippenhook area - threats to aquatic biota/habitat due to temperature, nutrients, pathogens, and silt due to pastureland through which the river flows. No woody vegetation next to the stream (meadow dominated by purple loosestrife) and cows have access all along the river in this area. c(900,1100,1400,1700) s(1000)

#### COMMENTS

Earlier assessments mentioned threats from a metal finishing shop and quarrying for crushed rock. Don Gallus said there is a crushed rock facility (Carrara's) but not that near the Clarendon and so he doesn't see how it would be a threat. There is a machine shop upstream of Carrara crushed rock, which is on the banks of the Clarendon, but no problems have ever been reported. There are no permits for either the quarry or metal finishing shop.

#### INFORMATION SOURCES

Carole Fowler, Vt DEC Wastewater Management division - found no discharge permits for Carrara or a machine or metal finishing shop to the Clarendon River. There is a permit for Carrara in North Clarendon for a discharge to an unnamed trib. to Otter Creek. (9707)

Don Gallus, Vt ANR Enforcement Division - information in Comments above (9707)

Cathy Kashanski, Vt DEC Water Quality Division - field observations on the Clarendon River (9707)

## Clarendon River

VT03-15

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	15.0	2.0	0.0	0.0	0.0
20	Aquatic biota	15.0	2.0	0.0	0.0	0.0
21	Fish consumption	17.0	0.0	0.0	0.0	0.0
42	Contact recreation	15.0	2.0	0.0	0.0	0.0
44	Noncontact recreation	17.0	0.0	0.0	0.0	0.0
50	Drinking water supply	15.0	2.0	0.0	0.0	0.0
62	Aesthetics	15.0	2.0	0.0	0.0	0.0
72	Agriculture water supply	15.0	2.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	17.0

Impairment Cause	Mag	Size (mi.)
Metals	T	2.00
Nutrients	T	1.00
Siltation	T	4.00
Thermal modifications	T	2.00
Pathogens	T	1.00
Oil and grease	T	2.00

Impairment Source	Magnitude	Size (mi.)
Agriculture	T	1.00
Land development	T	1.00
Urban runoff/storm sewers	T	2.00
Streambank modification/destabilization	T	1.00
Highway maintenance and runoff	T	2.00

Point Source Description	NPDES No.
West Rutland WWTF 0.325mgd 2 permitted stormwater discharges	VT0100714 sw

**Cold River  
Assessment Report**

**Waterbody No:** VT03-16 **Basin:** 03-Otter  
**River Length (mi.):** 16 **Classification:**  
**Description:** Mouth to Headwaters & Tribs

*Location Identifiers*

**County:** Rutland **NRCS District:** 2  
**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT  
**Fish & Wildlife District:** 2

*Assessment Information*

**Assessment Date:** 9707 **Assessment Types**  
**Date Last Updated:** 9/30/1997 Surveys of fish and game biologists or other professionals  
**Assessment Category:** E Land use information and location of sources  
**Water Quality Limited?** RBP III or equivalent benthos surveys  
**On 303(d) List?** N  
**Monitored for Toxics?** N

**Aquatic Contamination** **Toxics Testing**  
None detected

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

**Assessment Comments**

**THREATENED MILES**

Cold River: 2.5 - upstream from confluence with Otter Creek - threats to aquatic biota/habitat, aesthetics, water clarity, and contact recreation (swimming) from sedimentation & turbidity, flow alterations, habitat modifications from streambank erosion, road and railroad track crossings, land development, channelization, and runoff from industrial and commercial lands. c(1100,1900,2500) s(3200,4000,7700,8300)

Cold River: 3.0 - downstream of the area named Cold River on the atlas (where the road crosses the stream) - threats to aquatic biota/habitat and aesthetics from siltation, exotic species establishment (Japanese knotweed) due to road runoff, residential encroachment (including a horse yard), removal of riparian vegetation, c(1100,2600) s(3200,7700,8300)

**INFORMATION SOURCES**

Stuart Blacklock, Vt. FP&R Regional Park Manager - noted turbidity to Cold River and suspects industrial/commercial businesses as the source. (8801)

Jim Philbrook, Vt. FP&R Forester - noted streambank erosion of natural origin. (8801)

Glenn Brown & Winston Seeley - noted water quality related problems to lower Cold R. from increasing flooding and increased material deposits. (8801)

Don Gallus, Vt ANR Enforcement Division - said that the settling pond overflows noted by Bert Patry, Paul Cummings, and Dave Callum in the 1988 assessment is probably Samica. Long ago there were problems but that there have been none in recent years. (9707)

Dave Shepard, Vt DEC (formerly Waste Management Division) - stated that the General Electric hazardous material site listed in the 1988 assessment (disposal site for metal hydroxide sludge) is closed and there is no threat to the Cold River. Monitoring wells down gradient showed no problems. (9707)

Vt DEC Ambient Biomonitoring data - showed full support of the macroinvertebrate community at mile 6.8 on the Cold River. Data showed a threatened status on the North Branch of the Cold River at mile 0.6. Both sites were sampled in October 1993.

## Cold River

VT03-16

Cathy Kashanski, Vt DEC Water Quality Division - field observations of the land use, streamside threats to the Cold River in July 1997. (9707)

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	10.5	5.5	0.0	0.0	0.0
20	Aquatic biota	10.5	5.5	0.0	0.0	0.0
21	Fish consumption	16.0	0.0	0.0	0.0	0.0
42	Contact recreation	13.5	2.5	0.0	0.0	0.0
44	Noncontact recreation	16.0	0.0	0.0	0.0	0.0
50	Drinking water supply	16.0	0.0	0.0	0.0	0.0
62	Aesthetics	10.5	5.5	0.0	0.0	0.0
72	Agriculture water supply	16.0	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	16.0

Impairment Cause	Mag	Size (mi.)
Siltation	T	5.50
Oil and grease	T	2.50
Turbidity	T	2.50
Exotic species	T	3.00

Impairment Source	Magnitude	Size (mi.)
Land development	T	5.50
Urban runoff/storm sewers	T	2.50
Streambank modification/destabilization	T	5.50
Highway maintenance and runoff	T	5.50

Point Source Description	NPDES No.
US Samica (paper manufacture) 1.0 mgd 2 permitted stormwater discharges	VT0000442 sw

**Mill River  
Assessment Report**

**Waterbody No:** VT03-17 **Basin:** 03-Otter  
**River Length (mi.):** 24 **Classification:**  
**Description:** Mouth to Headwaters & Tribs

*Location Identifiers*

**County:** Rutland **NRCS District:** 2  
**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT  
**Fish & Wildlife District:** 2

*Assessment Information*

<b>Assessment Date:</b> 9707	<b>Assessment Types</b>
<b>Date Last Updated:</b> 9/30/1997	Information from local residents
<b>Assessment Category:</b> E	Surveys of fish and game biologists or other professionals
<b>Water Quality Limited?</b>	Occurrence of conditions judged to cause impairment
<b>On 303(d) List?</b> N	
<b>Monitored for Toxics?</b> N	
<b>Aquatic Contamination</b>	<b>Toxics Testing</b>
None detected	

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

**Assessment Comments**

**PARTIAL SUPPORT MILES**

Mill River: 3.0 (subset of 6.0 miles below) - from area where Mill river begins to parallel Rte. 103 upstream to just below the RR trestle - partial support of aquatic biota/habitat and aesthetics due to habitat alteration, increased temperatures from dredging and channelization following earlier floods. c(1400,1600) s(7100,7200)

**THREATENED MILES**

Mill River: 6.0 - upstream from confluence with Otter Creek to Cuttingsville - threats to aquatic biota/habitat, water clarity and aesthetics from sedimentation and turbidity by streambank erosion. c(1100,2500) s(7700)

**INFORMATION SOURCES**

Jim Philbrook, Vt Dept of Forests & Parks forester - noted unstable soils, bank sloughing and the need for stabilization. (8801)

District Fisheries Manager - noted huge clay slide, bank erosion, warm water, flooding and channel widening to Mill River. (8808)

Don Gallus, Vt ANR Enforcement Division - noted two major areas of streambank erosion (one just east of Long Trail gorge in Shrewsbury about 4 miles up from the mouth and another east of Cuttingsville). (9601)

Cathy Kashanski, Vt DEC Water Quality Division - observed shallow, wide nature of Mill River paralleling Rte. 103. Also noted erosion at bridge abutments. Spoke with a local angler who said that the river had been dredged and widened following a flood and the fishing had been ruined. (9707)

## Mill River

VT03-17

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	18.0	3.0	3.0	0.0	0.0
20	Aquatic biota	18.0	3.0	3.0	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	24.0	0.0	0.0	0.0	0.0
50	Drinking water supply	24.0	0.0	0.0	0.0	0.0
62	Aesthetics	18.0	3.0	3.0	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	6.00
Thermal modifications	H	3.00
Other habitat alterations	H	3.00
Turbidity	T	6.00

Impairment Source	Magnitude	Size (mi.)
Channelization	H	3.00
Dredging	H	3.00
Streambank modification/destabilization	T	6.00

Point Source Description	NPDES No.
Valley View Creamery-chlorinated cw 4 permitted stormwater discharges	sw



## Upper Otter Creek Watershed

VT03-18

Use No.	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	35.2	16.0	0.0	0.0	0.0
20	Aquatic biota	35.2	16.0	0.0	0.0	0.0
21	Fish consumption	51.2	0.0	0.0	0.0	0.0
42	Contact recreation	51.2	0.0	0.0	0.0	0.0
44	Noncontact recreation	51.2	0.0	0.0	0.0	0.0
50	Drinking water supply	51.2	0.0	0.0	0.0	0.0
62	Aesthetics	51.2	0.0	0.0	0.0	0.0
72	Agriculture water supply	51.2	0.0	0.0	0.0	0.0
82	Industry water supply	0.0	0.0	0.0	0.0	51.2

Impairment Cause	Mag	Size (mi.)
Siltation	T	16.00

Impairment Source	Magnitude	Size (mi.)
Streambank modification/destabilization	T	16.00

Point Source Description	NPDES No.
Omya Wallingford 0.24 mgd	VT0020141
Wallingford FD#1 WWTF 0.120mgd	VT0100552
Temper Hardware Co.-log pile drainage	VT0000507
1 permitted stormwater discharge	sw

**Appendix D**  
**Otter Creek Basin Groups and Their Activities**

