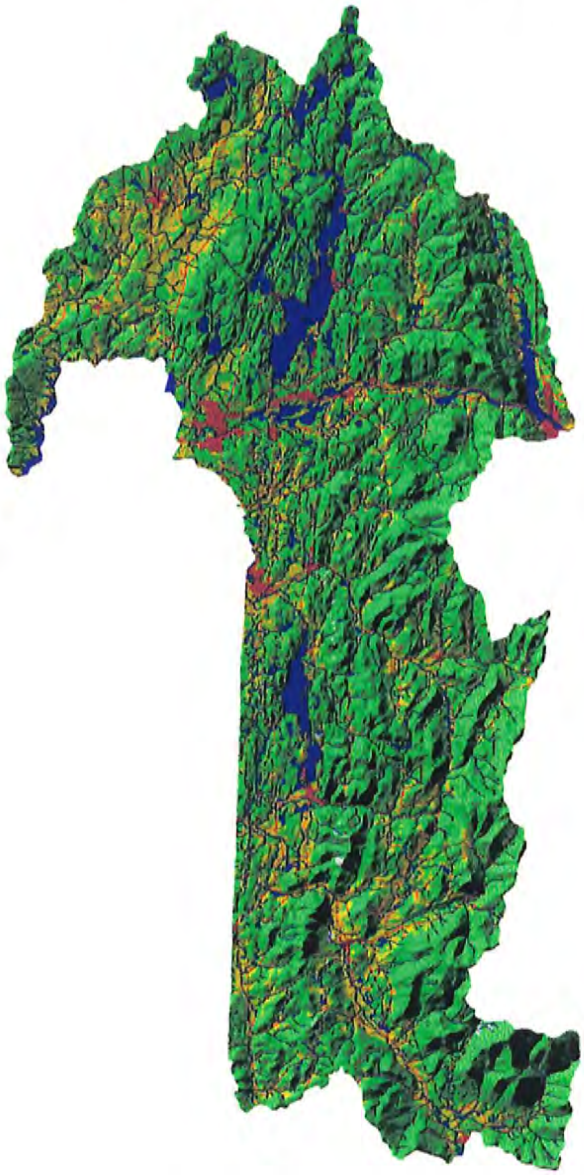
# Basin 2

## Poultney - Mettawee Watersheds Water Quality & Aquatic Habitat Assessment Report



Agency of Natural Resources
Department of Environmental Conservation
Water Quality Division

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## Contents

## *General Description of the Basin**

Basin 2 includes the Poultney River and Mettawee River watersheds and covers 373 square miles in Vermont. The Poultney River originates in Vermont and flows northwesterly into New York state entering South Bay of Lake Champlain near Whitehall, New York. The Mettawee River joins the Poultney River via the Champlain Barge Canal near Whitehall, New York. The Indian River, which originates in Vermont, joins the Mettawee River at Granville, New York. The Poultney-Mettawee Basin is located in the west central part of the State within the counties of Addison, Rutland and Bennington. The majority of the basin area lies in Rutland County.

There are a total of 25 lakes and ponds that are 20 acres and greater within the Vermont portion of the Poultney-Mettawee Basin. They total approximately 5250 acres. The largest is Lake Bomoseen (2,360 acres) followed by Lake St. Catherine (883 acres), Lake Hortonia (479 acres), Glen Lake (206 acres), Sunset Lake (202 acres), and Little Pond (177 acres).

### Poultney River Watershed

The Poultney River drains 236 square miles in Vermont and is 40 miles long within and along the borders of Vermont. It originates in the town of Tinmouth in the valley between Tinmouth and Spoon Mountains. From its source, the Poultney River flows northerly for about four miles and enters the town of Middletown Springs, from which point it flows westerly to its confluence with South Brook 6.7 miles downstream from its origin.

South Brook begins at the extreme southern tip of the town of Middletown and flows northerly to its confluence with the Poultney River. It is a small, meandering stream lined with alder and willow for much of its four mile length. South Brook has a drainage area of seven square miles.

The Poultney River continues westerly to Burnham Hollow, thence northwesterly and enters the town of Poultney, where at a point 6.2 miles downstream of South Brook, it is joined by Fennell Hollow Brook from the north.

Fennell Hollow Brook has a length of 5.5 miles and a drainage area of 6.5 square miles. This brook rises in the town of Ira on the western slopes of Herrick Mountain. From its source, Fennel Brook flows westerly into the town of Poultney where it flows southerly for the last two miles of its course prior to its confluence with the Poultney River.

Downstream of Fennell Hollow Brook, the Poultney River flows southwesterly passing the village of East Poultney, after which the river changes in character from a rapidly flowing stream to a meandering one.

* largely taken from the Poultney-Mettawee Water Quality Management Plan, April 1975.

Continuing southwesterly, the Poultney River passes the village of Poultney, where at a point three miles downstream of Fennell Hollow Brook, it arrives at the Vermont-New York state line. For the balance of its course, the Poultney River is the boundary between the two states.

After flowing northerly for 3.4 miles, the Poultney River is joined by Lewis Brook in the town of Fair Haven. This brook has a drainage area of 8.5 square miles and a length of 5.5 miles. From its source, in the northeastern portion of the town of Poultney, Lewis Brook flows southwesterly to its confluence with the Poultney River.

Downstream from Lewis Brook, the Poultney River flows northwesterly for 7.4 miles to its union with the Castleton River, about one mile west of the village of Fair Haven.

The Castleton River is the largest and most important tributary of the Poultney River, with a length of 20 miles and a drainage area of 99 square miles. The Castleton River is, throughout most of its length, a sluggish and meandering stream. It originates on the southeastern slopes of Biddie Knob in the town of Pittsford. From its source, it flows southerly through Whipple Hollow, entering the town of West Rutland. Proceeding through a large swamp northwest of West Rutland Village, the Castleton River turns west and flows into the town of Castleton, where at a point 11 miles from its source, it is joined by North Breton Brook from the north.

The Castleton River proceeds westerly, passing to the north of Castleton Village and south of Castleton Corners and Hydeville. Downstream of the latter village at a point four miles from North Breton Brook, it is joined from the north by its principal tributary, the Lake Bomoseen outlet stream. Although the length of this stream is only 0.4 miles, it has a drainage area of about 40 square miles, being the terminus of several brooks draining the many lakes and ponds of this area of Rutland County. Below the Lake Bomoseen outlet brook, the Castleton River flows westerly for the final five miles of its course, entering the town of Fair Haven where it passes through Fair Haven Village and joins the Poultney River.

From its confluence with the Castleton River, the Poultney River flows northerly for three miles into the town of West Haven, to Carver Falls, where it cascades over a total drop of 126 feet. From this point, the Poultney River proceeds westerly for 2.4 miles, where it is joined by the Hubbardton River, which enters from the northeast.

The Hubbardton River has a length of 17 miles and a drainage area of 45 square miles. Flowing generally southerly and southwesterly for its entire course, the Hubbardton River begins at a wetland in the town of Orwell, passes through the town of Benson and into the town of West Haven, to its juncture with the Poultney River. A tributary from Lake Hortonia joins the Hubbardton River in Benson.

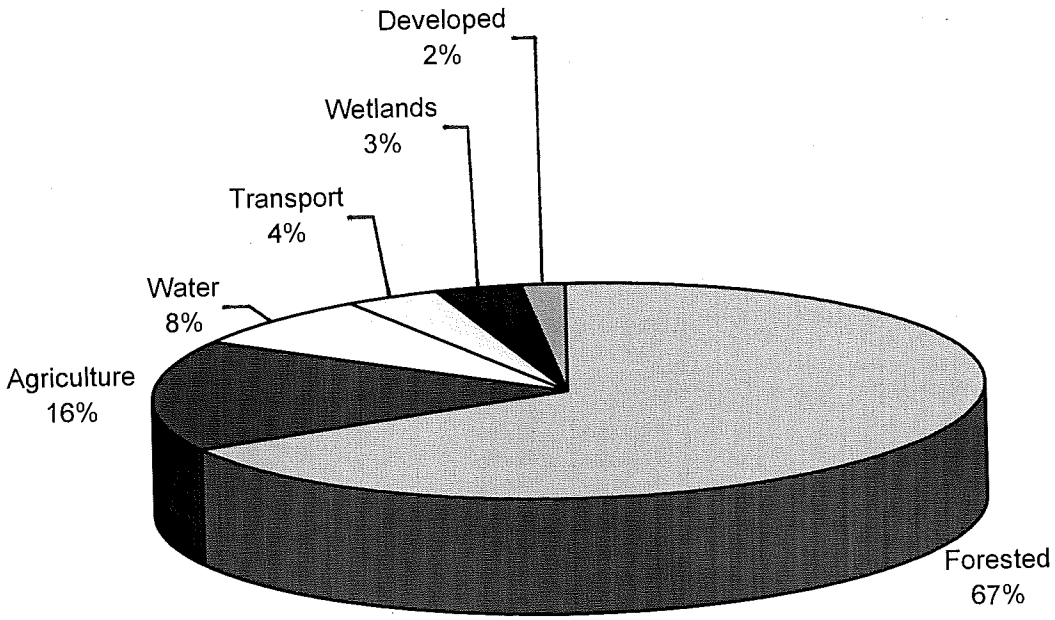
Below the Hubbardton River, the Poultney River flows westerly for 1.8 miles where it is joined by Coggman Creek which enters from the north.

Coggman Creek is a slow meandering stream with a length of 7.5 miles and a drainage area of 13 square miles. Originating on the flat plateau southwest of the village of Benson in the town of Benson, Coggman Creek flows southwesterly into the town of West Haven, where it turns southerly for the last two miles of its course prior to joining the Poultney River.

Proceeding generally southerly for 6.1 miles, the Poultney River is joined by the Champlain Canal in New York, which enters from the south. From this point, the Poultney River flows northwesterly for two miles to its terminus in Lake Champlain, adjacent to South Bay.

The land use information generated through the Vermont Land Cover Classification Project shows that the Poultney River watershed is predominantly forested with 67% of the watershed area either deciduous or evergreen forest.* A significant portion of the watershed land use, 16%, is agricultural. Surface water covers about 8% of the watershed and wetlands comprise 3%. Transportation and other developed land covers about 6% of the watershed.

**Figure 1. Land Use and Land Cover in the Poultney River Watershed in Vermont**




* The data were released in 1997 although the land cover information is from 1991-1993 satellite photographs.

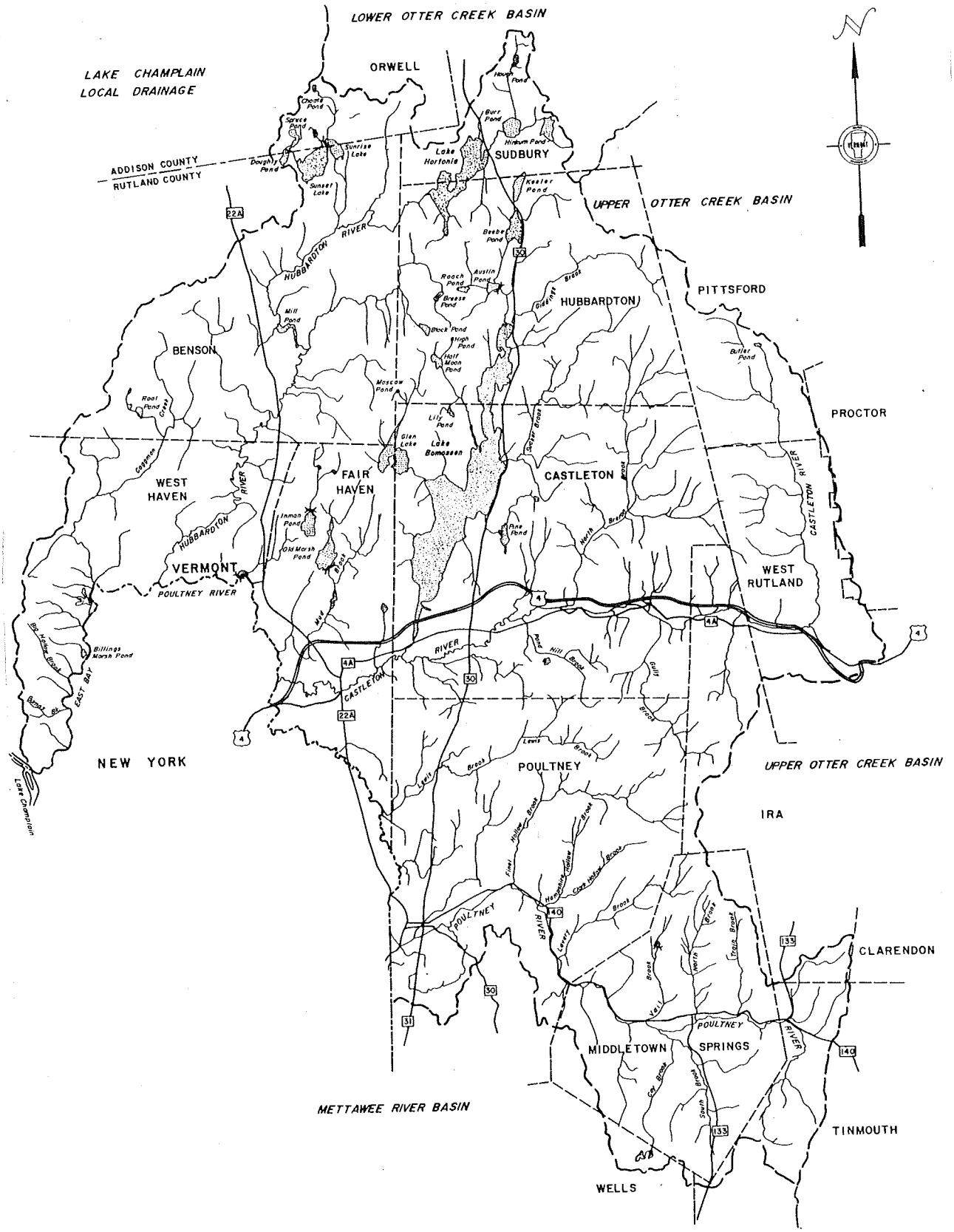



**Figure 2. Poultney River Watershed in Vermont**

## The Mettawee River

The Mettawee River has a length of 17 miles within Vermont and has a drainage area within the state of 137 square miles. It originates on the southern slopes of Dorset Mountain near the northern boundary of the town of Dorset. From its source, the small stream tumbles rapidly down the mountainside, flowing in a southerly direction through Dorset Hollow and westerly onto the valley floor, entering the town of Rupert in East Rupert. In East Rupert, the Mettawee River becomes a slower and more meandering stream. It flows northwesterly through the town of Rupert and into the town of Pawlet. At a point 9.5 miles from its source and adjacent to the village of Pawlet, it is joined by Flower Brook from the east.

Flower Brook is seven miles long and has a drainage area of 19 square miles. This brook begins on the southern slopes of Tinmouth Mountain in the town of Tinmouth, and flows southerly into the town of Danby. After passing between Mount Hoag and Dutch Hill, Flower Brook flows southwesterly into the town of Pawlet to its confluence with the Mettawee River. Flower Brook is a flashy stream that has had a history of producing minor flooding.

Proceeding west then north from Pawlet Village, the Mettawee River forms a wide "S" loop at Butternut Bend and continues under Vermont Route 153. It passes through a rocky gorge and continues to the point where Wells Brook enters from the northeast, 6.9 miles downstream of Flower Brook.

Wells Brook is the largest tributary to the Mettawee River. This brook, generally flashy upstream of Wells Village, begins in the town of Tinmouth on the western slopes of Tinmouth Mountain. It flows southwesterly to the Wells town line, westerly past the village of Wells, and to a point nine miles from its source. Here it is joined by Mill Brook from the northeast.

Mill Brook is the outlet brook of the Lake St. Catherine chain of lakes. It is two miles long and has a drainage area of 26.5 square miles.

From its confluence with Mill Brook, Wells Brook proceeds southerly into the town of Pawlet, where one mile downstream of Mill Brook, it joins the Mettawee River. Wells Brook has a total length of ten miles and a drainage area (including Mill Brook) of 34 square miles.

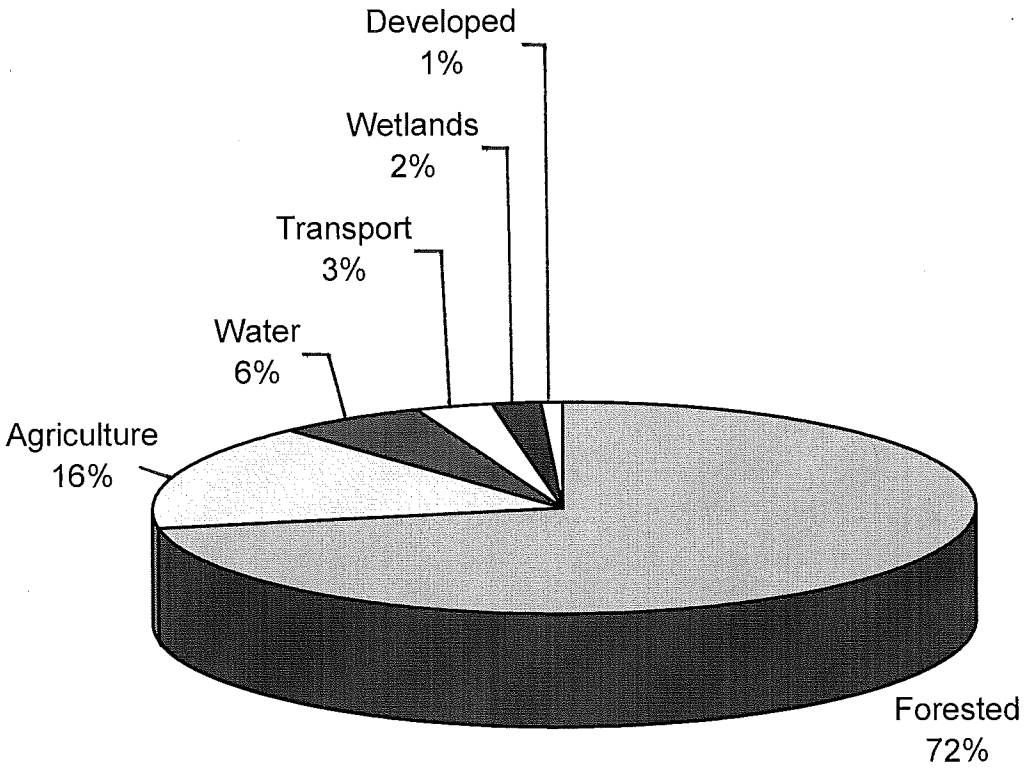
Continuing westerly, the Mettawee River enters the State of New York at a point 0.6 mile below Wells Brook, and proceeds to its eventual union with the Champlain Canal south of Whitehall, New York.

Another tributary of the Mettawee River within Vermont is the Indian River, which joins the Mettawee at Granville, New York. The Indian River is generally a meandering stream seven miles long in Vermont. It drains 39 square miles of land within the state. This stream begins at the watershed divide just north of the village of Rupert and proceeds northerly into the town of Pawlet entering New York at West Pawlet Village.

The Mettawee River watershed in Vermont is a little more forested than the Poultney River with 71% of the watershed either deciduous or coniferous forest. The land used for agricultural purposes is about the same - 16% of the watershed area. Surface water covers 6% of the Mettawee watershed and wetlands cover 2%. Transportation and other developed land comprise 4%.

Tables showing the land use acres and percentages for both the Mettawee and the Poultney watersheds are in Appendix A.

**Figure 3. Land Use and Land Cover in the Mettawee River Watershed in Vermont**



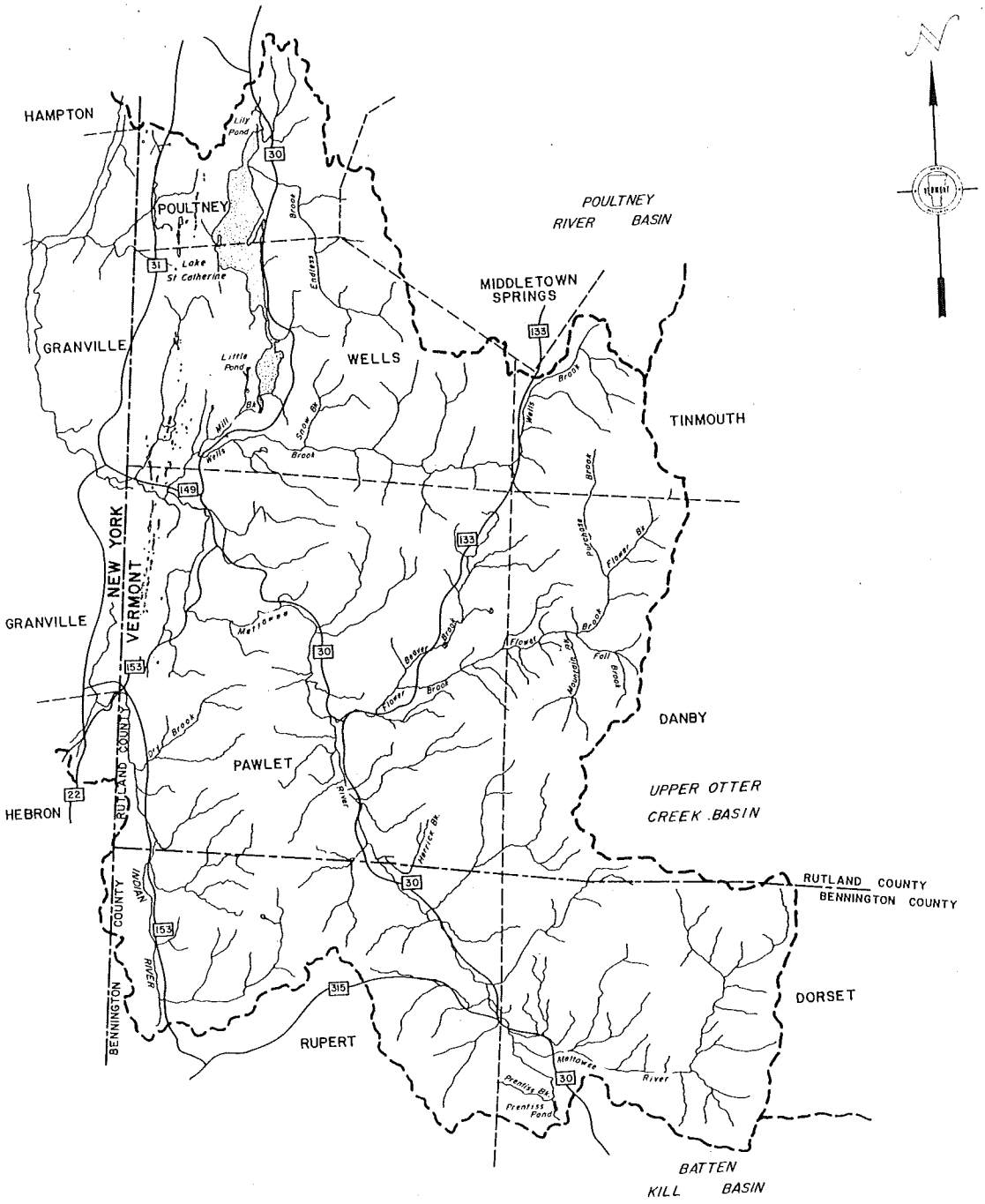



**Figure 4. Mettawee River Watershed in Vermont**

## *Wetland Natural Communities*

Some of the finest wetlands in the state can be found in the Poultney/Mettawee Basin including the Lake Bomoseen marshes, Dorset Marsh, West Rutland marshes, Beaver Meadow, Little Pond and Parsons Mill Pond. The wetlands of this basin can be grouped into four major areas: wetlands associated with the large lakes at the northern end of the basin; wetlands along the Castleton River including the West Rutland Marsh complex; wetlands within the slate quarry belt; and the southern wetlands ending with Dorset Marsh.

Statewide inventories of specific community types have included floodplain forest communities. The East Bay floodplain forest along Lake Champlain in the town of West Haven and the Pawlet Sycamore Forest along the Mettawee River are two important examples. A 1995 study of calcareous open fens and riverside seeps identified two calcareous fens in the Poultney River watershed. Both are in the town of Dorset and are excellent examples of rich fens. A clayplain forest community was found in West Haven. This is one of the natural bottomland forest types formerly found extensively throughout the Champlain Valley.

***Lakeside Floodplain Forest***


The aquatic bed marshes at the north end of Lake Bomoseen are the largest in the state. The 1989 drawdown of Lake Bomoseen had a severe impact on these marshes. This wetland system was one of the most diverse wetland habitats for wildlife and plants in Vermont, but after the drawdown, which killed large quantities of native plants, Eurasian watermilfoil became a severe problem. One state threatened and one state endangered plant species are found in these wetlands.

As of this report, Dorset Marsh is the only listed Class One wetland in the state. A local citizens group successfully petitioned in 1992 to achieve that status. The Water Resources Board found the functions and values provided by this wetland complex highly significant. According to the Vermont Nongame and Natural Heritage Program, the marsh contains three uncommon plant species. Interestingly, the southern end of the marsh drains to the Battenkill while the northern end drains to the Mettawee.

The large wetland complex known as the West Rutland Marshes contains a high diversity of species and habitat for the sedge wren. Unfortunately industrial activities have had an impact on this wetland along the eastern and southeastern ends. Many areas are now overgrown with *Phragmites*, a tall reed with little wildlife value.

A large vein of slate winds its way through the Poultney watershed. The National Wetlands Inventory maps for this area show many small wetlands, however, many of these areas are settlement ponds and are not functioning wetlands. Quarry operations have had a heavy impact on many forested wetlands that were once in this area.

Overall the health of the wetlands in this watershed remains good except for the situations described above. Few projects have been proposed that have resulted in significant acreage of wetlands being altered. The area has an informed citizenry that actively educates the public to the benefits of wetlands in the region.

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

The Lower Poultney River has been designated as an Outstanding Resource Water (ORW) due to its exceptional natural, cultural and scenic values. The Lower Poultney River ORW begins at the Poultney/Fair Haven town line and extends 22 miles downstream to a headwater region of Lake Champlain, referred to as the "elbow" (an area of the river that turns north toward Lake Champlain).

The Lower Poultney River has one of the longest segments of natural river corridor in Vermont. Canoeing is excellent in this segment, and this corridor provides natural habitat for a diversity of plants and animals. Directly north of the Delaware and Hudson Railroad crossing is an interesting geologic area known as the "Slide/swimming flume." This is a rock outcrop in the stream bed, which has had much recreational use. It is also a historic area, having been used as a baptismal site by the Seventh Day Adventist Church, formed in 1831 by their prophet William Miller. His church near the river is now on the National Register of Historic Places.

Several other exceptional geological features are found downstream of the "Slide/swimming flume," including "Ranney's Rocks" (which includes mud turbidites and boudinage structure), "Layered Cliffs", "Poultney River Folds/Deep Sea Fan", "Carver Falls", and "Limestone Cliffs." Carver Falls, the highest major falls in Vermont, contains two falls at the head of a limestone gorge. The falls have been altered by hydropower development since 1894. For 100 years before that date, they were harnessed to drive mill operations. The river above and below the falls lies in deep ravines. A cave in a limestone cliff above the river is located about one mile

below the falls. Indian artifacts have been found in the cave, as well as in the vicinity of Carver Falls and in fields by Hackadam Road. Sunken boats from the War of 1812 can be seen at certain times of the year at the "elbow". These artifacts are on the National Register of Historic Places.

Much of the land bordering the Lower Poultney River is forested or wetlands. The river corridor has a diversity of flora and fauna. The watershed includes many natural communities including floodplain forests, oak-hickory forest, rich northern hardwood forest, birch-beech-maple forest, emergent marsh, hardwood-cedar swamp, shrub swamp, calcareous outcrop and talus slope. A state-identified deer yard is adjacent to the Poultney River in West Haven. Extensive wetland complexes are adjacent to and are interdependent with the Poultney River in Fair Haven and West Haven: Steves Marsh, Blue Hole, Schoolhouse Marsh, Corroscaden Marsh, Billings and Reed Marshes, Coggman Pond and Cemetery Cedar Swamp. Cemetery Cedar Swamp drains to the Poultney in Fair Haven, between Routes 22A and 4. The Vermont Nongame and Natural Heritage Program lists Cemetery Cedar Swamp as one of the largest cedar wetlands in Vermont.

The fishery in the Poultney River is diverse and rich - over 55% of the fish species that occur in Vermont are found in the Poultney River.

A small gorge, cascades and swimming hole are located on Lewis Brook in the town of Poultney approximately three miles upstream of its mouth. The site is amidst private land and there is no public access. Lewis Brook enters the Poultney approximately 2 miles upstream of Cemetery Cedar Swamp.

A deep gorge with a waterfall and cascades is located on the Poultney River at an old mill site in the center of the village of East Poultney. It can be seen from the bridge crossing over it. This is an attractive site, with impressive cliffs but not accessible for swimming. Just upstream of the village, and continuing for approximately one mile, are located a series of gorges, waterfalls, pools and cascades. Two or three of these sites are accessible for swimming. There is a pretty little cascade, waterfall and approximately 20 foot deep gorge on an unnamed tributary to the Poultney River just north of the village of East Poultney.

Middletown Springs, six miles upstream of the village of East Poultney, is the site of historic mineral springs. The springs were in the middle of the village, at the junction of the Poultney River and North Brook. A park was developed here at the turn of the century, when the springs were popular with tourists. There is only one active spring now, which draws an occasional curious tourist. The river is shallow here, and only allows wading.

A swimming area is located at the confluence of Mill Brook and the Mettawee River in Pawlet. Approximately one mile upstream of this juncture is Button Falls on the Mettawee River. It is a large cascade at the head of a small gorge with a deep pool below.

A small gorge with a cascade is located on Flower Brook, tributary to the Mettawee River, in the village of Pawlet. The gorge is an old mill site, with a dam at the upper end, and is spanned by the village general store. The site is presently operated for hydroelectricity, and a penstock bypasses the gorge.

Sucker Brook Cascade is located in the town of Castleton on Sucker Brook, which discharges to Lake Bomoseen. The site is described by Jerry Jenkins: "Approaching the cascades from upstream, there are first a few cascades between three and six feet in height. Then the stream separates into three narrow channels and falls three to four feet, and then these channels unite and there is a steep cascade about 12 feet. Then there is a steep-sided ravine approximately 20 feet deep and 150 feet long, with some nice pools. Below the ravine, the stream enters a swamp... Before the land was posted, the cascade was a popular recreational area and was used for camping, swimming, picnicking and parties." There is no public access.

Giddings Brook, a stream that discharges to the northern portion of Lake Bomoseen in the town of Hubbardton contains pretty cascades, ledges and pots used for swimming, approximately three-quarters mile above the lake.

Bretton Brook, a tributary to the Castleton River in the town of Castleton, contains a small bathing pool approximately 4 feet deep below an old mill dam with a few ledges on either side; undeveloped but right next to the road.

## *Special Uses and Values of Basin Lakes and Ponds*

VTDEC's Lake Protection Classification System is a framework within which lakes can be evaluated for their significance when compared to other lakes statewide. The Lake Protection Classification System identifies unique lakes based on their wilderness status, the occurrence of scenic and natural features, the existence of very high water quality, and the presence of rare, threatened and endangered species. Several of the lakes in Basin 2 are notable, mostly due to the presence of rare or threatened aquatic plants.

Black Pond, Hubbardton:
This small 20 acre pond supports a population of the rare pondweed *Potamogeton friesii*. The most recent verification that this plant still occurs in Black Pond was in 1993. The presence of a small, actively managed Eurasian watermilfoil population on this lake poses a specific threat to the rare pondweed.

Lake Bomoseen, Castleton:
Lake Bomoseen supports two rare or threatened macrophyte species: the pondweed *Potamogeton friesii,* which was last documented in 1990; and the horned pondweed *Zannichellia palustris*, for which only one record from 1977 exists. Given the extent of the Eurasian watermilfoil problem in Lake Bomoseen, both pondweeds can be assumed to be highly threatened. This lake supports a myriad of recreational uses.

Burr Pond, Sudbury:
Burr Pond, with its adjacent large wetland, supports three rare or threatened macrophytes. *Potamogeton friesii* was last documented in 1997. The coontail *Ceratophyllum echinatum* was last documented in 1997, while the aquatic buttercup *Ranunculus longirostris* was last seen in 1995. These plants appear to have remained a component of the Burr Pond flora despite the severe milfoil infestation there.

Doughty Pond, Orwell:
This small 17 acre pond is partially contained within the Pine Woods Wildlife Management Area. It is noteworthy in that the lake is completely undisturbed, and is accessible only by foot. The lake itself is surrounded by a perimeter of Sphagnum, on which can be found numerous sundew and pitcher plants. This lake is highly tannic, which is anomalous for this region of Vermont.

Echo Lake (Keeler Pond), Hubbardton:
The aquatic buttercup *Ranunculus longirostris* was last seen in Keeler Pond in 1989. Eurasian watermilfoil is a threat in this pond.

Glen Lake, Castleton:
This lake supports a population of *Potamogeton friesii*, which was last observed in 1990. In addition, the northwest shore of the lake is quite scenic, with a small cliff band which overlooks the lake. The majority of the Glen Lake shoreline is in state ownership, as a component of the Lake Bomoseen State Park. Eurasian watermilfoil is a threat in this lake.

Hinkum Pond, Sudbury:
Hinkum Pond is a spectacular wilderness-like pond located in the center of a privately-owned, 2,000 acre undeveloped forest. These 2,000 acres are themselves adjacent to another 1,500 acre block, the ownership of which is presently split between the Audubon Society and the Nature Conservancy. The entire Hinkum Pond watershed is presently protected.

Hinkum Pond is characterized by very clear water, and an extremely scenic lake bottom. The lake supports 32 species of macrophytes, and is free of Eurasian watermilfoil, water chestnut, or zebra mussels at this time. It does, however, support the non-native (but non-nuisance) chestnut banded snail *Viviparus georgiensis*. The lake supports a very healthy bass fishery, which is unmanaged and self sustaining. Hinkum Pond is considered a biological reference lake for Vermont's Lake Biocriteria System. Public access to Hinkum Pond is restricted, and is allowed only by permission from the owners of the property which surrounds the lake.

Lake Hortonia, Sudbury:
Lake Hortonia, despite its severe infestation of milfoil, supports the following aquatic plants: the waterweed *Elodea nuttalii* (last documented in 1984); the burr-reed *Sparganium natans* (last observed in 1984), *Potamogeton friesii* (last seen in 1995); and the pondweed *Potamogeton hillii* (last observed in 1991). All of these species are highly threatened by Eurasian watermilfoil.

Inman Pond, Fair Haven:
This Class A water supply pond is notable due to its steep slopes which drop dramatically into the lake. Access to Inman Pond is restricted, and the lake is closed to all public use.

Love's Marsh, Castleton:
This large wetland which is attached to Lake Bomoseen hosts *Ceratophyllum echinatum*, a rare Vermont plant. Eurasian watermilfoil is a threat in this marsh.

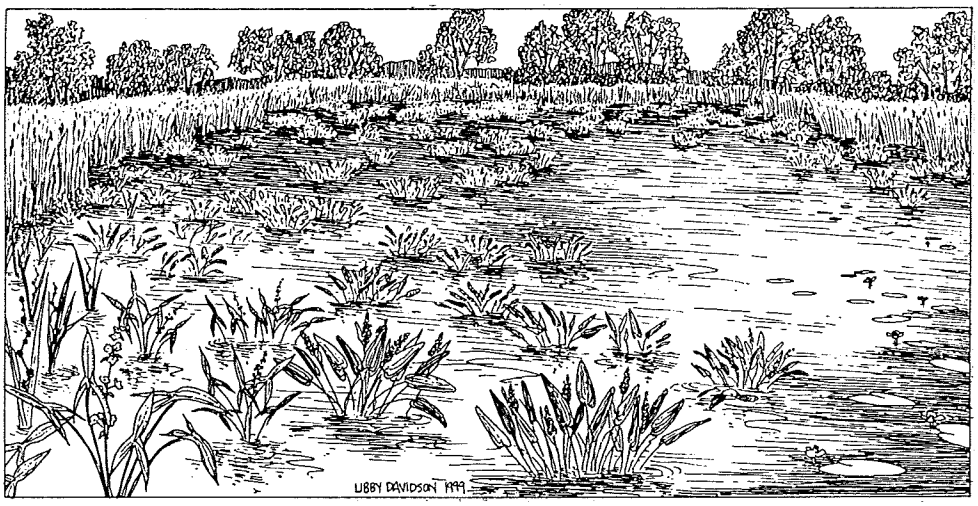
Lake St. Catherine, Wells:
Lake St. Catherine supports the rare non-nuisance milfoil *Myriophyllum farwellii.* This species, last seen in 1984, can be considered to be highly threatened due to the level of Eurasian watermilfoil infestation in the St. Catherine Lake chain. This lake supports a wide variety of recreational activity.

Sunrise Lake, Benson:
This lake supports the Southern naiad *Najas guadalupiensis.* This plant was last observed in 1993, and may be threatened by the Eurasian watermilfoil present in the lake.

Sunset Lake, Benson:
Sunset Lake is a scenic lake with very high water quality. While numerous camps occupy the well-developed shoreline, there exists a very scenic lake bottom in a number of locations on the lake. In addition, a dramatic steep slope descends into the northeast and northwest sections of the lake. This is a very popular swimming lake. Eurasian watermilfoil is present and threatens this lake.

Spruce Pond, Orwell:
This small, undeveloped, wilderness pond is completely surrounded by forestland. The setting is remarkably beautiful. The land surrounding the pond is in state ownership, as part of the Pine Woods Wildlife Management Area. A small dirt road approaches the pond from the northwest, and this appears to recently have been improved, but is limited to four wheel drive traffic at best. Spruce Pond has a fine diversity of aquatic macrophytes. In addition, the lake is highly tannic, which is anomalous for this part of the state.

***Broad Leaf Marsh***



## *Population and Housing Growth in the Basin*

Between 1980 and 1990 in the Poultney River watershed towns in Vermont, the population grew between 2% (Fair Haven) and 18% (Castleton and Hubbardton) and housing units grew between 12% (Fair Haven) and 33% (Benson) (tables in Appendix C). Some of the population and housing growth rates appear high in part because the actual population or housing unit number was relatively low to start. Those smallest communities aside, the town of Castleton had some of the highest growth in terms of people and housing units in the watershed. The effect of the high growth in Castleton will likely be on Lake Bomoseen, the Castleton River and its tributaries unless adequate surface water protection is in place locally. The 1996 Castleton town plan has as a goal to "reduce erosion and siltation of shorelines and streambanks..." and to "regulate commercial and residential development in the lake district to ... insure water quality standards" among other goals and objectives. The plan also notes that continued health of the fishery in Lake Bomoseen, the Castleton River, Belgo Brook and other streams "depends upon the maintenance of streambanks and water quality." The zoning regulations that would implement water quality and aquatic habitat protection, however, are old (1987) and so do not follow through on the town plan goals at this time leaving surface waters vulnerable to growth impacts.

In the Mettawee River watershed, the towns of Dorset and Wells had very high rates of growth between 1970 and 1980 (27% and 46% respectively) and between 1980 and 1990 (16% and 11% respectively). The housing unit growth was also high between 1980 and 1990 in the four towns that cover most of the watershed with the number of units increasing between 19% and 23%. Only the Dorset town plan has strong water resource protection goals and strategies that might mitigate the impacts of some of the town's growth. Dorset's zoning regulations, however, do not yet follow through on most of the plan's policy statements. The Wells town plan does address the need for water resource and wetland protection but specific strategies are not identified and the town does not have any zoning.

## *River Water Quality Impairments or Threats*

The two greatest causes of impairments and threats to the rivers and streams of Basin 2 (both the Poultney and Mettawee watersheds within Vermont) are nutrients and sediments. The origins or sources of these pollutants include agricultural activities, streambank destabilization, riparian vegetation removal, and municipal wastewater treatment facilities (tables in Appendix B). Both the Poultney and Mettawee watersheds have a relatively high percentage of their land area in agriculture and so it is not surprising that agriculture leads the list of sources of threats and impacts. Streambank destabilization and riparian vegetation removal (the number 2 and 3 "sources" of pollutants) are a consequence of not only agricultural land use but land development encroaching on riparian areas as well.

Two of the five wastewater treatment plants in the Vermont portion of the basin have had problems over the past five years or so resulting in discharges of pathogens, nutrients and organic material above levels allowed. The Fair Haven Wastewater Treatment Facility (WWTF) Adams Street pump station has had overflows resulting in raw sewage going into the Castleton River. Some of the sewer laterals that are receiving infiltration will be replaced and the pump station is also being upgraded to increase the pumping capacity. Flows at the

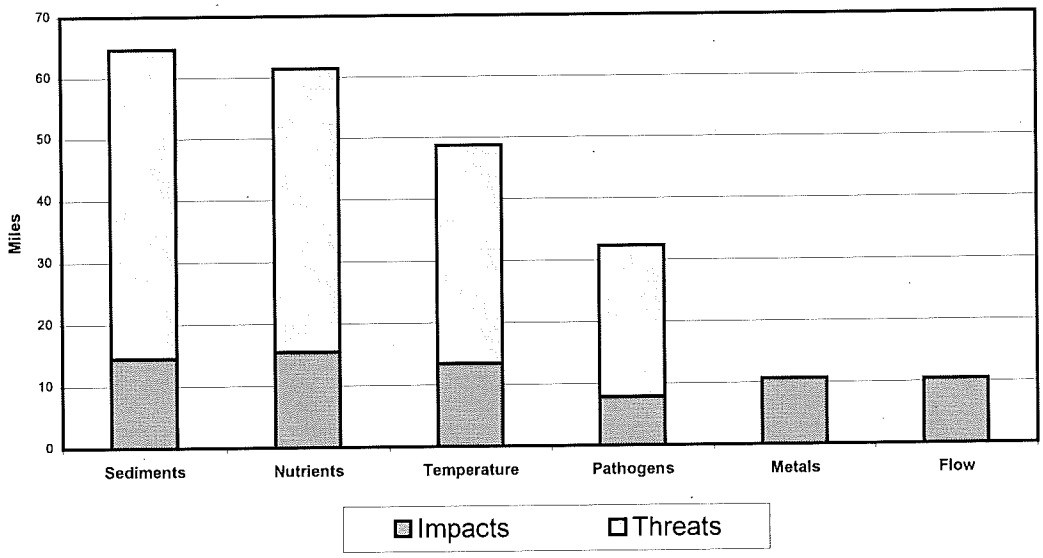
Poultney WWTF have exceeded design flows frequently, sometimes reaching flows that are three times permitted levels due to inflow and infiltration. There were instream E. coli violations each year from 1994 to 1997 due to the design flow exceedances. The plant will be going to phosphorus removal and will be extensively refurbished at the same time. The town will also be looking to reduce the inflow and infiltration by addressing roof drain connections and sump pumps among other sources.

Metals, mercury primarily in this basin, are the fourth largest cause of impairment to basin waters. The source is atmospheric transport of mercury from coal power plants in the midwestern United States into surface waters where it gets into the aquatic food chain. There is a fish consumption advisory for walleye in the lower part of the Poultney River due to the amount of mercury in the fish tissue. This advisory suggests no consumption for women of child-bearing age and children age 6 and under. There is also a statewide advisory restricting the number of meals per month that applies to "all other fish" (other than the six species with specific advisories) due to mercury.

Flow alteration is the fifth largest cause of impairment to basin waters and that is from the Carver Falls hydroelectric facility. This impact should be eliminated once the Federal Energy Regulatory Commission (FERC) license is re-issued and the operation goes to run-of-the-river but until then the low flow and flow alterations impair downstream river uses.

Another impact, the degree of which has not yet been determined, is that of the old Fairhaven landfill. The landfill actually forms part of the bank of the Castleton River and trash from this site is in the channel - glass, metal, tires. The pH measured at this location by students from Fair Haven was 9.0. The site and river stretch adjacent to the site needs further investigation.

**Figure 5. Major Causes of Impacts and Threats to Basin 2 Rivers and Streams**



## *Status of Support of Designated Uses - Rivers*

For each river use or value that is assessed, the miles of river or stream fully supported, threatened, partially supported or not supported are determined. For example, river miles that are fully supported for aquatic biota have macroinvertebrate and fish communities in good to excellent health. River miles that are fully supported for swimming have no known high levels of E. coli, a bacteria that is used as indicator for pathogens. Table 1 below gives the miles in these categories for seven uses or values: aquatic biota and/or habitat, contact recreation (swimming, tubing), secondary contact recreation (boating, fishing), aesthetics, fish consumption, drinking water supply and agricultural water supply. The use called "overall" reflects the miles for which one or more of the uses are not supported, partially supported, threatened or fully supported.

In the Poultney/Mettawee Basin, only 3.6 miles are not supporting one or more uses; 26 miles are partially supporting one or more uses; 57.8 miles are threatened; and 126.5 miles are fully supported. Aquatic biota and/or habitat are threatened or impaired* over the most miles. Aesthetics are threatened or impaired over the second largest number of miles. The problems and their sources that are causing the threats or impacts were discussed above and are in the tables in Appendix B.

**Table 1. Use Support Status of Basin 2 Rivers and Streams**

| Use | Miles of full support | Miles threatened | Miles of partial support | Miles of non-support | Miles not assessed |
|---|---|---|---|---|---|
| Overall | 126.5 | 57.8 | 26.0 | 3.6 | 0.0 |
| Aquatic biota/habitat | 127.4 | 59.3 | 23.7 | 3.5 | 0.0 |
| Contact recreation | 166.5 | 29.0 | 15.4 | 3.0 | 0.0 |
| Secondary contact recreation | 175.8 | 17.1 | 21.0 | 0.0 | 0.0 |
| Fish consumption | 203.5 | 0.0 | 10.4 | 0.0 | 0.0 |
| Aesthetics | 151.5 | 14.9 | 14.7 | 3.6 | 0.0 |
| Drinking water supply | 0.0 | 2.5 | 0.0 | 0.0 | 211.4 |
| Ag water supply | 0.0 | 2.5 | 0.0 | 0.0 | 211.4 |

* In the 305(b) assessment process, partial or non-support of uses is considered an impairment of those uses. The determinations are made using a wide range of information and data (from best professional judgement to rigorous biological monitoring). The stretches of river and stream that are partially or not supported as determined with sound and recent monitoring data are those considered impaired for inclusion on the Vermont 303(d) List of Impaired Waters.

## *Lake Water Quality Impairments or Threats*

The primary causes of threats or impacts to lakes in the Vermont portion of Basin 2 are directly related to non-native nuisance aquatic species. Eurasian watermilfoil *(Myriophyllum spicatum*), water chestnut (*Trapa natans*), and the invasive zebra mussel (*Dreissena polymorpha*) have been found in many of the inland lakes in this basin. Of these species, Eurasian watermilfoil is presently the most problematic in terms of the number of infested acres. In sum, 1,332 acres in Basin 2 are impacted by non-native nuisance aquatic species.

Indeed, the Poultney and Mettawee River Basin has the highest concentration of lakes with dense populations of milfoil statewide. The infestation in four waters, Lakes Bomoseen, St. Catherine, and Hortonia, and Burr Pond, are among the most problematic and use-limiting milfoil infestations of any in Vermont. Other impacts to lakes in this region include mercury contamination in fish, which impacts 1,085 acres, and siltation, which threatens 232 acres. Table II in Appendix B summarizes the causes of impacts to the lakes in this basin.

The major sources of these impairments* are boating and recreational activities, which cause the spread of nuisance non-native species, and atmospheric deposition of mercury, which has resulted in the need for fish consumption advisories. Table B.IV. summarizes the sources of impairments to lake designated uses in the Poultney and Mettawee Basin.

## *Status of Support of Designated Uses - Lakes*

Table 2 summarizes those lake acres which are threatened or do not fully support designated uses. Of the total 5,410 lake acres in the Poultney/Mettawee Basin, 1980 are threatened, 236 partially support designated uses, and 727 acres do not support designated uses.

**Table 2. Use Support Status of Basin 2 Lake Acres**

| Use | Acres Fully Supporting Uses | Acres with Uses Threatened | Acres Partially Supporting | Acres Not Supporting Uses | Acres Not Assessed |
|---|---|---|---|---|---|
| Overall Uses | 2467 | 1273 | 943 | 727 | 0 |
| Aesthetics | 2749 | 1910 | 24 | 727 | 0 |
| Aquatic Life Use Support | 2643 | 2016 | 24 | 727 | 0 |
| Agricultural Water Supply | 0 | 0 | 0 | 0 | 5410 |
| Drinking Water Supply | 85 | 0 | 0 | 0 | 0 |
| Fish Consumption | 4325 | 0 | 1085 | 0 | 0 |
| Filtered Water Supply | 0 | 0 | 0 | 0 | 5410 |
| Industrial Water Supply | 0 | 0 | 0 | 0 | 5410 |
| Secondary Contact Uses | 3441 | 1208 | 34 | 727 | 0 |
| Swimming Uses | 3441 | 1208 | 34 | 727 | 0 |

* see footnote on previous page

To provide background information on individual lakes in this basin, a summary of overall use support by individual lake is provided in Table 3 below. The majority of lakes in the basin are considered monitored, meaning that some new water quality data, plus observational or anecdotal information, is available from within the past five years. The following sections describe the most important impacts to specific Poultney and Mettawee River Basin lakes.

**Table 3. Overall Use Support Status for Individual Lakes**

| Lake Name | Lake Area | Last Assessed (YYMM) | Assessment Type | Fully Supporting | Partially Supporting | Not Supporting |
|---|---|---|---|---|---|---|
| AUSTIN | 28 | 9812 | Monitored | 28 | 0 | 0 |
| BEEBE (HUBDTN) | 111 | 9812 | Monitored | 111 | 0 | 0 |
| BILLINGS MARSH | 56 | 9903 | Evaluated | 56 | 0 | 0 |
| BLACK (HUBDTN) | 20 | 9812 | Monitored | 19 | 1 | 0 |
| BOMOSEEN | 2360 | 9908 | Monitored | 2060 | 0 | 300 |
| BREESE | 12 | 9903 | Evaluated | 12 | 0 | 0 |
| BURR (SUDBRY) | 85 | 9908 | Monitored | 45 | 15 | 25 |
| BUTLER | 3 | 9903 | Evaluated | 3 | 0 | 0 |
| CHOATE | 11 | 9903 | Evaluated | 11 | 0 | 0 |
| COGGMAN | 20 | 9908 | Monitored | 19 | 0 | 1 |
| DOUGHTY | 17 | 9908 | Monitored | 17 | 0 | 0 |
| ECHO (HUBDTN) | 54 | 9908 | Monitored | 46 | 8 | 0 |
| FAN; | 12 | 9903 | Evaluated | 12 | 0 | 0 |
| GLEN | 206 | 9812 | Monitored | 196 | 10 | 0 |
| HALF MOON | 23 | 9908 | Monitored | 23 | 0 | 0 |
| HIGH (HUBDTN) | 3 | 9903 | Evaluated | 3 | 0 | 0 |
| HINKUM | 60 | 9908 | Monitored | 60 | 0 | 0 |
| HORTONIA | 479 | 9908 | Monitored | 319 | 0 | 160 |
| HOUGH | 16 | 9810 | Monitored | 16 | 0 | 0 |
| INMAN | 85 | 9903 | Monitored | 85 | 0 | 0 |
| LILY (CASLTN) | 9 | 9903 | Evaluated | 9 | 0 | 0 |
| LILY (POULTY) | 21 | 9908 | Monitored | 0 | 0 | 21 |
| LITTLE (WELLS) | 177 | 9812 | Monitored | 136 | 0 | 41 |
| LOVES MARSH | 62 | 9903 | Monitored | 62 | 0 | 0 |
| MILL (BENSON) | 39 | 9903 | Monitored | 39 | 0 | 0 |
| MUD (ORWELL) | 10 | 9903 | Evaluated | 10 | 0 | 0 |
| N.E. DEVELOPERS | 27 | 9908 | Evaluated | 27 | 0 | 0 |
| OLD MARSH | 131 | 9903 | Monitored | 131 | 0 | 0 |
| PINE | 40 | 9903 | Monitored | 40 | 0 | 0 |
| PINNACLE; | 6 | 9903 | Evaluated | 6 | 0 | 0 |
| PRENTISS | 5 | 9903 | Evaluated | 5 | 0 | 0 |
| QUARRY; | 17 | 9903 | Evaluated | 17 | 0 | 0 |
| ROACH | 20 | 9812 | Monitored | 20 | 0 | 0 |
| ROOT | 18 | 9810 | Monitored | 18 | 0 | 0 |
| SPRUCE (ORWELL) | 25 | 9903 | Monitored | 25 | 0 | 0 |
| ST. CATHERINE | 883 | 9908 | Monitored | 707 | 0 | 176 |
| SUNRISE | 57 | 9908 | Monitored | 54 | 0 | 3 |
| SUNSET (BENSON) | 202 | 9812 | Monitored | 0 | 202 | 0 |

## Lakes with impacts due to non-native plant and animal species

As stated above, many lakes in this basin have infestations of Eurasian watermilfoil. The lakes listed below are those which have particularly severe infestations, have multiple non-native nuisance species present, or are at particular risk of further infestation. In Vermont, an established heavy or moderate population of Eurasian watermilfoil or water chestnut has an impact on aesthetic, aquatic life, secondary contact, and swimming uses. Established zebra mussel colonies are presently assessed to impact only aquatic life and swimming uses.

Lake Bomoseen, Castleton:
Lake Bomoseen has a long history of impacts caused by the presence of a dense infestation of Eurasian watermilfoil: 300 Lake Bomoseen acres do not support designated uses due to this infestation, while 571 acres have threatened designated uses. The infestation of Eurasian watermilfoil in Lake Bomoseen is cyclic in nature, and is currently rebounding from a decade low. During the summer of 1997, a small population of water chestnut was identified near the Grady Bridge, in the northern section of the lake. All identified plants were hand-removed, and the area was re-surveyed twice during 1998. One water chestnut plant was found and removed from this site in 1999.

In June 1999, a single adult zebra mussel was found by a seven year old boy in Lake Bomoseen. Vermont Department of Environmental Conservation (DEC) staff located several more adults in the same area. Routine monitoring also revealed the presence of zebra mussels veligers on three separate sampling dates. Underwater dive surveys in other areas of the lake had not identified any more adult zebra mussels as of August, 1999. However, due to the rocky nature of Lake Bomoseen's main basin, and to zebra mussels preferential colonization of such areas, 236 littoral acres are presently considered threatened for aquatic life and swimming uses.

Burr Pond, Sudbury:
The 85 acre Burr Pond presently supports a dense infestation of Eurasian watermilfoil. Of 45 total openwater (non-wetland) areas, 25 acres are considered not supporting uses, and 15 acres are considered only partially supporting uses. The Vermont DEC is presently evaluating whether to permit the use of the aquatic herbicide Sonar to control milfoil in Burr Pond.

Coggman Pond, West Haven:
Water chestnut was discovered in Coggman Pond in 1997, and handpulling efforts have been ongoing since that time. One acre is considered not supporting uses due to the presence of this highly invasive species. Eurasian watermilfoil is also present in this pond.

The Lake St. Catherine Chain, Wells:
The Lake St. Catherine chain consists of three individual but interconnected lakes. To the north is the 21 acre Lily Pond in Poultney from which water flows south through a small navigable channel into the 883 acre Lake St. Catherine. From this lake, water flows through a larger channel, then a large wetland, into the 177 acre Little Pond. Mill Brook drains Little Pond.

The entirety of Lily Pond does not support uses due to a persistent infestation of Eurasian watermilfoil. 176 acres of Lake St. Catherine does not support uses due to a long-established milfoil infestation, and 41 acres of Little Pond also do not support uses. An active, locally-operated harvesting program is in place on the Lake St. Catherine chain.

In 1997, VT Department of Fish and Wildlife confirmed the presence of alewives in Lake St. Catherine. A non-native anadromous planktivore, the alewife is recognized as having caused irreversible changes to the Great Lakes food web. In addition, alewife die-offs are a common occurrence in waters where these fish reside. The entire acreage of Lake St. Catherine is thus now considered threatened for aquatic life and aesthetics based on the presence of this non-native fish species. The Department of Fish and Wildlife is presently finalizing an Alewife Management Plan to address the threats posed by this species.

Lake Hortonia, Sudbury:
The highly developed Lake Hortonia also supports a very severe infestation of Eurasian watermilfoil with 160 of 479 acres not supporting uses. The Vermont DEC is presently evaluating whether to permit the use of the aquatic herbicide Sonar to control milfoil in Lake Hortonia. As with Lake Bomoseen, during 1999, larval zebra mussels were found in samples from two separate dates. Subsequent dive surveys for adult zebra mussels found none. However, calcium levels are above those values that the literature suggests will support zebra mussel colony development (mean Spring calcium = 32 parts-per-million). Accordingly, 160 acres (33% of lake area) are now considered threatened for aquatic life and swimming uses.

**Lakes with impacts or threats to uses due to other causes**

Lake St. Catherine, Wells, and Sunset Lake, Benson:
Both the 202 acre Sunset Lake, and Lake St. Catherine are coldwater fisheries which support lake trout (*Salvelinus namaycush*), a popular gamefish. Based on a statewide survey of fish tissue mercury concentrations, this species has been identified by the VT Department of Health as bioaccumulating sufficient quantities of mercury that it warrants being placed in a more restrictive consumption advisory class. Accordingly, fish consumption use of both of these lakes is considered only partially supported.

Lily Pond, Poultney:
In addition to impacts by Eurasian milfoil, the entire 21 acres of this pond are considered to partially support uses due to high nutrient concentrations, which result in persistent algal blooms. The long-term spring total phosphorus mean concentration on this lake is 38 parts per billion. This is the fourth highest such mean value in Vermont.

Old Marsh Pond, Fair Haven:
This 131 acre shallow and marsh-like lake is surrounded by actively logged forests. Accordingly, 131 acres are considered threatened by siltation.

Billings Marsh, West Haven:
This 56 acre openwater palustrine wetland is said to be threatened by sedimentation. This information is over five years old, and should be verified during the next assessment cycle in this basin.

## *Waters Requiring Total Maximum Daily Load Analysis*

Seven segments of rivers and streams in Basin 2 are on the EPA approved Vermont 1998 List of Impaired Surface Waters ( the TMDL list). Two segments of the Poultney River have documented impairments due to nutrient enrichment; one segment of the Poultney is listed due to elevated levels of mercury in walleye; a stretch of the Castleton River and a stretch of the Poultney are impaired due to pathogens; a stretch of the Mettawee River has documented temperature impairments; and an unnamed tributary is impaired due to metals from landfill leachate. See the individual waterbody reports in Appendix E for these and other problems and threats to specific stretches of rivers and streams.

There are no Basin 2 lakes listed separately on the Vermont TMDL list. However, as noted in the footnote of Vermont's TMDL list, all Vermont waters are included on the TMDL list due to the presence of elevated mercury in fish tissue.

## *Special Projects or Water Quality Protection Work in Basin 2*

### Lower Poultney River ORW Designation

In June 1991, the Lower Poultney River, defined as the stretch from the Poultney/Fair Haven town line down to the "elbow", was designated an Outstanding Resource Water (ORW) by the Vermont Water Resources Board. The Fair Haven River Committee compiled the information and prepared the petition acting on behalf of the towns of Fair Haven and West Haven who chose to be the petitioners for the ORW status. A description of this stretch of river, a detailed inventory of river and river corridor values and uses, the ORW designation process for the Lower Poultney, and the Agency of Natural Resources Management Plan for this river segment are contained in the August 1992 document *The Lower Poultney River: A Vermont Outstanding Resource Water.* The inventory portion of this publication contains substantial information on the natural, cultural, and scenic features of the Lower Poultney including descriptions of the river corridor wildlife habitat and natural communities, geologic and hydrologic features, aquatic habitat and fisheries, threatened, endangered and rare plant and animal species, historical sites, scenic areas, and boating, fishing, research and education uses.

### Castleton Area River Project

The Castleton Area River Project is an environmental studies project of the Fair Haven Grade School. In June 1999, staff and students of the school concluded the first year of what is intended to be an annual, year-round study of the Castleton River. The last portion of their study was a five day kayak exploration of five sites - Glen Lake, Love's Marsh, Lake Bomoseen, and two stretches of the Castleton River. Following the fieldwork, a thorough and enjoyable report was produced by the students in which the plant, bird, amphibian, reptile, wildlife, fish and invertebrate life of these areas was described. Water quality, flow and trash information was also gathered and reported.

## Riparian Restoration Work

The U.S. Fish and Wildlife Service Partners for Wildlife Program together with the USDA Natural Resource Conservation Service (NRCS) and supported in part by The Nature Conservancy have implemented a number of livestock exclusion (fencing), buffer re-establishment (tree and shrub planting) and streambank stabilization projects along the Mettawee River, the Poultney River or tributaries to them. Between 1996 and 1999 (all numbers are not in for 1999 projects at the time of this writing), there were 17 riparian restoration projects covering 67,650 bank feet or 12.9 miles.

Seven projects were in the Mettawee watershed and they resulted in 23,500 feet (4.5 miles) of riparian zone restoration with 11 acres of upland and 20.5 acres of wetland restored or protected. Ten of the projects were in the Poultney watershed and they resulted in 44,150 feet (8.4 miles) of riparian zone restoration with 38 acres of upland and 48.5 acres of wetland restored or protected.

## Poultney/Mettawee Watershed Partnership

A Vermont/New York watershed partnership steering committee was formed in July 1998 to identify and discuss the issues in the Poultney and Mettawee watersheds. The committee held a series of public forums in November 1998 in both states and heard about watershed residents' special places, resources, and activities, their concerns, and project ideas. As a result of the interest and discussions at the forums, five topic areas were identified around which projects could be organized. These five areas are water quality, agriculture, natural resources and wildlife, education, and recreation. With a grant from the Lake Champlain Basin Program, the Poultney-Mettawee Partnership has hired a professional partnership coordinator. The coordinator will help determine inventory needs; coordinate implementation of specific projects; compile inventory results, project information, and watershed residents' concerns into a Watershed Management Plan; and do community education and outreach.

The Nature Conservancy has received a grant from the Environmental Protection Agency (EPA) to do a riparian and wetland assessment in the Poultney River watershed. This information will be used by the partnership and others interested in water quality and fish and wildlife habitat issues in the watershed. The information will also be used to focus restoration projects.

## Nutrient Management Program

The Poultney-Mettawee Natural Resources Conservation District has received a FY99 Clean Water Act Section 319 grant to work with farmers in Bennington and Rutland counties, which would largely serve the Poultney and Mettawee watersheds. The program has hired a nutrient management consultant to help farmers who want the technical assistance to create a nutrient management plan. The service would also do education work, monitor the benefits of nutrient management plans, and encourage adoption of management practices that reduce runoff of, or inefficient use of, nutrients. The overall goal of the nutrient management plans, technical assistance, education, and ongoing crop management service program is to reduce agriculture's contribution of pollutants to nearby rivers and streams.

**Aquatic Nuisance Control on Lake St. Catherine Chain**

The Vermont DEC's Aquatic Nuisance Control Grant-in-Aid Program has funded Eurasian watermilfoil management on the Lake St. Catherine chain lakes each year since 1994, and for many years prior to that, in response to town and lake association requests. The towns of Poultney and Wells received a grant of $23,424 to support mechanical harvesting of milfoil in 1999.

## *Discussion and Recommendations*

The Poultney and Mettawee Rivers' watersheds still have a relatively high percentage (16% each) of their land use in agriculture. Where agricultural activities have occurred too close to watershed rivers and streams, there has been a loss of riparian vegetation and nutrients and other pollutants are more likely to reach the waters with storm runoff. In some locations adjacent to crop and pasture land, however, buffers are being left to grow or are being re-planted. In the future, as more farmers implement the Acceptable Agricultural Practices (AAP) regulations and/or participate in programs sponsored by the Natural Resources Conservation Service and U. S. Fish and Wildlife and as buffers grow and mature, assessments will likely find less of a threat or problem due to agricultural activities.

The work of organizations and partnerships such as the Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, The Nature Conservancy and the Poultney/Mettawee Watershed Partnership with private landowners should be encouraged and supported. The results of their work include, and will continue to include, stable streambanks, buffers of vegetation along rivers and streams, conservation of agricultural soils, agricultural waste and nutrient management, public education, and the necessary technical assistance and support of the farming community.

The high housing and population growth in some basin towns will alter water quality and aquatic habitat. Unless the rapidly growing towns have strong, clear protection goals and strategies in their town plans and zoning regulations, new development (with the accompanying land changes, soil exposure, encroachment on riparian areas, and increased impervious surfaces) will lead to more environmental threats and impacts. Currently, the plans of the most rapidly growing basin towns address water resource protection but the zoning or land conservation programs that would make the protection happen are not yet in place.

Atmospheric transport and deposition of mercury and the incorporation of mercury into the food chain is an issue in this basin as in other basins in Vermont. This is especially a problem in the lakes' food webs but is also an issue affecting walleye and consumption of them from the lower reaches of the Poultney. The issue unfortunately cannot be addressed solely on the state level. Vermont did enact legislation requiring the labeling of all mercury-containing products as well as recycling of mercury in those products by the manufacturers, however, portions of this legislation are currently being challenged in court. Serious reduction of mercury releases and eventually mercury impacts, however, will require the influence and involvement of the federal agencies.

As discussed earlier, the Poultney and Mettawee basin has the highest concentration of lakes with dense populations of milfoil statewide. Lakes St. Catherine and Hortonia as well as Burr Pond have the most use-limiting and difficult milfoil infestations of any in Vermont. Adequate resources are a significant limiting factor to milfoil management within the basin and elsewhere in the state as recreational activities continue to spread it.

The Carver Falls project on the Poultney River, which impairs 10.4 miles of river, will be going to a run-of-river operation from a daily peaking operation under the New York State issued 401 and FERC license. Low or fluctuating flows below the Carvers Fall dam should be eliminated as a result. The owner has yet to apply for a Vermont 401 certificate as they have been ordered to by FERC.

The hope is that the next full assessment of the Poultney River and Mettawee River in the years 2002 and 2003 will document substantial improvements to segments of these rivers and their tributaries. As more fencing, buffer, and streambank projects are in place and buffers grow up; as the wastewater treatment facilities correct situations resulting in pollution; as the Fair Haven landfill situation is investigated; and as towns implement local regulations that protect water quality, river and stream health should improve. Following is a list of recommendations/actions for the Department of Environmental Conservation, the Department of Fish and Wildlife, and, in many cases, the DEC Water Quality Division. It serves as a checklist for progress on the major problems and threats to the surface waters of this basin.

*Action Recommendations*

- Re-sample temperature in the 2000 field season at the lower Mettawee River sample site at least to have data to compare with the 1995 data.

- Sample macroinvertebrates at the same location as the temperature is monitored for a more complete understanding of aquatic health.

- Investigate the old Fair Haven landfill site to determine: if river movement is undermining the landfill; what water quality and habitat issues exist at this location; and how to address the problems identified.

- Offer planning and zoning water quality protection assistance to watershed towns with the highest growth rates. Encourage development with minimal water quality and aquatic habitat impacts.

- Participate in the Poultney-Mettawee Watershed Partnership and provide assistance requested by the partners when able to do so.

- Use any available opportunity to advocate for reductions in mercury due to human activities.

- Work with the communities whose wastewater treatment facilities have caused water quality problems to improve their treatment.

## *References and Resources*


1. *The Lower Poultney River - A Vermont Outstanding Resource Water.* Vermont Department of Environmental Conservation and The Lower Poultney River Citizens Committee. August, 1992.

2. *Poultney-Mettawee Water Quality Management Plan.* Agency of Environmental Conservation, Department of Water Resources. April 1975.

3. *The Waterfalls, Cascades and Gorges of Vermont.* Jerry Jenkins and Peter Zika. July, 1988.

4. *Vermont Swimming Hole Study, Part I. Swimming Hole Data Volume I.* Jerry Jenkins, Debbie Benjamin and Jane Dorney. March 15, 1992.

5. *Calcareous Open Fens and Riverside Seeps of Vermont: Some Sites of Ecological Importance.* Elizabeth Thompson and Rober Popp, Vermont Nongame and Natural Heritage Program. March 1995.

6. *Floodplain Forests of Vermont: Some Sites of Ecological Significance.* Eric Sorenson, Marc Lapin, Brett Engstrom and Robert Popp, Vermont Nongame and Natural Heritage Program. July 1998.

7. *Castleton Area River Project, June 14 - 18, 1999.* Fair Haven Grade School.

8. *State of Vermont 1998 List of Waters: Part A - 1998 List of Impaired Surface Waters.* Vermont DEC Water Quality Division. December 11, 1998. EPA approved August 1999.

9. *Vermont Lake Protection Classification System.* Lakes and Ponds Unit, Vermont DEC Water Quality Division. September 1994.

# Appendix A

# Land Use and Land Cover
# of
# Basin 2 Watersheds

**Table A.1. Poultney River Watershed in Vermont Land Use/ Land Cover***

| Land Use[1] | Acres | % Total |
|---|---|---|
| Forested | 101,465 | 67 |
| Agriculture | 24,856 | 16 |
| Surface water | 11,316 | 7 |
| Transportation | 5,682 | 4 |
| Wetlands | 4,986 | 3 |
| Other developed[2] | 2,473 | 2 |
| Totals: | 150,778 | |

**Table A.2. Mettawee River Watershed in Vermont Land Use/Land Cover***

| Land Use[1] | Acres | % Total |
|---|---|---|
| Forested | 61,332 | 71 |
| Agriculture | 13,677 | 16 |
| Surface water | 5,067 | 6 |
| Transportation | 2,655 | 3 |
| Wetlands | 1,615 | 2 |
| Other developed[2] | 636 | 1 |
| Total | 84,982 | |

*Vermont Land Cover Classification Project, 1997 (based on satellite photographs from 1991-1993.

1 "brush" and "barren land" not included
2 residential, commercial, industrial, other urban

# Appendix B

# Causes and Sources of Impairments

# for Rivers and Lakes

**Table I. Causes of Impacts and Threats to Basin Rivers**

| Code | Cause | High Impact (miles) | Moderate/Slight Impact (miles) | Total (miles) | Threats (miles) |
|---|---|---|---|---|---|
| 900 | Nutrients | 0 | 15.4 | 15.4 | 46.0 |
| 1100 | Sedimentation | 0.5 | 14.0 | 14.5 | 53.2 |
| 1400 | Thermal modifications | 8.2 | 5.2 | 13.4 | 35.3 |
| 500 | Metals | 10.6 | 0 | 10.6 | 0 |
| 1500 | Flow alterations | 0 | 10.4 | 10.4 | 0 |
| 1700 | Pathogens | 2.0 | 5.8 | 7.8 | 24.5 |
| 1200 | Org enrichment/low d.o. | 0 | 3.0 | 3.0 | 6.3 |
| 700 | Chlorine | 0 | 3.0 | 3.0 | 0 |
| 2500 | Turbidity | 0 | 2.8 | 2.8 | 6.5 |

**Table II. Causes of Impact and Threats to Basin Lakes**

| Cause of Impact | High | Medium | Low | Total Impacting | Threatened |
|---|---|---|---|---|---|
| 0500 Metals | 202 | 0 | 883 | 1,085 | 0 |
| 0560 Mercury | 202 | 0 | 883 | 1,085 | 0 |
| 0900 Nutrients | 0 | 21 | 0 | 21 | 63 |
| 1100 Siltation | 0 | 0 | 0 | 0 | 232 |
| 1200 Organic enrichment - DO | 0 | 0 | 0 | 0 | 21 |
| 2200 Noxious aquatic plants - Native | 0 | 0 | 0 | 0 | 91 |
| 2210 Noxious aquatic plants - Algae | 0 | 21 | 0 | 21 | 65 |
| 2600 Exotic Species | 1,332 | 0 | 0 | 1,332 | 443 |

**Table III. Sources of Impacts and Threats to Basin Rivers**

| Code | Source | High (miles) | Moderate/Slight (miles) | Total (miles) | Threats (miles) |
|---|---|---|---|---|---|
| 1000 | Agriculture | 0 | 14.5 | 14.5 | 43.5 |
| 7700 | Streambank destabilization | 0 | 14.5 | 14.5 | 29.8 |
| 7600 | Riparian vegetation removal | 10.4 | 0 | 10.4 | 41.0 |
| 7410 | Flow modification - hydro | 10.4 | 0 | 10.4 | 0 |
| 8100 | Atmospheric deposition | 10.4 | 0 | 10.4 | 0 |
| 200 | Municipal point sources | 4.8 | 3.0 | 7.8 | 13.3 |
| 4500 | Road maintenance & runoff | 0.5 | 0 | 0.5 | 6.0 |
| 6300 | Landfills | 0.2 | 0 | 0.2 | 2.5 |
| 3200 | Land development | 0 | 0 | 0 | 4.7 |

**Table IV. Sources of Impacts and Threats to Basin Lakes**

| Source of Impact | High (acres) | Low (acres) | Medium (acres) | Total Impacts (acres) | Threatened (acres) |
|---|---|---|---|---|---|
| 1000 AGRICULTURE | 0 | 0 | 21 | 21 | 56 |
| 1800 VT-Animal holding/management area | 0 | 0 | 21 | 21 | |
| 2000 SILVICULTURE | 0 | 0 | 0 | 0 | 131 |
| 2100 Harvesting, Restoration, Residue Management | 0 | 0 | 0 | 0 | 131 |
| 3000 CONSTRUCTION | 0 | 0 | 0 | 0 | 22 |
| 3200 Land Development | 0 | 0 | 0 | 0 | 22 |
| 7000 HYDROMODIFICATION | 0 | 0 | 0 | 0 | 39 |
| 7550 HABITAT MODIFICATION (OTHER THAN HYDROMOD) | 0 | 0 | 21 | 21 | 2 |
| 7600 Removal of Riparian Vegetation | 0 | 0 | 21 | 21 | 41 |
| 7900 MARINAS AND RECREATIONAL BOATING | 1332 | 0 | 0 | 1332 | 442 |
| 7910 In-Water releases | 1332 | 0 | 0 | 1332 | 442 |
| 8100 ATMOSPHERIC DEPOSITION | 202 | 883 | 0 | 1085 | 0 |
| 8600 NATURAL SOURCES | 0 | 0 | 0 | 0 | 28 |
| 9070 VT-UNSPECIFIED NONPOINT SOURCE | 0 | 0 | 0 | 0 | 25 |

# Appendix C

## Stream Macroinvertebrate Sample Sites & Results

## Table C.1. Macroinvertebrate Sampling Sites in Basin 2

| Waterbody id | Name | Town | Milepoint | Date | Assess-ment |
|---|---|---|---|---|---|
| VT02-01 | Poultney River | West Haven | 6.0 | 9/18/97 | fair |
| VT02-01 | Poultney River | Fair Haven | 10.1 | 9/11/91 | fair |
| VT02-01 | Poultney River | Fair Haven | 13.1 | 10/07/98 | good |
| VT02-04 | Poultney River | Poultney | 21.8 | 10/07/98 | good |
| VT02-04 | Poultney River | Poultney | 24.0 | 10/07/98 | good |
| VT02-02 | Hubbardton River | West Haven | 1.8 | 9/12/91 | good |
| VT02-02 | Hubbardton River | West Haven | 1.8 | 9/28/92 | good |
| VT02-02 | Hubbardton River | Hubbardton | 10.7 | 9/30/94 | good |
| VT02-02 | Hubbardton River | Hubbardton | 10.7 | 10/05/95 | good |
| VT02-02 | Hubbardton River | Hubbardton | 10.7 | 9/26/96 | good |
| VT02-03 | Castleton River | Castleton | 8.7 | 10/29/91 | exc |
| VT02-03 | Castleton River | Castleton | 8.7 | 10/06/93 | exc |
| VT02-03 | Castleton River | Castleton | 8.7 | 10/05/95 | good |
| VT02-03 | Castleton River | Castleton | 8.7 | 9/26/96 | exc |
| VT02-05 | Mettawee River | Pawlet | 28.6 | 9/30/97 | good |
| VT02-05 | Flower Brook | Danby | 4.8 | 9/12/91 | exc |
| VT02-05 | Flower Brook | Danby | 4.9 | 9/12/91 | exc |

# Appendix D

# Population and Housing Growth

# in Basin 2 Watersheds

**Table D-1. Population Data for Poultney Watershed Towns* in Vermont**

| Town | 1970 Population | 1980 Population | change 1970-1980 | 1990 Population | change 1980-1990 |
|---|---|---|---|---|---|
| Benson | 583 | 739 | 27 % | 847 | 15 % |
| Castleton | 2837 | 3637 | 28 % | 4278 | 18 % |
| Fair Haven | 2777 | 2819 | 2 % | 2887 | 2 % |
| Hubbardton | 228 | 490 | 53 % | 576 | 18 % |
| Middletown Springs | 426 | 603 | 42 % | 686 | 14 % |
| Poultney | 3217 | 3196 | - 1 % | 3498 | 9 % |
| West Haven | 240 | 253 | 5 % | 273 | 8 % |
| West Rutland | 2381 | 2351 | - 1 % | 2448 | 4 % |
| Total: | 12,689 | 14,088 | 11 % | 15,493 | 10 % |

**Table D-2. Housing Data for Poultney Watershed Towns in Vermont**

| Town | 1980 Housing | 1990 Housing | Change 1980 - 1990 |
|---|---|---|---|
| Benson | 360 | 479 | 33% |
| Castleton | 1706 | 2026 | 19% |
| Fair Haven | 1070 | 1196 | 12% |
| Hubbardton | 486 | 553 | 14% |
| Middletown Springs | 275 | 357 | 30% |
| Poultney | 1423 | 1624 | 14% |
| West Haven | 101 | 117 | 16% |
| West Rutland | 903 | 1018 | 13% |
| Total: | 6324 | 7370 | 17% |

* Towns whose land area is completely within or substantially within the watershed

**Table D-3. Population Data for Mettawee Watershed Towns* in Vermont.**

| Town | 1970 Population | 1980 Population | change 1970-1980 | 1990 Population | change 1980-1990 |
|---|---|---|---|---|---|
| Dorset | 1293 | 1648 | 27 % | 1918 | 16 % |
| Pawlet | 1184 | 1244 | 5 % | 1314 | 6 % |
| Rupert | 582 | 605 | 4 % | 654 | 8 % |
| Wells | 560 | 815 | 46 % | 902 | 11 % |
| Total: | 3,619 | 4,312 | 19 % | 4,788 | 11 % |

**Table D-4. Housing Data for Mettawee Watershed Towns in Vermont**

| Town | 1980 Housing | 1990 Housing | change 1980 - 1990 |
|---|---|---|---|
| Dorset | 986 | 1209 | 23% |
| Pawlet | 568 | 701 | 23% |
| Rupert | 371 | 442 | 19% |
| Wells | 654 | 776 | 19% |
| Total: | 2579 | 3128 | 21% |

* Towns whose land area is completely within or substantially within the watershed

# Appendix E

# Dams of Basin 2

## Table E - 1. Basin 2 Dam Summary

| Dam Name | Stream | Town | Status | Use* | Built | Recon | State ID |
|---|---|---|---|---|---|---|---|
| Sunrise Lake | Hubbardton River | Benson | In Service | R | 1920 | | 18.02 |
| Peach Pond | Perch Pond Brook | Benson | In Service | | 1965 | | 18.03 |
| Parsons Mill | Hubbardton River | Benson | In Service | R | 1900 | 1955 | 18.04 |
| Munger | Hubbardton River | Benson | In Service | R | 1965 | | 18.05 |
| Glen Lake | Lake Bomoseen-T | Castleton | In Service | R | 1991 | | 43.01 |
| Brown | Sucker Brook-TR | Castleton | In Service | R | 1971 | | 43.02 |
| Lake Bomoseen | Castleton River-TR | Castleton | In Service | R | 1850 | 1994 | 43.03 |
| Castleton State College | Hill Brook–OS | Castleton | In Service | | 1967 | | 43.04 |
| Chizmar | Lake Bomoseen-T | Castleton | In Service | R | 1971 | | 43.05 |
| Said | Glen Lake-TR | Castleton | In Service | R | 1968 | | 43.06 |
| Pine Pond | Lake Bomoseen-T | Castleton | In Service | R | 1900 | 1993 | 43.08 |
| Pelletier | Breton Brook | Castleton | In Service | R | 1890 | | 43.09 |
| Loves Marsh | Lake Bomoseen-T | Castleton | In Service | R | 1956 | | 43.10 |
| Prentiss Pond | Mettawee River-TR | Dorset | Unknown | | | 1957 | 60.02 |
| Sheldon Pond | Sucker Brook-TR | Fair Haven | Unknown | | | | 72.01 |
| Howard Pond | Sucker Brook | Fair Haven | Unknown | | 1920 | | 72.02 |
| Inman Pond | Sucker Creek-TR | Fair Haven | In Service | S | | | 72.03 |
| Old Marsh Pond | Mud Brook-TR | Fair Haven | In Service | R | 1900 | | 72.04 |
| Lake Hortonia | Hubbardtown River | Hubbardton | In Service | R | 1955 | | 99.01 |
| Abatiell | Giddings Brook-TR | Hubbardton | In Service | R | 1970 | | 99.04 |
| Fenton | Vail Brook | Middletown Springs | In Service | | 1968 | | 127.01 |
| Middletown Springs-2 | South Brook-TR | Middletown Springs | Unknown | | | | 127.02 |

| Dam Name | Stream | Town | Status | Use* | Built | Recon | State ID |
|---|---|---|---|---|---|---|---|
| Coy Brook | Coy Brook | Middletown Springs | Abandoned | | 1900 | | 127.03 |
| Buxton's Pond | South Brook | Middletown Springs | Abandoned | | 1900 | | 127.04 |
| Pawlet | Flower Brook | Pawlet | In Service | H | | | 150.01 |
| Burr Pond | Lake Hortonia-TR | Sudbury | Unknown | R | 1915 | 1965 | 202.01 |
| Little Pond | Mill Brook | Wells | In Service | R | 1900 | | 230.01 |
| Schmidt | Coy Brook | Wells | Unknown | R | 1970 | | 230.02 |
| Schiff | Coy Brook | Wells | In Service | R | 1969 | | 230.03 |
| Northeast Developers | Mill Brook-TR | Wells | In Service | R | 1968 | | 230.04 |
| Carver Falls | Poultney River | West Haven | In Service | H | 1894 | | 234.02 |
| Youngs Brook | Youngs Brook | West Rutland | Breached (Partial) | O | 1920 | | 238.01 |

* R = recreational, H = hydroelectric

# Appendix F

# Individual River Waterbody Reports

# for Basin 2

## Poultney Mainstem and tributaries

## Assessment Report

**Waterbody No:** VT02-01 **Basin:** 02-Poultney

**River Length (mi.):** 29.2 **Classification:**

**Description:** Poultney River mainstem from the mouth to confluence with the Castleton River and tributaries including Coggman Creek and Mud Brook

### *Location Identifiers*

**County:** Rutland **NRCS District:** 2

**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT

**Fish and Wildlife District:** 2

### *Assessment Information*

**Assessment Date:** 1999

**Date Last Updated:** 8/30/1999

**Assessment Category:** B

**Water Quality Limited?**

**On 303(d) List?** Y

**Monitored for Toxics?** N

**Assessment Types**

Surveys of fish and game biologists or other professionals

Occurrence of conditions judged to cause impairment

Fish tissue analysis

RBP III or equivalent benthos surveys

**Aquatic Contamination**

Restricted consumption for general population

No consumption for subpopulation (e.g. children...)

**Toxics Testing**

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

**Assessment Comments**

PARTIAL SUPPORT MILES

Poultney River: 10.4 - mouth to Carver's Falls (subset of 13.2 miles below) - partial support of fish consumption due to mercury contamination of walleye from atmospheric deposition (suspected) and partial support of all uses due to flow regulation from hydroelectric facility. c(500,1500) s(7410,8100)

Poultney River: 2.7 - from river miles 13.1 just below Castleton river confluence downstream to Carver's Falls (almost exactly the same stretch as below) - partial support of aquatic biota due to nutrient enrichment likely due in part to the Fair Haven WWTF Adams Street pump station overflows. c(900) s(200)

Poultney River: 2.8 - from confluence with Castleton River to Carver's Falls - partial support of aesthetics and contact recreation (swimming) due to turbid conditions and pathogens caused by streambank erosion, agricultural runoff and WWTF pump station overflows. c(1100,1700,2500) s(200,1000,7700)

THREATENED MILES

Coggman Creek: 4.5 - beginning at the upstream end of the wetland (which is the lowest stretch of the creek) upstream - threats to aquatic biota/habitat, aesthetics, and contact recreation (swimming) due to turbid conditions, thermal modifications, nutrients and pathogens due to loss of riparian vegetation, agricultural land uses (pasture, livestock instream) and streambank erosion. c(900,1100,1400,1700,2500) s(1000,7600,7700)

**Poultney Mainstem and tributaries** **VT02-01**

Mud Brook: 2.0 - upstream beginning at confluence with Poultney River - threats to aquatic biota/habitat, contact recreation (swimming), and aesthetics from turbid conditions, thermal modifications, sediments from development and streambank erosion. c(1100,1400,2500) s(4000,7700)

COMMENTS

The Carvers Falls project owned by Central Vermont Public Service will be going to a run-of-river operation from a daily peaking operation under the New York State 401 and FERC license. This should eliminate DO and other impacts once due to low or fluctuating flows below the Carvers Falls dam. As of this time, however, the company has yet to get a Vermont 401 certifcate as they have been ordered to do by FERC. Until the FERC license is issued, this stretch is considered only partially supported.

Macroinvertebrate sampling was done at milepoint 6.0 in 1997, milepoint 10.1 in 1991 and milepoint 13.1 in 1998. The community integrity in each case was rated as fair, which is considered partial support because there has been a degree of impairment of the community as a result of pollution. At the 1998 milepoint 13.1, sampling results found a low EPT value and a high BI (biotic index). Caddisfly larvae and Diptera (flies) dominated the community, which indicates problems from nutrient enrichment.

Results from nutrient samples taken in July and August 1999 found 55 micrograms/liter total phosphorus and 0.74 milligrams/liter total nitrogen on 7/6/99 and 78 micrograms/liter total phosphorus and 0.86 milligrams/liter total nitrogen on 8/5/99. Samples were taken upstream of the West Street bridge in Fair Haven. Filamentous algae coverage was 80 to 90% in the run at this location.

Field observations of the lower Poultney River in early September 1998 noted turbid conditions with river temperatures 70-72 F.

The Lower Poultney River from the Fair Haven/Poultney town line to the river's mouth at Lake Champlain was designated an Outstanding Resource Water (ORW) due to natural, cultural and scenic values on June 21, 1991 by the Water Resources Board. Fairly long stretches of river with natural riparian vegetation including floodplain forests and large marshes characterize the stretch designated an ORW. A detailed inventory of river values and river uses such as river corridor wildlife habitat and natural communities, geologic and hydrologic features, aquatic habitat, fisheries, threatened, endangered and rare species, scenic enjoyment, boating, research and educational opportunities was part of the ORW petition and is contained in Section II of the The Lower Poultney River Management Plan document of August 1992.

The Lake Champlain Diagnostic-Feasibility Study Final Report has phosphorus load estimates and concentration numbers for the mouth of the Poultney River for the period March 1990 to February 1992. The mean load of total phosphorus from the Poultney is 32.3 metric tons/year and the mean concentration is .087 mg/liter. The Poultney River waters flow into the so-called South Lake B section of Lake Champlain.

Zebra mussels are in South Bay of Lake Champlain but an investigation of the lower part of the Poultney River in summer 1998 found no young mussels yet.

INFORMATION SOURCES

Jerry Jenkins, Environmental Consultant - noted nonsupport of swimming from Poultney Village to Carvers Falls due to ag. soil erosion and natural streambank erosion - very turbid conditions. (8801)

Dave Callum, Vt.F&W Fisheries Biologist - noted murky conditions of Poultney River near Hubbardton River, clayey soils of riverbanks; very erodable conditions. (8801)

Hydro Assessment Vt DEC May 1987 - noted low/fluctuating flows caused by Carvers Falls Hydro; potential for DO violations to occur (esp. during summmer overnight ponding) - supersaturated DO levels and indications of algae and presence of 3 rare fish species below facility.

Steve Fiske, Vt DEC water Quality Division Biomonitoring and Aquatic Studies (BASS) section - provided data and interpretation for the 3 Poultney River sites. (1998)

A Phosphorus Budget, Model, and Load Reduction Strategy for Lake Champlain, Lake Champlain Diagnostic-Feasibility Study Final Report, January 1997, Vt Dept of Environmental Conservation and NY State Dept of Environmental Conservation.

Michael Hauser, Vt DEC Water Quality Division - status of zebra mussels and the Poultney River. (1999)

**Poultney Mainstem and tributaries** **VT02-01**

| Use No. | Use Description | Fully | Threat | Partial Support | Non Support | Not Assessed |
|---|---|---|---|---|---|---|
| 01 | Overall | 9.5 | 6.5 | 13.2 | 0.0 | 0.0 |
| 20 | Aquatic biota/habitat | 9.6 | 6.5 | 13.1 | 0.0 | 0.0 |
| 21 | Fish consumption | 18.8 | 0.0 | 10.4 | 0.0 | 0.0 |
| 42 | Contact recreation | 9.5 | 6.5 | 13.2 | 0.0 | 0.0 |
| 44 | Noncontact recreation | 18.8 | 0.0 | 10.4 | 0.0 | 0.0 |
| 50 | Drinking water supply | 0.0 | 0.0 | 0.0 | 0.0 | 29.2 |
| 62 | Aesthetics | 9.5 | 6.5 | 13.2 | 0.0 | 0.0 |
| 72 | Agriculture water supply | 0.0 | 0.0 | 0.0 | 0.0 | 29.2 |
| 82 | Industry water supply | 0.0 | 0.0 | 0.0 | 0.0 | 29.2 |

| Impairment Cause | Magnitude | Size (mi.) |
|---|---|---|
| Metals | H | 10.40 |
| Nutrients | M | 2.70 |
| Nutrients | T | 4.50 |
| Siltation | M | 2.80 |
| Siltation | T | 6.50 |
| Thermal modifications | T | 6.50 |
| Flow alterations | M | 10.40 |
| Pathogens | M | 2.80 |
| Pathogens | T | 4.50 |
| Turbidity | M | 2.80 |
| Turbidity | T | 6.50 |

| Impairment Source | Magnitude | Size (mi.) |
|---|---|---|
| Municipal point sources | H | 2.80 |
| Agriculture | S | 2.80 |
| Agriculture | T | 4.50 |
| Urban runoff/storm sewers | T | 2.00 |
| Flow mod. - hydroelectric | H | 10.40 |
| Removal of riparian vegetation | T | 4.50 |
| Streambank modification/destabilization | M | 2.80 |
| Streambank modification/destabilization | T | 6.50 |
| Atmospheric deposition | H | 10.40 |

| Point Source Description | NPDES No. |
|---|---|
| McDonald's SW permit to Mud Brook | 1-0651 |
| Fairhaven Housing SW permit to Mud Brook | 1-0721 |

# Hubbardton River

## Assessment Report

**Waterbody No:** VT02-02 **Basin:** 02-Poultney

**River Length (mi.):** 31 **Classification:**

**Description:** Mouth to headwaters and tributaries including unnamed tribs from Strong Swamp, Lake Hortonia and Sunset Lake

### *Location Identifiers*

**County:** Rutland **NRCS District:** 2

**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT

**Fish and Wildlife District:** 2

### *Assessment Information*

**Assessment Date:** 1999

**Date Last Updated:** 9/14/1999

**Assessment Category:** B

**Water Quality Limited?**

**On 303(d) List?** N

**Monitored for Toxics?** N

**Assessment Types**

Land use information and location of sources

Occurrence of conditions judged to cause impairment

RBP III or equivalent benthos surveys

RBP V or equivalent fish surveys

Discharger self-monitoring data (ambient)

**Aquatic Contamination**

None detected

**Toxics Testing**

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

**Assessment Comments**

NON-SUPPORTED MILES

Unnamed trib: 3.0 - from Benson to confluence with Hubbardton River - non- support of contact recreation (swimming), aesthetics and aquatic biota/habitat due to high sediment loads, turbidity, thermal modifcation, nutrients, pathogens, and DO problems from a municipal point source, agricultural land uses (esp. crop production, animal grazing, and animal waste mgmt.) and streambank erosion. c(900,1100,1200,1400,1700) s(200,1000,7700)

Hubbardton River: 0.5 - from Main Street bridge in West Haven downstream (subset of 15.0 miles below) - non-support of aquatic habitat and aesthetics (at least) due to severe sedimentation from streambank and road embankment erosion. c(1100) s(1000,4500,7700)

THREATENED MILES

Hubbardton River: 15.0 - from Pleasant Valley road downstream to mouth - threats to aquatic biota and habitat, aesthetics, non-contact recreation and contact recreation (swimming) from nutrients, sediments, turbidity, thermal modifications, and pathogens from agricultural land use (especially grazing on streambanks, cows instream, crop production), loss of riparian vegetation, and streambank destabilization. c(900,1100,1400,1700) s(1000,7600,7700)

**Hubbardton River** **VT02-02**

COMMENTS

The discharge from the Benson WWTF causes violations of total residual chlorine (TRC), ammonia and temperature criteria. Violations of the permit limit for E. coli occurred from 11/97 - 1/98 (as seen in a file review in June 1998). Because of the small size and low 7Q10 flow of the tributary to which Benson discharges, it is expected that violations of dissolved oxygen standards will occur if the plant is up near design flow even if it is meeting the BOD conditions of the permit.

Two joint Natural Resource Conservation Service (NRCS)/USFWS Partners for Wildlife projects were recently done on the Hubbardton River. One involved 3000 feet of rivershore being fenced and riparian land being enrolled in the Conservation Reserve Program in West Haven. The other project involved restoration of four acres of riverine scrub/shrub wetland, which had been grazed and trampled by livestock in Benson. Livestock will be fenced out of the wetland and provided alternative water sources. The wetland, which is adjacent to the Hubbardton river, will be allowed to grow back to woody vegetation.

Two sites on the Hubbardton River and one site on the unnamed tributary from Strong Swamp were sampled. The macroinvertebrate community assessment at milepoint 1.8 on the Hubbardton River in 1991 and 1992 was good; at milepoint 10.7 on the Hubbardton in 1994, 1995, 1996 was good; and at milepoint 2.2 on the unnamed tributary below Benson village in 1997 was poor. The latter site is downstream from the Benson WWTF.

Field investigation of the Hubbardton River in early September 1998 included observations of turbid water from the mouth upstream to where the Lake Hortonia outlet stream enters. Algae on the channel bottom and cows on the banks or in the river were common observations. Instream temperatures ranged from 70 to 76 F. Observations in September 1999 included the areas of severe bank erosion.

INFORMATION SOURCES

Paul Cummings, Vt.DEC Water Resources Investigator - noted ag. land uses and heavy or clay soils responsible for turbid conditions (8801)

Vt DEC Wastewater Division files - information about Benson WWTF discharges (1999)

Steve Fiske, Vt DEC Water Quality Division biomonitoring program - data and interpretation from macroinvertebrate sample sites on the Hubbardton and an unnamed tributary (1999)

Jerry McArdle and Cathy Kashanski, Vt DEC Water Quality Division - field observations of Hubbardton River and adjacent land uses (1999)

Sally Eugair, Natural Resources Conservation Service, Rutland office - information on fencing and Conservation Reserve Program projects (1999)

| Use No. | Use Description | Fully | Threat | Partial Support | Non Support | Not Assessed |
|---|---|---|---|---|---|---|
| 01 | Overall | 13.0 | 14.5 | 0.0 | 3.5 | 0.0 |
| 20 | Aquatic biota/habitat | 13.0 | 14.5 | 0.0 | 3.5 | 0.0 |
| 21 | Fish consumption | 31.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 42 | Contact recreation | 13.0 | 15.0 | 0.0 | 3.0 | 0.0 |
| 44 | Noncontact recreation | 31.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50 | Drinking water supply | 0.0 | 0.0 | 0.0 | 0.0 | 31.0 |
| 62 | Aesthetics | 13.0 | 14.5 | 0.0 | 3.5 | 0.0 |
| 72 | Agriculture water supply | 0.0 | 0.0 | 0.0 | 0.0 | 31.0 |
| 82 | Industry water supply | 0.0 | 0.0 | 0.0 | 0.0 | 31.0 |

| Impairment Cause | Magnitude | Size (mi.) |
|---|---|---|
| Chlorine | S | 3.00 |
| Nutrients | M | 3.00 |
| Nutrients | T | 15.00 |
| Siltation | H | 0.50 |
| Siltation | M | 3.00 |
| Siltation | T | 15.00 |
| Organic enrichment/Low D.O. | M | 3.00 |

| **Hubbardton River** | | **VT02-02** |
|---|---|---|
| Thermal modifications | M | 3.00 |
| Thermal modifications | T | 15.00 |
| Pathogens | S | 3.00 |
| Pathogens | T | 15.00 |

| **Impairment Source** | **Magnitude** | **Size (mi.)** |
|---|---|---|
| Municipal point sources | M | 3.00 |
| Agriculture | M | 3.50 |
| Agriculture | T | 15.00 |
| Highway/road/bridge runoff | H | 0.50 |
| Removal of riparian vegetation | T | 15.00 |
| Streambank modification/destabilization | M | 3.50 |
| Streambank modification/destabilization | T | 15.00 |

| **Point Source Description** | **NPDES No.** |
|---|---|
| Benson WWTf 0.0177mgd | VT0100498 |

# Castleton River

## Assessment Report

**Waterbody No:** VT02-03 **Basin:** 02-Poultney

**River Length (mi.):** 47 **Classification:**

**Description:** Mouth to headwaters and tributaries including Sucker Brook, North Breton Brook and Gully Brook

### *Location Identifiers*

**County:** Rutland **NRCS District:** 2

**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT

**Fish and Wildlife District:** 2

### *Assessment Information*

**Assessment Date:** 1999

**Date Last Updated:** 10/18/1999

**Assessment Category:** B

**Water Quality Limited?**

**On 303(d) List?** Y

**Monitored for Toxics?** N

**Assessment Types**

Land use information and location of sources

RBP III or equivalent benthos surveys

RBP V or equivalent fish surveys

**Aquatic Contamination**

None detected

**Toxics Testing**

**Waste Management Zone - Miles:** 2.90 **Description:** below Castleton & Fair Haven WWTF outfalls

**Assessment Comments**

PARTIAL SUPPORT MILES

Castleton River: 0.5 - below Fairhaven WWTF Adams Street pump station to the Poultney River confluence - partial support of contact recreation due to pathogens from pump station overflows. c(1700) s(200)

Castleton River: 0.2 - below old Fair Haven landfill (subset of the 6.3 miles below) - partial support of aesthetics, contact recreation and non-contact recreation and threats to aquatic biota/habitat due to a lot of trash in the river and high pH value. (0.2 miles arbitrarily chosen until more investigation can be done). c(1000) s(6300)

THREATENED MILES

Castleton River: 6.3 - below Castleton River WWTF to mouth - threats to aquatic biota and fishing from possible dissolved oxygen violations due to WWTF discharges. c(1200) s(200)

Gully Brook: 3.0 - mouth to headwaters - threats to aquatic habitat due to road runoff, road bank erosion to stream. c(1100) s(4500)

COMMENTS

Macroinvertebrate sampling was done at milepoint 8.7 on the Castleton River, which is located upstream of

**Castleton River** **VT02-03**

North Road in Castleton. This site was sampled in 1990, 1991, 1993, 1995 and 1996 and the community assessment was good or excellent each year. The site is upstream of the two WWTFs that discharge to the Castleton river and upstream of the Fair Haven landfill that is discussed below.

Three unlined landfills (Fair Haven, Castleton and West Rutland) are in the watershed of the Castleton River. Files for these sites were reviewed in summer 1998. No surface water data was found in the Fair Haven landfill files. The landfill was closed in the mid-1980's but never was capped or closed according to a plan that was produced. A 100 foot high bank of trash is adjacent to the river in a meander bend. Tires, glass and numerous other pieces of trash are in the river itself. The order requiring closure of the Castleton landfill cited the potential for adverse impact on adjacent surface waters. There is no recent information, however - the last information in the file is from 1988. The closure plan approved by DEC in 1990 for the West Rutland landfill called for biannual surface and ground water monitoring. An inspection report in 1993 noted leachate seeps and standing water at the toe of the slope from the landfill. No monitoring data were seen in the files. More information is needed on the potential impacts of these landfills on the Castleton River or its tributaries.

There are overflows from the Adams Street pump station of the Fair Haven WWTF to the Castleton River. The most recent occurrence, as of a June 1998 file review, was on March 9-10 1998. Fair Haven is under an enforcement order to stop overflows. Part of the remediation plan involves replacement of some of the lateral pipes that parallel the river - in the spring highwater periods, there is infiltration into the pipes. The town also plans to upgrade the pump station and increase the pumping capacity.

Hutchins & White Fuels hazardous waste site (94-1626) had a series of spills and releases prior to 1995. In 1995, a remediation system was installed after a 1272 order was issued. A discharge permit was issued in 1996 and amended in 1997 with limits of 5 ppb benzene and 50 ppb BTEX. Twice monthly sampling was required initially but because the results have been non-detectable amounts of benzene and BTEX, the Castleton is sampled once a month (1999).

Field observations on the Castleton River in early September 1998 included the following:

The lowest 6 1/2 miles were turbid, temperature where sampled was 61-62 , the land uses were mixed - residential, agricultural, forested and commercial. From Castleton Village upstream 3 miles, filamentous green algae was noted on the channel substrate, the water was generally clear although a light brownish cast was noted, water temperatures were 57-60 . From the Gully Brook confluence upstream 4 miles, the Castleton is slow-moving and amidst wetland communities, temperatures still 58-60 . Upstream of this area, algae was again noticed instream, agricultural land uses dominate.

North Breton Brook in Castleton has a small dam about a mile upstream of its mouth. A deer farm is present further upstream.

Gully Brook, a small stream in Castleton and Poultney, appears threatened by road runoff. Steep banks along the road drop down to the brook. Sediment was observed on the rocks in the channel.

INFORMATION SOURCES

Vt DEC Water Quality Division Biomonitoring and Aquatic Studies Section data (1998)

Vt DEC Wastewater Division permit compliance files (1998)

Vt DEC Waste Management Division Solid Waste files (1998)

Brian Kooiker, Vt DEC Wastewater Division - further information (beyond info in files) on Basin 2 WWTFs. (1999)

Jerry McArdle, Vt DEC Water Quality Division - observations on the Castleton River and tributaries. (1999)

Jim Surwilo, Vt DEC Waste Management Division - information about the history and status of the Fair Haven landfill. (1999)

Castle Area River Project report, Fair Haven Grade School, 1999 - observations of trash bank and trash in the river. The students also took the pH and conductivity readings that were high (pH of 9, conductivity 300).

| Use No. | Use Description | Fully | Threat | Partial Support | Non Support | Not Assessed |
|---|---|---|---|---|---|---|
| 01 | Overall | 37.0 | 9.3 | 0.7 | 0.0 | 0.0 |
| 20 | Aquatic biota/habitat | 37.7 | 9.3 | 0.0 | 0.0 | 0.0 |
| 21 | Fish consumption | 47.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 42 | Contact recreation | 46.3 | 0.0 | 0.7 | 0.0 | 0.0 |
| 44 | Noncontact recreation | 40.7 | 6.1 | 0.2 | 0.0 | 0.0 |

**Castleton River** **VT02-03**

| | | | | | | |
|---|---|---|---|---|---|---|
| 50 | Drinking water supply | 0.0 | 0.0 | 0.0 | 0.0 | 47.0 |
| 62 | Aesthetics | 46.8 | 0.0 | 0.2 | 0.0 | 0.0 |
| 72 | Agriculture water supply | 0.0 | 0.0 | 0.0 | 0.0 | 47.0 |
| 82 | Industry water supply | 0.0 | 0.0 | 0.0 | 0.0 | 47.0 |

| Impairment Cause | Magnitude | Size (mi.) |
|---|---|---|
| pH | T | 0.20 |
| Siltation | T | 3.00 |
| Organic enrichment/Low D.O. | T | 6.30 |
| Pathogens | H | 0.50 |

| Impairment Source | Magnitude | Size (mi.) |
|---|---|---|
| Municipal point sources | H | 0.50 |
| Municipal point sources | T | 6.30 |
| Highway/road/bridge runoff | T | 3.00 |
| Landfills | H | 0.20 |

| Point Source Description | NPDES No. |
|---|---|
| Castleton WWTf 0.36 mgd | VT0100897 |
| Fair haven WWTf 0.20 mgd | VT0100129 |
| West Way Mall SW permit | 1-0874 |

# Upper Poultney Watershed
## Assessment Report

**Waterbody No:** VT02-04 **Basin:** 02-Poultney

**River Length (mi.):** 59.2 **Classification:**

**Description:** Poultney River from its confluence with the Castleton River to headwaters and tributaries including Lewis Brook

### *Location Identifiers*

**County:** Rutland **NRCS District:** 2

**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT

**Fish and Wildlife District:** 2

### *Assessment Information*

**Assessment Date:** 1999

**Date Last Updated:** 7/26/1999

**Assessment Category:** M

**Water Quality Limited?**

**On 303(d) List?** Y

**Monitored for Toxics?** N

**Assessment Types**

Non-fixed station monitoring, conventional, during key seasons and

RBP III or equivalent benthos surveys

Discharger self-monitoring data (effluent)

**Aquatic Contamination**

None detected

**Toxics Testing**

**Waste Management Zone - Miles:** 1.50 **Description:** below Poultney WWTF outfall

**Assessment Comments**

PARTIAL SUPPORT MILES

Poultney River: 1.5 - from WWTF outfall downstream (subset of 10.7 miles below) - partial support of contact recreation and aesthetics due to E. coli violations, thick algae growth, green water from periodic exceedance of design flows of the WWTF. c(900,1700) s(200)

Poultney River: 2.2 (subset of 10.7 miles below) - from Route 30 bridge over river south of Poultney Village to the WWTF - partial support of secondary contact recreation and aquatic habitat due to high temperature from the loss of riparian vegetation. c(1400) s(7600)

THREATENED MILES

Poultney River: 10.7 - from Route 30 bridge over Poultney downstream to end of waterbody 02-04 (overlaps with segments above) - threats to aquatic biota/habitat due to nutrient enrichment and siltation from agricultural land uses, loss of riparian vegetation, Poultney WWTF and other upstream land uses. c(900,1100) s(200,1000,7600)

OTHER STREAMS AND BROOKS

Lovery Brook is in a primarily forested watershed with scattered rural homes. A road crosses the brook at least four times as it winds down from Spaulding Hill.

**Upper Poultney Watershed** **VT02-04**

North Brook was also surveyed and generally appeared in good condition. Minor threats to the stream are a potential where it passes through Middletown Springs.

South Brook is a small alder and willow-lined stream that has vegetation along much of its length. At the upper end, however, it appears to be surrounded by development of a small private golf course.

COMMENTS

Temperature data were gathered from April through October in 1995 just above the Granville Street bridge south of Poultney Village. Temperatures were over 77°F for 59 hours in mid-summer. Daytime temperatures were above 70-72°F for much of a two month stretch during the summer. A Ryan TempMentor was used to collect the data.

Observations were made at a number of locations on the Poultney River in late summer and early fall of 1998 and 1999. In 1999, the river was at low flow given the well below normal precipitation of the summer. The river was observed where Route 30 crosses, Granville Street crosses, behind Green Mountain College, just below the WWTF where York Street extension crosses the river, and where Route 22A crosses the river. Silt, turbidity, greenish water, and abundant filamentous algae were noted at most of the locations. Silt and algae on the channel bottom were especially thick from the Granville Street bridge downstream. Behind Green Mountain College, there was 100% cover of algae in the channel in 1999. There was also channel and bank disturbance in this stretch as well as a lot of garbage from parties. Algae coverage of 100%, green water, and thick duckweed was noted just below the WWTF also in 1999.

Macroinvertebrate data from 2 sites on the Poultney River (at milepoint 21.8 and 24.0) in 1998 resulted in a macroinvertebrate community rating of good. At the milepoint 21.8 site, there was a lot of filamentous algae present and the metrics indicate that the site is moderately enriched. The enrichment is a definite threat to the aquatic biota. At milepoint 24.0, the metrics all clearly showed a community in good conditions. Site 24.0 is above the Poultney WWTF and Site 21.8 is below.

Several "Partners for Wildlife" projects are underway in this watershed, the largest located about 1.7 miles southwest of Fair Haven on the Poultney River. The downstream end of the project is about 1000 feet upstream of the Route 4 bridge over the Poultney and the upstream end of the project is at a pasture boundary about 2300 feet west of Swamp Road. The riparian area to be restored is a 5400 foot section of riverbank and adjacent riparian wetlands and uplands including a 1000 foot long partially wooded, seasonal stream. Cows will be fenced out of this area allowing it to revegetate. Alternate water supplies for the livestock are being established.

Mercury thermometers waste, metal shavings, oils and photochemicals were allegedly disposed of at the Old Poultney Dump site (8801 assessment). Phase II investigation of the site includes monitoring wells: no mercury found, ? organics (9001 assessment). The latest monitoring well sampling data (September 1993) in the files showed no VOCs or mercury in any of the private wells. Monitoring wells around the landfill, for the most part, found none of the chemicals tested for. The one exception was at MW2 where total volatile compounds were found at 278 micrograms/liter. It is not known which specific compound(s) contributed to that concentration. This site is no longer a threat to surface waters (9601 assessment).

Staco Thermometer site - soils around site were found to be contaminated with mercury. Soils were removed from site (8801 assessment). Re-sampling of soils for mercury at Staco Thermometer found nothing (9001 assessment). Mercury is no longer a problem at the site and groundwater monitoring shows that perc, which is present, degrades going offsite. This site is no longer a threat (9601 assessment).

"Chlordane, an organochlorine pesticide, was found in tissues of all six replicates (of mussels) from the Poultney River" in 1992. However, mussel tissue analysis done in 1993 found only trace amounts of chlordane. The turf farm along the Poultney, which was the suspected source of the chlordane was sold soon after the study. Because of the trace amount finding and the sale of the turf farm, no further sampling or analysis has been done.

INFORMATION SOURCES

Vt.DEC Hazardous Materials Environmental Release files - provided information on Old Poultney dump site and Staco Thermometer site.

Mike Smith, Vt. DEC Hazardous Materials Division - latest information on Staco Thermometer

Agricultural Runoff in Selected Vt. Watersheds, USDA/SCS, February 1983. Estimated that 86% of annual NPS phosphorus load was from agriculture.

Poultney-Mettawee River Basin Water Quality Management Plan, Vt.DEC, April 1975. Noted below

**Upper Poultney Watershed** **VT02-04**

Poultney Village - river lacking spawning & nursery fish habitat and very sparse cover for large fish.

Rich Langdon, Vt. DEC Biological and Aquatic Studies Section - information on the mussel tissue contamination

Memo from Carole Fowler to Neil Kammon 11/15/95 - list of NPDES Permittees in significant noncompliance with their discharge permits

Larry Fitch, Vt DEC Facilities Engineering Division - his section is not aware of failed septic sytems in East Poultney as noted by Joel Williams (an area resident) in a past assessment. Needs more investigation before including in the assessment. (9807)

Vt. DEC Wastewater Management Division files - information on discharges from Poultney WWTF. (1999)

Sally Eugair, Natural Resources Conservation Service - provided information on Partners for Wildlife (USF&W Service projects) and other projects. NRCS are partners with USF&W on these efforts. (1999)

Vt. Department of Fish & Wildlife - temperature data from the Poultney River above Granville Street bridge. (1999)

Jerry McArdle & Cathy Kashanski, Vt Department of Environmental Conservation - field observations on the Poultney River and tributaries. (1999)

Steve Fiske, Vt.DEC Biomonitoring and Aquatic Studies Section - provided data from and information about the two biomonitoring sites on this waterbody. (1999)

| Use No. | Use Description | Fully | Threat | Partial Support | Non Support | Not Assessed |
|---|---|---|---|---|---|---|
| 01 | Overall | 48.5 | 7.0 | 3.7 | 0.0 | 0.0 |
| 20 | Aquatic biota/habitat | 48.5 | 8.5 | 2.2 | 0.0 | 0.0 |
| 21 | Fish consumption | 59.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| 42 | Contact recreation | 57.7 | 0.0 | 1.5 | 0.0 | 0.0 |
| 44 | Noncontact recreation | 57.0 | 0.0 | 2.2 | 0.0 | 0.0 |
| 50 | Drinking water supply | 0.0 | 0.0 | 0.0 | 0.0 | 59.2 |
| 62 | Aesthetics | 48.5 | 9.2 | 1.5 | 0.0 | 0.0 |
| 72 | Agriculture water supply | 0.0 | 0.0 | 0.0 | 0.0 | 59.2 |
| 82 | Industry water supply | 0.0 | 0.0 | 0.0 | 0.0 | 59.2 |

| Impairment Cause | Magnitude | Size (mi.) |
|---|---|---|
| Nutrients | M | 1.50 |
| Nutrients | T | 9.30 |
| Siltation | T | 10.70 |
| Thermal modifications | M | 2.20 |
| Pathogens | H | 1.50 |

| Impairment Source | Magnitude | Size (mi.) |
|---|---|---|
| Municipal point sources | H | 1.50 |
| Municipal point sources | T | 7.00 |
| Agriculture | T | 10.70 |
| Removal of riparian vegetation | H | 2.20 |
| Removal of riparian vegetation | T | 8.50 |

| Point Source Description | NPDES No. |
|---|---|
| Poultney WWTF 0.350mgd | VT0100269 |

## Mettawee River Watershed

## Assessment Report

**Waterbody No:** VT02-05 **Basin:** 02-Mettawee

**River Length (mi.):** 47.5 **Classification:**

**Description:** Mettawee River from the NY/VT border to its headwaters and tributaries including Flower and Indian Brooks

### *Location Identifiers*

**County:** Rutland Bennington **NRCS District:** 2

**ANR Enforcement District:** 1 **Regional Planning Commission:** RUT

**Fish and Wildlife District:** 2

### *Assessment Information*

**Assessment Date:** 1999

**Date Last Updated:** 7/29/1999

**Assessment Category:** B

**Water Quality Limited?**

**On 303(d) List?** Y

**Monitored for Toxics?** N

**Assessment Types**

Surveys of fish and game biologists or other professionals

Land use information and location of sources

Non-fixed station chemical/physical monitoring-conventional polluta

**Aquatic Contamination**

**Toxics Testing**

**Waste Management Zone - Miles:** 0.30 **Description:** below Pawlet WWTF outfall in West Pawlet

**Assessment Comments**

NON-SUPPORT MILES

Flower Brook: 0.1 - Pawlet Village - non-support of aesthetics due to collapsing structure, old pipes, other debris and iron staining at Flower Brook Cascade. c(500) s(8520)

PARTIAL SUPPORT MILES

Mettawee River: 8.2 - upstream from NY/VT border to confluence with Flower Brook - partial support of aquatic biota/habitat and non-contact recreation due to temperature problems, sediments, and nutrient enrichment from agricultural land uses (esp. corn, hay and pasture), loss and removal of riparian vegetation and streambank erosion. c(900,1100,1400) s(1000,7600,7700)

Unnamed tributary to the Mettawee River: 0.2 - downstream of Pawlet landfill - at least partial support of aquatic biota/habitat due to instream iron and zinc levels that exceed standards from landfill discharges (0.2 miles arbitrarily chosen to represent length of this impact). c(500) s(6300)

THREATENED MILES

Mettawee River: 6.8 - upstream from confluence with Flower Brook to East Rupert - threats to aquatic biota/habitat and non-contact recreation due to temperature problems, sediments, and nutrient enrichment from agricultural land uses (esp. corn, hay and pasture), loss and removal of riparian vegetation and

**Mettawee River Watershed** **VT02-05**

streambank erosion. c(900,1100,1400) s(1000,7600,7700)

Mettawee River: 4.2 - upstream from Rupert/Dorset town line - threats to aquatic biota/habitat, non-contact recreation and aesthetics from siltation/sedimentation and nutrients from riparian vegetation removal and land development. c(900,1100) s(3200,7600)

Flower Brook: 0.5 - upstream from Pawlet Village - threats to aquatic biota/habitat and aesthetics due to temperature changes, nutrients, sediments from yards and lawns down to the brook, removal of riparian vegetation and residential land runoff. c(900,1100,1400) s(3200,7600)

Flower Brook: 1.5 - upstream from about 1 mile up from the confluence with Mettawee River - threats to aquatic biota/habitat and aesthetics due to thermal modifications, nutrient enrichment and siltation caused by agricultural land uses (esp. pasture and corn), removal of riparian vegetation and streambank erosion. c(900,1100,1400) s(1000,7600,7700)

Indian Brook: 5.0 - upstream of NY/VT border - threats to contact rec. (swimming), aesthetics, and aquatic biota/habitat from sedimentation, nutrient & organic enrichment, thermal changes, and pathogens caused by ag land uses, poor ag practices and Pawlet WWTF. c(900,1100,1200,1400,1700) s(200,1000)

Unnamed Trib (Quarry Brook): 2.5 - below Wells Landfill - threats to drinking and ag water supplies, aquatic biota, recreation uses and aesthetics due to unknown toxicity from improper landfill disposal practices. c(100) s(6300)

COMMENTS

Temperature data were gathered by the Vermont Department of Fish & Wildlife from two sites on the Mettawee River from mid-April to the end of October 1995. The lower site near where Route 153 crosses the river in the eastern portion of Pawlet (Ryan TempMento SN904671 #002) had high temperatures in much of the daytime in July and August. At this site, the temperature was over 25 C (77 F) for 180 hours; it was over 27 C (80.5 F) for 46 hours; and it reached 29 C and 30 C for 5 and 2 hours respectively. The second site was further upstream on the Mettawee just above the mouth of Flower Brook (Ryan TempMentor SN904672 #005). The temperatures here were not as high and did not stay high for as long. The temperature was over 25 C for 36 hours but did not go above 27 C this season.

Macroinvertebrate data from one site on the Mettawee River and two sites (rivermile 4.8 and 4.9) on Flower Brook found the aquatic community in good to excellent health. On the Mettawee, a sample was taken at river mile 28.6 in Pawlet in 1997 and the community integrity was good.

Fish data were also collected at one of the Flower Brook sites described above (milepoint 4.9) and the fish community was in excellent condition.

Information gathered from the Solid Waste files showed that at the Pawlet Landfill instream sampling site, the instream iron concentrations exceeded the 1000 ppm chronic criterion in at least six samples collected between 1995 and 1997. The highest result was a value of 6390 ppm in October 1996. Zinc criteria at a hardness of 50 mg/liter are: acute = 65 ppb and chronic = 58.6 ppb. Instream zinc concentrations exceeded both of these criteria on 7 occasions from 1995 to 1997. The maximum concentration sampled was 156 ppb.

The Pawlet WWTF has very low effluent DO concentrations although we don't have instream DO values to know the effect of the effluent levels. An example of the low effluent values: during an eight day period in August 1995, DO readings show a mean of 2.26 mg/liter, a maximum of 2.75 mg/liter and a minimum of 1.0 mg/liter. Another example; from July 1997 to May 1998, the effluent DO concentrations were below 4 mg/liter on 30% of the days recorded and below 5 mg/liter on 75% of the days.

A number of the tributaries to the Mettawee were checked in October 1998 for obvious problems or threats, however, most of those evaluated appeared to be in good condition. Some of those checked include: an unnamed tributary north of East Rupert, an unnamed tributary west of Dorset center that flows northerly and two unnamed tributaries north of Dorset center that flow southerly and westerly into the Mettawee.

At least two Partners for Wildlife (U.S. Fish & Wildlife Service with partners such as NRCS) projects are currently happening in the Mettawee watershed. One project located south of the village of Pawlet involves fencing off 1000 feet of Mettawee River shoreland, stabilizing 270 feet of bank with tree revetments, and converting an area of pasture to hayland. Two acres of upland and two acres of wetland riparian habitat will be restored. Another project is located in the headwaters of Flower Brook where a 1100 foot section of streambank and wetland riparian area is being restored. Beef cattle will be fenced out of the stream and provided a new watering system.

**Mettawee River Watershed** **VT02-05**

INFORMATION SOURCES

Steve Fiske, Vt DEC Water Quality Division Biomonitoring Section - data on 2 Flower Brook sites and one Mettawee site. (1999)

Memo from David Sligh to Cathy Kashanski dated August 3, 1998 - Solid Waste Landfills in Basins 2,7,10 &14. (1999)

Vt Dept of Fish & Wildlife - temperature data on the Mettawee River from 1995 season. (1999)

Jennifer Kimberly, NRCS - noted that little has changed on the Mettawee since the 1988 assessment. Only one manure storage facility built - no money for more. The Mettawee has better shading in Bennington Co. than in Rutland Co. Indian Brook still has problems - poor manure practices, cows in stream (9601)

Don Gallus, Vt. DEC Enforcement Division - did not think there has been any change since 1988: the farms are still on top the river and animals still in the river (9601)

Vt. DEC Solid Waste Files 1/88 - solid waste disposed of in abandoned/ water filled rock quarry for 15 years. Stream leaving site is visually contaminated. Dump closed since 1985. No sampling done.

Dave Callum, Vt. F&W Fisheries Biologist - noted fish kills in Mettawee in 1970s; temperature-related problems due to turbidity and riparian vegetation loss in Mettawee and Flower Brook (8801)

Dennis Borschardt - RC&D Coordinator - noted poor fishery in Mettawee (formerly cold water fishery), need for re-establishing riparian vegetation and fencing; thermal/sediment pollution (8801)

William Forbes, SCS - noted ag. watershed of Mettawee (8801)

Paul Cummings, Vt. DEC Water Resources Investigator - noted poor ag practices (manure spreading, cropland erosion, no buffer strips) (8801)

Bob Rudd, ASCS - noted barnyard runoff to Mettawee (8801)

Mettawee River Restoration Project. 'Mini' Strategic Plan 2/84 - report on nature of problem and remediation plan prepared by NY DEC & VT F&W.

Ag. Runoff from Selected Vt. Watersheds, USDA/SCS, February 1983 - report estimates that 86% of total annual NPS phosphorus load of Mettawee watershed originates from ag NPS pollution.

| Use No. | Use Description | Fully | Threat | Partial Support | Non Support | Not Assessed |
|---|---|---|---|---|---|---|
| 01 | Overall | 18.5 | 20.5 | 8.4 | 0.1 | 0.0 |
| 20 | Aquatic biota/habitat | 18.6 | 20.5 | 8.4 | 0.0 | 0.0 |
| 21 | Fish consumption | 47.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| 42 | Contact recreation | 40.0 | 7.5 | 0.0 | 0.0 | 0.0 |
| 44 | Noncontact recreation | 28.3 | 11.0 | 8.2 | 0.0 | 0.0 |
| 50 | Drinking water supply | 0.0 | 2.5 | 0.0 | 0.0 | 45.0 |
| 62 | Aesthetics | 33.7 | 13.7 | 0.0 | 0.1 | 0.0 |
| 72 | Agriculture water supply | 0.0 | 2.5 | 0.0 | 0.0 | 45.0 |
| 82 | Industry water supply | 0.0 | 0.0 | 0.0 | 0.0 | 47.5 |

| Impairment Cause | Magnitude | Size (mi.) |
|---|---|---|
| Unknown toxicity | T | 2.50 |
| Metals | H | 0.20 |
| Nutrients | M | 8.20 |
| Nutrients | T | 18.00 |
| Siltation | M | 8.20 |
| Siltation | T | 18.00 |
| Thermal modifications | H | 8.20 |
| Thermal modifications | T | 13.80 |
| Pathogens | T | 5.00 |

| Impairment Source | Magnitude | Size (mi.) |
|---|---|---|
| Agriculture | M | 8.20 |
| Agriculture | T | 13.30 |
| Land development | T | 4.70 |

| **Mettawee River Watershed** | | **VT02-05** |
|---|---|---|
| Landfills | H | 0.20 |
| Landfills | T | 2.50 |
| Removal of riparian vegetation | H | 8.20 |
| Removal of riparian vegetation | T | 13.00 |
| Streambank modification/destabilization | M | 8.20 |
| Streambank modification/destabilization | T | 8.30 |

| **Point Source Description** | **NPDES No.** |
|---|---|
| West Pawlet WWTF 0.40mgd | VT0101192 |
| W.L King Subdiv. SW permit UT Mettawee | 1-0696 |