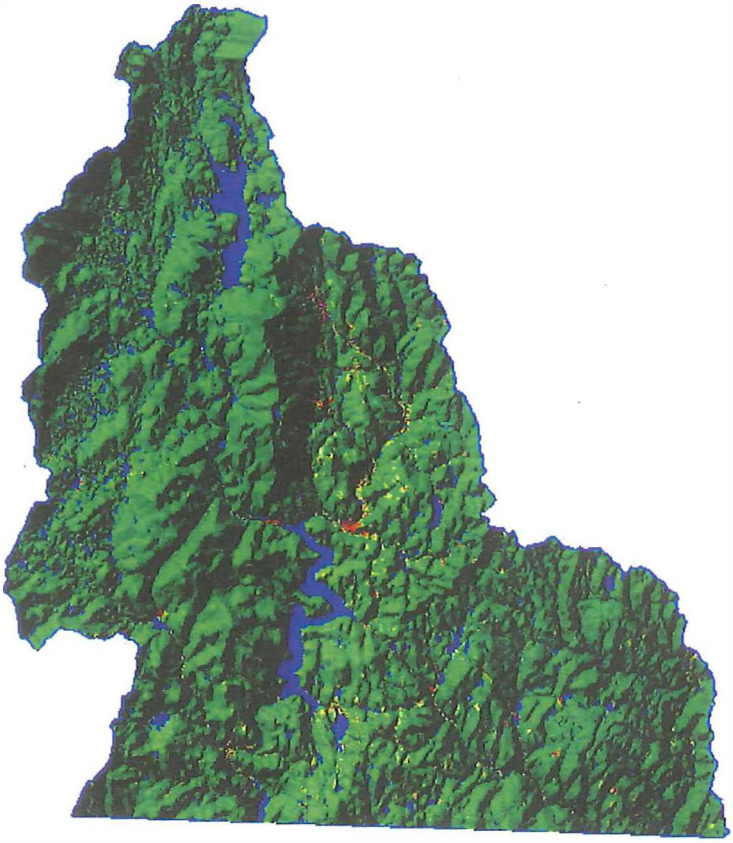
Basin 12

Deerfield River Watershed Assessment Report



Agency of Natural Resources
Department of Environmental Conservation
Water Quality Division

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Contents

General Description Of The Basin

The Deerfield River rises in the Green Mountains in the towns of Glastenbury and Stratton in the southern part of Vermont. The Deerfield River has four branches in Vermont: North Branch, South Branch, East Branch and West Branch. Two of the Deerfield's main tributaries, the East Branch of the North River and the Green River, originate in Vermont but then cross the Vermont-Massachusetts state line and enter the Deerfield River before it joins the Connecticut River near Greenfield, Massachusetts. The Deerfield River system, including the East Branch of the North River and the Green River, drains 14 towns in two counties and is about 318 square miles in area.

There are 17 lakes and ponds in the Deerfield Basin, 20 acres or greater, which total approximately 4,000 acres. The largest is Harriman Reservoir (2,040 acres), followed by Somerset Reservoir (1,568 acres), Sadawga Lake (194 acres), and Sherman Reservoir (160 acres.) Harriman Reservoir is the second largest lake found entirely in Vermont.

Forests cover by far the greatest percentage of the Deerfield River watershed, including the East Branch North River and Green River, with about 85% of the watershed in Vermont in this cover type. Surface water is the second greatest land cover type in the Vermont portion of the watershed. Surface waters and wetlands combined account for close to 10% of the watershed which is a high percentage for these land cover types. Developed land, including transportation, accounts for about 3% of the watershed with much of that in the North Branch subwatershed (Dover and Wilmington). Agricultural land is just over 2% of the watershed area. The acres in each land use and the percentage of the watershed that it represents is given in Table 1.

Deerfield River

The Deerfield River flows through the counties of Bennington and Windham a distance of about 26 miles and comprises a drainage area of 224 square miles in Vermont. The mainstem of the Deerfield rises on the eastern slope of Glastenbury Mountain in the southwest corner of the town of Stratton. The Deerfield flows rapidly from its source a distance of 5.0 miles, with a vertical drop of 500 feet, to its confluence with the Glastenbury River. The Deerfield continues in a southeasterly direction a distance of 5.3 miles to Searsburg Reservoir. At this point, the river is joined by the East Branch from the north.

The East Branch has Somerset Reservoir and its tributaries as its source. Grout Pond, with an area of 84 acres, flows into Somerset Reservoir which has an area of 1568 acres at elevation 2131 (normal spring high water). From the spillway at Somerset Reservoir, the East Branch flows quite rapidly for a distance of 5.5 miles until it reaches the Deerfield River.

From the spillway at Searsburg Reservoir, the Deerfield continues in a southerly and then an easterly direction to Harriman Reservoir. The North Branch of the Deerfield enters Harriman Reservoir about 2.0 miles east of the location where the main Deerfield River enters.

The North Branch of the Deerfield River drains the area northeast of Harriman Reservoir. The North Branch rises in the Green Mountain National Forest in the town of Dover and flows for approximately 11.0 miles to the village of Wilmington, passes through on its westerly course and enters the northeast corner of Harriman Reservoir. The tributaries of the North Branch starting near the headwaters are Blue Brook, Ellis Brook, Cheney Brook, Negas Brook, Bill Brook (outlet of Lake Raponda), and Cold Brook. These tributaries are of a steep and flashy nature.

Harriman Reservoir extends approximately 9 miles southward through the valley south of Wilmington Village and has the following small tributaries starting at the source: Boyd Brook, Wilder Brook, Graves Brook, No. 9 Brook, the outlet of Clara Lake, the outlet of Sadawga Lake, and an unnamed tributary entering from the east. The surface area of this reservoir is 2040 acres at the spillway crest elevation 1492.

From the spillway of Harriman Reservoir, the Deerfield River flows in a southwesterly direction for a distance of 3.0 miles where it is joined by the West Branch in the village of Readsboro.

The West Branch forms in the so-called Beaver and Camp Meadows in the southeast quarter of the town of Woodford. Reservoir Brook, Yaw Pond Brook, plus five unnamed tributaries comprise the headwaters. These tributaries are flashy streams draining a wooded and mountainous area. The West Branch reaches the village of Heartwellville 5.5 miles from its source where it is joined by another small tributary. The West Branch continues in a southeasterly direction for 5 miles to its confluence with the Deerfield River in Readsboro.

The Deerfield River then flows for about a mile and a half in a southeasterly direction into Sherman Reservoir, which is about a mile long to the Vermont-Massachusetts state line. The South Branch enters the Deerfield River about a quarter mile upstream from the state line.

The South Branch rises on the east side of the Hoosic Range of mountains, so-called, in the town of Readsboro. The branch is only 5.5 miles long and flows quite rapidly for its entire length. There is scattered rural habitation on this stream.

East Branch of the North River

The East Branch of the North River drains 41 square miles of hilly wooded terrain southeast of the Deerfield River drainage basin. The branch has as its source Ryder Pond, located in the northern portion of the town of Whitingham about 2 miles northwest of Jacksonville. The East Branch of the North River flows in a southeasterly direction through the towns of Whitingham and Halifax, a distance of 11 miles, to the Vermont-Massachusetts state line.

From Ryder Pond to Jacksonville, a distance of 1.7 miles, the East Branch of the North River flows rapidly. At Jacksonville, the river is joined by a small tributary which is fed by three ponds: Laurel Lake, Gates Pond and Jacksonville Pond.

Another small tributary joins the main stem at Jacksonville. This unnamed tributary parallels Route 100. The stream is flashy and flows a distance of 1.3 miles.

Continuing its southeast course for 4.5 miles, the East Branch of the North River forms small rapids until it reaches a short stretch of cascades opposite the turn-off road which leads to West Halifax. The river continues another half mile to its confluence with Branch Brook, which enters from the north. In this 4.5 mile stretch, five small tributaries join the river, all but one entering from the southwest.

Branch Brook, the largest tributary to the East Branch of the North River, flows from its source near the Marlboro-Halifax town line a distance of 5.5 miles in a southerly direction to its confluence with the East Branch. Three miles from its source, Branch Brook flows through the village of West Halifax. A distance of 1.5 miles further downstream it joins with Sperry Brook, a small tributary 1.5 miles long, and then travels a distance of 1.0 mile to its juncture with the East Branch North River.

Continuing in a southeast direction, the East Branch North River flows a fast 2.5 miles to the Vermont-Massachusetts state line. This stretch of river receives six more small flashy tributaries.

Green River

The Green River drainage basin lies directly to the east of the East Branch North River. The Green River from its source in the southwest corner of the town of Marlboro, flows in the town of Halifax in a westerly direction until it crosses the Halifax-Guilford town line where it changes its course to a southerly direction. The total length of the river in Vermont is 13.0 miles.

The Green River flows a distance of 3.5 miles from its source to Harrisville where it is joined by Harrisville Brook. From Harrisville, the Green River flows 0.5 miles to its confluence with Pond Brook, which originates at South Pond 1.0 miles east of Marlboro College. Pond Brook travels a slow and then rapid course a distance of 3.3 miles. The Green River then continues for 3.8 miles in a southeast direction to its confluence with Hinesburg Brook. This stretch of the river flows through a sparsely populated area and lies in a narrow valley.

Hinesburg Brook joins the Green River at a bend in the river 1.0 mile south of Hinesburg. This brook is 4.0 miles long and drains a small farming area.

Continuing southward, the Green River flows 1.8 miles to the village of Green River. From Green River Village, the Green River flows a distance of 3.2 miles to where it crosses the Vermont-Massachusetts state line.

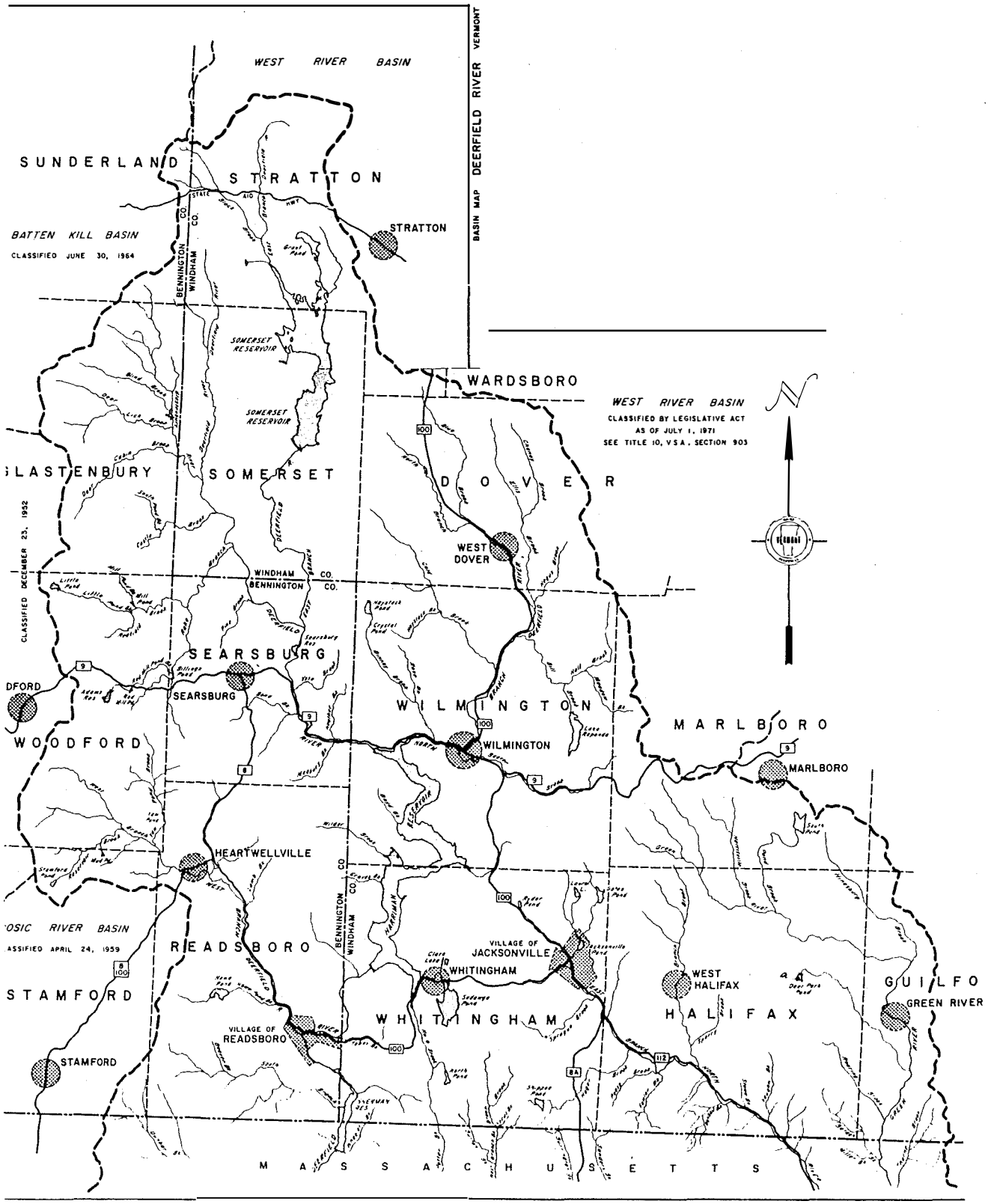
Table 1. Land Use and Land Cover for the Deerfield River Watershed[1]

Land Use	Acres	% of Total
Forested	128,168.6	85.1
Surface Water	9,749.2	6.5
Wetlands	4,376.1	2.9
Transportation	4,132.4	2.7
Agriculture	3,325.5	2.2
Developed Land[2]	625.2	0.4
Old Field & Barren	165.8	0.1
Total:	150,542.8	99.9

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

2 Developed land = residential, commercial, industrial but not transportation, which is listed separately

Figure 1. The Deerfield River Watershed in Vermont



Uses, Values and Features of Basin 12 Waters

Waterfalls, cascades and gorges

No waterfalls, cascades or gorges were identified in the Deerfield River watershed during a study of those features for the state in the 1980s. However, in a later swimming hole study, several cascades/waterfalls were described for the watershed. Two cascades were identified on the West Branch of the Deerfield River: one consists of a half-mile long cascade and pool chain with an eight-foot waterfall and the other has small cascades with rock pools and a "giant boulder". Halifax Gorge, a cascade and pool chain in a narrow wooded ravine on the East Branch of the North River, was also noted in the swimming hole survey report. The site is considered state significant for its pool chain and was popular for swimming at one time; however, the land adjacent to this stretch of the river was posted at the time of the swimming hole survey and so not used by the public.

Swimming

The three sites with cascades and pools described above are good swimming holes. In addition to these sites, two other swimming spots both on the Green River were identified during the *Vermont Swimming Hole Study*. One of the sites is an impoundment in Green River village above a timber crib dam, which is well used for swimming and jumping. The other is on the lower Green River and is a large pool about 200 feet long on a bend in the river.

Swimming uses are common on nearly all Vermont waters, and lakes and ponds in the Deerfield River watershed are no exception. While it is impractical for Vermont DEC to track the location of every informally used swimming spot in this watershed, the following lakes are popular for swimming, and are known to receive more than incidental swimming use.

Adams Pond in Woodford is located within the Woodford State Park and has two designated swim beaches. Grout Pond in Stratton is located on U.S. Forest Service land and is the site of a popular campground. There is one designated swim beach with numerous smaller access points. At Lake Raponda in Wilmington, there is a popular town swim beach.

Swimming occurs at several locations on Harriman Reservoir including the well-used south and north end beaches. At Somerset Reservoir, the public access area is commonly used as a swimming area.

Boating

There are a number of whitewater boating stretches in the Deerfield River watershed that are described in *The Whitewater Rivers of Vermont* report. Two stretches are described for the upper Deerfield River: one with a put-in at the Somerset Road bridge extending downstream for 4.5 miles to the confluence with the East Branch and the other with a put-in below Searsburg Reservoir then extending downstream about 4 miles to Harriman Reservoir. The former stretch is "essentially a Class II run" that is best during snowmelt but also possible to run after some rainstorms. It is a bouldery stretch with "no drops or narrow chutes." The latter run is Class III at high water and also is a bouldery stream; however, it has "big rocks, steep pitches and tight corners" and is considered "tricky".

Another whitewater stretch is described for the East Branch of the Deerfield River from below Somerset Reservoir to the Deerfield River. The flow is regulated by the Somerset Dam and so it is not as fast as it would be without that control in the spring. It can be run during snowmelt, during water releases, and when the reservoir is drawn down in the fall. The authors of the *Whitewater Rivers* report considered it to be the "wildest and most remote whitewater stream in Vermont" and valuable for that characteristic. It is accessible by road at either end of the run but not in the middle of it.

The North Branch of the Deerfield River is mostly a quickwater stream rather than whitewater and is boated from West Dover down to Harriman Reservoir. It flows through the developed Dover-Wilmington valley near Route 100 much of the time. Although not a remote experience, it is quite accessible.

A 5-mile stretch on the West Branch of the Deerfield River from Heartwellville to Readsboro is a possible kayak stream but it is thought to be hazardous and only possible by expert boaters. The authors of the *Whitewater Rivers* report had not run this stream and had mainly warnings about its dangerous nature.

An 8-mile stretch on the Green River from Green River, Vermont to West Leyden, Massachusetts is largely Class II whitewater with some Class III spots at high water. It is considered a "delightful" run and is popular with both individual boaters as well as clubs and classes.

There is a flow telephone maintained by the power utility that reports flow rates below all their hydro-electric facilities.

Wetlands and other significant natural communities

The Southern Green Mountains biophysical region, of which the Deerfield River watershed is a part, consists of the peaks and ridges of the Green Mountains and then the high plateau with numerous wetlands east of the mountaintops. According to *Wetland, Woodland, Wildland*, "[o]n the plateaus, Northern Hardwood Forests dominate the upland landscape. Lowland Spruce-Fir Forests occupy the drier portions of large, cold depressions and grade into wetland complexes of Spruce-Fir Swamps, Shallow Emergent Marshes, and beaver impoundments." Some special examples of these communities are briefly described below.

In the Rake Branch subwatershed that drains to the upper Deerfield is the 4-acre Billings Pond in Searsburg surrounded by a 70 acre emergent marsh and wet meadow community. In this same subwatershed, however in the town of Woodford, is the Mill Pond Meadows community, which includes 7-acre Red Mill Pond and then approximately 100 acres of associated marsh and wet meadows.

Also in the town of Woodford in the West Branch subwatershed is the approximately 250-acre Beaver Meadows wetland complex. It is a large beaver pond complex that provides good food and cover for wildlife, very good nesting and a good migratory stopover area for waterfowl. In this same subwatershed is also the 200-acre wetland complex known as Camp Meadows which is a series of remote beaver meadows and wooded swamps.

In the town of Glastenbury is a wetland complex of about 50 acres called Castle Meadows that consists of a beaver pond surrounded by a mat of floating vegetation.

A shallow marsh dominated by emergent plants east of Somerset Reservoir is known as Blueberry Swamp. This 60-acre wetland provides good food and cover for waterfowl. A number of other 30- to 40-acre wetlands usually associated with old or active beaver ponds have been identified for the town of Somerset.

South of Lake Raponda in Wilmington is the Lake Raponda Balsam Swamp which was described in the 1971 Vermont Natural Areas Inventory as "an excellent balsam swamp with plant communities of unusual diversity and productivity with boreal plant species and a luxuriant ground cover of mosses and lichens."

Atherton Meadow in the town of Whitingham is about 20 acres and is a deep marsh used by waterfowl and beaver at least.

Deerfield River Watershed Fisheries

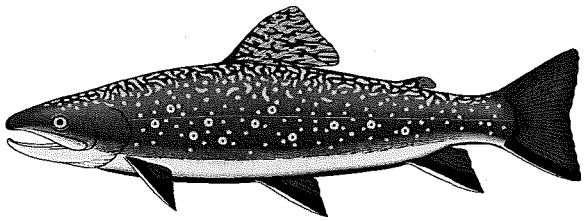
The Deerfield River watershed supports a diversity of cold and warm water fisheries. The distribution and abundance of individual species is dictated by environmental factors (e.g., water temperatures and chemistry) and fishery management activities (e.g., fish stocking). The existence of large impoundments, such as Harriman and Somerset Reservoirs, while having altered riverine environments, has also created habitats and specific fish communities that otherwise would not occur naturally in the watershed. Generally, the watershed is characterized by high elevation terrain with acidic soils underlaid by weather resistant bedrock with low acidity buffering capacity. This surficial geology has a significant affect on the overall biological productivity of the lakes and streams in the Deerfield watershed, including fish populations.

Most first and second order, upland and headwater streams (e.g., Blue Brook in East Dover) are habitat for wild, self-sustaining brook trout *(Salvelinus fontinalis)* populations. These streams typically have cold water year round and support very simple fish communities (usually not more than 2 or 3 species). Even though trout numbers may be high, cold temperatures and chemical characteristics are not usually conducive to allowing fish to grow to large sizes. Third and fourth order streams, such as the North Branch in East Dover, tend toward having wider channels, more variable flows, and greater exposure to the sun resulting in warmer temperature regimes, particularly during the summer months. In the Deerfield River watershed, this results in wild brook trout being gradually replaced by wild brown trout *(Salmo trutta)*, a species more tolerant of slightly warmer water temperatures. The fish community also becomes more diverse with more species of minnows and shiners inhabiting these reaches. Continuing downstream even further (e.g., the North Branch in Wilmington and the main river along Route 9) trout may become supplanted altogether by warm water fishes, such as smallmouth bass *(Micropterus dolomieui)*, with salmonids occurring only seasonally when water temperatures are cooler. Streams and river segments having marginal habitat for trout and, therefore, supporting low densities of wild sport fish, may be stocked annually by the Vermont Fish and Wildlife Department with yearling, catchable-size brook and brown trout provided that the angling public has access to these waters. The North and West Branches, the East Branch of the North River, the Green River, and the main stem of the Deerfield River are managed by stocking.

River reaches below the large hydro power storage impoundments have created unique trout management opportunities. The Deerfield River Project's current operating license mandates specific minimum flows in river reaches below the dams be provided year round. Minimum flows have improved habitat for aquatic biota by increasing the amount of wetted area, water depths, and temperature conditions that otherwise did not exist prior to relicensing. This has created cold tailwater trout fisheries below Somerset, Searsburg, and Harriman reservoirs. For example, in the spring 1998, the river below Harriman Reservoir was provided with minimum flows on a continual basis. This flow is a deep water release and consequently is a constant supply of cold water capable of supporting trout. Later that fall the Fish and Wildlife Department with assistance of the U. S. Forest Service/Green Mountain

National Forest initiated wild brook trout restoration in the tailwater. Wild brook trout collected in 1998 and 1999 from other streams within the Deerfield River watershed were relocated into the Harriman Reservoir tailwater. These introductions have resulted in establishing a self-sustaining wild brook trout population and fishery in that reach.

Lakes, ponds and reservoirs support diverse fish populations and are managed for a variety of sportfishing opportunities. Small lakes and ponds (e.g., Grout Pond, Lake Raponda, Sadawga Lake, Jacksonville Pond) have warm water fish assemblages typically consisting of smallmouth and/or largemouth bass *(Micropterus salmoides)*, yellow perch *(Perca flavescens)*, brown bullhead *(Ameiurus nebulosus)*, pumpkinseed *(Lepomis gibbosus)* among other species. In contrast, the large, deep impoundments provide habitats for both warm and cold water fish communities. Warm water species common to both Somerset and Harriman reservoirs include smallmouth bass, rock bass *(Ambloplites rupestris)*, yellow perch, pumpkinseed, and chain pickerel *(Esox niger)*. In addition to these fishes, Harriman Reservoir has wild populations of rainbow smelt *(Osmerus mordax)* and brown trout. Both waters are managed for salmonid fisheries and are stocked annually with one or more species. Somerset Reservoir is stocked with catchable-size brook trout, and Harriman Reservoir is stocked with catchable-size brown, rainbow *(Oncorhynchus mykiss)* and brook trout; landlocked Atlantic salmon *(Salmo salar)*; and lake trout *(Salvelinus namaycush)*. Sport fishing in Searsburg Reservoir is dependent on brook trout stocking exclusively. Many of these standing water fisheries are used by anglers during both open water and ice fishing seasons.



Lakes with Special Significance or Features

Vermont DEC's Lake Protection Classification System is one framework within which lakes can be evaluated for their special significance when compared to other lakes statewide. The Lake Protection Classification System identifies unique lakes based on: wilderness status; occurrence of unusual scenic and natural features; existence of very high water quality; and/or the presence of rare, threatened, and/or endangered species. In the Deerfield River watershed, eight ponds are significant for these reasons.

Deer Park Pond, Halifax:This 22-acre pond provides habitat for the rare pondweed *Potamogeton farwelii.*

Grout Pond, Stratton: This 84-acre pond provides habitat for three rare aquatic plant species. These are the milfoil *Myriophyllum humile*, and the pondweeds *P. bicupulatus* and *P. confervoides.* This pond is considered a wilderness-like pond, indicating that it has wilderness character, while being easily accessible.

Haystack Pond, Wilmington: This is a 27-acre high elevation wilderness pond.

Howe Pond, Readsboro: This 52-acre pond provides habitat for the rare pondweed *P. bicupulatus.* Howe Pond is considered wilderness-like and is noteworthy for its natural sand beaches.

Jacksonville Pond, Jacksonville: This 20-acre pond/wetland provides habitat for the rare milfoil *M. humile.*

Lake Raponda, Wilmington: This 121- acre lake provides habitat for the rare waterweed *Elodea nutallii.*

Somerset Reservoir, Somerset: This 1,568-acre hydroelectric reservoir provides habitat for one nesting common loon pair (*Gavia immer*) and one additional territorial, non-nesting loon pair.

South Pond, Marlboro: This 68-acre pond provides habitat for the rare pondweed *P. bicupulatus.*

Water-Related Activities or Projects in the Basin

Deerfield River Hydroelectric Project Relicensing

The Deerfield River Project consists of eight hydroelectric facilities on the Deerfield River or its branches: three facilities are in Vermont. The original license for this project expired in December 1993. New England Power Company and 12 parties negotiated an Offer of Settlement to resolve the environmental, conservation, and recreational issues in the relicensing proceeding. A FERC license was issued for the Deerfield River hydroelectric projects in April 1997. The conditions of the new license and the 401 water quality certification provide protection to the aquatic communities that was not in place before. The license sets conservation flow standards at the three Vermont dams; establishes bypass flows at Searsburg and Harriman; and sets standards for water level changes at the reservoirs. Recreation enhancements were also agreed upon and conservation easements were put on over 15,000 acres of New England Power Company land in Vermont.

Deerfield River Enhancement Fund

The Deerfield River Enhancement Fund was established in 1999 by USGen New England Inc (the company which bought the Deerfield River Project from New England Power) for environmental preservation in the Deerfield River watershed. The Fund was established for "the purpose of supporting watershed conservation, development of low impact recreational and educational facilities, and planning, design, maintenance and monitoring of such facilities in the Deerfield River Watershed." Establishment of this fund was part of the settlement agreement for the Deerfield project. Approximately $15,000 will be awarded in 2003, the first year that grant money will be available from this fund.

Deerfield River Watershed Association

The Deerfield River Watershed Association is a non-profit organization based in Massachusetts but with the mission to "preserve, protect, and enhance the natural resources of the Deerfield River watershed in southeastern Vermont and northwestern Massachusetts." The association does spring and summer sampling; participates in river clean-ups; did a wetland wildlife survey; works to protect water quality, habitat and open space; and participated in the Deerfield River Settlement Agreement process.

Green River Watershed Preservation Alliance

The Green River Watershed Preservation Alliance is also based in Massachusetts but focuses on the Green River watershed in Vermont and Massachusetts. This group did a petition for Outstanding Resource Water (ORW) status for the Green River and worked on a fish passage issue in the village of Green River.

Mercury Studies in the Deerfield River Watershed

The US Environmental Protection Agency, the US Forest Service, the Vermont DEC, and other agencies have supported several Vermont-specific studies of mercury dynamics in the past few years, which have produced much information about mercury in lakes in the Deerfield River basin. Three specific projects have been carried out on lakes in the Deerfield Basin. First, Vermont DEC maintains a database where results from the joint Vermont DEC-Vermont Department of Fish and Wildlife Tissue Contaminant Monitoring Program are archived. This archive contains 67 individual measurements from 6 lakes in the Deerfield River watershed, collected between 1994 and 2001, for a variety of fish species. Second, two lakes (Somerset Reservoir and Jacksonville Pond) were included in a large joint Vermont DEC-New Hampshire Department of Environmental Services project to assess mercury burdens in 93 Vermont and New Hampshire lakes. Water column, sediment, fish tissue, and fish-eating bird tissue mercury data are available from this project. Finally, Vermont DEC in conjunction with the US Forest Service and Vermont Monitoring Cooperative, has undertaken a paleolimnological investigation of historical mercury deposition to four lakes in the Lye Brook Wilderness to reconstruct mercury deposition trends from 1800 to present.

Vermont Long-Term Monitoring of Acid Sensitive Lakes Project

The Vermont Department of Environmental Conservation has been monitoring the chemistry of acid sensitive lakes in Vermont since the winter of 1980. In 1983, the U.S. EPA Long-Term Monitoring Project was initiated within the National Acid Precipitation Assessment Program. Since 1983, the Vermont Long-Term Monitoring of Acid Sensitive Lakes project has been conducted in cooperation with EPA. Currently, Vermont monitors the chemistry of twelve lakes as part of the longterm project. Each of these lakes has been monitored from 16 to 20 years making it one of the oldest lake monitoring programs designed specifically to assess acidification. The lakes are monitored at their outlets for five weeks during spring run-off (late March to early May) and near their deepest point during mid-May (spring), July-August (summer) and October (fall). Five of the twelve lakes are in the Deerfield River watershed.

Deerfield Watershed River and Stream Assessment Summary

The assessment of Basin 12 rivers and streams involves identification of those miles where important uses and values of the waters are compromised by poor water quality or alterations. It also involves identification of the "causes" (specific pollutants or changes) and the "sources" (activity or land use) of the problem that result in less than full support of the uses. The assessment process also is used to identify waters and aquatic habitat in good condition as well as rivers and streams where Vermont DEC does not have enough information to determine the conditions of the waters and habitat. In addition to the summary information in the paragraphs and tables below, the conditions, problems, and other information about specific rivers and streams are described in the Waterbody Reports in Appendix D.

Support of Designated Uses in Watershed Rivers and Streams

As shown in Table 2 below, approximately 24 miles of river and stream in the Deerfield watershed in Vermont do not fully support one or more uses of these waters. However, most river miles in the watershed do support all uses with 153 miles fully supporting all uses and about 32 miles fully supporting uses but known threats exist. Aquatic biota and/or habitat is the use most compromised by either pollution, a condition or an activity.

Table 2. Use Support Status of Rivers in the Deerfield River Watershed

Use	Miles of full support	Miles threatened	Miles of partial support	Miles of non-support	Miles not assessed
Overall	152.4	31.8	21.1	2.6	6.9
Aquatic biota/habitat	152.4	31.8	21.1	2.6	6.9
Contact recreation	206.9	1.0	0	0	6.9
Secondary contact recreation	181.6	17.7	8.6	0	6.9
Aesthetics	182.6	10.5	14.8	0	6.9
Drinking water	51.2	1.0	0	0	162.6
Agricultural water	15.2	1.0	0	0	198.6
Fish consumption	0	214.8	0	0	0

Causes and Sources of Problems or Threats in Watershed Rivers and Streams

The causes and sources of impacts to aquatic biota and habitat as well as other uses include snowmaking water withdrawals, sedimentation, channel alterations, thermal modifications (cold water releases from impoundments, warm water from riparian vegetation removal and widened channels), and acid rain effects. Tables 3 and 4 list the known causes and sources of impacts and threats to Deerfield watershed rivers and streams.

Table 3. Causes of Impacts or Threats to Deerfield Watershed Rivers and Streams

Cause or pollutant	Miles of high impact	Miles with moderate impact	Total miles of impact	Miles threatened
Flow alterations	15.0	0	15.0	0
Sedimentation	14.8	0	14.8	10.3
Physical habitat alterations	14.8	0	14.8	0
Thermal modifications	0	12.0	12.0	22.6
Turbidity	0	12.0	12.0	2.0
pH	5.0	0	5.0	14.8

Table 4. Sources of Impacts or Threats to Deerfield Watershed Rivers and Streams

Source	Miles of high impact	Miles with moderate impact	Total miles of impact	Miles threatened
Water withdrawals - snowmaking	15.0	0	15.0	0
Land development	12.4	0	12.4	8.3
Streambank destabilization	0	12.0	12.0	2.0
Riparian vegetation removal	0	8.8	8.8	12.7
Channelization	8.0	0	8.0	0
Atmospheric deposition	5.0	0	5.0	14.8
Road/bridge construction	2.8	0	2.8	2.0
Upstream impoundment	0	0	0	8.3

Deerfield Watershed Lakes and Ponds Assessment Summary

The Deerfield River watershed (including the Green and North River drainages) has 46 lakes and ponds consisting of 4,600 acres. Twenty-eight of these lakes (4,589 acres) are tracked in Vermont DEC's Lake Assessment Database. For these 4,589 acres, 4,449 (16 lakes) are monitored, and assessments are based on these data. For the remaining 140 acres (12 lakes), assessments are based on evaluation of available information.

Support of Designated Uses of Deerfield Watershed Lakes and Ponds

Overall, there are 4,030 lake acres in these drainages that only partially support one or more uses, and 44 acres where one or more uses are not supported. All designated uses are fully supported on 512 assessed lake and pond acres. Three acres of the 4,589 acres in the database are unassessed. Impaired lake acres in the Deerfield, Green, and North River drainages are so designated due to impacts on aquatic life uses as well as waterbody-specific data supporting Vermont Department of Health advisories that advise against fish consumption by women of childbearing age and children age 6 or under. Table 5 shows lake acres where designated uses are supported, threatened, or not fully supported.

Table 5. Use Support Status of Deerfield Watershed Lakes and Ponds

Use	Acres Fully Supporting Uses	Acres Threatened	Acres Partially Supported	Acres Not Supporting Uses	Acres Not Assessed
Overall	288	224	4030	44	3
Aquatic Life	281	416	3845	44	3
Swimming	4505	2	0	0	82
Secondary Contact Rec	4505	2	0	0	82
Aesthetics	4572	14	0	0	3
Drinking Water Supply	79	0	0	0	4510
Ag Water Supply	0	0	0	0	4589
Fish Consumption	709	0	3877	0	3

A summary of overall use support by individual lake (Table 6) in acres provides useful information about lakes in the Deerfield River watershed. The next section of the report provides information regarding mercury contamination and acidification in relation to specific lakes.

Table 6: Overall Use Support by Individual Lake in the Deerfield River Watershed

Lake name	Area (ac)	Assessed (yyyymm)	Assessment type	Full support	Threats	Partial Support	Non-Support
Adams (woodfd)	21	200109	monitored	0	0	21	0
Clara	18	200109	evaluated	18	0	0	0
Crystal (wilmtn)	3	200109	evaluated	0	0	0	0
Grout	84	200109	monitored	0	0	84	0
Harriman (whithm)	2040	200112	monitored	0	0	2040	0
Haystack	27	200109	monitored	0	0	0	27
Howe	52	200109	monitored	0	0	52	0
Little (woodfd)	16	200109	monitored	0	0	0	16
Lost (glasby)	1	200109	evaluated	0	0	0	1
Mud (woodfd)	6	200109	evaluated	0	6	0	0
North (whithm)	20	200109	evaluated	20	0	0	0
Raponda	121	200001	monitored	0	121	0	0
Red Mill	7	200109	evaluated	0	7	0	0
Sadawga	194	200109	monitored	0	194	0	0
Searsburg	25	200109	evaluated	0	0	25	0
Sherman	160	200109	monitored	0	0	160	0
Somerset	1568	200109	monitored	0	0	1568	0
Spruce (wilmtn)	12	200109	evaluated	12	0	0	0
Stamford	12	200109	monitored	0	0	12	0
Yaw	2	200109	evaluated	2	0	0	0
Gates	30	200109	monitored	0	30	0	0
Jacksonville	20	200109	monitored	0	20	0	0
Laurel	16	200109	evaluated	0	16	0	0
Ryder	14	200111	monitored	14	0	0	0
Shippee	24	200109	evaluated	24	0	0	0
Deer Park	22	200109	monitored	0	22	0	0
Deer Park-West	6	200109	evaluated	6	0	0	0
South (marlbr)	68	200109	monitored	0	0	68	0

Causes and Sources of Problems or Threats in Watershed Lakes and Ponds

Impairments to lakes in this watershed are caused by atmospheric mercury contamination (5 lakes, 3,877 acres), and acidification (7 lakes, 3,889 acres). Acidification also causes threats to uses (8 lakes, 430 acres) as does the presence of very dense surfacing native plant growth that threatens swimming use on two acres of Sadawga Lake. Table 7 lists the causes of impairments and threats to lakes in this drainage system.

Table 7. Causes of Impacts or Threats to Basin 12 Lakes and Ponds

Code	Cause	High	Moderate	Slight	Threat
500	Metals	3877	0	0	0
560	Mercury	3877	0	0	0
1000	pH	197	3692	0	430
2200	Native aquatic plants	0	0	0	2

Two sources of contamination impair or threaten lake uses in the Deerfield River watershed: atmospheric deposition of mercury and atmospheric deposition of acid precursors. Atmospheric deposition and natural lake acid sensitivity (low buffering capacity – termed "Natural Sources" in Table 8) threaten 430 acres (9 lakes) and 236 acres (8 lakes), respectively. The two acres threatened by dense aquatic plant growth in Sadawga Lake are also attributed to natural conditions.

Table 8. Sources of Impacts or Threats to Basin 12 Lakes and Ponds

Code	Cause	High	Moderate	Slight	Threat
8100	Atmospheric deposition	4074	0	0	430
8600	Natural sources	0	3713	176	238

Mercury contamination: Mercury contamination is a widespread environmental problem having an impact on aquatic ecosystems across the northeast and eastern Canada, as well as other portions of the globe. Mercury is a naturally occurring element found in a certain bedrock types and mined for a wide variety of applications. With a very limited number of exceptions, the contamination of aquatic systems in New England is the result of mercury deposition from the atmosphere largely from sources outside of New England. Most of the mercury in the atmosphere is the result of combustion of coal and municipal and medical wastes.

Mercury undergoes numerous biochemical transformations in lake watersheds ultimately contaminating food chains in the form of highly toxic 'methylmercury.' Methylmercury bioaccumulates strongly in aquatic food chains resulting in high fish tissue mercury levels. This bioaccumulation is most pronounced in certain types of lakes and lake watersheds and these are often the highest-elevation and/or least disturbed systems. Humans and fish-eating wildlife are exposed to mercury through the consumption of mercury-contaminated fish. Based on waterbody-specific fish tissue mercury data, the Vermont Department of Health issues alerts concerning waters where tissue mercury concentrations are known to be particularly elevated. Lakes subject to waterbody-specific advisories indicating that women of childbearing age and children under age 6 should eat no fish are impaired for fish consumption. On these lakes, the use "fish tissue consumption" is partially supported.

Several Vermont-based studies of mercury dynamics in the past few years have produced a volume of mercury-specific information about lakes in the Deerfield River basin. In general, lakes occupying the southern Vermont highlands draining the vicinity of the Lye Brook Wilderness show enhanced contamination of mercury. Project data and other literature implicate several factors that influence this contamination including elevation, the large proportion of forests and wetlands in the basin, enhanced atmospheric deposition of mercury (particularly in rainfall) to the Deerfield River basin, and the surface water level fluctuation of hydroelectric reservoirs in the basin.

The following Deerfield River watershed lakes and reservoirs are known to have elevated tissue mercury concentrations and therefore only partially support fish consumption:

Grout Pond	Stratton	84 acres
Harriman Reservoir	Whitingham	2040 acres
Searsburg Reservoir	Searsburg	25 acres
Sherman Reservoir	Whitingham	160 acres
Somerset Reservoir	Somerset	1568 acres

Lake acidification: The deposition of acid-forming precursors (e.g., sulfur oxides and nitrogen oxides) in the northeast has long been recognized as an impact to aquatic communities due to the slow but steady acidification of watershed soils and receiving waters. The issues of acid rain and mercury are linked in that the major emission sources of sulfur oxide, and to some degree nitrogen oxide, are often the same. Combustion of coal and other fossil fuels is recognized as the major source of both acid precursors and atmospheric mercury.

Acidification of lakes is exacerbated in naturally acidic systems, which are those waters where buffering capacity (the ability of waters to neutralize acids) is low. These lakes are typically the same as those that display elevated fish tissue mercury concentrations owing in part to factors discussed above. Therefore, significant crossover exists between lakes reported as impaired due to mercury and due to acidification. While impacts to humans due

to lake acidification are indirect, there are direct and persistent impairments to aquatic communities in lakes that become overly acidified.

Healthy communities of aquatic biota are not supported in lakes where buffering capacities routinely fall below zero parts-per-million (ppm, as $CaCO_3$) during the spring, and are partially supported where buffering capacities fall below 2.5 ppm. Lakes that display annual minimum buffering capacities of between 2.5 and 12.5 ppm are considered threatened due to acid deposition. Table 9 shows those lakes that are impaired or threatened due to acid deposition in the Deerfield River watershed.

Table 9. Lakes in the Deerfield River Watershed where Acidification affects Aquatic Life

Not Supporting	Partially Supporting	Threatened
Haystack Pond, Wilmington, 27 ac	Adams Res, Woodford, 21 ac	Deer Park Pond, Halifax, 22 ac
Little Pond, Woodford, 16 ac	Grout Pond, Stratton, 84 ac	Gates Pond, Jacksonville, 30 ac
Lost Pond, Glastenbury, 1 ac	Harriman Res., Whitingham, 2040 ac	Jacksonville Pond, Jacksonville, 20 ac
	Howe Pond, Readsboro, 52 ac	Laurel Pond, Whitingham, 16 ac
	Somerset Res., Somerset, 1568 ac	Mud Pond, Woodford, 6 ac
	Stamford Pond, Stamford, 12 ac	Lake Raponda, Wilmington, 121 ac
	South Pond, Marlboro, 68 ac	Red Mill Pond, Woodford, 7 ac
		Sadawga Lake, Whitingham, 194 ac

Lakes and Ponds in Need of Further Assessment

There are four lakes and ponds in the Deerfield River watershed identified as needing further assessment at this time, all of which are located in the town of Whitingham. These are identified below, along with a summary of information from the Vermont DEC Lake Assessment database. There are several very small ponds (less than 10 acres in size) in the basin for which Vermont DEC has little or no information. The public accessibility of all of these smaller lakes is unknown.

Clara Lake: Vermont DEC has no recent information or monitoring data on this 18-acre lake.

Jacksonville Pond: This 20-acre pond/wetland has been visited for a variety of reasons in the past few years, including routine nutrient monitoring, and two visits in conjunction with Vermont DEC mercury studies. Older survey information (1993) indicates that a "straight pipe" is, or was, present in the pond. The purpose of this pipe is unknown and should be investigated, if indeed it still exists.

Laurel Pond: This 16-acre pond has not been visited by Vermont DEC for the purpose of collecting monitoring data since 1980. This pond should be visited in the next basinwide assessment to verify its status as threatened by acidification.

North Pond: This 20-acre pond is understood to have been privately built, and is believed to support a warmwater fishery. No additional data are available, and this pond should also be visited in the next basinwide assessment.

Population and Housing Unit Growth in the Deerfield River Watershed

There have been very large housing unit and population growth rates in some portions of the Deerfield River watershed. The towns of the North Branch watershed, Wilmington and Dover, have especially seen large rates of growth in the last several decades primarily due to ski area-related development. Between 1980 and 1990, the number of housing units increased over 32% in Wilmington and over 195% in Dover! The population in this same time period increased by almost 9% in Wilmington and 49% in Dover. The population and housing unit numbers and rates of increase are given in tables in Appendix B.

Municipal Discharges in the Deerfield River Watershed

WWTF	WBID	Receiving Water	Permitted Flow (gals/day)	Annual Average Flow (gals/day)
Readsboro	VT12-01	Deerfield River	75,000	39,500
Whitingham	VT12-01	Harriman Reservoir	12,300	6,800
Jacksonville	VT12-07	East Branch North R	50,100	15,500
Wilmington	VT12-05	North Branch Deerfield	135,000	93,300
Cold Brook FD1	VT12-05	North Branch Deerfield	32,500	0- direct discharge capacity not used

Waters Listed as Impaired in the Deerfield River Watershed

There are fifteen reservoirs, ponds, or river segments that are currently on Part A of the 2002 List of Impaired Surface Waters for the Deerfield River watershed in Vermont. Twelve of the fifteen waterbodies are ponds or reservoirs and mercury or acidification or both are the causes of impairment of these waters. The other three impaired (not fully supported) waters are river or stream segments where iron, sediment, and *E. coli* are the pollutants.

References and Resources

Fisheries Status in Relation to Acidity in Selected Vermont Streams, July 1985. Former Vermont Agency of Environmental Conservation, Department of Water Resources and Environmental Engineering.

Petition to Designate the Green River as an Outstanding Resource Water, Draft, November 1994. Green River Watershed Alliance.

Preliminary Comprehensive Rivers Plan for the Deerfield River: An Inventory of Uses, Values and Goals, July 1991. Vermont Department of Environmental Conservation and the Windham Regional Commission.

State of Vermont Draft 303(d) List of Waters, July 15, 2002. Vermont DEC Water Quality Division.

Vermont Indicators Online, 2002. UVM Center for Rural Studies and Vermont Center for Geographic Information using U.S. Census Bureau data.

Vermont Swimming Hole Study, 1992. Jerry Jenkins, Deborah Benjamin, and Jane Dorney for Vermont DEC, Water Quality Division. Unpublished.

Vermont Water Quality Standards, July 2000. Vermont Water Resources Board

Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont, 2000. Elizabeth H. Thompson and Eric R. Sorenson. Published by The Nature Conservancy and Vermont Department of Fish and Wildlife.

Whitewater Rivers of Vermont, 1989. Jerry Jenkins for Vermont DEC.

Appendix A

Macroinvertebrate Sampling Sites in Basin 12

Table A. Macroinvertebrate Stream Sampling Sites and Results 1993-2001 in Basin 12

Water-body id	River or stream	Town	River-mile	Date	Assess-ment
VT12-02	Lamb Brook	Readsboro	0.7	09/1995	Good
VT12-02	Lamb Brook	Readsboro	0.7	10/1996	Exc
VT12-02	Lamb Brook	Readsboro	0.7	10/1997	Good
VT12-02	West Branch Deerfield	Readsboro	1.8	10/1993	Exc
VT12-05	Ellis Brook	Dover	0.5	10/1994	Good
VT12-05	Ellis Brook	Dover	1.0	10/1994	Exc
VT12-05	North Branch Deerfield	Dover	5.8	09/1998	Exc
VT12-05	North Branch Deerfield	Dover	11.0	09/1998	Good
VT12-05	North Branch Deerfield	Dover	12.0	09/1998	Fair
VT12-05	North Branch Deerfield	Dover	12.6	09/1998	Good
VT12-05	Cold Brook	Dover	0.1	10/1998	Good
VT12-05	Blue Brook	Dover	0.7	10/1993	Good
VT12-05	Tannery Brook	Dover	0.3	10/1996	Good
VT12-05	Iron Stream	Dover	0.2	10/1996	Poor
VT12-06	Green River	Guilford	16.0	10/1993	Exc
VT12-07	East Branch North R.	Halifax	11.7	10/1993	Exc
VT12-07	East Branch North R.	Halifax	11.7	10/1994	Exc
VT12-07	East Branch North R.	Halifax	11.7	10/1995	Exc
VT12-05	East Branch North R.	Halifax	11.7	10/1996	Exc

Appendix B

Population and Housing Data

of the Deerfield River Watershed

Table B.1. Population Growth in the Deerfield River Watershed

Town	1970	1980	1990	2000	% change 1970-1980	% change 1980-1990	% change 1990-2000
Readsboro	638	638	762	809	0.0	19.4	6.2
Whitingham	1011	1043	1177	1298	3.2	12.8	10.3
Halifax	295	488	588	782	65.4	20.5	33.0
Marlboro	592	695	924	978	17.4	32.9	5.8
Wilmington	1586	1808	1968	2225	14.0	8.8	13.1
Searsburg	84	72	85	96	-14.3	18.1	12.9
Woodford	286	314	331	414	9.8	5.4	25.1
Glastenbury	0	3	7	16	n/a	133.3	128.6
Somerset	0	2	2	5	n/a	0.0	150.0
Dover	555	666	994	1410	20.0	49.2	41.8
Watershed*	5047	5729	6838	8033	13.5	19.4	17.5

*A portion of Guilford and Stratton are also in the watershed but the population concentrations of these towns are in other watersheds and thus counted there. Only a portion of Marlboro is in the watershed but enough such that an increase in population and housing would affect watershed health.

Table B.2. Housing Unit Growth in the Deerfield River watershed

Town	1980	1990	2000	% change 1980-1990	% change 1990-2000
Readsboro	417	478	466	14.6	-2.5
Whitingham	582	737	802	26.6	8.8
Halifax	397	473	493	19.1	4.2
Marlboro	388	474	497	22.2	4.9
Wilmington	1645	2176	2232	32.3	2.6
Searsburg	89	92	87	3.4	-5.4
Woodford	246	267	334	8.5	25.1
Glastenbury	6	5	11	-16.7	54.5
Somerset	22	22	28	0	27.3
Dover	831	2450	2749	195.8	12.2
Watershed*	4623	7174	7699	55.2	7.3

*A portion of Guilford and Stratton are also in the watershed but the population concentrations of these towns are in other watersheds and thus counted there. Only a portion of Marlboro is in the watershed but enough such that an increase in population and housing would affect watershed health.

Appendix C

Dams in the Deerfield River Watershed in Vermont

Table C.1. Dams on the Deerfield River watershed rivers and streams in Vermont

Dam Name	Stream	Town	Status	Use *	Built	Recon	ID
Sibley	Green River	Guilford					90.04
Gates Mill	Green River	Guilford	Breached				90.05
Deer Pond Brook	Green River - Tr	Halifax	In service	R	1900		91.01
South Pond	Pond Brook	Marlboro	Breached				122.04
Ryder Pond	East Branch North River	Whitingham	In Service	R	1972		243.04
Gates Pond	East Branch North River - Tr	Whitingham					243.05
Jacksonville Pond	East Branch North River - Tr	Whitingham	In service	O	1900		243.06
Laurel Lake	East Branch North River - Tr	Whitingham			1890		243.09
Shippee Pond	Hager Brook	Whitingham	In service	R	1989		243.08
Snow Lake	North Branch Deerfield River	Dover	In service	R	1961		61.01
North Branch FD1	Ellis Brook - Tr	Dover	In service	O	1975	1987	61.03
Lake Raponda	Bill Brook	Wilmington	In service	R	1950		246.01
Binney Brook	Binney Brook	Wilmington	Breached				246.02
Spruce Lake	Beaver Brook - Tr	Wilmington	In service	R	1970		246.03
Mirror Lake	Cold Brook - Tr	Wilmington	In service	R	1970		246.04
Somerset	East Branch Deerfield River	Somerset	In service	H	1913		191.01
East Branch	East Branch Deerfield River	Stratton					
Heartwellville	West Branch Deerfield River	Readsboro	Breached		1911		164.01
Howe Pond Upper	Howe Pond Brook	Readsboro					164.02

Dam Name	Stream	Town	Status	Use	Built	Recon	ID
Howe Pond Lower	Howe Pond Brook	Readsboro	Breached (partial)	R	1875		164.06
Stamford Pond	Reservoir Brook	Stamford					195.02
Searsburg	Deerfield River	Searsburg	In service	H	1922		182.01
Harriman	Deerfield River	Whitingham	In service	H	1924		243.01
Lake Sadawga	Harriman Res - Tr	Whitingham	In service	R	1880	1964	243.03
Lake Clara	Lake Sadawga	Whitingham	In service	R	1928	1992	243.02
Lake Sadawga West Dike	Harriman Res - Tr	Whitingham	In service	R	1880	1981	243.11
North	No 9 Brook - Tr	Whitingham	In service	R	1967		243.07
Ricker	Glastenbury River	Glastenbury					80.01
Billings Pond	Rake Branch	Searsburg	Breached				182.02
Little Pond	Little Pond Brook	Woodford					253.01
Red Mill Pond	Red Mill Pond Brk	Woodford	In service		1962		253.02
Adams Reservoir	Red Mill Pond Brook	Woodford	In service	R	1948	1999	253.03
Red Mill Pond Dike	Red Mill Pond Brook	Woodford	In Service				253.10

* H = hydroelectric, R = recreation, C = flood control, S= water supply, O = other

Appendix D

Individual River Waterbody Reports

Lower Deerfield River

Assessment Report

Waterbody No: VT12-01 **Assessment Year:** 2002

River Length (mi.): 19.2 **Date Last Updated:** 3/31/2003

Description: Lower Deerfield River from the Massachusetts border to Harriman Reservoir and tributaries including South Branch, Tobey Brook, No. 9 Brook, Wilder Brook

Location Identifiers

ANR Enforcement District: 2 **NRCS District:** 8

Fish and Wildlife District: 1 **Regional Planning Commission:** WIN

Assessment Information

Monitored (mi.): 6.1

Evaluated (mi.): 13.1

Assessment Type

Chemical/physical monitoring

Modeling

Water Quality Limited Y

On 303(d) List? N

Monitored for Toxics? N

Aquatic Contamination

Toxics Testing

Waste Management Zone - Miles **Description** below Whitingham and Readsboro WWTFs outf

Assessment Comments

THREATENED MILES (STRESSED MILES)

South Branch Deerfield: 3.0 - upstream from Sherman Reservoir - threats to aquatic biota and habitat and secondary recreation from low alkalinity and low pH due to naturally low buffering capacity and from atmospheric deposition. c(1000) s(8100)

Deerfield River: 3.1 - threats to aquatic biota/habitat and secondary contact recreation (fishing) due to cold summer water temperatures from Harriman Reservoir dam releases and naturally low alkalinity and low pH. c(1400) s(7350)

COMMENTS

The Vermont Department of Fish and Wildlife has focused on this stretch of the Deerfield below Harriman Dam for wild trout restoration since Fall 1998. Trout populations surveys in this reach have been done annually since summer 1999. "Estimates indicate the brook trout population continues to increase in terms of numbers of fish; however, fish growth is depressed resulting in low biomass (population by weight). The likely cause for depressed growth is the very cold water discharged from the dam. Summer water temperatures (2002 data) show that the river stays in the 50s throughout the summer months. This factor coupled with general low productivity (low alkalinity and pH) of the Deerfield River watershed is not supportive of good trout growth." Conditions in the 401 certificate for Harriman

Lower Deerfield River **VT12-01**

provide for both the study of the temperatures below Harriman Reservoir and for correction of a documented temperature problem.

The most current fish population data for the South Branch of the Deerfield River is 1994. The stream supports wild populations of both brown and brook trout.

The Vermont Department of Fish and Wildlife has no populations estimates for Toby Brook but presence-absence" electrofishing shows the stream supporting low numbers of wild brook trout and the usual assemblage of fishes characteristic of other small streams in the watershed. The stream's small size, low summer flows, summer temperatures affected by a beaver wetland, and general low fertility of the water (low alkalinity and pH) likely account for the low numbers of trout seen.

Earlier assessments (8801 on) showed partial and non-support of aquatic biota/habitat and other uses due to no and low flows from the Harriman Reservoir dam. A new FERC license was issued in April 1997 and conservation flows were established in November 1997 so the stretches now meet standards in terms of flow. (1998)

Readsboro WWTF has dechlorination online and so the impacts listed earlier due to chlorine limits possibly being exceeded were also removed. (1998)

INFORMATION SOURCES

Ken Cox, Vermont Department of Fish and Wildlife - status of fishery based on fish population surveys (2002)

Jeff Cueto, Vt DEC Water Quality Division - provided information on the 401 certification and the conservation flows below Harriman Reservoir (1998) and on the temperature study and temperature correction conditions of the 401. (2003)

Vermont DEC Wastewater Division - information that Readsboro WWTF now has chlorine removal (1998)

Fisheries Status in Relation to Acidity in Selected Vermont Streams, July 1985.

Use No	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	13.1	6.1	0.0	0.0	0.0
20	Aquatic biota/habitat	13.1	6.1	0.0	0.0	0.0
21	Fish consumption	0.0	19.2	0.0	0.0	0.0
42	Contact recreation	19.2	0.0	0.0	0.0	0.0
44	Noncontact recreation	13.1	6.1	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	19.2
62	Aesthetics	19.2	0.0	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	19.2

Impairment Cause	Magnitude	Size (mi.)
pH	T	3.00
Thermal modifications	T	3.10

Impairment Sourc	Magnitude	Size (mi.)
Atmospheric deposition	T	3.00
Upstream impoundment	T	3.10

Permit No.	Point or Nonpoint Source Description	Receiving Water
VT0100731	Readsboro WWTF 0.075mgd	
VT0101109	Whitingham WWTF 0.0125mgd	

West Branch Deerfield River

Assessment Report

Waterbody No: VT12-02 **Assessment Year:** 2002

River Length (mi.): 22 **Date Last Updated:** 2/11/2003

Description: West Branch Deerfield river from mouth to headwaters and tributaires including Howe Pond Brook, Lamb Brook, Yaw Pond Brook, Reservoir Brook

Location Identifiers

ANR Enforcement District: 8 **NRCS District:** 8

Fish and Wildlife District: 1 **Regional Planning Commission:** WIN

Assessment Information

Monitored (mi.): 1.8

Evaluated (mi.): 20.2

Water Quality Limited On 303(d) List? N

Monitored for Toxics? N

Aquatic Contamination

Assessment Type

Surveys of fish and game biologists or other professionals

Occurrence of conditions judged to cause impairment

RBP III or equivalent benthos surveys

Toxics Testing

Waste Management Zone - Miles **Description**

Assessment Comments

THREATENED MILES

West Branch: 6.4 - mouth upstream - threats to aquatic habitat/biota and fishing from summer water temperature stress due to a wide open channel that has low summer flow as well as the low alkalinity/low pH of the watershed waters. c(1400) s(7600, other)

COMMENTS

Lamb Brook was sampled at milepoint 0.7 in 1995, 1996, 1997. The macroinvertebrate community health was determined to be good, excellent, good respectively based on a number of metrics evaluated. The West Branch Deerfield River was sampled at milepoint 1.8 in 1993 and the macroinvertebrate community was in excellent health. No sampling has been done since that year.

The Vermont Department of Fish and Wildlife does not have much current data on the fish populations of the streams of the West Branch Deerfield watershed. There are population estimates from 3 to 4 sites on the West Branch itself and some spot check sampling on a few tributaries collected within the last 10 years or so. Generally the watershed is characterized by low productivity including trout. Factors affecting productivity include low alkalinity and pH. Summer water temperature stress is also a factor especially in the lower West Branch (Heartwellville down). It appears that AOT might have re-constructed Route 100 or armored banks of the river for other reasons but now there is a fairly wide and open channel. Boulders

West Branch Deerfield River **VT12-02**

are exposed during the low summer flows and heat up. Little canopy to cool the water.

Threats given in earlier assessments were removed because they were 15 years old and referenced logging that is no longer happening and a ski area (Dutch Hill) that is not operational and where trails and other clearings are growing in.

INFORMATION SOURCES

Ken Cox, Vermont Department of Fish & Wildlife - data and information on fish populations in West Branch watershed streams (2002)

Vermont DEC Water Quality Division biological monitoring data and evaluation. (2001)

Use No	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	15.6	6.4	0.0	0.0	0.0
20	Aquatic biota/habitat	15.6	6.4	0.0	0.0	0.0
21	Fish consumption	0.0	22.0	0.0	0.0	0.0
42	Contact recreation	22.0	0.0	0.0	0.0	0.0
44	Noncontact recreation	15.6	6.4	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	22.0
62	Aesthetics	22.0	0.0	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	22.0

Impairment Cause	Magnitude	Size (mi.)
Thermal modifications	T	6.40

Impairment Sourc	Magnitude	Size (mi.)
Removal of riparian vegetation	T	6.40

East Branch Deerfield River

Assessment Report

Waterbody No: VT12-03 **Assessment Year:** 2002

River Length (mi.): 21.9 **Date Last Updated:** 1/13/2003

Description: East Branch Deerfield River and tributaries

Location Identifiers

ANR Enforcement District: 2 **NRCS District:** 8

Fish and Wildlife District: 1 **Regional Planning Commission:** WIN

Assessment Information

Monitored (mi.): 0.0

Evaluated (mi.): 21.9

Assessment Type

Occurrence of conditions judged to cause impairment

Modeling

Water Quality Limited

On 303(d) List? Y

Monitored for Toxics? N

Aquatic Contamination

Toxics Testing

Waste Management Zone - Miles **Description**

Assessment Comments

THREATENED MILES (STRESSED MILES)

East Branch: 5.2 - below Somerset Reservoir - threats to aquatic biota/habitat and secondary contact recreation due to low pH from atmospheric deposition and low alkalinity conditions naturally and due to cold water from dam discharge. c(1000,1400) s(7350,8100)

COMMENTS

The impacts due to low or no flow below Somerset Reservoir dam were removed. The Deerfield River and East Branch of the Deerfield River have been improved through the issuance of a 401 and a new FERC license (April 1997) that require bypass flows, mimimum downstream flows, and restrictions on reservoir elevation fluctuations.

The Vermont Department of Fish and Wildlife notes that as with most waters in the Deerfield River watershed low fertility is a factor limiting productivity in the East Branch. Since relicensing, minimum flows below Somerset Dam have improved, but as in the Deerfield below Harriman, the discharge produces a very cold environment.

Harriman Reservoir is considered partially supported for aquatic life use support because its buffering capacity falls below 2.5 ppm as CaCO3 and it is affected by acid rain.

Tribs to East Branch not assessed.

East Branch Deerfield River **VT12-03**

DISTANCES
East Branch Deerfield River - 15.0 miles
Tribs - 6.9 miles

INFORMATION SOURCES
Jeff Cueto, Vermont DEC Water Quality Division - information on 401 certification and conservation flows (1998)
Ken Cox, Vermont Department of Fish and Wildlife - information on East Branch habitat conditions (2002)
Vermont DEC Lakes and Ponds Assessment Program - status of Harriman Reservoir (2002)

Use No	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	9.8	5.2	0.0	0.0	6.9
20	Aquatic biota/habitat	9.8	5.2	0.0	0.0	6.9
21	Fish consumption	0.0	21.9	0.0	0.0	0.0
42	Contact recreation	15.0	0.0	0.0	0.0	6.9
44	Noncontact recreation	9.8	5.2	0.0	0.0	6.9
50	Drinking water supply	0.0	0.0	0.0	0.0	21.9
62	Aesthetics	15.0	0.0	0.0	0.0	6.9
72	Agriculture water supply	0.0	0.0	0.0	0.0	21.9

Impairment Cause	Magnitude	Size (mi.)
pH	T	5.20
Thermal modifications	T	5.20

Impairment Sourc	Magnitude	Size (mi.)
Atmospheric deposition	T	5.20
Upstream impoundment	T	5.20

Upper Deerfield River
Assessment Report

Waterbody No: VT12-04 **Assessment Year:** 2002

River Length (mi.): 63.5 **Date Last Updated:** 1/13/2003

Description: From the top of Harriman Reservoir to the Deerfield headwaters and tributaries including the Glastenbury River, Castle Brook, Rake Branch and many others

Location Identifiers

ANR Enforcement District: 2 **NRCS District:** 8

Fish and Wildlife District: 1 **Regional Planning Commission:** WIN

Assessment Information

Monitored (mi.): 3.6 **Assessment Type**

Evaluated (mi.): 59.9 Monitoring data that are more than 5 years old

Fish surveys

Water Quality Limited

On 303(d) List? N

Monitored for Toxics? N

Aquatic Contamination **Toxics Testing**

Waste Management Zone - Miles **Description**

Assessment Comments

PARTIAL SUPPORT MILES

Deerfield River: 5.0 - upstream from confluence of Glastenbury River - partial support of aquatic biota/habitat and secondary contact recreation due to naturally low alkalinity and low pH caused by low buffering capacity and acid rain. c(1000) s(8100)

THREATENED MILES (STRESSED)

Deerfield River: 3.6 - below Searsburg Dam down to Harriman Reservoir - partial support of aquatic biota/habitat and secondary contact recreation due to low alkalinity, low pH, and summer temperature stress from low buffering capacity, acid rain, open and wide channel, lack of canopy coverage, summer low flow. c(1000,1400) s(7600, 8100)

COMMENTS

The Vermont Department of Fish and Wildlife electrofished two sites in this waterbody in summer 2002 : one site was just downstream of the Searsburg dam and had low numbers of wild brook trout and the other site which was adjacent to Route 9 produced a few of this year's stocked yearling rainbow trout and a tiny yoy salmonid too small to identify to species level. Temperature data collected this past summer at the Route 9 site indicated the highest recording was about 87F.

Upper Deerfield River **VT12-04**

The impacts due to low or no flow below Searsburg Reservoir dam were removed. The Deerfield River and East Branch of the Deerfield River have been improved through the issuance of a 401 and a new FERC license (April 1997) that require bypass flows, mimimum downstream flows, and restrictions on reservoir elevation fluctuations.

The range of pH on the upper Deerfield from samples taken in 1984 was 4.73 to 5.89 with a mean of 5.17.

DISTANCES

5.0 - source to mouth of Glastenbury River
5.0 - mouth of Glastenbury River down to mouth of East Branch
3.6 - Searsburg dam down to Harriman Reservoir (Medburyville bridge used)

INFORMATION SOURCES

Ken Cox, Vermont Department of Fish and Wildlife - information on fishery (2002)

Jeff Cueto, Vt DEC Water Quality Division - information on 401 certification and conservation flows (1998)

Fisheries Status in Relation to Acidity in Selected Vermont Streams, July 1985.

Use No	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	54.9	3.6	5.0	0.0	0.0
20	Aquatic biota/habitat	54.9	3.6	8.6	0.0	0.0
21	Fish consumption	0.0	63.5	0.0	0.0	0.0
42	Contact recreation	63.5	0.0	0.0	0.0	0.0
44	Noncontact recreation	54.9	3.6	5.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	63.5
62	Aesthetics	63.5	0.0	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	63.5

Impairment Cause	Magnitude	Size (mi.)
pH	H	5.00
Thermal modifications	T	3.60
pH	T	3.60

Impairment Sourc	Magnitude	Size (mi.)
Atmospheric deposition	H	5.00
Atmospheric deposition	T	3.60

North Branch Deerfield

Assessment Report

Waterbody No: VT12-05 **Assessment Year:** 2002

River Length (mi.): 36 **Date Last Updated:** 1/14/2003

Description: Mouth to headwaters and tributaries including Cold Brook, Ellis Brook, Beaver Brook, Iron Stream

Location Identifiers

ANR Enforcement District: 2 **NRCS District:** 8

Fish and Wildlife District: 1 **Regional Planning Commission:** WIN

Assessment Information

Monitored (mi.): 15.0

Evaluated (mi.): 21.0

Water Quality Limited On 303(d) List? Y

Monitored for Toxics? N

Aquatic Contamination

Assessment Type

Surveys of fish and game biologists or other professionals

Land use information and location of sources

RBP III or equivalent benthos surveys

Toxics Testing

Waste Management Zone - Miles **Description**

Assessment Comments

NON-SUPPORT MILES

Iron Stream: 0.4 - non-support of aquatic biota/habitat due to high levels of iron due to ski area associated land development. c(500) s(3200)

North Branch Deerfield River: 2.2 - below Mt Snow/Haystack snowmaking water withdrawal - non-support of aquatic habitat due to low flows from withdrawals c(1500) s(7420)

PARTIAL SUPPORT MILES

North Branch Deerfield: 9.3 - from 2.2 miles below 1 of the 3 Mt Snow/Haystack withdrawals (see above in NS) - partial support of aquatic habitat due to low flows from withdrawals c(1500) s(7420)

Trib to North Branch Deerfield: 1.0 - below 1 of the 3 Mt Snow/Haystack withdrawals - partial support of aquatic habitat due to low flows from withdrawals c(1500) s(7420)

Cold Brook: 2.5 - from 2.5 miles below 1 of the 3 Mt Snow/Haystack withdrawals - partial support of aquatic habitat due to low flows from withdrawals c(1500) s(7420)

North Branch Deerfield: 12.0 - base of Mt. Snow downstream (overlap with miles affected by low flow above) to Wilmington - partial support of aquatic biota/habitat and aesthetics due high levels of sedimentation, turbidity, habitat and thermal modifications alterations caused by parking lot runoff, land

North Branch Deerfield **VT12-05**

development (construction erosion), removal of riparian vegetation (6 miles), streambank encroachment and erosion, and channelization (8 miles) following flooding. c(1100,1400,1600,2500) s(3200,4000,7100,7600,7700) Threats to contact recreation due to occasionally elevated bacteria levels c(1700) s(6000)

Beaver Brook: 2.8 - from 1st place Route 9 crosses brook east of Wilmington and extending east - partial support of aquatic biota and aesthetics due to siltation, turbidity and physical habitat alteration from channel alteration and relocation and removal of streamside vegetation due to highway reconstruction. c(1100, 1600) s(3100,7100,7600)

THREATENED MILES

Ellis Brook: 0.8 - upstream from confluence of North Branch - threats to aquatic habitat/biota and aesthetics due to nutrient enrichment, sediments and turbidity and thermal modifications from land development, removal of riparian vegetation, and potentially waste disposal. c(900,1100,1400) s(3200,6200,7600)

Binney Brook: 3.0 - from mouth to Haystack Pond - threats to aquatic biota/habitat and water clarity from metals, acidity, sedimentation, and turbidity due to atmospheric deposition, land development, and recreation activities. c(1000,1100) s(3200,7000,8100)

Cold Brook: 2.5 - upstream from the mouth and Haystack Brook: 1.0 - threats to water clarity, aesthetics, and aquatic biota/habitat from sedimentation, turbidity, and thermal modifications due to land development, a gravel mining operation (Cold Brook) and loss of riparian vegetation. c(1100,1400) s(3200,7600)

Rose Brook: 1.0 - upstream from mouth - threats to aquatic biota/habitat and aesthetics from sedimentation and nutrient enrichment due to land development and watershed hydrology changesl. c(900,1100) s(3200,7000)

COMMENTS

The macroinvertebrate communities of the North Branch Deerfield River were assessed at four different river mile sites in 1998: one below the town of West Dover at rivermile 5.8, one about a mile below Snow Lake at the Tanney road crossing at rivermile 11.0, immediately above Snow Lake at rivermile 12.0 and above the Mt. Snow maintenance sheds at rivermile 12.6. The biological assessments indicate that at rivermile 12.0 and 11.0, above and below Snow Lake respectively, the macroinvertebrate community is depressed in density compared to both the upper rivermile at 12.6 and lower site at 5.8 indicating an impact to the macroinvertebrate community. The cobble substrate at both low density sites was embedded 50-75% and is probably in large part responsible for the low densities. High turbidity events from a construction project on Mt. Snow in summer 1998 also likely accounts for the low density numbers. (Info directly from memo dated 11/18/98 from Steve Fiske and Rich Langdon to The Record).

Macroinvertebrate sampling on Cold Brook in Dover occurred at rivermile 0.1 in 1992 and 1998. The community integrity and health was found to be good on both occasions. Ellis Brook in Dover was sampled at rivermile 0.5 and 1.0 in 1994 and the macroinvertebrate community integrity was good and excellent respectively. Iron Stream was sampled at rivermile 0.2 in 1996 and the community was found to be in poor condition. Tannery Brook was also sampled in 1996 and the community at that site (rivermile 0.3) was in good condition.

Ellis Brook and the North Branch of the Deerfield have been sampled at 2 locations each by the North Branch Fire District since 1996. The have sampled once a month upstream and downstream of their spray sites for E. coli and a number of other parameters and reported results to Vermont DEC Wastewater Management Division's Indirect Discharge Program. In 2002, there were no exceedances of the state E. coli standard of 77 per 100 ml on Ellis Brook upstream or downstream. There were 3 exceedances of the state standard at the North Branch upstream site and 1 exceedance at the North Branch downstream site in 2002, however, none of the sample values exceeded the EPA designated beach area single sample maximum of 235 per 100 ml. In 2001, there was one exceedance of the state standard at the Ellis Brook upstream site and two exceedances of the Ellis Brook downstream site with one of the two above the EPA standard. On the North Branch, there were four exceedances of the state standard at the upstream site and two exceedances at the downstream site with one of the two above the EPA standard. All the data are housed at the Vermont DEC Wastewater Management Division.

North Branch Deerfield **VT12-05**

There is a long history of land and instream alterations in the North Branch subwatershed, which have exacerbated the natural limitations (low alkalinity, fertility) of the Deerfield River watershed and had an impact on aquatic habitat and life. Stream flow diversions for snowmaking, onstream impoundments (Snow Lake), barriers (dams and culverts), increased stormwater runoff, erosion and the resulting sediment loading, removal of riparian vegetation (especially from the golf course downstream), channelization activities following flood events, gravel mining (especially near West Dover and the area near Sitzmark Golf Course and the trailer park), and river corridor encroachment have all had an impact on the North Branch.

On Cold Brook, there is a gravel pit through which the brook has been channelized. It has recovered to a certain degree and efforts are being made to have riparian vegetation re-established and a corridor protected.

The Wilmington landfill is in the North Branch Deerfield River watershed. It was closed in 1993 and has a post-closure monitoring plan for 20 years. An intermittent stream, an unnamed tributary to Meadow Brook, is adjacent to the landfill and leachate from the landfill reaches this stream. The stream was first sampled in lieu of sampling one of the groundwater monitoring wells. The downgradient monitoring wells had dissolved iron and manganese levels above groundwater enforcement standards at 2 wells in October 2001. Two volatile organic compounds were also detected at the same 2 wells but were below standards. In May 2002, manganese exceeded the groundwater enforcement standard at all 3 downgradient wells and dissolved iron was above standard at 1 well. One volatile organic compound was detected at one well but again the level was below the enforcement standard. In October 2002, dissolved iron and dissolved manganese were above VGES in both downgradient wells and dissolved iron was above the average allowable concentration in the stream. Cis-1-2 dichloroethene was detected in the stream but there is no wq standard for this organic compound.

Since 1988, the assessment had " Bill Brook: 0.5 - below Lake Raponda - threats to drinking water supply and aquatic biota from acids and other unknowns originating from a creosoted wood dump. c(1000) s(6300)", however, where this is and the status is not known currently so this was removed from threats category until more is learned.

The Wilmington Wastewater Treatment Facility has not had any problems in the recent past. Ammonia was somewhat of an issue in the past although because Cold Water FD1 has never used its discharge (it still has the capacity to do a land disposal option - spray irrigation and has never done a direct discharge) and Wilmington and Cold Water allocations were determined together, there has not been a problem meeting the joint allocation. Also EPA ammonia criteria was amended and it allows for greater amounts.

Haystack Pond is not supporting aquatic life use due to essentially no buffering capacity and exposure to acid rain.

INFORMATION SOURCES

John Akielasczek, Vermont DEC Wastewater Management Division - E. coli data for Ellis Brook and North Branch from indirect permit monitoring requirements (2003)

Bryan Harrington, Vermont DEC Waste Management Division - water quality reports from consultants for Wilmington landfill (2003).

Brian Kooiker, Vermont DEC Wastewater Management Division - info about wastewater treatment facilities in watershed (2003)

Steve Fiske, Vermont DEC Water Quality Division biomonitoring program - data and interpretation for Iron Stream (1997) as well as data and evaluation from sites on the North Branch Deerfield River, Cold Brook, Ellis Brook, and Tannery Brook. (2000)

Kenneth Cox, Vt. Dept. of Fish & Wildlife, fisheries biologist - noted highway impacts on Beaver Brook (1992) and many impacts to North Branch aquatic habitat (2002)

Jerry Jenkins, consultant - noted construction-related erosion and sedimentation on Binney Brook (1988)

Alan Confalone, NRCS - noted construction related erosion and sedimentation on North Branch; also repair of lagoons (1988)

Alan Liptack, Vt DEC Solid Waste - noted water quality problems in North Branch caused by construction activities and lack of suitable erosion controls (1988)

North Branch Deerfield **VT12-05**

Tim Blake, Vt DEC Enforcement Officer - noted poor/lacking maintenance for sediment ponds, increasing development, erosion, and sediment loads to North Branch. Also parking lot runoff. (1988)

North Branch Deerfield River Basin Water Quality Management Plan 10/86 - noted construction related erosion, sedimentation, thermal changes.

Memos to file by Geoffrey W. Poister

Fisheries Status in Relation to Acidity in Selected Vt. Streams, Vt DEC July 1985.

Use No	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	9.0	8.3	16.1	2.6	0.0
20	Aquatic biota/habitat	9.0	8.3	16.1	2.6	0.0
21	Fish consumption	0.0	36.0	0.0	0.0	0.0
42	Contact recreation	36.0	0.0	0.0	0.0	0.0
44	Noncontact recreation	36.0	0.0	0.0	0.0	0.0
50	Drinking water supply	36.0	0.0	0.0	0.0	0.0
62	Aesthetics	12.9	8.3	14.8	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	36.0

Impairment Cause	Magnitude	Size (mi.)
Metals	H	0.40
Nutrients	T	1.80
pH	T	3.00
Siltation	H	14.80
Siltation	T	8.30
Thermal modifications	M	12.00
Thermal modifications	T	4.30
Flow alterations	H	15.00
Other habitat alterations	H	14.80
Turbidity	M	12.00
Pathogens	T	12.00

Impairment Sourc	Magnitude	Size (mi.)
Highway/road/bridge construction	H	2.80
Land development	H	12.40
Land development	T	8.30
Channelization	H	8.00
Removal of riparian vegetation	M	8.80
Removal of riparian vegetation	T	4.30
Streambank modification/destabilization	M	12.00
Atmospheric deposition	T	3.00
Flow mod.- snowmaking water withdrawal	H	15.00
Hydromodification	T	4.00

Permit No.	Point or Nonpoint Source Description	Receiving Water
VT0100706	Wilmington WWTF 0.90mgd	Ellis Brook
VT0101214	Cold Brook FD#1 - Haystack Group	Rose Brook

Green River

Assessment Report

Waterbody No: VT12-06 **Assessment Year:** 2002

River Length (mi.): 36 **Date Last Updated:** 1/16/2003

Description: Mass Border to headwaters and tributaries including Roaring Brook, Hinesbury Brook, Pond Brook, Harrisville Brook

Location Identifiers

ANR Enforcement District: 2 **NRCS District:** 8

Fish and Wildlife District: 1 **Regional Planning Commission:** WIN

Assessment Information

Monitored (mi.): 0.0 **Assessment Type**

Evaluated (mi.): 36.0 RBP III or equivalent benthos surveys

Water Quality Limited

On 303(d) List? N

Monitored for Toxics? N

Aquatic Contamination **Toxics Testing**

Waste Management Zone - Miles **Description**

Assessment Comments

COMMENTS

Fish populations were done in the early 1990s with spot checks conducted in more recent years. The river and its tributaries support wild brook trout populations supplemented annually with low number so yearlings stocked into the mainstem. The lower Green River, downstream of the Green River log crib dam, is stocked annually with Atlantic salmon fry by the Massachusetts Division of Fish & Wildlife as part of the cooperative anadromous salmon restoration program. In 1999, the historic crib dam was reconstructed with a fish ladder incorporated into the structure. Although the ladder has not been evaluated for fish passage performance, if it is operating as intended, it has removed a fish passage barrier for several species of fish.

Biological samples were taken at 2 sites on the Green River in the early 1990s. At rivermile 16.0 in 1991, 1992, and 1993 the macroinvertebrate community was found to be in excellent condition. At rivermile 19.9, the macroinvertebrate community was found to be in excellent condition in 1991 and 1992. No macroinvertebrate sampling has been done on the Green River since 1993.

SOURCES

Ken Cox, Vermont Department of Fish and Wildlife - information on trout populations in Green River (200)

Green River **VT12-06**

Vermont Water Quality Division Biomonitoring and Aquatic Studies Section data and interpretation

Use No	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	36.0	0.0	0.0	0.0	0.0
20	Aquatic biota/habitat	36.0	0.0	0.0	0.0	0.0
21	Fish consumption	0.0	36.0	0.0	0.0	0.0
42	Contact recreation	36.0	0.0	0.0	0.0	0.0
44	Noncontact recreation	36.0	0.0	0.0	0.0	0.0
50	Drinking water supply	0.0	0.0	0.0	0.0	36.0
62	Aesthetics	36.0	0.0	0.0	0.0	0.0
72	Agriculture water supply	0.0	0.0	0.0	0.0	36.0

East Branch North River

Assessment Report

Waterbody No: VT12-07 **Assessment Year:** 2002

River Length (mi.): 16.2 **Date Last Updated:** 1/16/2003

Description: East Branch of the North River from the Massachusetts border to its headwaters and tributaries including Branch Brook, Sprague Brook, Hager Brook, Pease Brook, Fowler Brook

Location Identifiers

ANR Enforcement District: 2 **NRCS District:** 8

Fish and Wildlife District: 1 **Regional Planning Commission:** WIN

Assessment Information

Monitored (mi.): 0.0

Evaluated (mi.): 16.2

Assessment Type

Surveys of fish and game biologists or other professionals

Occurrence of conditions judged to cause impairment

Water Quality Limited

On 303(d) List?

Monitored for Toxics? N

Aquatic Contamination

None detected

Toxics Testing

Waste Management Zone - Miles **Description**

Assessment Comments

THREATENED MILES

East Branch North River: 2.0 - between Hager and Pease Brooks - threats to aquatic biota/habitat and aesthetics due to sedimentation, turbidity and pathogens from dairy farm run-off, streambank instability (overgrazing & roadside clearing) and road upgrade and re-location. c(1100,1700,2500) s(1000,3100,7600,7700)

Unnamed Trib: 1.0 - from landfill to confluence with East Branch of North River - threats to aquatic biota/habitat, contact recreation (swimming), and all water supplies from unknown toxicity factors and other inorganics from landfill leachate. c(100,800) s(6300)

COMMENTS

The same limiting factors of low fertility, low summer flows and summer temperature stress in terms of optimal trout and other fish growth apply to the East Branch of the North River as to other rivers and streams in the Deerfield River watershed. Wild and stocked brook trout are present in the mainstem and wild brook trout populations occur extensively throughout the watershed. Wild brown trout populations are also present in the mainstem and Branch Brook although these populations are not abundant. The East Branch from Jacksonville downstream is stocked annually with Atlantic salmon fry by the Massachusetts Division of Fish and Wildlife as part of the cooperative anadromous salmon restoration program.

East Branch North River **VT12-07**

No new information is available about the East Branch North River stretch threatened above so entry left for the time being.

The Whitingham landfill stopped receiving waste in 1982 and has been covered with soil. A closure plan was done for the landfill however, no state funding for full closure was given because the landfill had stopped operating prior to the 1989 Solid Waste Rules. As a result, the groundwater and surface water monitoring that would have been done as part of the closure plan is not being done.

INFORMATION SOURCES

Vermont DEC Waste Management Division files 2003 and Bryan Harrington, Vt DEC Waste Management Division - information on the situation at the Whitingham landfill (2003)

Ken Cox - Vt. fisheries biologist - noted road re-located next to river with steep, vegetationless banks. Also noted dairy farm with cows overgrazing streambank. Information on trout populations. (1988 and 2003)

Use No	Use Description	Fully	Threat	Partial Support	Non Support	Not Assessed
01	Overall	14.0	2.2	0.0	0.0	0.0
20	Aquatic biota/habitat	14.0	2.2	0.0	0.0	0.0
21	Fish consumption	0.0	16.2	0.0	0.0	0.0
42	Contact recreation	15.2	1.0	0.0	0.0	0.0
44	Noncontact recreation	16.2	0.0	0.0	0.0	0.0
50	Drinking water supply	15.2	1.0	0.0	0.0	0.0
62	Aesthetics	14.0	2.2	0.0	0.0	0.0
72	Agriculture water supply	15.2	1.0	0.0	0.0	0.0

Impairment Cause	Magnitude	Size (mi.)
Unknown toxicity	T	1.00
Other inorganics	T	1.00
Siltation	T	2.00
Pathogens	T	2.00
Turbidity	T	2.00

Impairment Sourc	Magnitude	Size (mi.)
Agriculture	T	2.00
Highway/road/bridge construction	T	2.00
Landfills	T	1.00
Removal of riparian vegetation	T	2.00
Streambank modification/destabilization	T	2.00

Permit No.	Point or Nonpoint Source Description	Receiving Water
VT0101044	Jacksonville WWTF 0.0501mgd	