

Undeveloped Waters in Southeastern Vermont



East Branch, Deerfield River, Searsburg, Vt.



Windham Regional
Commission
Brattleboro, VT
January 2013

Funding for this project was provided through Section 604(b) of the Federal Clean Water Act, administered by the Vermont Agency of Natural Resources.

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UNDEVELOPED WATERS: WHY, HOW, AND WHERE

Undeveloped and undisturbed areas along rivers and streams—riparian buffers—and along the shores of lakes and ponds—lacustrine buffers—are important for a number of reasons. They provide water quality values in terms of shade (temperature), pollutant filtration, and bank stability. They also provide habitat values both in the water, including direct sources of food and shelter for fish, and on shore, including viable habitat for plants and feeding, foraging, and travel corridors for wildlife. Finally, undeveloped waters provide a direct benefit to society in terms of scenery, recreation, and in many cases, buffering of flood waters.

Windham Regional Commission (WRC) analyzed spatial (map) data using Geographic Information System (GIS) software to identify and characterize undeveloped rivers, streams, lakes, and ponds—these will be lumped together under the umbrella term “waters”— in southern Windham County and eastern Bennington County, Vermont. This was done to help aid in the preservation of these riparian and lacustrine buffer areas in order to support maintaining water quality, habitat values, and societal benefits. Funding for this project was provided through Section 604(b) of the Federal Clean Water Act, administered by the Vermont Agency of Natural Resources, with work carried out in 2010 and 2012.

Forty lakes and ponds, with shoreline totaling nearly 100 miles, and over 1,400 miles of rivers and streams, were analyzed. What did we find?

- ❖ It should come as no surprise that in the more densely populated southeastern Windham County, few undeveloped waters are found, and many tend to be smaller, and potentially intermittent, headwater streams.
- ❖ Southwestern Windham County and especially southeastern Bennington County, with fewer people and large tracts of undeveloped land, have many more undeveloped waters. The Green Mountain National Forest and the conserved electric utility lands along the Deerfield River contain substantial amounts of undeveloped rivers and lakes, and their undeveloped status is fairly secure.
- ❖ Less secure are those undeveloped waters in the central part of the study area. Here fewer conserved lands and, in many cases, an absence of strong town plan policies, might leave development in the riparian and lacustrine buffers unchecked.¹

¹ This effort did not examine land use regulations in each town, but regulations specifically addressing and protecting riparian and lacustrine areas are uncommon and/or not specific.

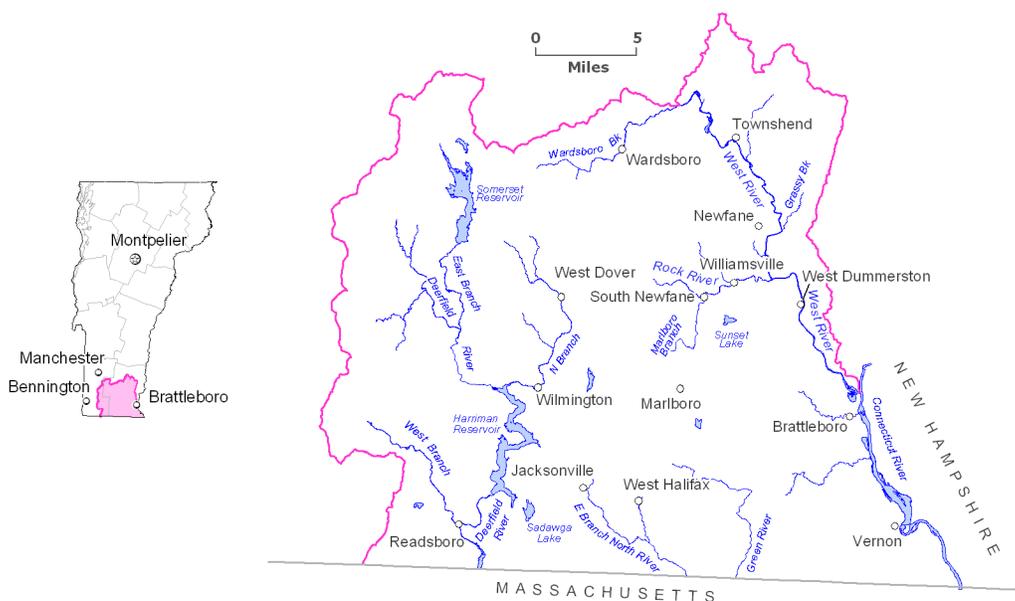
More detailed information can be found in the results section of this report, as well as on the report's maps.

Given the important values of undeveloped buffers and the dwindling extent of them, it is important for stakeholders to work to protect those that remain. The information in this report is useful to municipalities, landowners, and conservation groups to inform planning for protecting the resources, and development and implementation of strong regulatory protective measures.

HOW THIS ANALYSIS WAS DONE

Study Area

The area that was analyzed covers the Vermont portions of the Deerfield, North, and Green River watersheds (Vermont's Basin 12), the lower West River watershed (the southern portion of Basin 11), and those watersheds draining into the Connecticut River south of Brattleboro (the southern portion of Vermont's Basin 13, including the Whetstone, Broad, and Newton Brooks, and the Fall River). The Base Features Map shows the study area in detail. A generalized map is below.



Definitions

It can be difficult to come up with a definition for “undeveloped,” as peoples’ perception of what constitutes development can vary. For this analysis, we used the following:

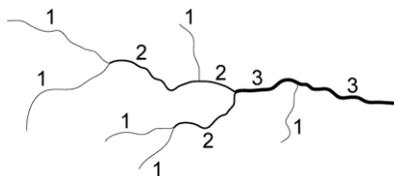
An undeveloped water is any water that is farther than three hundred feet from major structures, travelled roads, railroads, and electric transmission lines. Furthermore, cleared vegetation for agricultural land, ski trails, fields, lawns, and the like, as well as minor driveways, must be at least one hundred feet away (vegetation disturbance from logging was not considered development).

For conserved lands, the definition is more straightforward:

Conserved land is property that is 1) in public ownership (federal, state, or town) and used primarily for open space, habitat protection, natural resource management, or low-impact recreation; 2) owned by a conservation organization and used for the same purposes; , or 3) in private ownership with a conservation easement. These lands may still contain development due to the presence of structures, roads, dams, and cleared vegetation; in many cases, no future development on these lands will take place.

A *stream or river* is any mapped feature identified as such in the Vermont Hydrography Dataset. This may include small, intermittent headwater streams; the mapping of these streams is more dense some areas than others. A *lake or pond* is any mapped feature greater than ten acres identified as such in the Vermont Hydrography Dataset.

Stream order is a term used to imply the size of a stream segment based on tributaries. Any mapped headwater stream with no tributaries is a first order stream. When a first order stream joins another first order stream, it becomes a second order stream. When two second order streams join, they produce a third order stream. And so on. Many first order mapped streams may be intermittent and possibly not mapped accurately.



example of stream order

Procedure

GIS data representing development was created by buffering structures, travelled roads, railroads, and electric transmission lines a distance of 300 feet, then merging the resulting files. Data on these features is available from the Vermont Center for Geographic Information, and WRC has edited and updated these data where necessary. This development data layer was used to “erase” any waters

within its extent. The resulting draft undeveloped waters were examined with orthophotos (aerial photographs) and those with cleared vegetation within one hundred feet were excluded.

Data on conserved lands was obtained in 2002 from the Vermont Center for Geographic Information and the University of Vermont. WRC has edited and updated these data based on its own information, and data from the Vermont Land Trust. Data on town plan future land use districts were originally developed by WRC for individual towns. All districts have been classified into one of five broad categories based on the district's overall conservation goal and priority.²

Conserved lands and land use district data were intersected with the undeveloped waters, and statistics were generated in the GIS software for each water segment.

Work on the western portion of the study area (Basin 12) was done in 2010, and reflects conditions as of then, while the remaining work (for portions of Basins 11 and 13) was done in 2012. Individual reports describing each of these efforts are available, and include expanded results and discussion. Technical details on the procedure are available. These documents can be obtained from Windham Regional Commission.

WHAT DID WE FIND?

Some disclaimers

First, it must be mentioned that due to the non-definitive nature of the definition of "undeveloped," coupled with the limitations of the GIS data to represent accurately and precisely those developed features (e.g. traveled roads, structures), we can't say definitively that any of the waters identified as undeveloped are truly, absolutely undeveloped. Features such as long-abandoned railroad grades, or streams whose flows are controlled by upstream dams, may be present with these undeveloped waters. Yet what we are confident about is that those waters identified as such possess a degree of undeveloped character greater than that of other waters in the region.

Second, we are not emphasizing overall statistics about all the waters of the study area. There are many undeveloped waters in the west, and considerably fewer in the east. Presenting numerical statistics on the entire study will provide an average, and not values that are representative of most places within the study area. To provide results in a more meaningful way, we are including brief narratives of the results within each town. We also believe that maps are one of the best ways to visualize the results of this analysis.

² We only considered language in the town plan specific to the future land use district when determining the level of conservation priority for that district. Other policies in the town plan, or the presence of specific land use regulations, were not considered.

Lakes and Ponds

Lakes and ponds 10 acres and greater were considered. There are 40 water bodies in the study area meeting this criterion, with a total shoreline of 99.5 miles.³ Results are presented on the three maps, and summarized in a chart in the Appendix. Information is also included in the town-by-town summaries.

There appears to be no defining characteristics that cover all the lakes and ponds in the study area: waters are both small and large, and both conserved and unconserved.

About 68 percent of the shoreline in the study area is undeveloped, and a high percentage of this undeveloped shoreline is conserved. These may seem like large numbers, but over half of the undeveloped (and conserved) shoreline is found on just two large reservoirs. Many of the remaining lakes and ponds, especially those outside the Green Mountain National Forest, have some sort of development along their shores, and many of the undeveloped shorelines are not conserved (for over a dozen lakes and ponds, none of their undeveloped shoreline is conserved).

Rivers and Streams

There are over 1,400 miles of streams and rivers analyzed. (This does not include the West and Connecticut Rivers, and portions of the Rock River and Wardsboro Brook, which were analyzed differently due to their wider width; each bank of the river was considered separately.) Results are presented on the three maps, and summarized in a chart below. Information is also included in the town-by-town summaries.

About sixty percent of these streams were found to be undeveloped. Many of the undeveloped streams are in the western third of the study area, mostly in the Green Mountain National Forest or conserved electric utility lands along the Deerfield River.

Nearly sixty percent of all of the undeveloped streams are first order streams, which are typically small headwater streams, potentially intermittent, and lacking a significant riparian zone. They may be more seeps and swales than what one thinks of as a stream, therefore statistics and maps will highlight second order and larger streams.

³ Two water bodies, Somerset Reservoir and Harriman Reservoir, are much larger than the others, and account for nearly half the shoreline in the study area. These are both largely undeveloped, greatly affecting statistics across the study area. Their water levels may change by ten feet or more, which may cause one to question whether the shorelines of these reservoirs are undeveloped, let alone in a natural state.

A little over forty percent, or about 320 miles, of undeveloped streams are second order and larger, and again, the majority of these are in the western third of the study area. Of these larger undeveloped streams, half (158 miles) are unconserved. And of these undeveloped, unconserved streams, just over half are in future land use districts where, according to the town plan, conservation is not the primary land use vision for that district⁴ (another five percent are in towns with no town plan).

There are far fewer of these larger undeveloped streams in the eastern two-thirds of the study area than in the western third; most undeveloped stream segments here are short (less than one quarter mile), and the vast majority of undeveloped streams are unconserved. Clearly, larger undeveloped stream segments of any significant length in this area are a resource that is not common, and their preservation is not ensured.

Several continuous segments of undeveloped second order and higher streams merit special mention. In the far western portion of the study area, entirely within the Green Mountain National Forest, the following continuous segments are found, the first four being exceptional resources (note that many of these streams have old logging roads, abandoned logging railroad beds, and/or snowmobile trails along them, but other than snowmobiles, motorized travel is all but impossible, and the ground surface is for the most part recently undisturbed). Development pressure on these streams is limited by U.S. Forest Service ownership, though land disturbance certainly could take place.

- Redfield Brook/Rake Branch, 7.1 mi.
- Deerfield River headwaters: 4.1 mi.
- Deer Cabin Brook, 3.4 mi.
- Yaw Pond Brook, 3.3 mi.
- East Branch Deerfield headwaters: 2.6 mi.
- Glastenbury River: 2.5 mi.
- Vose Brook: 2.5 mi.

In the central and eastern portions of the study area, less conserved land and a higher population density mean fewer, and shorter, undeveloped second order and higher stream segments. Many are in steep valleys where development potential is limited. Most of these streams are in future land use districts where development at moderate densities or higher is discouraged according to the town plan, and conservation is emphasized.

- Baker Brook, and tributary Newfane, 4.0 mi
- Tannery Brook, Townshend, 2.9 mi

⁴ In such districts, conservation of natural resources is often a goal, supported by other town plan policies, but the primary land use vision for that district is typically low to moderate density development intended to accommodate future residential growth in town; large scale habitat and open space preservation is not the priority.

- Joy Brook, Townshend, 2.4 mi
- Halladay Brook, Brattleboro, 2.0 mi (is bordered by an impassable Class 4 town highway for much of its length)
- unnamed tributary of Worden Brook, Marlboro, 2.0 mi
- unnamed tributary of Grassy Brook Brookline, 1.8 mi
- Rock River, Dover, 1.8 mi
- Newfane's Wardsboro Brook (upstream of Smith Brook), Newfane, Townshend, and Dover, 1.6 mi (is bordered by an impassable legal trail for part of its length)
- Adams Brook, Marlboro, 1.5 mi

As mentioned above, the West and Connecticut Rivers, and portions of the Rock River and Wardsboro Brook (the Wardsboro Brook mostly in Wardsboro, along Route 100) were analyzed differently due to their wider width; each bank of the river was considered separately. Most of the undeveloped river segments are short, and in few cases is the entire river—both sides—lacking development. In most places only one of the river's banks was identified as undeveloped.

Undeveloped river segments, both banks undeveloped:

- West River, Townshend, above Townshend Reservoir, approximately 2.5 mi (area is subject to inundation by flood control dam, some access roads and gravel pit nearby)
- Rock River, Newfane, above confluence with West River, approximately 0.75 mi
- West River, Newfane, upstream of confluence with Rock River, approximately 0.3 mi

Undeveloped river banks, one bank undeveloped, opposite bank developed:

- West River, Dummerston, below confluence with Rock River, approximately 0.75 mi
- West River, Brattleboro, opposite West River Park, 0.6 mi
- West River, Brookline, opposite Winchester Stables, 0.52 mi

WHERE DO WE GO FROM HERE?

Undeveloped stream and pond shorelines and buffers provide many environmental (water quality, habitat, floodwater buffering) and cultural (aesthetics, recreation) values. Since they do, and since they are a limited finite resource, they warrant protection and preservation. There are a number of possible avenues to pursue to conserve undeveloped stream and pond shore buffers.

Some Approaches to Preserving Undeveloped Waters

Protecting buffers can happen through a number of mechanisms, with varying degrees of ease, effectiveness, and certainty. In broad categories, discussed in more detail below, it is possible to plan for protection of the resource areas, to regulate for their protection, to acquire or manage land to protect them, and to undertake various voluntary actions to protect their values.

Town Plans

Most towns in the region have Town Plans which prescribe a desired and intended future for the community. If a municipality would like to preserve undeveloped shorelines and buffers, it should say so in its Plan. This not only informs people that this is the town's intent, but also enables the town to enact land use regulations to explicitly protect the resources. As an additional benefit, clear Town Plan policies would enable protection of the areas in Act 250 proceedings and should receive due consideration in any Section 248 process.

Town land use regulations

Towns are authorized by the state to adopt a number of types of land use regulations that could protect stream and pond shores and buffers, as long as they have adopted a Town Plan that says they should. Among such regulations could be zoning bylaws, subdivision regulations, and shorelands and flood hazard area regulations. With the passage of the "Rivers Bill" in spring of 2012, towns that don't have a Town Plan can adopt freestanding flood hazard area regulations. In addition to conventional inundation flood hazard regulations, towns are enabled to protect fluvial erosion hazard areas near streams not necessarily likely to be flooded but in danger of potential bank erosion.

Regional plan

Windham Regional Commission has a regional plan that prescribes a land use vision for the region. The current (2006) Windham Regional Plan calls for the protection of waters, shores and buffers in general terms; using the information developed in these projects, and potentially from similar future efforts, the regional plan could contain more precise and prescriptive provisions and policies. As is the case with Town Plans, a regional plan with specific language would provide a stronger position in protecting undeveloped resource areas in an Act 250 or Section 248 review.

Acquisition in fee

As the analysis notes, some of the undeveloped resource areas are on conserved lands, but a large percentage are not. One of the surer ways to protect resource lands is through acquisition outright by an entity that will preserve it undeveloped. The most likely such buyers would be the National Forest or the state, but there are other conservation-oriented organizations, such as The Nature Conservancy, which buy and hold land to protect these and other resource values. Towns, also, may acquire land through purchase or by donation from conservation-minded landowners.

Acquisition of conservation easements

Another type of acquisition is less-than-fee purchase; acquisition of conservation easements can protect resource areas of interest while allowing landowners to retain their ownership and many or most of their original rights to use of the land. Easements cost less than fee purchases, so more areas can be protected for a given amount of money, and they are often can be much easier to accomplish. There are a number of entities that may be interested in acquiring easements, such as the Vermont Land Trust and the Vermont River Conservancy. There are other smaller organizations, like watershed associations, that can buy or accept donations of easements protecting stream and pond shores and buffers.

Voluntary actions by land owners and managers

Protection of the resources can be accomplished or facilitated by voluntary actions of the owners or managers of property. These can range from establishing private conservation provisions to ensuring that plans for management or development of their land leave the shores and buffers undeveloped.

How to make this happen

Windham Regional Commission will make this information widely available to people and organizations to plan for and implement protection of these identified undeveloped stream and pond shores and buffers. We will use it in our work with towns in updating their Town Plans and amending or creating land use regulations. We will also share it with state and federal agencies and non-governmental organizations to facilitate planning for and protection of these undeveloped resource areas.

The Vermont Agency of Natural Resources (ANR) will incorporate these data into the next iteration of the basin plans, and in the interim, they will be used when working with towns to develop corridor conservation plans and projects. The data serve as a baseline for locating where conservation projects should be targeted. Combining this with Stream Geomorphic Assessment (SGA) corridor information will help focus in on the reaches most critical for corridor protection.

This data can be integrated with ANR's current Aquatic Life Support (ALS) ratings to see what the correlation is between undeveloped streams and good biological conditions. One would expect ALS to rank high where there is good riparian condition. If this can be documented, it will be an added argument for better protection of riparian areas.

APPENDIX

Chart - Lakes and Ponds with Undeveloped Shorelines (percent undeveloped, percent conserved)

Map – Base Features (streams, roads, buildings, towns, etc.)

Map – Undeveloped Waters (lakes, ponds, streams by stream order)

Map – Conservation Status (undeveloped waters, conserved or unconserved)

Map – Town Plans (town plan land use district for undeveloped waters)

Lakes and ponds with undeveloped shoreline			
Waterbody name	Percent Undeveloped	Percent conserved	Town
wetland-W of Somerset Res	100	100	Somerset
Stamford Pond	100	100	Stamford
wetland, Vernon	100	43	Vernon
Little Pond	100	100	Woodford
Lily Pond, Athens	100	0	Athens
Atherton Meadow	100	100	Whitingham
Haystack Pond	100	100	Wilmington
wetland-Meadow Brook	100	100	Stratton
Howe Pond	100	100	Readsboro
Somerset Reservoir	95	100	Somerset, Stratton
Grout Pond	95	100	Stratton
wetland, Brookline	83	0	Brookline
Gates Pond	82	0	Whitingham
Shippee Pond	79	0	Whitingham
Shep Meadow	77	100	Somerset
Harriman Reservoir	76	100	Wilmington, Whitingham
Sunset Lake	70	91	Marlboro
Sweet Pond	69	100	Guilford
Deer Park Pond	65	0	Halifax
South Pond	63	100	Marlboro
Adams Reservoir	62	100	Woodford
Sherman Reservoir	62	100	Whitingham
North Pond	58	0	Whitingham
Marlboro Millpond	57	0	Marlboro
Jacksonville Pond	50	0	Whitingham
Lily Pond, Vernon	45	9	Vernon
Pleasant Valley Reservoir	44	100	Brattleboro
Laurel Lake	44	0	Whitingham
wetland-North Pond Rd	43	0	Marlboro
Ryder Pond	41	0	Whitingham
Weatherhead Hollow Pond	39	72	Guilford
Lake Sadawga	38	2	Whitingham
Hidden Lake	33	0	Marlboro
Townshend Reservoir	25	100	Townshend
Searsburg Reservoir	14	100	Searsburg
Kenny Pond	9	0	Newfane
Lake Raponda	8	6	Wilmington
setback, Brattleboro	0	0	Brattleboro
setback, Vernon	0	0	Vernon
Spruce Lake	0	0	Wilmington