Riparian Zone Protection in Vermont

Assessment of Current Regulations and Models for Future Action

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EXECUTIVE SUMMARY

Riparian zones play a crucial role in improving water quality by filtering pollution from surface runoff before it can enter lakes, streams, and other bodies of water. These areas are becoming increasingly degraded by human activities, such as construction and the clearing of vegetation. While many individual towns in Vermont do have regulations protecting riparian zones, the protections at the state level only apply to large-scale developments, leaving out the majority of residential and business construction. This report examines the current state of riparian zone protection in Vermont and presents several policy options that Vermont could implement to further this protection.

Riparian zones serve a variety of ecological functions, such as regulating stream flow; providing habitat for birds, fish, and other species; and encouraging ecotourism.[1] Most important for this report, riparian zones can act as filters of diffuse sources of pollution, often referred to as non-point sources, such as agricultural runoff and lawn fertilizers, which many states consider the greatest cause of water contamination.

In Vermont, no statewide standards exist to prevent small-scale developments from damaging riparian zones. Instead, protection is left to the discretion of individual towns and is primarily found in the form of zoning. While 80 percent of towns in Vermont have zoning systems in place, only 64 out of the 237 towns have zoning bylaws to protect river corridors and lake shorelines from unplanned development.[2]

The United States Code references riparian buffers 14 times, but there is no comprehensive federal law to protect riparian zones. The Clean Water Act of 1972 recommends the maintenance riparian zones to reduce pollution and establishes grant programs to encourage the protection of these areas, but does not require action. Furthermore, the Environmental Protection Agency provides both recommendations and funding for riparian zone protection as part of its Comprehensive Nutrient Management plans, but states have sole responsibility for program design and implementation.

Many states, such as Massachusetts, Maine and New Hampshire, have enacted statewide protection of riparian zones. Other states, such as Arkansas, have state-level programs or regulations to protect riparian zones that are less extensive than uniform standards.

Vermont has a variety of possible policy options for riparian zone protection. Taking into account federal regulations and programs, the models of other states, and Vermont's history and governmental structure, this report will present three primary options: Vermont can develop uniform statewide standards, it can take a watershed approach or it can continue with the status quo.

1. INTRODUCTION

While the definition of a riparian zone varies greatly, the Environmental Protection Agency describes a riparian zone as "a vegetated ecosystem along a water body through which energy, materials, and water pass."[3] These areas, which are often subject to flooding, can encompass wetlands, bogs, marshes, forested areas, grasslands, and uplands.[4]

Riparian zones serve a variety of functions, such as regulating stream flow, stabilizing stream banks, providing habitat for wildlife, and encouraging ecotourism.[5] Most importantly for this report, riparian zones filter non-point source pollution, largely considered to be the greatest cause of water contamination. Unlike point source pollution, which comes from a single outlet, non-point source pollution originates from many diffuse sources, such as agricultural runoff or lawn chemicals.[6] While the Federal Water Pollution Control Act regulates point source pollution directly, non-point source pollution is not subject to federal permit requirements and is often more difficult and expensive to regulate.[7]

Healthy riparian zones help reduce non-point source pollution by filtering sediment and harmful nutrients from surface runoff before they enter a body of water. Depending on characteristics such as width and type of vegetation, a riparian zone can absorb 50-100 percent of sediment from runoff, remove up to 21 pounds of nitrogen per acre per year, and remove up to 80 percent of phosphorous.[8]

Human activities, such as construction, overuse of land for grazing, removal of vegetation, and deposition of dredged material, can greatly damage riparian zones by clearing vegetation, filling rivers and streams, and leaching nutrients from soil. Not only does a damaged riparian zone often cease to perform many ecological functions, it can actually become a source of pollution itself by releasing accumulated sediment and other pollutants into the adjacent water body rather than filtering them out.[9] When these pollutants enter bodies of water, the excess nitrogen and phosphorous can cause eutrophication in lakes and kill fish and other aquatic life forms. Using technical means to remove the pollution normally removed by a healthy riparian zone could cost $3.7-$4.3 million per year, according to a Maryland study.[10]

This policy brief will focus on ways that Vermont can protect riparian zones. Apart from laws regulating agriculture and forestry practices and Act 250, which regulates large-scale development, Vermont currently leaves the protection of such areas to individual towns. After examining the results of this localized system of riparian zone protection, this report will discuss federal regulations and programs regarding riparian zones and will outline the models of other states for such protection. The report will also provide several policy options that Vermont could implement for future riparian zone protection.

2. AN EXAMPLE OF DISCRETIONARY TOWN-LEVEL PROTECTION

The current system of regulations on small-scale development to protect riparian zones, which is at the discretion of individual towns, has many implications for protecting riparian zones. The Battenkill River and the towns around it provide an excellent example for how this current system both succeeds and fails in protecting riparian zones.

2.1 Overview of the Battenkill

Located within 11 towns in south-western Vermont, the Battenkill area has historically supported a strong grazing and industry-based economy. During the past century, tourism has become the main economic force in the region.[11] As much of the tourism is generated by fishing and fishing-related activities, protecting the health of the watershed helps ensure the sustainability and growth of the area's economy. However, as the area has grown in popularity, so too has the demand for housing near the river. New housing is frequently built directly adjacent to the river and its tributaries, which has contributed to diminished riparian zones.[12]

2.2 Governmental Protections of the Battenkill Watershed

In response to the growth in residential development, or in anticipation of it, some towns in the Battenkill region have passed riparian zone protections. For example, Manchester, through which the main stem of the Battenkill flows, implemented its river protection zoning bylaw in 1989, which required both a 50-foot building setback and a protective vegetative strip.[13] The overall water quality of the Battenkill, however, still depended upon the state of riparian zones upstream, primarily in the town of Dorset. Dorset, did not enact similar riparian zone bylaws until 2005.[14] Thus during the period between 1989 and 2005, developments in Dorset had the potential to impair the health of the Battenkill watershed despite Manchester's regulations. This pattern is mirrored in other towns.

2.3 Problems facing the Battenkill Watershed

The lack of uniform regulation of small-scale development in the Battenkill watershed has contributed to increased damage of riparian zones. Twenty-four percent of the bank on the West Branch of the Battenkill, which has a high Land Use/Land Cover Impact Rating, now has less than 25 feet of vegetative buffer due to human impact.[15] While both Dorset and Manchester now have laws governing construction and the clearing of vegetation in riparian zones, the historical damage has caused the overall health of the area's rivers and fisheries to deteriorate, according to many of the area's fishermen.[16] These developments could potentially harm the economy of the region, as tourism oriented around the Battenkill River brings millions of dollars to the area each year.[17] The situation in the Battenkill is similar to that in the state of Vermont as a whole, as water quality and pollution prevention are dependent upon protections of bodies of water throughout entire watersheds, not just in individual towns through which the bodies of water flow.

3. CURRENT VERMONT REGULATORY ENVIRONMENT

The state of riparian zone protection in the Battenkill watershed reflects the situation in Vermont as a whole. While towns are increasingly adopting bylaws to safeguard water resources, these protections are circumscribed by town lines and a town's water quality largely depends upon the water management decisions of the towns located upstream.

3.1 Vermont's Act 250 and Town Zoning

The environmental damage caused by increased development in Vermont following the introduction of the Interstate Highway System prompted the legislature to adopt Act 250 in 1970. While the Act does address some of the impacts of development in riparian zones, it does not have jurisdiction over most residential and small business developments, which make up the majority of development within the state.[18] No statewide standards exist to regulate these smaller projects. Instead, protection is left to individual towns and is primarily found in the form of zoning. While 80 percent of towns in Vermont have zoning systems in place, only 64 out of the 237 towns have zoning bylaws to protect river corridors and lake shorelines from unplanned development.[19]

These 64 towns generally have larger populations and longer histories of development than those without such bylaws. The towns with zoning bylaws governing riparian zones are also more likely to be located adjacent to a major body of water, especially Lake Champlain, potentially making them more cognizant of the need for water resource management.[20] Furthermore, towns with riparian setbacks and buffers are frequently located along major roads, especially interstate highways (with the notable exception of I-91 in the Northeast Kingdom).[21]

Appendix A contains a map of Vermont towns that have enacted zoning bylaws.

3.2 Agriculture and Forestry Laws in Vermont

In addition to Act 250, towns must follow state guidelines governing agriculture and forestry, which they are forbidden from regulating themselves.[22] Vermont's Accepted Agricultural Practices Regulations stipulate that there must be at least a ten-foot wide buffer of perennial vegetation between farmland and surface waters. Furthermore, all new farm structures must be built at least 50 feet from surface waters.[23]

The state also regulates forestry practices, prohibiting any removal of vegetation that is more intensive than thinning or selective harvesting within 25 feet from surface water. Also prohibited is development in and clearing of wetlands, as defined by the Vermont Significant Wetlands Inventory maps.[24] Buffer zones of 100 feet for Class One wetlands and 50 feet for Class Two wetlands must be maintained at all times, unless a Conditional Use Permit is approved.[25]

3.3 Characteristics of Buffer and Setback Bylaws

As these state regulations only apply in certain circumstances, towns have great discretion in establishing riparian zone protection. Zoning bylaws are towns' primary mechanism for protecting riparian areas. Most of the 64 towns that have some form of riparian zone protection base their regulation on building setbacks, which stipulate the closest distance to a body of water that a person can build. Building setback regulations in these towns can be described by the following statistics:

- Average setback: 86 feet
- Median setback: 75 feet
- Most frequent setback: 75 feet
- Smallest setback: 10 feet (occurring in Newbury, Vershire, and Stockbridge)
- Largest setback: 400 feet (occurring in the Miller Shoreland District in Strafford)

Forty-one towns have buffer area bylaws, which limit the clearing of bushes and trees next to water bodies. Many of these bylaws entirely prohibit the clearing of such vegetation within a certain distance from the shore. The following statistics describe the current use of buffer areas:

- Average buffer: 59 feet
- Median buffer: 40 feet
- Most frequent buffer: 50 feet
- Smallest buffer: 10 feet (occurring in Newbury, Randolph, Stockbridge, and Vershire)
- Largest buffer: 200 feet (occurring in Strafford, applied to animal feed lots and manure piles)[26]

Buffers and setbacks often vary by type of water body or type of land use. For example, Bolton has different setback and buffer requirements for the Winooski River, named streams, unnamed streams, as well as Goose, Preston, and Upper Preston ponds. The most common differentiation is between named and unnamed streams, often with stricter regulations applying to named streams. The existence of differing setbacks and buffers for different land uses is less common. Such is the case in Strafford, however, which differentiates between residential/business, agricultural, and animal feed lot use. Variation by the slope of the bank is also common. Banks with a slope of greater than 20 percent frequently have a larger setback than those with lesser slopes. Despite these special circumstances, the majority of towns have one system of setbacks and buffers that applies to all bodies of water within the town.[27]

4. FEDERAL REGULATORY ENVIRONMENT

In studying the protection of riparian zones in Vermont, it is necessary to consider Federal laws that could influence state and local efforts. This section outlines how

Federal standards and programs could impact Vermont's current and future actions in this area.

4.1 Overview of Federal Laws and Regulations

Although the United States Code references riparian buffers 14 times, there is no comprehensive federal law to protect riparian zones. As discussed in detail in section 4.2, the Clean Water Act recommends the maintenance of riparian zones to reduce pollution and establishes grant programs to encourage the protection of these areas. The Environmental Protection Agency provides both recommendations and funding for riparian zone protection as part of its Comprehensive Nutrient Management plans, but states have sole responsibility for program design and implementation. Other laws require the establishment of riparian buffer areas at specific locations or for specific activities, but many of these are not applicable to the regulation of private lands along bodies of water in Vermont.[28]

In addition to these statutes, 47 sections of the Code of Federal Regulations reference riparian buffers. Many of these regulations restrict specific industrial practices, such as mining activities, within riparian zones, while others establish voluntary participation programs, such as the Conservation Reserve Program, to encourage private citizens to maintain buffers by providing financial and technical assistance. For a complete list of laws and regulations pertaining to riparian buffers as of 2005, see Appendix C.[29]

4.2 The Role of the EPA

4.2.1 Clean Water Act of 1972

The Clean Water Act (CWA) is the primary vehicle for protecting riparian zones at the federal level, but it does not address such zones directly. Section 303(d) of the Act promotes riparian zone protection by requiring states to identify bodies of water that do not meet state water quality standards, establish maximum amounts of pollution that these water bodies can receive to meet these standards, and implement measures, such as maintaining riparian zones, to achieve these goals.[30]

Section 404 of the CWA helps to protect riparian zones by creating a permitting program, administered by the Army Corps of Engineers and the EPA, to regulate the discharge of dredge and fill material into wetlands and public waters, including riparian zones.[31]

Section 319 of the Act authorizes the EPA to give grants to states to cover up to 60 percent of the costs of creating Non-point Source Assessment Reports and implementing Non-point Source Management Programs aimed at reducing non-point source pollution.[32] Projects eligible for these grants must use a watershed approach, to be described in section 4.2.2, and can include groundwater protection, abandoned mine land reclamation, urban storm runoff activities, and lake protection and restoration activities.[33]

Overall, the CWA has resulted in improved water quality in Vermont largely by regulating point-source pollution, primarily through a permitting system.[34] The Act, however, does not address riparian zone buffers directly and does not apply to isolated, intrastate, and non-navigable bodies of water. Any such initiative must be taken by Vermont.

4.2.2 The EPA Model – A Watershed Approach

The EPA recommends a watershed approach to environmental protection, including riparian zone protection, and requires states to take this approach to be eligible for many of the agency's grants. Rather than establishing uniform standards covering all bodies of water, states using a watershed approach develop individual plans to protect a limited number of major watersheds. The EPA suggests that these plans protect ecosystems at three levels -- the state, the basin and the local watersheds within each basin -- with riparian zone protection largely occurring at the local watershed level. States work with private and public stakeholders to create the plans, which include both regulatory and non-regulatory components, and would publish the plans in an initial state framework document describing their approach. After implementing their strategy, states schedule permitting, monitoring, modeling and water quality planning every five years for each basin.[35]

4.3 Federal Programs for Private Citizens

Many agencies, such as the United States Department of Agriculture, have programs that protect riparian zones by providing incentives to private citizens to reduce pollution. The Farm Bill of 2002, for example, reauthorized the Environmental Quality Incentives Program (EQIP), a voluntary program that provides technical and financial assistance to farmers to promote environmental health.[36] EQIP helps maintain healthy riparian zones by encouraging citizens to maintain buffer vegetation next to bodies of water to reduce runoff. Other programs that provide technical and financial assistance for similar goals include the Conservation Reserve Program and the Wetlands Reserve Program.[37]

5. STATE MODELS

States that have established effective riparian zones protection may serve as models for Vermont. This section will analyze several other states' programs for riparian zone protection and discuss their possible applicability to Vermont. Fact Sheets that summarize the key features of each state program are provided in Appendix E.

5.1 States with Uniform, Statewide Standards

5.1.1 Massachusetts

Massachusetts protects riparian zones under The Wetland Protection Act as amended by the 1996 River Protection Act, which extended riparian zone protection to include all river front areas rather than only those also considered wetlands or beaches.[38] The Act

defines a river as "any natural flowing body of water that empties to any ocean, lake, or other river and which flows throughout the year."[39] Manmade canals, most intermittent streams, ponds or lakes are not protected.[40]

Setbacks are the primary mechanism for riparian zone protection in areas between the mean high water mark and the setback limit, the region defined as the riverfront area.[41] The Act establishes a standard setback of 200 feet from the mean annual high water mark, irrespective of the size of the adjacent body of water.[42] This setback decreases to 25 feet in municipalities with populations greater than 90,000 or in municipalities with population densities greater than 9,000 inhabitants per square mile to accommodate areas of heavy development.[43]

Using the permitting guidelines set by the Wetland Protection Act, the River Protection Act requires citizens to receive approval from their town conservation committee or, if no such committee exists, from their board of selectman for projects that could significantly alter the character of the riverfront area.[44] To receive a permit, the applicant must demonstrate that the project does not greatly harm the riverfront area and that there is no practical and economically feasible alternative.[45]

The Act gives authority for enforcement to the town conservation committee, board of selectmen or other similar body with policing power.[46] Penalties for violations include a fine of up to $25,000 from the Department of Environmental Protection or two years imprisonment.[47] Structures built or projects approved to be built within the riverfront area before August 7, 1996 are exempt from the Act.

Overall, the Wetland Protection Act and the River Protection Act have successfully protected the state's riparian zones, although the effectiveness of the Act in reducing non-point source pollution is unknown, according to the Department of Environmental Protection.[48] The DEP lacks adequate data describing the levels of non-point source pollution present in Massachusetts' waterways. Within the next year, the DEP hopes to eliminate these information gaps by developing a statewide program to measure non-point source pollution.[49]

Several factors make the Massachusetts model relevant to Vermont. The two states have similar ecosystems and governing structures, and the delegation of enforcement authority to towns would be logical in Vermont, as development occurs primarily at the town level. However, the demographics and patterns of development in the two states are quite different. Town governments in Vermont might view the 200 foot setback as overly restrictive of development. Moreover, as many towns have already established setbacks and buffers, implementing state laws that potentially contradict these preexisting town requirements could create a confusing regulatory environment for developers.

5.1.2 Maine

Maine's Mandatory Shoreland Zoning Act establishes minimum statewide standards that require all municipalities to adopt, administer, and enforce ordinances to protect riparian

zones. The definition of shoreland area varies by the size of the adjacent water body: shoreland extends 250 feet from the high water mark around great ponds and rivers and coastal and freshwater wetlands, which include all tidal areas, but only 75 feet from the high water mark when bordering streams.[50]

The Act creates several shoreland zoning districts with distinct permitting regulations and minimum lot sizes. Certain districts are created specifically to permit development while others focus on conservation by limiting development. Shoreland is assigned to conservation oriented districts if development within these areas would greatly harm water quality or habitat. For example, the Act strictly regulates all development within two Resource Protection Districts, which include the areas around wetlands designated as significant waterfowl and wild life habitats, FEMA-designated floodplains and similar lands, and Stream Protection Districts (which cover all shoreland within 75 feet of the high water mark of streams).[51] All industrial, commercial or residential development, government construction, and clearing of vegetation is prohibited, and single family residential, dock, and essential public utility construction requires a permit.[52]

In addition to dividing shoreland into development districts, the Act establishes two general building setbacks for construction of primary and accessory structures based on the size of the adjacent water body. Primary and accessory structures must be set back at least 100 feet from the high water mark around great ponds and from rivers that flow into them. A setback of 75 feet is required for shoreland bordering streams and tributaries. These setbacks are reduced to twenty five feet in General Development I Districts and eliminated entirely in Commericial Fisheries/Maritime Activities Districts.[53]

The town Code Enforcement Officer or Planning Board reviews all permits to determine whether the project entails activities that are allowed within the shoreland district in which the project is located and whether the project will adversely affect water quality or wildlife habitats. Code Enforcement Officers also conduct onsite inspections for all permitted projects. Violations of the Act's provisions are punishable by fines that range from $100 to $2500 per violation per day that the violation persists. The maximum per day fine increases to $5000 in Resource Protection Districts.[54] Notably, the Maine Bureau of Land and Water Quality (BLWQ) has observed discrepancies in enforcement of the Act between different towns.

The BLWQ believes the Shoreland Zoning Act has successfully protected riparian zones throughout the state. Maine residents voice overall support for the Act, although some residents have objected to the provisions prohibiting vegetation clearing in certain districts.

Vermont could apply several aspects of Maine's program to its own system of riparian zone protection, including town-level implementation of zoning ordinances and local authority over enforcement. However, the 20 percent of Vermont towns without zoning boards or administrators might face problems overseeing permitting and enforcement. While towns may resist state-imposed zoning laws, the Maine Act allows towns some

discretion by establishing only a minimum standard that towns can exceed if they so choose.

5.1.3 New Hampshire

Enacted in 1991 and amended in 2006, New Hampshire's Comprehensive Shoreland Protection Act establishes minimum statewide standards for the subdivision, use, and development of shoreland bordering public waters. The Act applies to all state-designated bodies of fresh water, coastal waters, and rivers that flow year round and are of fourth order or higher.[55] Effective as of April 1, 2008, the amended Act establishes three protection zones:

- Waterfront buffer and primary building setback – 50 feet from the reference line
- Natural woodland buffer – 150 feet from the reference line
- Protected shoreland – 250 feet from the reference line

Each zone provides a different level of protection. For example, within the waterfront buffer, all ground cover must remain intact, while within the natural woodland buffer, only 50 percent of the area not covered by impervious surfaces need remain in an undisturbed state.[56] Within all zones, a permit from the Department for Environmental Services is required for any construction, excavation or filling activities.[57] Those filing a construction permit must also pay a permit fee which covers the cost of enforcement by inspectors.[58]

The Commissioner of the Department of Environmental Services or his/her designee has primary enforcement responsibility, but municipalities have the option of enforcing the Act through cease and desist orders, seeking injunctive relief or imposing civil penalties.[59]

The Act exempts many agricultural activities, including the use of animal manure and irrigation.[60] Furthermore, nonconforming structures located within the protected shoreland may be repaired, renovated or replaced using modern technologies if the existing footprint is not expanded and the functional use of the structure is unchanged.[61]

Currently, the effects of the 2006 amendment to the Act are unknown, as these changes will not be implemented until April 2008. The changes are expected to better riparian zone protection because they establish stricter standards, including the 50 foot water front buffer, according to the New Hampshire Department of Environmental Services.[62] Reactions to the new amendment from New Hampshire citizens have varied, with citizens voicing both support for and annoyance toward the tougher standards.[63]

While certain aspects of New Hampshire's law are applicable to Vermont, the New Hampshire Act's complexity and its relevance only to fourth order streams, could prove problematic. Furthermore, towns could resist expansion of the state into areas previously

delegated towns, and the three-zone system could contradict existing town bylaws, which would have to be changed in order to be in compliance with the state law.

5.2 Other State Models

Instead of implementing uniform standards, many states use voluntary programs or smaller, more targeted programs to provide some form of riparian zone protection. Arkansas' Private Wetland and Riparian Zone Creation and Restoration Initiative Act of 1995 offers income tax credits to citizens if they design and maintain systems to protect riparian zones on their property.[64] Several other states include riparian zone standards in forest protection legislation. For example, Oregon's 1987 Forest Practice Act protects riparian zones located within forests from clear cutting and timber harvesting.[65] In addition, many states enact riparian zone standards for specific water bodies. For example, Maryland, Pennsylvania, Virginia, and the District of Columbia collaborated to protect the Chesapeake Bay, including shoreland and riparian zones, in the 1993 Chesapeake Bay agreement. Similar work has been done in Vermont, as the state has worked with other stakeholders to protect Lake Champlain.

6. POLICY OPTIONS

6.1 Comprehensive Uniform Statewide Standards

One possible policy option for Vermont would be to adopt uniform statewide standards, as pioneered by Maine and several other states. As the Battenkill watershed demonstrates, uniform statewide standards could provide more consistent protection for Vermont's watersheds. While towns in certain areas of Vermont have implemented strong protection for wetlands, streams, and ponds, the overall protection of water quality depends on all towns within the watershed. Standardized regulations could also be more efficient and less confusing for developers than the current system of differing setbacks in different towns.

Despite these benefits, implementing uniform standards presents several difficulties for Vermont. While towns are creations of the state legislature, they could oppose such standards, as towns have historically been allowed to set their own standards for riparian zone protection, with the principle exception of Act 250. Furthermore, assigning enforcement of uniform standards to local zoning boards could prove problematic for towns without such boards. These towns would have to create new positions and hire new staff, which could prove to be a costly enterprise. It could also be expensive to conduct the necessary research to develop new standards. Additionally, uniform statewide standards could fail to account for variation in local conditions and concerns.

If Vermont were to implement uniform standards, the state would first have to develop the standard itself and then devise a way to implement that standard. In creating the standard, the state would have a variety of options. As demonstrated in Section 5, the definition of a protected riparian zone can vary greatly: it can include or exclude shoreland based on the size and type of the adjacent water body and can include

shoreland area of various widths. In determining the buffer width, data regarding what width is necessary to protect water quality and wildlife must be weighed against economic concerns regarding the potential impacts on development and infringement on citizens' property rights. Appendix D provides scientific recommendations about buffer width. Additionally, Vermont could adopt other protective mechanisms including building setbacks, buffer zones, minimum lot sizes, or sewer requirements.

Implementing a uniform standard would likely require that Vermont implement a permitting process, which could take a variety of forms. The state must decide what activities to prohibit entirely and what activities to allow after obtaining a permit. Moreover, permitting standards could be uniform throughout the entire riparian zone or they could vary by dividing riparian zones into sections, as under Maine's Mandatory Zoning Act and New Hampshire's Comprehensive Shoreland Protection Act. Permitting requirements must also account for nonconforming structures built before the enactment of standards and specify what types of improvements, if any, can be made to such structures. Institutions of town government, local conservation committees, or even the state government could become the primary implementation and enforcement agent. Vermont would also need to designate which agencies or officials could enforce the Act and determine what penalties should result from violating the Act.

6.2 Watershed Approach

A second option is the EPA-endorsed watershed approach. The watershed approach has a variety of benefits. Unlike other approaches that focus only on riparian zones, the watershed approach protects entire ecosystems, allowing Vermont to prioritize how best to manage all of its resources. Moreover, since private stakeholders are involved in the planning process, they are more likely to support the resultant program. The approach also allows for continual improvement of the regulations by emphasizing monitoring and evaluation.[66] Furthermore, because it is not necessarily a formalized regulatory program, the watershed approach is highly adaptable, providing the state with greater flexibility in deciding how best to protect each individual watershed.[67] The state is already using this approach, in conjunction with a Section 319 grant, to protect Lake Champlain.[68]

The watershed approach also has several disadvantages. Reaching a consensus among a variety of stakeholders with different views could be time consuming.[69] Another difficulty is that watersheds in Vermont cross town lines, complicating compliance and regulatory consistency.[70] A watershed approach focusing on each basin within the state also lacks the uniformity of statewide standards and requires the state to assess each watershed individually, a time-consuming endeavor. Furthermore, whereas existing zoning boards could enforce uniform state-mandated standards, the watershed approach could require the creation of an entirely new agency.

6.3 No State Standards and the Status Quo

Allowing Vermont to continue on its present course without any type of statewide program is another option. Change would still occur at the town level, as towns

constantly adapt their bylaws. Furthermore, statewide programs already exist to help towns and citizens protect riparian zones.

The governor's Clean and Clear initiative is already affecting the way towns protect riparian areas. The initiative funds a program through the Vermont League of Cities and Towns to help towns protect riparian zones by assisting them with the design of applicable bylaws.[71] Furthermore, the Vermont Department of Housing and Community Affairs funds the Municipal Planning Grant Program, which gives towns monetary support to help municipal planning. It has been used by towns in the past to research and implement zoning bylaws to protect riparian areas.[72]

In addition to providing support for protection at the town level, there are a variety of state and federal programs to help individuals adopt practices that protect riparian zones. The Federal Conservation Reserve Enhancement Program gives farmers long-term incentives to maintain buffer areas between croplands and riparian zones. Similarly, the Vermont Environmental Quality Incentive Program provides short-term aid to farmers to maintain buffer areas. The Wetland Protection and Restoration Program (WPRP), part of the governor's Clean and Clear Initiative, aids landowners in the Lake Champlain region in restoring wetlands. The River Corridor Protection Program purchases channel management rights to protect river basins in cooperation with landowners.[73]

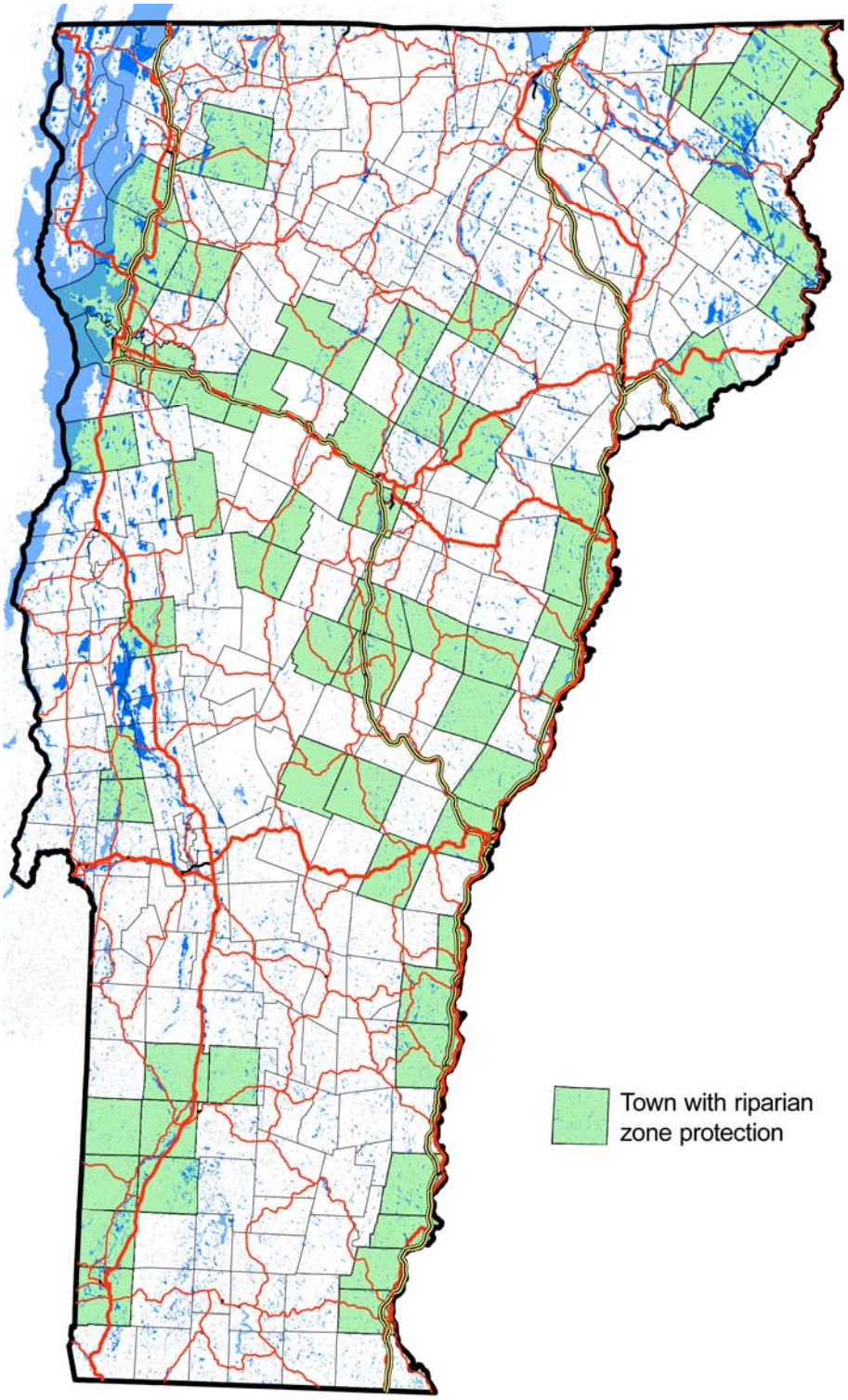
There are, however, several disadvantages to the current system. Because most riparian zones and buffers are determined by towns individually, each town differs in the zoning bylaws (if any) they enact to protect riparian zones. Thus, watershed protection can not be ensured. Furthermore, as seen in the Battenkill, towns often delay enacting riparian zone protection until water resource problems already exist.

7. CONCLUSION

Riparian zone protection is central to maintaining water quality standards, shoreland ecosystems and the overall aesthetic value of Vermont's waterways. Uniform statewide standards similar to those implemented in other states, smaller targeted programs, and the EPA-recommended watershed protection approach are all viable options for implementing further riparian zone protection. Conversely, the state could continue to leave riparian zone protection to individual towns. Each of these approaches has strengths and weaknesses that need to be evaluated and compared to develop the program that best provides comprehensive and practical protection for Vermont's shoreland.

APPENDICES

Appendix A. Map of Vermont Towns with Zoning Protecting Riparian Areas



Appendix B. Table of Vermont Towns and their riparian zone zoning characteristics

LOCATION		BUFFER AREA	BUILDING SETBACK
Averill	(streams buffer, ponds both)	50’	100’
Averys Gore	(streams buffer, ponds both)	50’	100’
Barnard	(Lakeshore Overlay District)	50’	100’
Barnet		100’	100’
Berlin	(streams)	--	75’
Bennington		--	50'
Bolton	(Winooski River)	75’	150’
	(9 named streams)	50’	100’
	(all other streams)	25’	50’
	(Goose, Preston, Upper Preston ponds)	100’	200’
Brattleboro	(Connecticut &West Rivers - depending on site)	100’/50’	100/50’
Bradford	(Connecticut & Waits River)		50’
	(Streams)		35'
Braintree	(Conditional Use Standard for the Storage of Materials)		100’
Brookfield	(rivers, streams, ponds)		75’
Burlington	(Lake Champlain)		250’
	(Winooski River)		250’
	(Centennial, Englesby & Potash Brook)		100’
	(unnamed streams and ponds)		50’
Canaan	(Wallace Pond)		50’
Calais	(lakes, ponds, named streams)	50’	50'
	(unnamed streams)	20’	20'
Charlotte	(named streams)	--	150'
	(unnamed streams)	--	75'
Chelsea			35’
Colchester	(named Streams, minor streams)	85’	
Concord	(Shadow Lake & Miles Pond)		35’
Dorset		50’	50’

LOCATION		BUFFER AREA	BUILDING SETBACK
Dummerston (Connecticut River)			50’ (principal str.)
Elmore	(rivers, streams)	50’	--
Fairfield	(year-round streams, ponds)	--	25’
	(Fairfield Pond)		150’
Ferdinand (streams buffer, ponds both)		50’	100’
Georgia	(streams delineated on zoning map)	--	50’
	(Deer Brook & Arrowhead Mtn. Lake)	--	200'
Hardwick (all streams, rivers & public lakes)		25’	75’
Hartford	(Conn., Ottauquechee, White R.)	100’	--
	(all other surface waters)	30’	--
Hubbardton (Shoreland District)		25’	--
Lemington	(Connecticut River)	--	50’
Lewis (streams buffer, ponds both)		50’	100’
Manchester	(Slope<20%)	50’	50’
Maidstone	(rivers, streams)	50'	50'
	(lakes)	25’	25’
Marshfield (rivers, streams, lakes, ponds)		25’	75’
Middlebury	(rivers)	100’	100’
	(streams)	25’	25’
Middlesex	(streams, rivers, public lakes)	25’	75’
Milton	(lake, undisturbed buffer)	25’	200’
	(lake, buffer with cutting allowed)	125’	200’
	(streams)		50’
Newbury		10’	10’
Norwich	(Connecticut & Ompomp. River)	--	60'
Peru	(structures)	50’	50’
	(septic systems)		100’
Putney	(Connecticut River)	50'-110'+**	50'-110'+**
	(streams)		75’
Randolph	(town reservoir)	--	200’
	(2nd & 3rd Branch of White River)	10’	50’
Richmond (two rivers, one lake, one pond)		--	50’
Ryegate (ponds, streams)		50’	100’

LOCATION		BUFFER AREA	BUILDING SETBACK
Sandgate			50’
Shaftsbury			50’
South Burlington	(Lake Champlain)	150’	
	(Muddy Brook & Potash Brook)	100’	
	(Winooski River)	100’	
	(Minor Streams)	50’	
	(Drainage way)	10'	
Springfield (Connecticut &Black Rivers)			50’
Starksboro		100’	--
Stockbridge		10’	10’
Stowe (with approved construction plan		50'	70'
the setback can be reduced to 50’)			
Strafford	(Miller Pond Shoreland District)	--	200'-400’
	(agriculture)	50’	
	(animal feed lots/manure piles)	200’	--
Sudbury		25’/50’	--
Vershire		10’	10’
Waitsfield		--	50'
Warners Grant (streams buffer, ponds both)		50’	100’
Warrens Gore (streams buffer, ponds both)		50’	100’
Warren		50'	100'
	(Slope>20%)	100’	100’
	(Rivers, Lakes & Ponds)	50'-110'+	50'-110'+
Weathersfield (Streams)		25'-85'+**	25'-85'+**
	(Rivers, Lakes & Ponds)	50'-100'+**	50'-100'+**
Westford	(overlay with exceptions)	100’	100’
Westminster		50’	50’
Williston	(Winooski River/Large Streams)	150’	
	(Smaller Streams)	50’	
Windsor		50’	50’
Woodstock		50’	--

* Information collected by Hartford Town staff, Two Rivers Ottauquechee Regional Commission, Connecticut River Joint Commission, Vermont League of Cities and Towns, and the Vermont Agency of Natural Resources.

**The buffer or setback width varies depending on slope.

Appendix C. All laws and regulations pertaining to riparian buffers as of 2005

United States Code Regarding Riparian Zones as of 2005

Title	Chapter	Part(s)
16- Conservation	1- National Pars, Military Parks, and Seashores	460
	2- National Forests	539
	6- Game and Bird Preserves, Protection	689
	36- Forest and Rangeland Renewable Resources Planning	1604
	41- Cooperative Forestry Assistance	2103, 2140
	58- Land and Wetland Conservation and Reserve Program	3831, 3839
25- Indians	11- Irrigation of Allotted Lands	381
33- Navigation and Navigable Waters	9- Protection of Navigable Waters and or Harbor and River Improvements Generally	465
	11- Bridges over Navigable Waters	500
	36- Water Resources Development	2336
42- The Public Welfare	19- Water Resources Planning	1962
43- The Public Lands	23- Grants of Swamp and Overflowed Lands	994

Source: Riparian Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of Current Science and Regulations (EPA/600/R-05/118)

Code of Federal Regulations Regarding Riparian Zones as of 2005

Title	Chapter	Part(s)
7- Agriculture	VI- National Resources Conservation Service	601, 610
	VII- Farm Service Agency	718
	XIV- Commodity Credit Corporation	1410, 1467, 1469
	XVII- Rural Utility Service	1767
	XVIII- Rural Housing Service, Rural Business Cooperative, Rural Utilities Service, and Farm Service Agency	1940, 1943, 1955
10- Energy	I- Nuclear Regulatory Commission	51
18- Conservation of Power and Water Resources	I- Federal Energy Regulatory Commission	5, 380
	XIII- Tennessee Valley Authority	1304
30- Mineral Resources	VII- Office of Surface	15, 80, 84, 715, 717, 780, 784, 816, 817
36- Parks, Forests, and Public Property	II- Forest Service	200, 228, 230, 292
40- Protection of the Environment	I- Environmental Protection Agencies	122, 412
43- Public Lands, Interior	II- Bureau of Land Management	2420, 2450, 3420, 3800, 3809, 4100, 4120, 4130
	III- Utah Reclamation Mitigation and Conservation Commission	10005
44- Emergency Management and Assistance	I- Federal Emergency Management Agency	60, 206, 209
50- Wildlife and Fisheries	I- U.S. Fish and Wildlife Service	17, 36, 37
	II- National Marine Fisheries Service	22, 223, 226

Source: Riparian Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of Current Science and Regulations (EPA/600/R-05/118)

Appendix D. Current recommended buffers widths

	CRJC	Act 250[74]	EQIP[75]	CREP[76]	WHIP[77]
Streams	35-300ft[a]	100ft	20ft	35ft	20ft
Lakes	35-300ft[a]	50-100ft[b]	20ft	35ft	20ft

[a] These figures come from a report by the Connecticut River Joint Commission Report published in 1998.

- Stabilize Eroding Banks: 35-50 Ft depending on size of stream
- To filter attached sediment and contaminants from runoff: depends on slope but around 35 ft
- To filter dissolved nutrients and pesticides from runoff: 100 ft, unless clay soil in which case 500
- To protect fisheries: 100 ft
- To protect Wildlife habitat: 300 ft[78]

[b] Fifty-foot buffers are generally for streams with small risk for channel adjustments, small floodplains, without significant wildlife travel, and low risk of erosion. One-hundred foot buffers are generally for streams with potential for channel adjustment, within floodplains (including most large rivers), significant wildlife travel, significant natural communities, increased risk of erosion, or potential for overland flow of pollutants.

Appendix E. Massachusetts, Maine, and New Hampshire Riparian Zone Fact Sheets

Fact Sheet: Massachusetts- River Protection Act

Date Passed: Passed in 1996, the River Protection Act amends the Wetland Protection Act passed in 1963.

Protection Mechanism: The River Protection Act designates a river front area as extending out 200 feet from the mean high water mark and establishes a 200 foot building setback to protect this area. The setback is reduced to 25 feet in municipalities with populations greater than 90,000 citizens or with population densities greater than 9,000 people per square mile. Within the river front area, projects that could potentially harm the quality of the riverfront area or the water way itself are prohibited. All projects proposing to build within the river front area must obtain a building permit before beginning site work.

Permitting Process: The permitting process is overseen by town Conservation Committees. The fee for applying for a permit varies greatly depending on the type of work proposed. The burden of proof that the project does not adversely affect the riverfront area is the responsibility of the applicant. A sign bearing the Massachusetts Department of Environmental Protection file number for the specific project must be present at the building site.

Enforcement: The Massachusetts Department of Environmental Protection, town Conservation Committees, environmental officers, or any other officers with policing power are authorized to enforce the Act. Violators of the River Protection Act are subject to fines of up to $25,000 or imprisonments of up to two years.

Role of Municipalities: Municipalities are the main authority in both the permitting and enforcement process. Town Conservation Committees oversee the permitting process and are involved in enforcement. These bodies are appointed by either the mayor or Board of Selectmen. Additionally, town police forces and environmental officers also help to enforce the Act.

Non-Conforming Structures: Any structure built prior to the enactment of the River Protection Act is exempt from the Act's standards.

Fact Sheet: Maine- Mandatory Shoreland Zoning Act

Date passed: Passed in 1971

Protection Mechanism: Ordinance applies to all land within 250 feet of any great pond or river or any land extending outward 75 feet from the high water mark of any stream.

The Official Shoreland Zoning map divides the above lands into seven districts: 1. Resource Protect, 2. Limited Residential, 3. Limited Commercial, 4. General Development One, 5. General Development Two, 6. Commercial Fisheries/Maritime Activities, 7. Stream Protection. This map is located in the offices of municipal clerks. Areas are assigned to districts based on an assessment of whether certain or all types of development will adversely affect water quality. Different districts allow certain activities at all times, allow certain activities with a permit, or prohibit certain activities entirely. Resource Protection and Stream Protection Districts have the strictest standards while the General Development Districts allow for the most development.

Permitting Process: Permits must be submitted to either the Code Enforcement Officer or planning board. Permits are valid for one year after the date issued and must be posted at worksites. The applicant must prove that a project does not adversely affect the purposes and provisions of the Act.

Enforcement: The municipal Code Enforcement Officer is responsible for keeping track of all permitted projects within each municipality. The Code Enforcement Officer is required to conduct on site inspections for permitted sites as well as inspections of any property that has been reported for suspected violations. Violators are subject to fines ranging from $100-$5000 if infractions are not corrected promptly.

Role of Municipalities: All permitting and enforcement is conducted at the municipal level via locally appointed Code Enforcement officer and a locally appointed Planning Board. The state considers the Act to be only a model and encouraged municipalities to form their own guidelines that were either as strict or stricter than the Act itself. Only 60 towns actually use unaltered state guidelines.

Fact Sheet: New Hampshire- Comprehensive Shoreland Protection Act

Date Passed: Amendments effective April 1, 2008

Protection Mechanism: Shoreland divided into three zones, based on distance from high water mark, with different activities permitted within each zone.

- Primary Building Setback and Waterfront Buffer, 0- 50 feet from reference line: All natural ground cover must remain intact.
- Natural Woodland Buffer, 50- 150 feet from reference line: 50 percent of the area not covered by impervious surfaces must be maintained in an undisturbed state.
- Protected Shoreland Area, 150 - 250 feet of the reference line: Limits impervious surface area, requires setbacks for setback systems by soil type, restricts the building of solid waste facilities, and requires a minimum lot size.

Permitting Process: Those who seek to perform activities that require a permit, must apply for one from the department of environmental services. The permit application fee is $100 plus $.10 per square foot area affected by the proposed activities. The money is deposited in the wetlands and shorelands review fund. Certain activities, such as earth excavation within the protected shoreland, require local approval.

Timber harvesting, construction of public roads, utility lines, and public water access facilities are exempt.

Enforcement: The commissioner of the department of environmental services, with the advice and assistance of the office of energy and planning, department of resources and economic development and department of agriculture, markets, and food, is primarily responsible for enforcing the Act. Before the State takes any enforcement action, the commissioner must inform the local governing body.

Role of Municipalities: Municipalities may adopt standards more strict than those demanded by the state. They may also voluntarily assist with the permitting process and enforcement of permit conditions by conducting on-site inspections and generating reports. Municipalities can enforce the Act's provisions through cease and desist orders, seeking injunctive relief, or civil penalties. Penalties and fines collected by the court are remitted to the municipality.

Non-Conforming Structures: Owners of an individual undeveloped lot are permitted to build a single family residential dwelling. Nonconforming structures built prior to July 1, 1994 within the protected shoreland may be repaired, renovated, or replaced using modern technology if the functional use is equivalent and the existing footprint is not expanded. Structures between the primary building setback and the reference line shall not be altered in a way that will extend the structure closer to the water, except for the addition of a dock of an open porch.

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