

River Corridor, Floodplain & Shoreland Protection Programs

Biennial Report to the General Assembly Pursuant to Act 110

Vermont Department of Environmental Conservation

Watershed Management Division

January 2017



River Corridor & Floodplain Protection

1. Final copy of memorandum of understanding (MOU) on implementation of exemption from municipal flood hazard regulation

The [Flood Hazard Area and River Corridor \(FHARC\) Rule](#) was adopted on 10/24/2014, and is effective as of March 1, 2015. Due to 2016 amendments to the FHARC General Permit and the Required Agricultural Practices in the midst of rulemaking, the Agency of Natural Resources (ANR) has not initiated MOU development with the Agencies of Agriculture and Transportation. The ANR plans to initiate MOU development with the Agency of Transportation in 2017.

2. River Corridor and Floodplain Protection - Municipal Bylaw Adoption

Many communities have taken action to protect river corridors and /or floodplains in recent years (Table 1, Figure 1). Since 2008, the number of communities enrolled in the National Flood Insurance Program (NFIP) has increased from 226 to 248. The effort to review and update flood hazard bylaws was required to meet deadlines for new FEMA Digital Flood Insurance Rate Maps (DFIRMs) that were updated in six counties. The DEC Rivers Program used the bylaw update process as an opportunity to educate municipalities on the benefits of adopting regulatory standards that exceed federal minimums.

The impetus of the FEMA map update process driving municipal bylaw updates ended with Bennington County DFIRMs becoming effective in December 2015. ANR was very recently made aware that FEMA is in the process of issuing a task order to the U.S. Geological Survey (USGS) to initiate a restudy in the Missisquoi watershed that will result in updated Flood Insurance Studies and DFIRMs for affected communities. As of this report, neither FEMA, nor the USGS, have provided a schedule for the work.

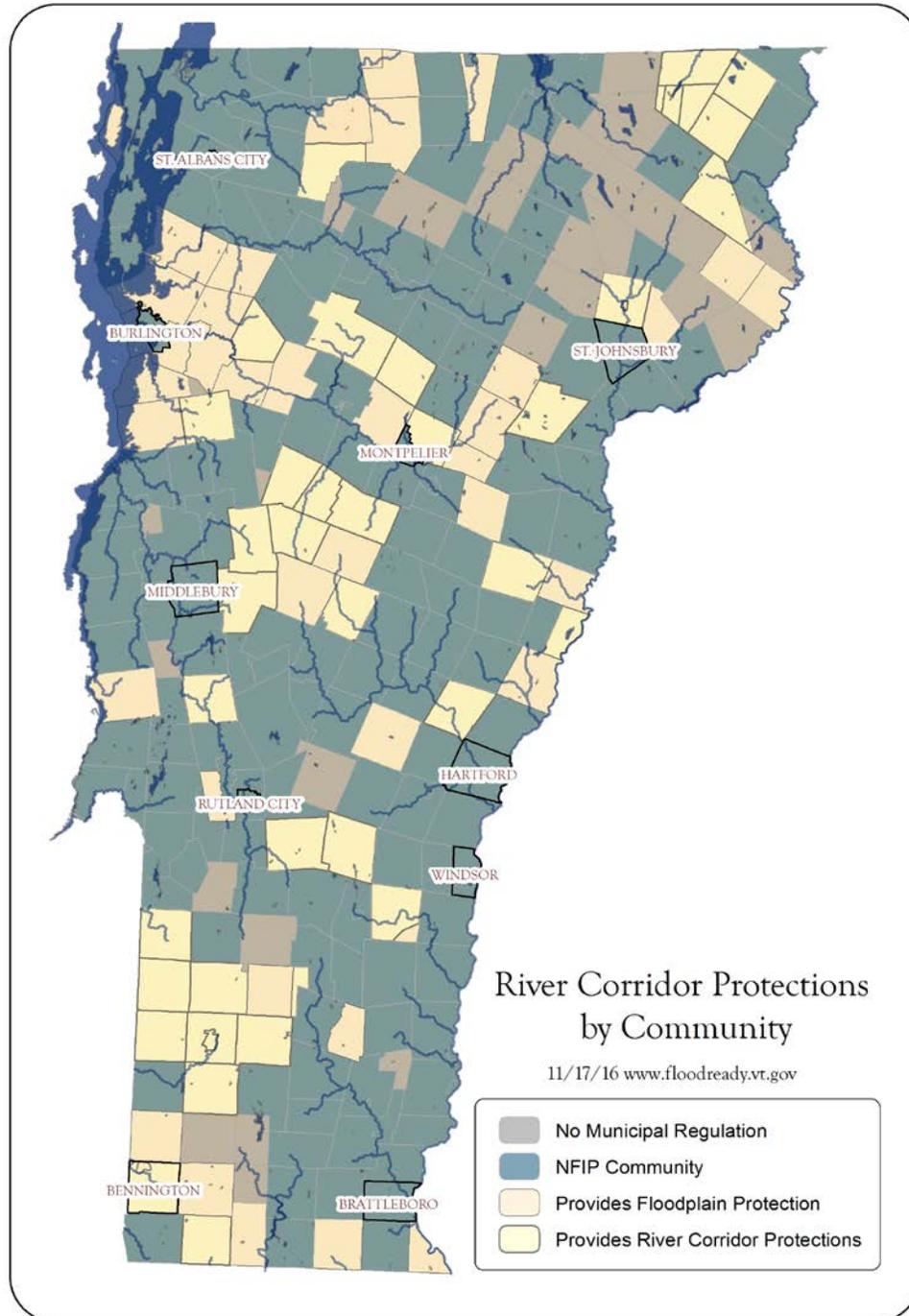
Outside of the DFIRM adoption process, the [Emergency Relief and Assistance Fund \(ERAF\) Rule](#), amended in 2012, created financial incentives to adopt river corridor and floodplain protection bylaws. In addition, a few communities have begun or completed a process of joining the NFIP in response to direct experience with flood events and related damage or to qualify at a higher ERAF reimbursement rate (Figures 2 and 3). In 2014, the Unified Towns and Gores of Essex County, comprised of 6 communities in the Northeast Kingdom, enrolled in the NFIP and adopted river corridor protection bylaws as a way to protect remaining floodplain functions and to minimize sophisticated administrative permitting processes. Other communities in the Northeast Kingdom and elsewhere in the state have undertaken updates to their municipal plans and/or zoning and have sought to incorporate current standards to prohibit new encroachment in river corridors and floodplains. The communities protecting river corridors and floodplains have adopted standards that far exceed NFIP minimum standards (Table 1, Figure 1).

Table 1. Municipal River Corridor and Floodplain Protection Bylaws that Exceed NFIP minimum standards (11/17/2016)

Municipality	Floodplain Protection	River Corridor Protection	Municipality	Floodplain Protection	River Corridor Protection
Averill UTG		Yes	North Bennington Village	Yes	
Averys Gore UTG		Yes	Northfield	Yes	Yes
Bakersfield	Yes		Norton	Yes	Yes
Baltimore	Yes		Orange	Yes	
Barnard	Yes		Orwell	Yes	
Bennington		Yes	Pawlet	Yes	Yes
Bolton	Yes		Peacham	Yes	Yes
Bradford	Yes		Peru	Yes	
Braintree	Yes	Yes	Plainfield	Yes	
Brandon	Yes	Yes	Plymouth	Yes	Yes
Cabot	Yes		Readsboro	Yes	
Cavendish	Yes	Yes	Richford	Yes	
Charlotte	Yes		Richford Village	Yes	
Colchester	Yes		Richmond	Yes	
Corinth	Yes	Yes	Ripton	Yes	Yes
Dorset	Yes	Yes	Roxbury	Yes	
East Montpelier	Yes	Yes	Rupert	Yes	Yes
Essex	Yes		Sandgate	Yes	
Essex Junction Village	Yes		Shaftsbury	Yes	
Fairlee	Yes	Yes	Sharon	Yes	
Fayston	Yes	Yes	Shelburne	Yes	
Ferdinand UTG	Yes	Yes	Shrewsbury	Yes	Yes
Granby	Yes		South Burlington	Yes	
Granville	Yes		Stamford		Yes
Guildhall	Yes		Stowe		Yes
Halifax	Yes		Sunderland		Yes
Hinesburg		Yes	Thetford	Yes	
Isle La Motte	Yes		Troy	Yes	
Jeffersonville Village	Yes		UTG	Yes	Yes
Jericho	Yes	Yes	Vernon	Yes	
Kirby	Yes		Waitsfield	Yes	Yes
Landgrove	Yes	Yes	Warners Grant UTG	Yes	Yes
Lewis UTG	Yes	Yes	Warren	Yes	
Lincoln	Yes		Warren Gore UTG	Yes	Yes
Lyndon	Yes	Yes	West Rutland	Yes	
Lyndonville Village	Yes	Yes	Westford	Yes	
Manchester		Yes	Williston	Yes	
Manchester Village	Yes	Yes	Windham	Yes	
Marshfield	Yes		Winhall	Yes	Yes

Municipality	Floodplain Protection	River Corridor Protection	Municipality	Floodplain Protection	River Corridor Protection
Marshfield Village	Yes		Winooski	Yes	
Middlesex	Yes		Worcester	Yes	Yes
Milton	Yes		Total (11/17/16)	75 (26%)	42 (15%)
Montgomery		Yes	New since 1/2015	9	8

Figure 1. Municipal Bylaws Protecting River Corridors and Floodplains that Exceed NFIP Minimum Standards



3. Incentives for Municipalities to Adopt River Corridor and Floodplain Protection Bylaws

Act 138 (2012) created a new *River Corridor Protection* section (10 V.S.A, § 1428) which directs the Secretary of Administration, after consultation with relevant state agencies, to create a Flood Resilient Communities Program and list the existing financial incentives under state law for which municipalities may apply for financial assistance, when funds are available, for municipal adoption and implementation of bylaws under 24 V.S.A. chapter 117 that protect river corridors and floodplains.

Obvious incentives that may motivate municipalities to adopt river corridor and flood hazard bylaws are flood hazard avoidance, public safety improvements, and abatement of water quality and habitat impacts. Continuing the Agency’s outreach to municipalities is essential to raise awareness about the important proactive steps that can be taken at the local level to achieve these objectives.

Financial incentives to nudge municipalities to adopt river corridor and floodplain protection zoning bylaws include qualifying criteria in grants, pass-through funds, technical assistance, and educational support that encourage municipalities to adopt and implement bylaws that conserve and restore river stability, floodplains, wetland and riparian buffer function. Table 2 below summarizes currently available incentives within the Agencies of Natural Resources and Commerce & Community Development, and the Department of Public Safety for which consideration has been made to incorporate incentives for municipal adoption of river corridor and floodplain protection.

Model municipal river corridor and floodplain protection bylaws have been developed. River Corridor Procedures adopted in 2014 describe the stream geomorphic assessment and mapping protocols that will be the basis for the development of municipal river corridors and river corridor protection area maps.

The fundamental standard to qualify for financial incentives is that the local bylaw must be designed to: (a) achieve and maintain stream equilibrium conditions; or, (b) ensure good floodplain management including maintenance of a buffer. Additional standards to qualify for incentives, such as the geographic extent of protection coverage required within a municipality, will be determined in a conference involving at least one representative of the local governing body, at least one representative of the municipal planning commission, and representatives of the DEC Rivers Program. Criteria for consideration will include the history of flood and fluvial erosion damage, stream geomorphic condition, and development pattern within the river corridor and floodplain.

Table 2: Municipal Incentives for River Corridor and Floodplain Protection

AGENCY	GRANT PROGRAM AS POTENTIAL INCENTIVE	Incentive Implemented as:		
		ELIGIBILITY CRITERIA	PRIORITY CRITERIA	ENHANCED STATE MATCH
ANR	Ecosystem Restoration		X	
	Aquatic Nuisance		X	
DEMHS	Hazard Mitigation Grant Program		X	
	Pre-Disaster Mitigation Grants		X	
	Flood Mitigation Assistance Grants		X	
	ERAF			X
ACCD	VT Community Development Program		X	

In addition to the above incentives, numerous state programs have updated their siting criteria acknowledging the importance of avoiding new encroachments in river corridors and floodplains. Recent updates include:

- The DEC Stormwater Management Manual and Guidance
- DEC Onsite Wastewater and Potable Water Supply
- AOT Transportation Enhancement Grant Program
- PSD Renewable Energy Siting Guidance

The [Emergency Relief and Assistance Fund \(ERAF\)](#) is the most significant incentive to encourage communities to become more flood resilient. The 2012 ERAF amendments encourage municipalities to take four or five flood damage mitigation actions. By doing the first four, the communities could increase their post-disaster support from the State of Vermont from 7.5% to 12.5%. By additionally acting to protect river corridors the communities would be eligible for a 17.5% rate.

The amended ERAF rule went into effect in October 2014 and many communities have responded. Through January 2014 most communities were missing at least one of the four basic mitigation elements and all Vermont communities were qualified for a 7.5% reimbursement rate from ERAF to supplement federal Public Assistance disaster recovery funding. Since then many communities have adopted the 2013 Road and Bridge Standards, prepared a Local Emergency Operations Plan, and have taken other actions as needed (Figure 2). As of late November 2016, nearly a third of communities qualified for highest reimbursement rates (Figure 3).

Communities Meeting Standard	ERAF Mitigation Actions
89%	1 NFIP Participation
93%	2 2013 Road and Bridge Standards
90%	3 Local Emergency Operations Plan
67%	4 Local Hazard Mitigation Plan
29%	5 River Corridor Protection

Figure 2.

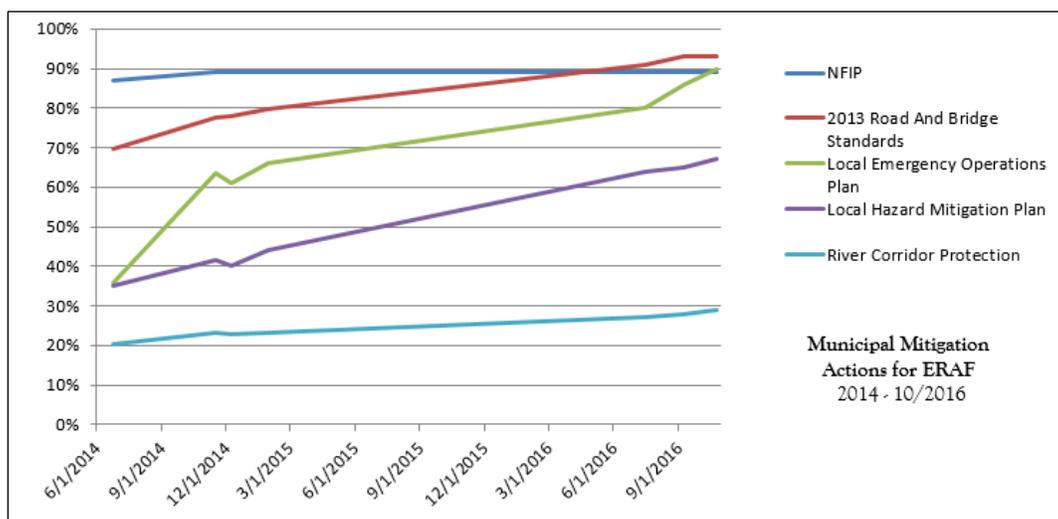
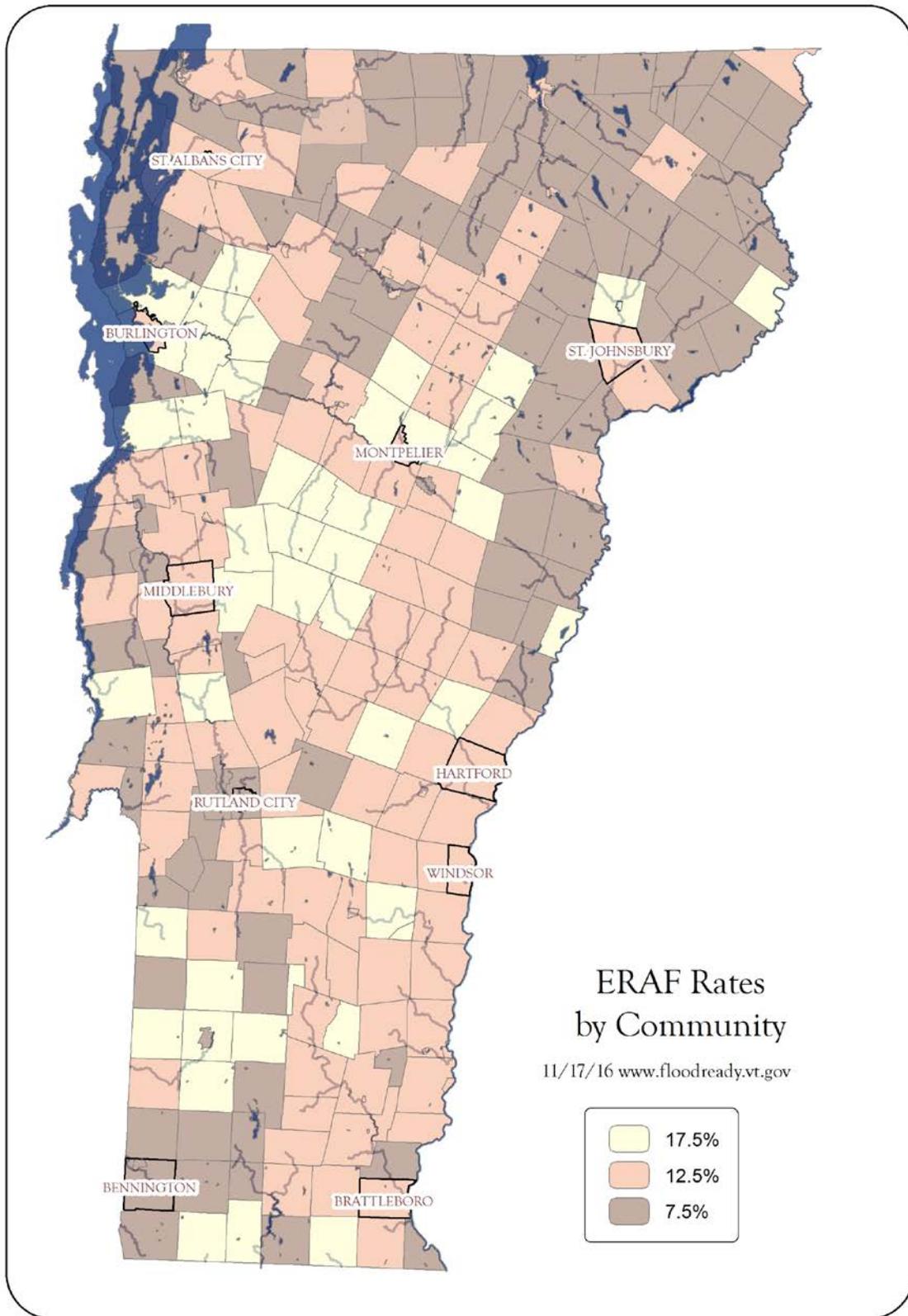


Figure 3. ERAF Reimbursement Rates



The primary responsibility for administering the ERAF fund is delegated to the Public Assistance program at the Division of Emergency Management & Homeland Security (DEMHS).

One of the primary tools used for this effort has been the public “ERAF Tracking” efforts of ANR using Flood Ready Vermont www.floodready.vermont.gov a professionally designed application of the State of Vermont template.

Flood Ready Vermont focuses on the needs of community leaders including select board members and planning commissioners as well as regional and professional planners. A [summary of current municipal actions for ERAF](#) can be found on the Community Reports page of the Flood Ready Vermont website. The website also features breaking news, a listserv, information on funding sources, the Flood Ready Atlas, and information to support planning for flood resilience.

In addition to Flood Ready Vermont, the River Corridor and Floodplain Protection section of the Rivers Program has technical material posted online at: <http://dec.vermont.gov/watershed/rivers/river-corridor-and-floodplain-protection> to provide support to communities managing their river corridors and floodplains.

4. State Agency Progress Towards Enhanced Flood Resilience.

State agencies have continued to develop planning and technical assistance programs that promote floodplain and river corridor protection and support implementation of the State Hazard Mitigation Plan.

ANR – The Rivers Program completed a statewide river corridor base layer in early 2015, which is now published on the ANR Natural Resources Atlas. A 2015 FEMA Hazard Mitigation Grant awarded to ANR is helping Program Scientists incorporate site specific data into the state wide layer to achieve a single source of river corridor mapping data that ANR will use in its regulatory reviews. The availability of river corridor mapping for every Vermont municipality creates a level playing field for municipal bylaw adoption and participation in ERAF incentives. The legislature also called upon the Agency to adopt River Corridor Protection Procedures (10 V.S.A. Chapter 49) to include best management practices. The Flood Hazard Area and River Corridor Protection Procedures were adopted in late 2014.

VTrans – The Transportation Resiliency Project (in progress) is using river corridors and floodplain function to identify the flood and fluvial erosion vulnerabilities of state and municipal road and stream crossing infrastructure. The project will also recommend floodplain and river corridor protection as important means for mitigating flood and fluvial erosion risks.

ACCD – The Vermont Economic Resiliency Initiative (VERI) used floodplain and river corridors to identify the vulnerability of infrastructure and economic centers in all Vermont communities. The interagency advisory committee chose five communities to identify projects and demonstrate how to improve municipal economic resiliency which, in every case, included river corridor and flood plain protection.

ACCD – Published the 2016 Vermont Municipal Planning Manual which provides technical assistance and stresses the importance of municipal actions to protect river corridors and floodplains.

BGS – Using a 2015 FEMA Hazard Mitigation Grant is identifying all state facilities located with Flood Hazard Areas and River Corridors. The Department will by using this mapping exercise to begin the development of mitigation strategies for state buildings.

5. Shoreland Protection

A progress report describing establishment of the shoreland regulatory program was submitted to the legislature on January 15, 2016. Voluntary contractor trainings will be described in a report due in January 2018.

To recognize the five-year anniversary of Tropical Storm Irene, Susan Warren and Perry Thomas (past and current Lakes Program Managers) wrote an account of how the Shoreland Protection Act came to be. We include the story below, as submitted to the North American Lake Management Society publication *LakeLine*.

Tropical Storm Irene and the Passage of Vermont's Shoreland Protection Act

In late August 2011, Tropical Storm Irene dropped more than seven inches of rain over parts of Vermont. Waterbury, base of operations for the Department of Environmental Conservation (DEC), was one of the many communities hit hard by the storm. DEC lost much of its infrastructure to flooding, and all employees working in central office buildings were displaced. In the face of such devastation, members of DEC's Watershed Management Division might have thrown in the towel; instead, they rallied to make the most of a teachable moment.

Not long before Irene, in the spring of 2011, the Agency of Natural Resources published a white paper describing predictions of climate change models and how impacts could affect Vermont's waters (Pealer and Dunnington 2011). Increased storm intensity and frequency were among the predictions. Restoring and protecting shorelands were described as important ways to improve lake resiliency. An intense storm hit central Vermont just after this report was released, leading the Agency of Natural Resources to establish a flood resilience program during summer 2011. Then Irene arrived. Two high intensity storms, happening in the same year, reinforced the need for flood resilience. Images of sediment transport into lakes helped point toward improved land management practices across Vermont's watersheds (Figure 4).

As floodwaters receded, one of the Watershed Management Division programs that seized on the opportunity to build upon lessons learned was the Vermont Lakes and Ponds Management and Protection Program. Created in 1975, in the wake of the Federal Clean Water Act, the Vermont Lakes and Ponds Program served as home for a range of lake-focused projects: 1) monitoring and assessment of the State's lakes, 2) regulation of aquatic nuisance control and lake encroachment (below mean water level), 3) aquatic invasive species management, 4) education and outreach about lake protection, and 5) lake watershed management. By building and maintaining this diverse set of initiatives, funded through various sources, the Lakes Program grew and thrived. As of 2011,

however, shoreland regulations were absent from the Program's toolkit. In Irene's aftermath, we sought to fill this gap.



Figure 4. Aerial view of Otter Creek delivering a sediment plume to Lake Champlain in Ferrisburgh VT (A) and the Ferrisburgh shoreline shows the lawn-to-lake pattern that we strive to change through legislation and outreach (B). Images by Staci Pomeroy, DEC.

A Shoreland Bill

After decades of development with few shoreland protections in place across Vermont, most people agreed lake shorelands needed better management. There were several key factors that we believe resulted in successful legislation. Perhaps most critical was the support of the leaders of the Agency of Natural Resources and the Department of Environmental Conservation who agreed to take on the issue where before it had been perhaps viewed as too controversial. The administration included it in their post-Irene legislative agenda and assigned key personnel to promote it.

Fortunately, the Vermont legislature is a very open and approachable body. Citizens can easily attend committee meetings and get on the agenda to speak. Legislators are easy to reach at home and pay attention to every comment they receive from constituents. During the legislature's consideration of the shoreland bill, Agency staff could sit in on all committee discussions. Committee members regularly referred to staff with questions even when we were not specifically testifying. The legislature respected Lakes Program staff and appreciated when we were available to provide information.

We were often asked by the legislature, "Why not just educate people about good shoreland management?" Although we had offered active outreach programs on shoreland management for many years and found education to be an essential component of all our efforts, we knew that education alone was not going to protect the shores. We provided social science research supporting this contention.

The legislature was keen to see that every standard addressing natural vegetation or runoff was supported by science. Perhaps most importantly, Vermont had new data showing how shoreland clearing and the associated runoff resulted in a substantially degraded littoral habitat (Merrell et al. 2009). This research was critical in gaining legislative support.

Vermont's Shoreland Protection Act

In 2013, the Vermont Legislature passed the Shoreland Protection Act, establishing a permit program that focuses on protection of existing natural vegetation within 100 feet of the water and minimization of stormwater runoff. The legislature and agency worked hard to produce a bill that addressed some of the specific concerns voiced by the public. These now include:

- Existing shoreland property owners are not required to change how their land is currently being managed, only a new project of a certain size (e.g. building an addition onto a camp) triggers a permit requirement;
- Some "deminimus" projects are allowed that would not require a permit, such as building a small storage shed within the 100-foot buffer area;
- The permit application process is relatively simple and landowners do not need to hire an engineer to comply;
- The state works closely with associated permit programs (e.g. septic systems and wetlands) to ensure a coordinated permit process;
- We have developed a voluntary contractor training program in coordination with contractor trade groups to support the new permit program; and
- Towns may adopt a protective shoreland ordinance and, after approval by the state, residents of that town do not also need a state shoreland permit;

The Vermont Lakes program is grateful for the support of the agency and legislature in enacting the Shoreland Bill. Going forward we are pursuing a three-pronged approach to shoreland management. First, the new permit program enables us to ensure shoreland development proceeds with little new impact on the lake resource. Second we continue to consider education and outreach a crucial part of shoreland management. Recently, Vermont's outreach program was substantially revamped in the form of LakeWise, and shoreland owners across the state are receiving it enthusiastically. It allows us to work with the existing owners of shoreland properties who are interested in reducing their impact on the lake (Picotte 2012). And third, we continue to monitor and assess the in-lake water quality and habitat conditions.

Monitoring Lake Resilience

Ongoing monitoring and assessment have allowed us to demonstrate clear connections between shoreland management practices and littoral habitat health. By participating in the EPA's National Lake Assessment (NLA) we not only continue to track habitat changes within Vermont lakes but also assess lake health in a national context. A comparison of lakeshore disturbance rates across Vermont, the ecoregion, and the nation revealed that Vermont lagged behind other states in protecting lakeshores. A separate study comparing Vermont lakes with those in Maine (where shoreland regulations have been in place since the 1970s) reinforced the importance of protecting shoreland vegetation (Merrell et al. 2013).

The research supporting enactment of Vermont's shoreland protection measures was supported through Vermont's Performance Partnership Agreement with USEPA Region 1. Field work and laboratory analyses were funded in large part thru that agreement, tied specifically to the EPA Office of Water's "Monitoring Initiative" set-aside funds. These funds are provided by EPA from each State's Section 106 allocation, subject to the stipulation that the funds enhance State water quality monitoring programs. Vermont has effectively used Monitoring Initiative funds to address management needs.

Shoreland Protection and Lake Resilience

In their pre-Irene white paper, Pealer and Dunnington emphasized the value of riparian and shoreland vegetation in providing shade for aquatic habitat, thereby directly mitigating the effect of increased water temperatures. This kind of local action to protect lakes from climate change is receiving increasing attention nationally and globally, as lake managers and policy makers recognize the need to provide specific, local recommendations for improving the resiliency of lake ecosystems (e.g., Borre et al. 2016). Faced with dire predictions from climate change experts and natural disasters consistent with those predictions, communities can become overwhelmed to the point of inaction (Scheffer et al. 2015).

When specific, doable projects are proposed as ways to protect local ecosystems from the impacts of climate change, people are encouraged to take action—making small changes that together have big impacts (Figure 2). In Vermont, as we continue to rebuild communities five years after Tropical Storm Irene, our new shoreland regulatory team is working closely with the voluntary Lake Wise Program to provide the information and tools shoreland property owners need to protect their lakes. Fees from permit applications and support from State funding sources such as the Ecosystem Restoration Program make these complementary programs possible.



Figure 5. This shoreland property on Lake Eden was restored by simply allowing succession of natural vegetation on an area that was once maintained as bare sand.

Acknowledgments

We wish to acknowledge the Vermont DEC's Watershed Management Division for contributions to the work described above. Many, many thanks to staff members of the Lakes and Ponds Management and Protection Program for dedicating their considerable energy and talents to the shoreland protection cause. Thanks also to Neil Kamman and the Monitoring Assessment and Planning Program for supporting lake monitoring efforts and for contributing to this article.

For more information, visit the following websites:

<http://dec.vermont.gov/watershed/lakes-ponds/permit>

<http://dec.vermont.gov/watershed/lakes-ponds/lakeshores-lake-wise>

<https://www.epa.gov/water-pollution-control-section-106-grants/monitoring-initiative-grants-under-section-106-clean>

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