

UNDERSTANDING THE FAILURE TO REDUCE PHOSPHORUS LOADING IN LAKE CHAMPLAIN: LESSONS FOR GOVERNANCE

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ABSTRACT

Many shallow lakes and bays throughout the world experience dangerous toxic algae blooms. Extensive biological research has been devoted to understanding the problem, but little research addresses the social and political drivers impeding solutions. This case study focuses on Vermont's efforts to reduce phosphorus inputs to Lake Champlain, a large

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lake dividing New York and Vermont in the U.S. that stretches north into Québec, Canada. Why, after four decades and hundreds of millions of dollars spent, has success been so difficult to achieve? What needs to be done to improve water quality management and reduce or eliminate dangerous algae blooms?

In 1993 Vermont and Quebec set a target for phosphorus levels in the shallow Missisquoi Bay at twenty-five micrograms per liter (ug/L) of phosphorus; however, the levels have not declined but increased slightly to fifty ug/L phosphorous, double the target levels. Further, the historic spring and summer floods of 2011 caused a spike in phosphorus concentrations in many parts of Lake Champlain to the highest levels observed since 1990. A warming climate and intense storms are projected to increase erosion making the problem of phosphorous loading more difficult to address.

Five lessons emerge from a study of the literature and structured interviews with a dozen individuals involved in efforts to reduce pollution: (1) funding follows leadership, but success requires substantially more leadership and funding, (2) fragmentation of agency responsibility impedes problem solving, (3) sparring interest groups both spur and block solutions, (4) shocks and crises galvanize action but may temporarily set back progress, and (5) social and cultural attitudes matter both inside and outside bureaucracies.

I. BACKGROUND

Lake Champlain (“the Lake”) is a large body of water dividing New York and Vermont, stretching north into Québec, Canada.¹ Intergovernmental efforts to reduce phosphorus loading and improve water quality in the Lake began in the late 1980s. However, blue green algae blooms (also commonly referred to as cyanobacteria or harmful algae blooms known to produce neurotoxins) continue to seasonally shut down beaches and threaten or kill fish in shallow waters of the Lake, especially in the St. Albans and Missisquoi Bays (at the northeast edge of the lake) and at the lake’s south end.²

1. Laura Medalie et al., *Use of Flow-Normalization to Evaluate Nutrient Concentration and Flux Changes in Lake Champlain Tributaries, 1990–2009*, in 38 JOURNAL OF GREAT LAKES RESEARCH, 58, 58 (See map, Fig. 1 at 59) (2012) (Its surface waters cover 435 sq. miles (1127 sq. kilometers) with an average depth of 64 ft. (19.5 meters). The watershed drainage area covers 21,326 square kilometers in Vermont, New York and Québec. Eric Smeltzer et al., *Environmental Change in Lake Champlain Revealed by Long-term Monitoring*, 38 SUPP. 1 J. SCI. RESEARCH 6, 6 (2012).

2. John Dillon, *State Sees Big Bill to Clean Up Waters, but No Funding in Sight*, VT. PUBLIC RADIO (Jan. 25, 2013, 10:19 AM), http://www.vpr.net/news_detail/97270/state-sees-big-bill-to-clean-up-waters-but-no-fund/; see, e.g., *Large Algae Bloom Reported in St. Albans Bay*, BURLINGTONFREEPRESS.COM (Aug. 20, 2013),

Despite sustained efforts by government at the state, provincial, federal, and international levels, phosphorus in the Lake, and especially in its shallow bays, has not improved.³ In 2011, the Lake Champlain Basin Program reported that, by 2008, point sources of phosphorus had been reduced to approximately five percent of the total load to the Lake suggesting that phosphorus inputs from wastewater treatment facilities (“WWTFs”) have declined substantially due to increased treatment following adoption of the federal Clean Water Act (“CWA”) in 1972.⁴ Nonetheless, Christopher Kilian of the Conservation Law Foundation (“CLF”), a non-profit environmental advocacy group based in Boston with an office in Vermont, asserts that the CWA requires more strict regulation of WWTFs.⁵ The remainder of the phosphorus comes from a combination of stormwater runoff and agricultural sources (in roughly equal measure).⁶

Because phosphorus concentrations in many segments of Lake Champlain exceed levels allowed under Vermont’s Water Quality Standards,⁷ the Lake is on the list of “impaired waters.”⁸ The CWA requires

<http://www.burlingtonfreepress.com/article/20130819/GREEN/308190019/Large-algae-bloom-reported-in-St-Albans-Bay>; *LCC Blue-Green Algae Monitoring Program*, LAKE CHAMPLAIN COMMITTEE (LCC), <http://www.lakechamplaincommittee.org/lcc-at-work/algae-in-lake/> (last visited Jan. 11, 2014).

3. Figure 3 “The Lake Champlain Phosphorus Concentrations by Lake Segment,” available at <http://sol.lcbp.org/PDFs/Fig3-PChart.pdf> (last visited Jan. 27, 2014).

4. Medalie, *supra* note 1 (citing *Missisquoi Bay Basin Study: Identification of Critical Source Areas of Phosphorus Pollution*, LAKE CHAMPLAIN BASIN PROGRAM (2011), <http://www.lcbp.org/water-environment/water-quality/nutrients/missisquoi-bay-basin-study/>); see also Interview with Laura DiPietro, ARM Deputy Dir., Vt. Agency of Agric., Food and Mkts. (Mar. 1, 2013) (asserting that phosphorus coming directly from sewage treatment or industrial facilities accounts for only 3-5% of the problem and the remaining inputs are roughly split equally between agricultural runoff and stormwater.); Email from Christopher Kilian, Vt. Dir., Conservation Law Found. (Apr. 18, 2013) (on file with author) (arguing that point sources still contribute roughly fifteen percent of human induced phosphorus pollution, and this has not gone down for fifteen years. Kilian explains that the ten percent discrepancy between the two stems from a difference in whether streambank erosion is treated as part of the natural background load or part of the non-point source load.)

5. Email from Christopher Kilian, *supra* note 4.

6. *Where Does the Phosphorus Come From?*, LAKE CHAMPLAIN BASIN PROGRAM (2012), http://sol.lcbp.org/phosphorus_where-does-p-come-from.html. The author avoids categorizing stormwater or agricultural runoff as either a point source or non-point source under the CWA. Anil J. Antony, *Shotguns, Spray, and Smoke: Regulating Atmospheric Deposition of Pollutants Under the Clean Water Act*, 29 UCLA J. ENVTL. L. & POL’Y 215, 239–40, n.116–18 (2011) (arguing that the CWA “contains an expansive definition of point sources.” Clearly “under the point source rationale, a pollutant [that] travels from a point source to navigable waters” violates the CWA, but a murky questions remains when there are “instances when a point source releases a pollutant onto land [such as stormwater and agricultural runoff], and the pollutant then travels to navigable waters without the aid of any conveyance other than gravity.”)

7. To see a comparison of phosphorus concentrations to target levels, see Figure 3 *supra* note 3; see also Vermont Water Quality Standards, VT. CODE R. § 12.004.052 (2011), available at http://www.watershedmanagement.vt.gov/rulemaking/docs/wrprules/wsm_d_wqs.pdf#zoom=100.

8. Vermont Impaired Waters, Env’tl. Prot. Agency http://iaspub.epa.gov/tmdl_waters10/attains_impaired_waters.control?p_state=VT (last visited Jan. 11, 2014); The Final New York State 2012 Section 303(d) List of Impaired Waters Requiring a

establishment of a Total Maximum Daily Load (“TMDL”) that a waterbody with impaired waters can receive and still meet water quality standards.⁹ As will be explored below, the U.S. Environmental Protection Agency (“EPA”), in 2002, approved Vermont and New York’s jointly developed TMDL for the Lake; however, following legal challenges, the EPA withdrew approval of the Vermont portion of the TMDL in 2011 and is currently rewriting the TMDL.¹⁰

A significant reason for lack of progress in reducing algae blooms is the huge quantity of phosphorus already locked up in the lake system. Sediment deposited in the lake over generations has built up a legacy of phosphorus,¹¹ delaying visible improvements in water quality for what is likely to be decades.¹² Phosphorus moves out of the system very slowly, especially from the shallower bays, so even where a tributary stream might indicate a decline in phosphorus, the lake or bay may take decades to respond.¹³ Missisquoi Bay is shallow and is only twelve to fourteen feet at its deepest points.¹⁴ Since agricultural lands surround the bay, farms are a significant source of phosphorus. Pollutants flow through tributaries in the watershed and wash into the bay from the shoreline.¹⁵

In 1993, Vermont and Québec adopted a bilateral agreement on Water Quality for Missisquoi Bay and set a 25 µg/L limit for phosphorus.¹⁶

TMDL/Other Strategy, Env’tl. Prot. Ag. (July 2012), available at <http://www.epa.gov/region02/water/waterbodies/303dList.pdf>.

9. See Lara D. Guercio, *The Struggle Between Man and Nature—Agriculture, Nonpoint Source Pollution, and Clean Water: How to Implement the State of Vermont’s Phosphorous TMDL Within the Lake Champlain Basin*, 12 VT. J. ENVTL. L. 455, 457–58 (2011).

10. RECONSIDERATION OF EPA’S APPROVAL OF VERMONT 2002 LAKE CHAMPLAIN PHOSPHORUS TOTAL MAXIMUM DAILY LOAD (“TMDL”) AND DETERMINATION TO DISAPPROVE THE TMDL 1–2, 16 (Jan. 24, 2011), available at <http://www.epa.gov/region1/eco/tmdl/pdfs/vt/LakeChamplainTMDLDisapprovalDecision.pdf>; see also *TMDL Program*, LAKE CHAMPLAIN BASIN PROGRAM, <http://www.lcbp.org/water-environment/water-quality/nutrients/tmdl/> (last visited Nov. 16, 2013).

11. Smeltzer, et al., *supra* note 1 (stating the watershed of Lake Champlain was heavily forested until the 1800s when hillsides were largely denuded over a period of seventy years as European settlers built sawmills, dammed and straightened streams, and created farmland producing erosion and increasing human inputs of fertilizers); Suzanne N. Levine et al., *The Eutrophication of Lake Champlain’s Northeastern Arm: Insights from Paleolimnological Analyses*, 38 J. OF GREAT LAKES RES. 35, 35, 37–38 (2012) (providing a short overview of land use changes in the Lake Champlain Watershed, stating that “persistent release of phosphorus from bottom sediments can delay lake recovery from nutrient diversion for years-to-decades.”).

12. Levine et al., *supra* note 11, at 35 (“Persistent release of phosphorus from bottom sediments can delay lake recovery from nutrient diversion for years-to-decades.”).

13. *Where Does the Phosphorus Come From?*, *supra* note 6.

14. VT. AGENCY OF NATURAL RES., MISSISQUOI BAY BASIN: WATER QUALITY MANAGEMENT PLAN 19 (2013).

15. Interview with Laura DiPietro, *supra* note 4.

16. INT’L MISSISQUOI BAY STUDY BD., MISSISQUOI BAY CRITICAL SOURCE AREA STUDY, FINAL REPORT TO THE INT’L JOINT COMM’N 3 (2012), available at

Phosphorus levels in recent years, however, have not declined but remained at double the level set in the 1993 standard and are near 50 µg/L.¹⁷ Between 2003 and 2010, Vermont invested over \$100 million (from federal and state sources) in reducing phosphorous loading; nonetheless, phosphorus levels have increased or remained the same.¹⁸

This paper explores the history of governance and examines why success has been difficult to achieve and what needs to be done to improve water quality management and reduce or eliminate harmful algae blooms. The study emphasizes Vermont because phosphorus loading is predominately generated from the Vermont part of the Lake's watershed, though there are lessons to be learned from governance in New York and Québec as well.

The story below reveals that a combination of powerful agricultural and development interests have made it difficult or impossible either to impose stricter regulations on stormwater treatment or to enforce, let alone increase, regulation of small farms (that account for half the phosphorus inputs from agriculture). Governors and other political figures pay lip service to the importance of water quality, but when confronted with competing economic interests and the demand for development and job growth they fail to allocate sufficient funding for environmental remediation or enforce full compliance with the CWA. Addressing phosphorus overload requires cooperation and coordination throughout numerous levels of government. The Lake Champlain Basin Program ("LCBP") has coordinated and fostered communication among New York, Vermont, and Québec; however, Vermont's key environmental agencies, the Agency of Agriculture, Food and Markets ("AAF") and the Agency of Natural Resources ("ANR"), have only recently committed to coordinate and work closely together.

The ANR has resisted ratcheting up regulation of WWTFs and tightening controls on stormwater while pointing to agriculture as the less expensive way to reduce phosphorus loads. In response, CLF has launched a prolonged legal battle using the administrative appeals process and the courts to lower the phosphorus limits that WWTFs must meet and to require more stringent control of stormwater runoff from urban development.

<http://www.ijc.org/missisquoiabayreport/wp-content/uploads/2012/04/International-Missisquoi-Bay-Study-Board.pdf>.

17. *Id.*

18. Daniel D. Dutcher & David J. Blythe, *Water Pollution in the Green Mountain State: A Case Study of Law, Science, and Culture in the Management of Public Water Resources*, 13 VT. J. ENVTL. L. 705, 713–14 (2012).

Blue-green algal blooms show up sporadically as well as seasonally (with warmer summer water) and are often localized.¹⁹ Thus, the algal bloom problem easily drops out of sight and out of mind until a particularly bad year or bad bloom triggers concern about human health, toxics, fish kills, and complaints about the look and putrid smell.²⁰ The occasional, rather than persistent, bloom easily masks the problem and allows the solution to fall off of the political agenda.

II. ANALYSIS OF PROGRAMMATIC EFFORTS TO SOLVE THE PROBLEM

A. Decades of Work by the Lake Champlain Basin Program

In 1990, Congress declared Lake Champlain “a resource of national significance” and created the LCBP, a non-regulatory partnership among the states of New York and Vermont, the Province of Québec, the EPA, as well as other federal, regional, and local government agencies and many public and private groups.²¹ LCBP has brought diverse interests together to create comprehensive plans for protecting and improving water quality in the Lake’s watershed. The Governors of Vermont and New York and the Regional Administrator of the EPA signed the first Basin Plan in 1996.²² Québec joined New York and Vermont to approve the second five-year plan in 2003.²³ The Governors, Québec’s Premier, and EPA Regional Administrators endorsed the third and current five-year plan in 2010.²⁴ The management plan identifies eight goals including reducing phosphorus, preventing toxic contamination, managing aquatic invasive species, and

19. *Center of Excellence for Great Lakes and Human Health: Frequently Asked Questions*, NOAA, http://www.glerl.noaa.gov/res/Centers/HABS/faqs_causes_habs.html (last visited Oct. 29, 2013).

20. See Associated Press, *High Amounts of Toxic Algae Found in Lake Champlain*, PRESS-REPUBLICAN (Sept. 30, 2011), available at http://pressrepublican.com/0100_news/x1190853796/High-amounts-of-toxic-algae-found-in-Lake-Champlain (commenting on the large traces of toxic blue-algae and two dogs dying as a result of a high concentration ten years ago); Andrew Stein, *Algae Blooms Hit Champlain in Wake of Record Phosphorous Runoff*, VTDIGGER.ORG (July 9, 2012), <http://vtdigger.org/2012/07/09/toxic-algae-bloom-spreads-to-new-areas-in-lake-champlain/> (reporting on the visibly high levels of blue-green algae on Lake Champlain); David Schneider, *Blue-Green Algae Blooms Create Stink, Toxins: Beach Conditions Poor at Some Lake Champlain Locations*, WPTZ NEWS (July 16, 2012), <http://www.wptz.com/news/vermont-new-york/burlington/Blue-Green-Algae-Blooms-create-stink-toxins/-/8869880/15513400/-/sd5eekz/-/index.html> (commenting on an algae bloom on the beach of Lake Champlain alerting people to stay off the beach.).

21. *Mission Statement*, LAKE CHAMPLAIN BASIN PROGRAM, <http://www.lcbp.org/about-us/mission/> (last visited Oct. 29, 2013).

22. *Introduction*, LAKE CHAMPLAIN BASIN PROGRAM, <http://plan.lcbp.org/ofa-database/chapters/introduction> (last visited Jan. 11, 2014).

23. *Id.*

24. *Id.* (New York is in EPA Region 2. Vermont is in EPA Region 1.); *Introduction*, *supra* note 22.

implementing educational programs to increase public involvement in stewardship.²⁵

The LCBP has become a basis for attracting funding from federal, state, provincial, and private non-profit foundation sources. The plan strongly influences the priorities of relevant agencies in Vermont, New York, and Québec. Thus, it carries significant weight but does not guarantee that funds will be authorized or appropriated to achieve the stated objectives. The current plan is now available online allowing citizens and managers access to updated information and studies.²⁶

For two decades, the LCBP has fostered international and regional cooperation among agencies across international and state borders and brought environmentalists, business leaders, legislators, scientists, and government agencies together to find ways to reduce phosphorus loading (among other goals). A generation of cooperative effort by the LCBP and hundreds of millions of government dollars,²⁷ however, have not ended or even reduced the toxic algae blooms that periodically make the waters of several of the shallower bays unsafe for swimming and harmful to fish and aquatic species.²⁸

Arguably, extensive research and education funded through the LCBP, in addition to incentive programs and increased regulation by government agencies, have prevented a serious problem from becoming far worse, but this is counterfactual and is hard, if not impossible, to document. One recent report by the U.S. Geological Survey (“USGS”) used flow weighted monitoring to determine that some improvement in water quality and phosphorus reduction occurred between 1990 and 2009.²⁹ Adding to the

25. See *Opportunities for Action: An Evolving Plan for the Future of the Lake Champlain Basin*, LAKE CHAMPLAIN BASIN PROGRAM 1, 5 (<http://plan.lcbp.org/ofa-database/chapters/introduction#section-goals> (last updated Sept. 16, 2013) (enumerating eight goals to improve water quality in the Lake Champlain Basin).

26. See generally, *id.* (describing studies and information to improve water quality in the Lake Champlain Basin).

27. See Eric Smeltzer et al., *Lake Champlain Phosphorus Concentrations and Loading Rates, 1990-2008*, 57 LAKE CHAMPLAIN BASIN PROGRAM TECHNICAL REP. 1, 2–3 (2009), available at, http://www.lcbp.org/wp-content/uploads/2013/04/57_Phosphorus_Loading_1990-2008.pdf (calculating that Vermont, New York, and Québec had spent approximately \$151 million to upgrade WWTFs, while the two states had expended \$115 million to reduce phosphorus from nonpoint sources); see also VERMONT CLEAN AND CLEAR ACTION PLAN, 2010 ANNUAL REPORT 1 (2011) (identifying over \$120 million for phosphorus reduction efforts).

28. MISSISQUOI BAY BASIN: WATER QUALITY MANAGEMENT PLAN, *supra* note 14, at 41.

29. See Medalie, *supra* note 1, at 62 (“Although the magnitude of many of the individual downward trends in the [1999–2009] period is small, taken as a group, it appears that nutrient reduction progress is being made.” The second ten years of the study were wetter years producing higher phosphorus levels, but correcting for the wetter weather, the study indicated that programs to reduce phosphorus are beginning to show positive results); SOIL AND WATER CONSERVATION SOC’Y, HOW TO BUILD BETTER AGRICULTURAL CONSERVATION PROGRAMS TO PROTECT WATER QUALITY: THE

problem, climate change over the last ten years has made the region wetter.³⁰ Wet years increase runoff that promotes algae blooms, therefore, government efforts to reduce phosphorus may be masked by the changing weather.³¹ The surface water temperatures have also increased over the last fifty years.³²

In August 2011, Tropical Storm Irene struck parts of central Vermont, sweeping acres of farmland into rivers and streams feeding into Lake Champlain, destroying bridges and roads, and displacing even Vermont's emergency response center and headquarters of the ANR.³³ More damage to watercourses occurred in the clean up as the ANR suspended regulations and permitting processes. Untrained clean up crews drove heavy equipment into streams and even tried to straighten river courses as they responded to massive destruction.³⁴ On the positive side, Irene was an alarm bell for the public, the media, and policy makers. It focused attention on water quality, increased the sense of urgency around phosphorus reduction, and led to widespread understanding that climate change is a current reality that cannot be ignored.

B. Efforts Aimed at Wastewater Treatment Facilities

In the 1970s and 80s, the U.S. made relatively rapid progress to clean up obviously polluted waters primarily by passing the CWA in 1972.³⁵ The

NATIONAL INSTITUTE OF FOOD AND AGRICULTURE—CONSERVATION EFFECTS ASSESSMENT PROJECT EXPERIENCE 152–53, 298, 302 (Deanna L. Osmond et al. eds., 2012) (looking at thirteen watersheds throughout the U.S. to determine what suite of conservation practices and what social and economic factors facilitate or impede implementation of conservation practices. In only one of the thirteen, the watershed for the Cannonsville Reservoir that is part of the water supply for New York City, did the study document reductions in dissolved phosphorus over time. In that case New York was making upgrades to sewage treatment plants as well as implementing conservation practices on agricultural land.)

30. *How Does Climate Change Affect Lake Champlain?*, LAKE CHAMPLAIN BASIN PROGRAM, http://sol.lcbp.org/climate-change_affect-lake-champlain.html (last visited Jan. 11, 2014).

31. *Id.*

32. See Smeltzer et al., *supra* note 1, at 10 (reporting mean surface temperature increases of 1.6–3.8 degrees C (0.035–0.085 degrees C/year) over the forty-six year period. They attribute this to warming regional climate likely due to declining winter ice coverage and increased heat absorption in the absence of ice.)

33. SACHA PEALER, LESSONS FROM IRENE: BUILDING RESILIENCY AS WE REBUILD 1–5 (Jan. 4, 2012), available at http://www.anr.state.vt.us/anr/climatechange/Pubs/Irene_Facts.pdf; see also LCBP, Technical Advisory Committee Meeting Summary from Oct. 3, 2012 at 4, available at <http://www.lcbp.org/wp-content/uploads/2012/09/2012-Oct-3-TAC-Meeting-Summary.pdf> (“Irene deposited 102mm of rainfall in the watershed and produced an estimated 5.16 hm³ of stormflow runoff with a peak flow of approximately 52 m³/s (1,840 ft³/s).”).

34. Dick McCarrick, *Changing Attitudes about Waterways in Post-Irene Vermont*, ENVTL. LEADER (May 10, 2012), <http://www.environmentalleader.com/2012/05/10/changing-attitudes-about-waterways-in-post-irene-vermont/>.

35. Clean Water Act, 33 U.S.C. §§ 1251–1387 (2006).

CWA established the National Pollution Discharge Elimination System (“NPDES”) addressing the obvious point sources of pollution. While the federal government, through the EPA, sets minimum standards, each state may administer its own clean water program, issue permits, and set standards in accord with federal law and EPA’s regulations.³⁶ In Vermont and New York, this produced dramatic improvements in municipal WWTFs, although the WWTFs remain substantial contributors to the phosphorus problem.³⁷

The City of St. Albans Treatment Plant (“Plant”) completed a major \$2.3 million upgrade (by chemical addition, flocculation, and sand filtration) in 1987 that resulted in a thirty percent drop in total annual phosphorus loading to the St. Albans Bay and reduced phosphorus from this one facility about ninety percent.³⁸ Although the Plant continues to meet the regulatory limit of 0.5 milligrams per liter (mg/L) and operates below the phosphorus load limit allocated under the TMDL established in 2002, today’s phosphorus concentrations in St. Albans Bay remain high.³⁹

As ANR staff explained, high phosphorous concentrations are due to lake processes such as century-old accumulated phosphorous.⁴⁰ This preexisting phosphorus loading from decades of industrial pollution, however, does not constitute an excuse for not further upgrading the St. Albans Plant or other plants. As will be discussed later, the EPA invalidated the 2002 TMDL and is now developing a more stringent TMDL to meet the requirements of the CWA.⁴¹ Further, the CLF argues, “this plant needs to be upgraded to the Limit of Technology which is now less than .1 mg/L at the end of the pipe.”⁴²

36. See Dutcher & Blythe, *supra* note 18, at 718–22.

37. *Id.* at 719–20.

38. ERIC SMELTZER, VT. DEP’T. OF ENVTL. CONSERVATION WATER QUALITY DIV., THE PHOSPHORUS PROBLEM IN ST. ALBANS BAY: A SUMMARY OF RESEARCH FINDINGS, 2 (2003), available at http://www.anr.state.vt.us/dec/waterq/lakes/docs/lp_stalbansphosphorus.pdf.

39. No significant change in phosphorous levels occurred between 1992 and 2009. See Smeltzer et al., *supra* note 1, at 14 (stating that “[c]onversion of land during this period to higher phosphorous-yielding uses, and greater river flow rates in recent years, may have offset the gains from wastewater treatment.”).

40. SMELTZER, *supra* note 38, at 2–8, 11 (noting that long delays in recovery of lakes after long historical accumulation of phosphorous is not unusual).

41. Letter from H. Curtis Spalding, Reg’l Adm’r, Env’tl. Prot. Agency Region 1, to Deborah Markowitz, Sec’y, Vt. Agency of Nat. Resources (Jan. 24, 2011), available at <http://www.epa.gov/region1/eco/tmdl/pdfs/vt/LakeChamplainTMDLDisapprovalDecision.pdf>.

42. Email from Christopher Kilian, *supra* note 4 (Kilian notes that facilities in Massachusetts, New Jersey, and elsewhere are now meeting such limits. CLF strategy of commenting on permit applications and litigating when limits are too lax resulted in EPA setting an instream concentration of phosphorus limit of .1 mg/L in 2008 on the Upper Blackstone River in Massachusetts, a limit the U.S. Court of Appeals for the First Circuit upheld in August 3, 2012).

The environmental movement was just beginning in the 1970s when Vermont's Attorney General, Jim Jeffords, sued New York over sewage sludge discharged directly to Lake Champlain from an International Paper Company plant in Ticonderoga, New York.⁴³ Jeffords won one of the two lawsuits against International Paper and settled the other. The settlement led to International Paper conducting meaningful cleanup work as well as making significant payments to environmental groups to help clean up the Lake.⁴⁴ According to Tom Berry, who later staffed Senator Jeffords' Vermont field office, "[the successful lawsuits] cemented Jim Jeffords as a leader with strong environmental credibility, and the funds helped environmental groups coalesce around the fight to protect Lake Champlain."⁴⁵

Québec was behind Vermont on the cleanup of wastewater treatment plants, but with a population of only 20,000 in the Missisquoi Bay watershed, Québec had only about five towns without treatment.⁴⁶ The province developed a 2010–2016 plan for wastewater treatment; now all towns have completed installation of proper water treatment.⁴⁷ Due to the engagement of the Government of Québec, Québec's Environment Minister in the LCBP was able to spend funds more freely to pay for preparation of the Lake Champlain Action Plan and for actions to address phosphorus inputs into the Missisquoi watershed.⁴⁸ To date, Québec has invested over \$61 million in clean up. Before 2003, Québec invested \$24 million in WWTFs and \$3 million for storage structures. From 2003 to 2010, Québec

43. *IP History of Lawsuits and Permit Violations*, PEOPLE FOR LESS POLLUTION, http://www.lesspollution.org/ip_history.html (last visited Jan. 11, 2013).

44. Interview with Tom Berry, Field Representative, Senator Leahy (Mar. 26, 2013).

45. *Id.* (controversy continued over the company's discharges into water and air into the '80s and '90s; air emissions that could also affect the lake have become more controversial in the last 10 years.); see PEOPLE FOR LESS POLLUTION, *supra* note 43; See also *NYS Governor's Award for Pollution Prevention—International Paper*, NY STATE DEPT. OF ENVTL. CONSERVATION (Mar. 8, 1999), <http://www.dec.ny.gov/public/22498.html> (describing the Governor's award to Ticonderoga for pollution prevention related to a voluntary effort to reduce potential dioxin formation and reduction of elemental chlorine in its operations).

46. Interview with Martin Mimeault, Agronomic Expert, QC Ministère du Développement durable, de l'Environnement et des Parcs (Feb. 27, 2013).

47. Email from Martin Mimeault, Agronomic Expert, Ministry of Sustainable Dev. of the Env't., Fauna, and Parks (Sept. 18, 2013) (on file with author) (regarding the integration of Lake Champlain into wastewater treatment plans.).

48. *Id.* Québec's MDDEFP mandated Mimeault in Dec. 1996 as a technical coordinator to assist with Québec's commitment to the LCBP. In 2003 more funding became available to hire staff full-time to survey and enforce regulations, identify which streams were problematic and identify the major sources of pollution. They surveyed all the resorts and camping places not covered by wastewater collection systems, and inspected and enforced the requirement to install septic systems.

and its partners invested more than \$34 million in various actions to reduce phosphorus from the Missisquoi Bay watershed.⁴⁹

In 1990, Vermont unilaterally passed a law limiting phosphorus from WWTFs to 0.8 mg/L.⁵⁰ The larger plants were required to upgrade if they discharged to Lake Champlain or Lake Memphramagog.⁵¹ Thirty of the sixty plants discharging to Lake Champlain were above the threshold; these thirty were upgraded over 10–15 years to meet the 1990 standard, largely with state rather than federal funds.⁵²

The Vermont Legislature, in an effort to not overburden municipalities, required the state to cover all costs of state requirements to reduce phosphorus below 0.8 mg/L.⁵³ The remaining half of Vermont's WWTFs (thirty facilities) still have no phosphorus controls, as only the largest facilities have been required to implement phosphorus controls.⁵⁴ Kilian points out, “dissolved phosphorus is immediately bioavailable and is unlikely to precipitate out of solution. Thus, it is far worse in the near term than the phosphorus bound up with sediment associated with non-point sources.”⁵⁵

In 2002, Vermont and New York set a TMDL for Lake Champlain as required by the federal CWA for all “impaired waters” of the state.⁵⁶ This required upgrading five additional WWTFs that had been exempt earlier because they used an aerated lagoon process.⁵⁷ After 2002, the state found that these plants could use a phosphorous-reducing chemical additive to

49. *Id.* (referencing *Suivi environnemental des eaux du bassin de la Baie Missisquoi: Séance d'information de la Commission mixte internationale à Saint-Armand, Québec* at 7–8 (Oct 13, 2010)).

50. Vt. Stat. Ann. Tit. 10, § 1266a(a) (2012), available at <http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=10&Chapter=047&Section=01266a>.

51. Telephone Interview with Eric Smeltzer, Env'tl. Scientist, Vt. Dep't. of Env'tl. Conservation (Feb. 15, 2013) Smeltzer, a limnologist, has been with DEC for thirty years working on lake science and particularly on Lake Champlain, focusing on wastewater discharge and management of non-point sources in the watershed.

52. *Id.*

53. Vt. Stat. Ann. Tit. 10, § 1266a(c) (2012), available at <http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=10&Chapter=047&Section=01266a>; see also, Email from David Deen, Vt. State Rep., Chair of the Fish, Wildlife and Water Res. Comm. (Apr. 20, 2013) (on file with author). In 2008, Vermont Law School's Environmental and Natural Resources Law Clinic filed a Petition on behalf of CLF to invalidate Vermont's NPDES program alleging, among other complaints, that Waterbury's WWTF far exceeded its wasteload allocation under the 2002 TMDL. CLF argued that the Vermont law that made compliance contingent on availability of state funding was inconsistent with the CWA. In March 2012, the Commissioner of DEC committed to assist municipalities to secure funding and to require compliance with water quality-based effluent limits without regard to Vt. Stat. Ann. 10 § 1266a (c). Anthony Iarrapino, *Vermont Recommits to the Clean Water Act*, CLF SCOOP (July 19, 2013), available at <http://www.clf.org/blog/vermont/vermont-recommits-to-the-clean-water-act/>.

54. Email from Christopher Kilian, *supra* note 4.

55. *Id.*

56. Guercio, *supra* note 9.

57. Telephone interview with Eric Smeltzer, *supra* note 51.

affordably meet the TMDL, and four of the plants were upgraded.⁵⁸ Revocation of the 2002 TMDL in the courts (discussed later), as well as other design and funding issues, delayed plans to upgrade the Waterbury plant because the chemical additive might be insufficient to meet the requirements of the new TMDL, expected to be established sometime in 2014.⁵⁹ Kilian argues, “[t]he 2002 wasteload allocation was about shielding dischargers from upgrades and allowing them to increase dissolved phosphorus loads, which of course was all about pacifying developers who want free and easy access to WWTF capacity.”⁶⁰

The early efforts to reduce pollution in the Lake focused on the easily identifiable sources of phosphorus from industrial and municipal WWTFs rather than focusing efforts to reduce sources of pollution from urban storm water and rural agricultural runoff, which appeared both expensive and politically difficult.⁶¹ In CLF’s view, reducing phosphorus from large WWTFs to a standard lower than 0.8 mg/L has been difficult politically.⁶²

C. Removing Phosphate from Consumer Products

An early and effective action by the Vermont Legislature to reduce inputs of phosphorus into the environment banned the sale of laundry detergents containing more than trace amounts of phosphorus.⁶³ The ban removed nearly forty percent of phosphorus from wastewater.⁶⁴ The Vermont ban became effective in 1978.⁶⁵ Surprisingly, however, Vermont’s ban left a legal loophole that allowed phosphorus to remain in automatic dishwasher detergent sold within the state, a loophole the Vermont legislature (and fifteen other states) closed in 2010.⁶⁶ Québec adopted a ban

58. *Id.*

59. *See id.* (explaining the Waterbury plant is discharging 5 mg/L now).

60. Email from Christopher Kilian, *supra* note 4.

61. Telephone interview with Eric Smeltzer, *supra* note 51 (explaining that this sector has made major improvements, and further expenditures to reduce phosphorus are not as cost effective as other measures to reduce pollution from non-point sources, and questions targeting limited funds for further WWTF reductions).

62. Email from Christopher Kilian, *supra* note 4 (stating the Vermont League of Cities and Towns (VLCT) and the administration of Governor Douglas completely shielded municipal WWTFs from needed upgrades, and the current Governor is not doing more).

63. CHRIS KNUD-HANSEN, HISTORICAL PERSPECTIVE OF THE PHOSPHATE DETERGENT CONFLICT 6 (1994), *available* at http://hogan.chem.lsu.edu/CHEM_1002/Notes/PhosphateDetergentConflict.pdf.

64. Telephone Interview with Eric Smeltzer, *supra* note 52.

65. *See generally* KNUD-HANSEN, *supra* note 63 (detailing the history of the ban on phosphates in laundry detergent).

66. VT. STAT. ANN. tit. 10 § 1382(c) (2010); Melinda Davenport, *Phosphate Ban to Take Effect in July*, WAX.COM (June 20, 2010), <http://www.wcax.com/global/story.asp?s=12679796>; *see also* Interview with David Deen, Vt. State Representative, Chair of the Fish, Wildlife and Water Res. Comm.

on phosphorus in dishwasher detergent in 2007 that became effective in 2010, and New York followed, adopting a ban in 2012. New York and Vermont also adopted bans on lawn fertilizers containing phosphorus in 2012.⁶⁷

D. Wetlands Protection

Wetlands provide a natural mechanism for phosphorus reduction.⁶⁸ In 1981, the Vermont Natural Resources Council (“VNRC”), a non-profit statewide environmental organization, produced a report with recommendations for protecting wetlands in Vermont under contract to the ANR.⁶⁹ In spite of early efforts of environmental advocates to protect wetlands, Vermont’s first Wetland Rules were not adopted until 1990.⁷⁰ The Wetland Rules were most recently revised in 2010.⁷¹ The Wetland Rules establish a three tiered classification system that treats Class 1 and Class 2 wetlands as “significant.”⁷² The rules also protect ten functions and values of these wetlands and their buffer zones (generally 100 feet for Class 1 and fifty feet for Class 2). Class 3 covers smaller and less important wetlands; these are not regulated under state law, but some may be

(Feb. 23, 2013) (stating sixteen states banned the sale of dishwasher detergent containing phosphorus at the same time).

67. Michael Virtanen, *New York Bans Phosphorous in Detergent, Lawn Fertilizer*, DESERET NEWS (Aug. 15, 2010), available at <http://www.deseretnews.com/article/700057097/New-York-bans-phosphorus-in-detergent-lawn-fertilizer.html>. See also Email from Eric Smeltzer, Env’t. Scientist, Vt. Dep’t. of Env’t. Conservation, (Mar. 18, 2013) (on file with author) (explaining that European nations are still discussing action to remove phosphorus from household dishwasher detergent).

68. Curtis J. Richardson, *Mechanisms Controlling Phosphorus Retention Capacity in Freshwater Wetlands*, 228 SCI. 1424, 1424 (1985), available at <http://www.ldeo.columbia.edu/~sanpisa/wetlands/reading/richardson1985.pdf>.

69. GAIL OSHERENKO ET AL., VERMONT WETLANDS—LAWS AND VOLUNTARY TECHNIQUES FOR CONSERVATION, VT. AGENCY OF ENVT’L CONSERVATION (1982); see also ROBERT WANNER, WETLANDS IN VERMONT, THEIR IDENTIFICATION AND PROTECTION, VT. AGENCY OF ENVT’L CONSERVATION (1979) (preceding the 1982 Vermont Natural Resources Council report and describing the importance of Vermont’s wetlands).

70. Vt. Admin. Code 16-5-103:1 (2010) (identifying after Feb. 23, 1990 “[i]t is the policy of the State of Vermont to identify and protect significant wetlands and the values and functions which they serve in such a manner that the goal of no net loss of such wetlands and their function is achieved”).

71. *Id.*; Watershed Mgmt. Div., *Wetland Regulation-Wetland Permits*, VT. DEPT. OF ENVTL CONSERVATION, http://www.anr.state.vt.us/dec//waterq/permits/htm/pm_cud.htm (last visited Jan. 11, 2014).

72. Classification of Significant Wetlands and Designation of Buffer Zones, Vt. Admin Code 16-5-103:4 (2010).

protected by municipal or federal law.⁷³ Québec has not been allowed to convert or develop wetlands in the Missisquoi watershed since 2006.⁷⁴

E. Controversy Over Stormwater Management

Once wastewater-treatment facilities and industrial plants had been substantially cleaned up through the NPDES permit process, state and federal agencies turned their attention to stormwater runoff. Here, the responsibility lies with municipalities, industrial facility operators, and development interests to treat runoff from roads and parking lots to remove pollutants in order to meet water quality standards. Where the receiving water body is not impaired, stormwater runoff may be regulated by Best Management Practices (“BMPs”).⁷⁵ BMPs may include “use of detention ponds, vegetated swales, infiltration systems, low-impact development, and other structural or design practices to help regulate storm flows and to remove some pollutants, including phosphorus.”⁷⁶ Under the CWA, all municipal separate storm sewer system (“MS4”) permits⁷⁷ require BMPs to address “6 minimum control measures,” in order to meet the enhanced requirements of water quality standards and/or implement a TMDL.⁷⁸

After Hurricane Irene in 2011, the Vermont Department of Environmental Conservation (“DEC”) within the ANR became more aware of the need to improve road and bridge standards and pay more attention to culvert sizing. As with farms, the DEC needs to identify and inventory the critical areas or hot spots for agricultural runoff. Currently, House Bill 291, if passed, would make road and bridge standards mandatory rather than voluntary.⁷⁹

Under the CWA, new or increased discharges of stormwater must be regulated under NPDES if they flow into “impaired waters” (waters not meeting the state’s water quality standards).⁸⁰ Numerous other conditions trigger the need for a permit, including MS4s serving a population over 1,000 as defined in the CWA, discharges associated with industrial activities, discharges from large and small construction sites, and

73. *Id.*

74. Interview with Martin Mimeault (Feb. 27, 2013), *supra* note 46.

75. Dutcher & Blythe, *supra* note 17, at 720.

76. *Id.* at 719.

77. Clean Water Act 33 U.S.C. § 1342(p)(6) (2006).

78. ENVTL. PROT. AGENCY, MEASURABLE GOALS GUIDANCE FOR PHASE II SMALL MS4S 4 (2001), available at <http://www.epa.gov/npdes/pubs/measurablegoals.pdf>.

79. Interview with Kari Dolan, Manager, Ecosystems Restoration Program, Dep’t Envtl. Watershed Mgmt. Div., Vt. Agency of Natural Res. (Feb. 19, 2013) (on file with author).

80. 33 U.S.C. § 1342(p)(2)(E) (2006).

discharges that contribute to violations of Water Quality Standards or are significant contributors of pollutants to the waters of the U.S.⁸¹

Technology based effluent limitations (“TBELs”) and BMPs are not sufficient to meet the legal requirements for flows into impaired waters. Instead, regulations focus on whether the discharge will exceed the limited capacity of the receiving waters to assimilate the pollutant.⁸² Regulation shifts to “tier-two” standards where water quality is based on effluent limitations (called “WQBELS”). Permits are to be based on the amount of phosphorus a water body can assimilate, and the ANR is charged with setting a TMDL (total maximum daily load) for each impaired water body.⁸³

Environmental groups, frustrated by inaction on the part of Vermont’s DEC, challenged the agency’s issuance of permits for new or increased discharge of storm water into “impaired waters” of the state where the ANR had not yet determined the assimilative capacity of the receiving waters by setting a TMDL.⁸⁴ Two legal scholars, Dutcher and Blythe, present a scathing attack on the ANR for resisting “pollutant budgeting and other essential policies for cleaning up Vermont’s polluted waters.”⁸⁵ The attack recounts the administrative and court battles between environmental advocates and executive agencies.⁸⁶

The CLF challenged a permit issued by the ANR before the Vermont Water Resources Board (“WRB”), a quasi-judicial body of citizens appointed by the Governor.⁸⁷ The ANR had granted a permit for a shopping center based on compliance with technological standards rather than an assessment of assimilative capacity of the impaired receiving waters.⁸⁸ The WRB decided in favor of the CLF, determining that permitting the applicants’ (Hannaford Brothers, a grocery chain, and Lowes Home Center) new or increased discharges into impaired waters was not allowed under Vermont law and regulations in the absence of a TMDL.⁸⁹ Angry land developers claimed that the decision would shut down all new development

81. See generally 40 C.F.R. § 122.26(b)(8) (establishing regulations for when a NPDES permit is required).

82. Dutcher & Blythe, *supra* note 18, at 720.

83. See *id.* at 720–21 (describing how the Clean Water Act addresses requirements for impaired waters).

84. See *id.* at 724–27 (discussing CLF’s action challenging ANR’s permit of a shopping center in Burlington).

85. *Id.* at 723.

86. Dutcher & Blythe, *supra* note 18, at 724–39.

87. Hannaford Bros. Co. and Lowes Home Centers, Inc., No. WQ-01-01 (Vt. Water Res. Bd. June 29, 2001), available at <http://www.anr.state.vt.us/imaging/DECdocs/decisions/wrp/2001/wq-01-01-mod.pdf>.

88. *Id.* at *1, *5, *11.

89. *Id.* at *16.

in Vermont; this sparked pushback from the ANR and led to more government delay.⁹⁰ Eventually, the WRB allowed the ANR to issue a permit before developing TMDLs for the receiving waters because applicants could avoid increasing their overall discharges by reducing pollution from preexisting development.⁹¹

In 2011, after the Hannaford case, the Vermont Legislature rewrote the stormwater laws to allow ANR to issue Watershed Improvement Permits (“WIPs”) even where the state had no watershed cleanup plan or TMDL for the receiving water body.⁹² Dutcher and Blythe pointed out that it was not concern for water quality that made the ANR move forward on clean up plans, but rather concern that water quality laws would block the ANR’s ability to issue discharge permits for new development.⁹³

In 2003, the CLF and VNRC challenged the ANR’s issuance of WIPs in another case before the Vermont WRB, and once again, the WRB told the ANR to develop TMDLs before it could issue permits.⁹⁴ The ANR argued that TMDLs were not feasible and stalled on development of cleanup plans, although it did develop a phosphorus TMDL for Lake Champlain⁹⁵ and determined maximum loads of phosphorus for each of the Lake’s thirteen segments and major tributaries. But the ANR failed to develop a detailed plan for how to reduce loads so that new discharges might be assimilated. In 2008, the CLF finally sued the EPA in federal court to get the EPA to declare the ANR’s 2002 Lake Champlain TMDL invalid.⁹⁶ According to Kilian of the CLF:

The 2002 TMDL wasteload allocation for Vermont allowed WWTFs to increase their actual aggregate load to Lake Champlain by relying on the “permitted design load” rather than “actual loads.” So Table 5 in the TMDL compares actual loads in 2001 (33.5 mt/yr) with the “permitted load”-based WLA (55.8 mt/yr)—an increase of 22.3 mt/yr!

90. Dutcher & Blythe, *supra* note 18, at 725–26.

91. Hannaford Bros. Co., Doc. No. WQ-01-01 (Vt. Water Res. Bd. Jan. 18, 2002) (Findings of Fact, Conclusions of Law, and Order).

92. Vt. Stat. Ann. 10 §§ 1264(a), 1264 (f) (1) (A) (2010).

93. Dutcher & Blythe, *supra* note 18, at 728 (“ANR had cannibalized its stormwater program to cope with budget cuts during the Dean Administration.” Thousands of permits had expired, and ANR lacked the capacity to enforce existing permits.).

94. *In re Morehouse Brook*, No. WQ-02-04, at *20, *28–29 (Vt. Water Res. Bd. June 2, 2003).

95. Dutcher & Blythe, *supra* note 18, at 735 (citing Vermont Wetland Rules, VT. CODE R. § 5).

96. *EPA Repeals Approval of Champlain TMDL*, LAKE CHAMPLAIN COMMITTEE (Feb. 18, 2011), http://www.lakechamplaincommittee.org/learn/news/item/?tx_ttnews%5Btt_news%5D=167&cHash=cbbb3e9c1973a2f40661378e8817a02a.

That is why we commented so vehemently at the time of adoption that this approach is illegal, why we challenged the TMDL in court . . . and why we challenged every WWTF permit based on the TMDL in court, successfully.⁹⁷

In a settlement of the lawsuit, the EPA agreed to reconsider its 2002 TMDL approval. In 2011, EPA revoked its approval⁹⁸ and is now developing a new TMDL. Ultimately, EPA agreed that the Lake Champlain cleanup plan failed for lack of “reasonable assurance” that clean up actions would occur.⁹⁹ Unfortunately, rewriting of the TMDL has stalled installation of some improvements, including a storm water pond in the town of St. Albans, because the town “won’t get credit” for the project until the new TMDL is in place.¹⁰⁰

Vermont is a largely rural state with only one major metropolitan area with a population over 200,000. Until recently only Burlington (population 42,417 according to 2010 census)¹⁰¹ had any regulations for stormwater, although now several additional communities with populations around 10,000 discharging into “impaired waters” (MS4 areas) are required by regulation to obtain permits.¹⁰² Smaller cities and towns have begun to separate their stormwater so that it doesn’t flow into the sewer system, but they don’t generally treat stormwater; instead it flows directly into rivers, as is the case in Swanton, a town of roughly 6,000, close to Lake Champlain.¹⁰³

According to Kari Dolan, Manager of the ANR’s Ecosystem Restoration Program within the DEC, the state only regulates six percent of impervious cover in the Lake Champlain Basin, not including the MS4, which is about twelve percent when including MS4 permits for storm water

97. Email from Christopher Kilian, *supra* note 4.

98. Letter from H. Curtis Spalding, *supra* note 41.

99. *EPA Repeals Approval of Champlain TMDL*, *supra* note 96.

100. Telephone Interview with Steve Beauregard, Dir. of Public Works, Town of St. Albans, Vt. (Aug. 14, 2013).

101. *Census data for Burlington, Vt.*, U.S. CENSUS BUREAU, <http://quickfacts.census.gov/qfd/states/50/5010675.html> (last visited Jan. 11, 2014). *See also, Vintage 2011: Metropolitan and Micropolitan Statistical Areas Tables*, U.S. CENSUS BUREAU, http://www.census.gov/popest/data/historical/2010s/vintage_2011/metro.html (last visited Jan. 11, 2014) (The wider metropolitan area of Burlington including three counties, six cities and towns, and one village, had an estimated population of 211,261 in the 2010 census, or roughly one-third the population of the entire state of Vermont.).

102. Interview with Kip Potter, Res. Conservationist, USDA-NRCS (Feb. 22, 2013) (on file with author).

103. *Id.*

flowing into impaired waters.¹⁰⁴ In short, Vermont is a long way from addressing runoff from gravel roads and impervious surfaces into adjacent streams and surface waters.

F. Addressing Agricultural Inputs of Phosphorus

Agriculture contributes approximately fifty-five percent of the pollution to Lake Champlain that does not come from WWTFs.¹⁰⁵ The social and cultural taboos on regulating farms and the high value Vermont places on protection of farmers' livelihoods has impeded progress on reducing the load of phosphorous from agricultural land. Vermont's farms are valued both for the food they produce and the role they play in maintaining picturesque rural landscapes. The Natural Resources Conservation Service ("NRCS"), a branch of the U.S. Department of Agriculture ("USDA"), uses incentive programs rather than regulations to address water pollution from agricultural operations.¹⁰⁶ NRCS, formerly known as the Soil Conservation Service, has provided \$7–8 million annually over the last ten years to the LCBP for water quality improvement practices.¹⁰⁷ Monitoring in Lake Champlain and its tributaries has not shown significant improvement in either stream or lake water quality;¹⁰⁸ however, a 2012 study using statistical models did show phosphorus reductions from 1990–2009 in half the tributaries of the Lake Champlain basin.¹⁰⁹ Christopher Kilian asks, "if we import tons of phosphorus into the watershed annually in feed and fertilizer, how can we expect to deal with the phosphorus problem?"¹¹⁰ According to Kilian, Vermont's phosphorus input into the lake dwarf those of Québec and New York, and Vermont needs to reduce inputs by hundreds of metric tons based on new analyses since revocation of the TMDL. Even under the now defunct TMDL, Vermont was required to reduce phosphorus

104. Interview with Kari Dolan, *supra* note 79; Comments on draft from Kari Dolan, Manager, Ecosystems Restoration Program, Dep't Env'tl. Watershed Mgmt. Div., Vt. Agency of Nat. Res. (Sept. 14, 2013) (on file with author).

105. Medalie, *supra* note 1, at 65 (citing WILLIAM HEGMAN ET AL., ESTIMATION OF LAKE CHAMPLAIN BASIN-WIDE PHOSPHORUS EXPORT 63 (1999) and stating that thirty-five percent comes from urban sources. Presumably these figures include stream bank erosion.)

106. Nat. Res. Conservation Serv., *Environmental Quality Incentives Program*, U.S. DEP'T. OF AGRIC., <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/equip/> (last visited Jan. 11, 2014).

107. Vicky M. Drew, *Conserving Natural Resources in Vermont*, NAT. RES. CONSERVATION SERV. (2011), ftp://ftp-fc.sc.egov.usda.gov/VT/News/Publications/Vermont_Final_5%2019%2011_4_Page_Fact_Sheet.pdf.

108. Interview with Kip Potter, Res. Conservationist, *supra* note 103.

109. Medalie, *supra* note 1, at 63.

110. Interview with Christopher Kilian, Dir., CLF. (Oct. 11, 2012).

by 150 metric tons while New York was only required to reduce inputs by 0.5 metric tons over fifteen years.¹¹¹

The number of cows in Vermont is constant if not increasing, as is the concentration of cows, cornfields, and fertilizer into large-scale farms in the Champlain basin (particularly in Franklin and Addison Counties).¹¹² Additionally, the acres in corn production increased twenty percent from 1987-2007 along the northern Vermont tributaries of the Lake.¹¹³ Farmers have increasingly installed tile drains in fields to reduce water in soils and increase production, and those changes increase the direct runoff of phosphorus into waterways.¹¹⁴ To be eligible for NRCS programs, farmers are not allowed to convert wetlands and must reduce erosion on highly erodible land; however, monitoring for compliance is far from perfect.¹¹⁵ The NRCS provides funding to correct “resource concerns,” but many farmers are not able to plan five years ahead given the uncertainty in milk prices, weather, and the economy, so they may not be able to take advantage of financial assistance for water quality improvement.¹¹⁶

Kip Potter, a resource conservationist with NRCS, explained that NRCS has concentrated funding for structural improvements around the farmstead—focusing on practices such as proper manure storage, treatment of milk house wastes, and controlling runoff from barnyards.¹¹⁷ In more recent years, the NRCS has emphasized field based management practices such as cover crops, reduced tillage, and nutrient management in order to reduce phosphorus runoff.¹¹⁸ Bruce Howlett, a conservation planner and former farmer, noted, “nutrient management was all the rage about ten

111. Email from Christopher Kilian, *supra* note 4 (explaining that Table 3 provides the overview of load reductions for the two states. Vermont had no planned or funded WWTF upgrades and shows a need for total load reduction of 145.8 tons phosphorus/yr. This leaves Missisquoi Bay with annual loading of 58.3 metric tons of phosphorus, an amount insufficient to meet Water Quality Standards.).

112. *Annual Bulletin: New England Agricultural Statistics*, NAT'L AGRIC. STAT. SERV. 1, 40, 50, 72, 74, 77–78 (2011), http://www.nass.usda.gov/Statistics_by_State/New_England_includes/Publications/Annual_Statistical_Bulletin/11start.htm.

113. Medalie et al., *supra* note 1, at 62–63 (see Table 4).

114. Sarah Harris, *Research Examines Links Between Runoff and Phosphorus Pollution*, INNOVATION TRAIL (Aug. 9, 2013, 12:15 PM), <http://innovationtrail.org/post/research-examines-links-between-runoff-and-phosphorus-pollution>.

115. *Compliance*, NAT. RES. CONSERVATION SERV. WIS., http://www.nrcs.usda.gov/wps/portal/nrcs/detail/wi/farmerrancher/?cid=nrcs142p2_020795 (last visited Jan. 11, 2014).

116. *Environmental Quality Incentives Program*, NAT. RES. CONSERVATION SERV., <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/equip/> (last visited Jan. 11, 2014).

117. Interview with Kip Potter, *supra* note 102.

118. *Id.*

years ago, but has dropped from priorities (though it is still required). Field practices generally pay too little to interest farmers and require too much paperwork to interest agency field staff.”¹¹⁹ Potter also explained that NRCS is learning from critical area studies that they need to target the farms and areas most responsible for phosphorus runoff rather than fund whichever farmer happens to apply voluntarily for funding.¹²⁰ At the same time, the local office of NRCS is constrained by national NRCS rules that disallow any favoritism.¹²¹

The LCBP completed a Critical Source Area Study for Missisquoi Bay in 2012 that identified the hot spots of phosphorus generation.¹²² The study brought watershed modeling and critical source area analysis in Vermont to a comparable level of what exists in Québec, modeling the entire Missisquoi basin at high resolution of land use, slope, and soil type.¹²³ According to the final project report, “[t]argeting critical source areas of phosphorus in the watershed for BMP implementation can result in two-to-three fold improvements in phosphorus reduction over random BMP targeting.”¹²⁴

Half of the manure and land in the Lake Champlain watershed are in 170 large and medium size farms. AAFM claims to be “completely engaged” with these farms, as does NRCS.¹²⁵ Regulation of the twenty large farm operations (“LFOs”) has been in place since 1999.¹²⁶ For efficiency, these LFOs have cows in the barn, not in the streams, and the manure on each farm is managed in one pool.¹²⁷ LFOs and medium farm operations (“MFOs”) are required to have nutrient management plans.¹²⁸ In 2007, Vermont began to regulate MFOs of 200–699 mature cows.¹²⁹

119. Email from Bruce Howlett, Conservation Planner, Mass. Ass’n of Conservation Districts (Aug. 26, 2013) (on file with author).

120. Interview with Kip Potter, *supra* note 102.

121. Email from Bruce Howlett, *supra* note 119.

122. INT’L MISSISQUOI BAY STUDY BD., *supra* note 16, at 10.

123. *Id.* at 15, 31.

124. Howe et al., *Modeling Efforts and Identification of Critical Source Areas of Phosphorus Within the Vermont Sector of the Missisquoi Bay Basin* 11 (Lake Champlain Basin Program Technical Report No. 63A, December 2011), available at http://www.lcbp.org/wp-content/uploads/2013/07/63A_Missisquoi_CSA-3.pdf.

125. Interview with Laura DiPietro, *supra* note 4.

126. Large Farm Operations (LFO), VT. AGENCY OF AGRIC. FOOD & MKTS., http://agriculture.vermont.gov/protecting_lands_waters/agricultural_water_quality/lfo (last visited Jan. 11, 2014).

127. *Id.*

128. Interview with Laura DiPietro, *supra* note 4.

129. *Id.* There are no authorized positions to monitor and work with small farms, though DiPietro submitted a proposal to the Governor and the Legislature in 2013 to institute a fee increase on feed, seed, pesticide, and fertilizers sold in the state to raise an additional \$250,000 to fund 2–3 staff positions to work with small farms. See FREQUENTLY ASKED QUESTIONS, VERMONT’S CONFINED

MFOs and LFOs have their own economic reasons for reducing phosphorus. Since the price of fertilizer has risen substantially, nutrient management provides financial gains. A younger generation of farmers using smart phones and computers has the sophistication and the technology to reduce phosphorus flows; on mid-size and large farms, they may have the personnel and incentive to learn about new methods and technologies. Nonetheless, nutrient management plans have not solved the manure runoff problems at large and medium size farms.

Unlike LFOs and MFOs, compliance with BMPs for small farms (fewer than 200 mature cows and 100-150 acres in the Lake Champlain basin) is voluntary.¹³⁰ Small farms however control half the land and half the cows in the Lake Champlain basin. They also may have issues with phosphorus reduction. Thus, environmental NGOs are calling for regulation of small farms, and some farmers and agency personnel think regulation is inevitable, while others are adamantly opposed to a regulatory approach.

Vermont regulations require stream banks to be vegetated except at defined animal crossings, but no state has a total prohibition on cows in streams.¹³¹ According to DiPietro, regulation to exclude livestock from streams is likely in the next two years. The cost in Vermont, however, to fence all livestock and prevent manure directly entering streams has been estimated at \$33 million, and some question whether the water quality benefits will warrant this expense.¹³² DiPietro suggests that they need to know which areas to target and that density of livestock is a critical factor.¹³³ Organic farming, which is growing rapidly, produces grass fed meat and dairy products that require grazing in open fields and even near streams because the organic farmer cannot spray invasive weeds.¹³⁴

ANIMAL FEEDING OPERATIONS GENERAL PERMIT 1 (Feb. 2013), available at http://www.watershedmanagement.vt.gov/stormwater/docs/CAFO/sw_gp_6100_faq.pdf (“Individual permits may be required for large or small farms that discharge.” LFOs and MFOs are defined by the number of animals on the farm. These animals might also be veal calves, swine, horses, sheep or lambs, turkeys, or chickens. Vermont requires a Concentrated Animal Feeding Operation (CAFO) permit for any medium farm that discharges pollutants into the State’s waters.)

130. See VT. AGENCY OF AGRIC., FOOD, & MKTS., MEDIUM AND SMALL FARM OPERATION RULES FOR ISSUANCE OF GENERAL AND INDIVIDUAL PERMITS 5–6 (2006), available at http://agriculture.vermont.gov/sites/ag/files/MFO_Rule.pdf (stating a small farm operation houses no more than 199 mature dairy animals, 299 youngstock or heifers, 299 cattle or cow/calf pairs, 749 swine weighing over 55 pounds, 149 horses, 2,999 sheep or lambs, 16,499 laying hens without a liquid manure handling system, 37,499 chickens other than laying hens without a liquid manure handling system, or 9,999 ducks without a liquid manure handling system).

131. Interview with Laura DiPietro, *supra* note 4.

132. *Id.*

133. *Id.*

134. *Id.*

In contrast to Québec where the land is quite flat, Vermont's hills are steep, and seventy percent of the riverbanks are eroding.¹³⁵ Thirty-five to forty percent of the sediment flow to tributaries in the Missisquoi basin comes from the stream banks, and rivers are now so deeply cut into the landscape that erosion is a huge problem that even stream buffers do not prevent.¹³⁶

According to Howlett, the 1985 Food Security Act ("FSA") requires farmers to follow field-specific conservation plans to limit field or "sheet" erosion.¹³⁷ A plan, for example, might rule out growing corn for more than three consecutive years on highly erodible land ("HEL"). There is no systematic monitoring of compliance with these plans;¹³⁸ however, if farmers violate the FSA, they become ineligible to receive federal or USDA loans, grants, or milk price support.¹³⁹

The Vermont AAFM is now doing a small farm survey with the goal of surveying all small farms.¹⁴⁰ This could result in more funding applications to NRCS, but the lack of agronomists or conservation planners to advise small farms has been an impediment to farmers applying for available grant money. An audit of the ANR's Clean and Clear Program (now renamed the Ecosystem Restoration Program) found that the state AAFM did not have enough engineers to do design work for manure silos and management of discharges from farms.¹⁴¹ After the audit, the agency finally received money for one position, and according to Representative Deen, this one position "probably leveraged millions of dollars in agricultural improvements."¹⁴²

The LCBP funded three agronomists for the state of Vermont and one for New York, which is a good start, but fewer than will be needed to work with small farmers to encourage compliance with the law and greater

135. *Id.*

136. *Id.*; Comments from Kari Dolan, *supra* note 104.

137. Email from Bruce Howlett, *supra* note 119.

138. *Id.*; Interview with Bruce Howlett, Conservation Planner, Mass. Ass'n of Conservation Dists. (Aug. 17, 2013).

139. Interview with Bruce Howlett, *supra* note 138.

140. *Revised Implementation Plan Lake Champlain Phosphorus TMDL*, VT. AGENCY OF NAT. RES. 1, 65 (2010), http://www.vtwaterquality.org/erp/docs/erp_revisedtmdl.pdf.

141. Interview with David Deen, Vt. State Rep., Chair of the Fish, Wildlife and Water Res. Comm. (Feb. 13, 2013). The audit had been ordered by the legislature after the Chairs of the Senate and Assembly natural resources committees, Virginia Lyons and David Deen, became frustrated with the failure to clean up water demonstrated by the TMDL fight. According to Deen, "We had a hell of a fight with the Douglas Administration to put money aside to hire an engineer in the Ag Agency [AAFM]. Leahy had brought in extra money to help agriculture through the NRCS program, and we couldn't spend it because of the Douglas Administration."

142. *Id.*

participation in NRCS programs.¹⁴³ NRCS provides \$4,000–\$5,000 per year per district to work with District Conservation Associations in Vermont.¹⁴⁴ A few towns contribute small amounts (several hundred dollars) annually to the Conservation Associations. These are quasi-governmental associations of citizens.¹⁴⁵ They often have offices co-located with NCRS offices. Vermont has one conservation district manager who is a part-time employee and one or two full time paid staff, depending on funding levels.¹⁴⁶ New York, in contrast, has well staffed Conservation Districts with more employees because their government funds the Conservation Districts at the county (not the town) level.¹⁴⁷ These conservation district managers and staff are key to increasing participation in federal incentive programs. They operate at the local level and have more knowledge of, and trust from, local farmers. In Vermont, conservation district work is supplemented through an independent non-profit, Vermont Association of Conservation Districts (“VACD”). The VACD serves as an umbrella organization for the fourteen Natural Resource Conservation Districts established in 1939 under the Soil Conservation Act.¹⁴⁸ According to Bruce Howlett, VACD and its Massachusetts sister non-profit, MACD, “have proved to be convenient conduits to channel discretionary NRCS and Department of Agriculture funds to hire extra staff, but New York State does have a better funded system that would be a reasonable model for New England states to follow.”¹⁴⁹

Since 1996–1997, Québec has had an effective system of watershed clubs (called Dura Clubs).¹⁵⁰ There are now fifty-six in the province. One agronomist works with about thirty farms.¹⁵¹ According to Mimeault, these clubs, together with the Farmer’s Union and government, pushed for implementation of regulations through BMPs. Québec uses financial incentive programs to control non-point sources, and has been about a decade ahead of Vermont in working with farmers to change the way

143. Jeff Carter, *Agronomists Hired to Help Farms Find Ways to Protect Lake Champlain*, U. OF VT. (Jan. 28, 2011), <http://www.uvm.edu/extension/?Page=news&storyID=11528&category=extension>.

144. Comments to the draft, Kip Potter, Res. Conservationist, USDA-NRCS (Sept. 19, 2013) (on file with author).

145. *Who We Are*, VT. ASSOC. OF CONSERVATION DISTS., <http://www.vacd.org/who-we-are> (last visited Jan. 11, 2014).

146. *Conservation Districts*, VT. ASSOC. OF CONSERVATION DISTS., <http://www.vacd.org/districts> (last visited Jan. 11, 2014).

147. *Local Districts*, N.Y. ASSOC. OF CONSERVATION DISTS., <http://nyacd.org/local-districts/> (last visited Jan. 11, 2014).

148. *Who We Are*, *supra* note 145.

149. Email from Bruce Howlett, *supra* note 119.

150. Interview with Martin Mimeault, *supra* note 46.

151. *Id.*

farmers manage nutrients.¹⁵² BMPs are voluntary, but compliance is high due to the education and expertise provided by agronomists working for the clubs.¹⁵³ The federal and provincial government, as well as private farmers, provide funding for the clubs.¹⁵⁴ Membership in a club is not required, but in the Missisquoi region, about one-third of the 600 farmers are members in one of the two clubs.¹⁵⁵ The Farmers Union played a major role and has been an active partner since 1996, in part because farmers hoped to avoid regulation by initiating action voluntarily.¹⁵⁶

Québec uses regulation alongside voluntary programs. Animals don't have access to watercourses. Even small farms are regulated and can be fined for violations, and regulations require nutrient management plans for almost all farms.¹⁵⁷ Mimeault attributes the high level of cooperation and compliance among Québec farmers in part to Québec's culture of cooperation. Québec farmers accept more basic regulation than is the case in Vermont due to concern that one farmer doesn't harm someone else because of his or her action. But another significant difference between Vermont and Québec is availability of funding for agency staff, on the ground inspections, education, and incentive programs to help farmers pay for the necessary changes. Vermont and New York have had neither the staffing nor agronomists on the ground working closely with farmers and assisting them.¹⁵⁸

To solve this problem, several of the agency experts interviewed suggest increasing the number and use of private agronomists available to farmers. These agronomists will consult with and assist farmers in identifying problems contributing to water pollution and apply for grants from NRCS. In the last few years, NRCS has returned money allocated for conservation programs in Vermont because it either did not have enough applicants or some applicants who were approved for funding chose to drop out of the program. In addition to the lack of trained agronomists in Vermont, farmers are deterred by the amount and complexity of the

152. *Id.*

153. *Id.*

154. *Id.*

155. *Id.*

156. *Id.*

157. *Id.*

158. *Id.*; see also Interview with Laura DiPietro, *supra* note 4 (noting that while regulation in Québec covers farms of all sizes and is much more intrusive than in Vermont, their stream setback rules only require a ten foot setback and on the top of a bank only a three foot buffer. They also have intense cropping (corn and soybeans) which can contribute more to phosphorus inputs than open fields. Since this whole breadbasket region is zoned as a greenbelt, the farms cannot be converted to urban uses, which could produce even more phosphorus. Where an area is zoned as a floodplain, when a barn burns down, it cannot be rebuilt.)

paperwork required or because the cost to participate may be too high. NRCS expects farms to pay twenty-five percent of the average projected cost as estimated by NRCS.¹⁵⁹ Some see accepting grants as charity and do not want to be seen taking government handouts. Others have concerns that once they become involved in incentive programs, regulation will follow.¹⁶⁰

Many larger farms use outside experts, including soil fertility consultants and nutrient management consultants, but these consultants often work for or are affiliated with fertilizer companies.¹⁶¹ NRCS does not have the staff to closely check nutrient management plans submitted before authorizing payments to farmers, nor does it have the staff to do follow-up monitoring.

G. Introduction of CAFO Permit System for Farms

CLF had advocated that the ANR require permits for spreading manure and regulating Vermont's intensive dairy farms and other industrial farms under the NPDES permit system.¹⁶² CLF's website states, "Vermont is one of the last states, and in fact may be the last state to issue a permit to minimize and eventually eliminate these discharges from "Concentrated Animal Feeding Operations" ("CAFOs") under the Clean Water Act."¹⁶³

In 2008, the CLF issued a detailed report that relied on years of agency inspection documents showing numerous cases of manure and other discharges that clearly violated the CWA.¹⁶⁴ CLF's report called for the Vermont ANR to require polluting operations to obtain CWA permits.¹⁶⁵ CLF lawyers argued, "Vermont officials lacked the political will to adequately deal with a major group of polluters in a manner consistent with the nation's landmark clean water law."¹⁶⁶ When the ANR did not respond,

159. Interview with Kip Potter, *supra* note 102.

160. *Id.*

161. *Id.*

162. Email from Christopher Kilian, *supra* note 4 ("Vermont is the last state in the nation without a Clean Water Act compliant NPDES permit to address discharges from CAFOs. EPA has formally required Vermont to adopt a CAFO permit to regulate these farms or face withdrawal of CWA delegation. EPA has specifically found that the State program is materially weaker than the Federal program.").

163. Anthony Iarrapino, *Growing Our Food Without Poisoning the Water: VT Issues Important New Draft Permit*, CONSERVATION LAW FOUND. (Feb. 28, 2013), <http://www.clf.org/blog/vermont/growing-our-food-without-poisoning-the-water-vt-issues-important-new-draft-permit/>.

164. *Failing our Waters, Failing our Farms: Vermont Regulators Turn a Blind Eye to Threat of Illegal Pollution for Concentrated Animal Feeding Operations*, CONSERVATION LAW FOUND. 1, 2 (2008), <http://www.clf.org/wp-content/uploads/2013/02/CAFO-Report-FINAL.pdf>.

165. *Id.* at 3.

166. Iarrapino, *supra* note 163.

the Vermont Law School Environmental and Natural Resources Law Clinic petitioned the EPA on behalf of CLF to take over Vermont's CWA NPDES permitting.¹⁶⁷ EPA took the petition seriously, and negotiations over the last couple of years finally resulted in the DEC agreeing to a Corrective Action Plan to resolve most of the issues raised by the petition. This Plan included a commitment that DEC will administer the NPDES permit program to regulate discharges from CAFOs.¹⁶⁸ In June 2013, ANR issued General Permit 3-9100 for "Discharges from Medium Concentrated Animal Feeding Operations."¹⁶⁹ The permit applies to MFOs that discharge pollutants to waters of the state through a man-made ditch, flushing system, or similar man-made device. The permit also applies to "pollutants discharged directly into waters of the State which originate outside of and pass over, across, or through the [MFO] or otherwise come into direct contact with the animals confined in the operation."¹⁷⁰ While not all MFOs are required to seek coverage under this general CAFO permit, coverage under the permit protects an MFO against enforcement actions by federal or state government and against citizen suits, should a discharge occur.¹⁷¹

III. LESSONS FOR SUCCESS

Five lessons emerge from this study: (1) funding follows leadership, but success requires substantially more leadership and funding; (2) fragmentation of agency responsibility impedes problem solving; (3) sparring interest groups both spur and block solutions; (4) shocks and crises galvanize action but may temporarily set back progress; and (5) social and cultural attitudes matter both inside and outside bureaucracies. This section discusses each of these before closing with comments on the way forward.

167. See generally Petition for Withdrawal from David Mears et al., Interim Dir., Vt. Law School's Envtl. & Natural Res. Law Clinic, to Stephen Johnson, Adm'r, U.S. Envtl. Prot. Agency (Aug. 14, 2008), available at http://www.vermontlaw.edu/Documents/20080814_CLFPetition.pdf (filing supplements to the petition on October 21, 2008 and July 21, 2010).

168. EPA REGION 1'S INTERIM RESPONSE TO PETITION TO WITHDRAW VERMONT'S NPDES PROGRAM APPROVAL 8 (Jul. 9 2013), available at <http://www.clf.org/wp-content/uploads/2013/07/VTCorrectiveActionPlan-FINAL-7-9-13.pdf>.

169. NAT'L POLLUTANT DISCHARGE ELIMINATION SYS. (NPDES) GENERAL PERMIT 3-9100 FOR DISCHARGES FROM MEDIUM CONCENTRATED ANIMAL FEEDING OPERATIONS 1 (Jun. 21, 2013), available at http://vtwaterquality.org/stormwater/docs/CAFO/sw_finalsignedGP.pdf.

170. *Id.* at 2-3.

171. FREQUENTLY ASKED QUESTIONS, *supra* note 129, at 4.

A. Individual Leaders Produce Funding But Not Success

Vermont has the good fortune to have had two long-term powerful senators who have been champions for water quality of Lake Champlain. These two senators were instrumental in writing and passing the Lake Champlain Special Designation Act and have together helped to funnel substantial funds for water quality and agricultural support to both Vermont and New York. Senator Patrick Leahy was elected to the U.S. Senate in 1974 at the age of 34. He is now the senior most member of the Senate Appropriations Committee and a senior member of the Agriculture Committee.¹⁷² James “Jim” Jeffords became the U.S. Congressman from Vermont in 1975 (at the age of 40) and served until 1989 when he was elected to the U.S. Senate, where he served until 2007.¹⁷³

Over nearly four decades, Leahy (with the help of Jeffords) secured more than \$70 million in federal funds to clean up Lake Champlain.¹⁷⁴ In the last five fiscal years (2008–2012) alone, “programs authored and championed by Senator Leahy have delivered over \$41 million to Vermont for sea lamprey control, ecosystem restoration and improved water quality in Vermont’s Great Lake.”¹⁷⁵ Federal authorizations of funds for Lake Champlain have been as high as \$11 million a year (2001), although the highest amount appropriated in a single year was \$4 million (in 2010).¹⁷⁶ This dropped to \$3.4 million in FY 2011. Funding for 2012–2013 is at \$2.4 million, but this could decline another five to eight percent depending on sequestration.¹⁷⁷ Until recently, the EPA received appropriations of \$2.5–\$3 million for Lake Champlain, some of which went to the LCBP that

172. *Biography*, PATRICK LEAHY, <http://www.leahy.senate.gov/> (last visited Jan. 11, 2014).

173. Interview with Tom Berry, *supra* note 44. Jim Jeffords developed his reputation as a strong environmentalist from his days as Vermont’s Attorney General. He was one of the leaders in passage of Vermont’s unique land preservation law known as Act 250. He also helped with the first enforcement of Vermont’s ban on billboards (roadside advertising), and as Attorney General of Vermont, he sued International Paper Company for dumping sewage sludge directly into Lake Champlain from its plant in Ticonderoga, New York. In one of the two lawsuits against International Paper, Jeffords won and the other he settled, which led to International Paper doing meaningful cleanup as well as making significant payments to environmental groups to help clean up Lake Champlain. According to Berry, “[t]his cemented Jim Jeffords as a leader with strong environmental credibility, and the funds helped environmental groups coalesce around the fight to protect Lake Champlain.” Berry, who holds a master’s degree in aquatic ecology, was on Jeffords’ staff in Vermont from 1997 until Jeffords’ retirement in 2006; then Berry began working for Senator Leahy. *See also Senator James M. Jeffords: A Short Biography*, U. OF VT., http://www.uvm.edu/~jeffords/?Page=about/jeffords_bio.php&SM=about/_aboutmenu.html (last visited Jan. 11, 2014) (describing Jim Jeffords’ achievements).

174. PATRICK LEAHY, *supra* note 172.

175. Interview with Tom Berry, *supra* note 44.

176. *Id.*

177. *Id.*

allocates funding to each state.¹⁷⁸ Vermont and New York each receive about \$100,000 annually to assign a staff position to the LCBP.¹⁷⁹

Two-thirds of ANR's funding comes from EPA. There have been grants in every federal budget for WWTF upgrades in the range of \$6 million per year.¹⁸⁰ In 2009, Congress adopted the American Recovery Act in order to stimulate the lagging economy; this resulted in tens of millions of dollars nationally for sewage treatment in 2010 and 2011.¹⁸¹

In the last few years federal funding for the Great Lakes Fisheries Commission has surpassed funding for Lake Champlain coming from EPA.¹⁸² Initially this funding was directed to sea lamprey control, but in the last four years significant funds have come to support work in Lake Champlain.¹⁸³ Some funds come through the U.S. Fish and Wildlife Service (about \$3 million per year). The largest source of funding (\$9–\$15 million annually) comes through the Farm Bill and is allocated to the U.S. Department of Agriculture for Vermont conservation programs that impact Lake Champlain, including implementation of BMPs to reduce runoff from silage, increase stream buffers, etc.¹⁸⁴ Tom Berry of Leahy's Vermont staff estimates that seventy-five to eighty percent of this funding is spent in the Lake Champlain Basin which is the most significant agricultural area in the state.¹⁸⁵

Studies have demonstrated the importance of entrepreneurial leadership—leadership by individuals who can form winning coalitions, skillfully craft agreements, move issues to the front burner, and “bring home the bacon” (funding to accomplish their goals).¹⁸⁶ Both Senators Leahy and Jeffords provided this leadership in Congress to create the LCBP and keep Lake Champlain high on the agenda of places to protect and restore. While they demonstrated significant success in obtaining funding, even in tough economic times, the funding has not achieved one of the top goals: restoration of water quality.

178. *Id.*

179. *Id.*

180. *Id.* EPA puts considerable funding into upgrading sewage treatment plants through the Clean Water Revolving Fund. This funding is available to states to allocate to towns through a state loan fund. As less funding was available from EPA for State Revolving Funds, Leahy was able to add funds through the State and Tribal Assistance Grants (STAG). Between 1997 and 2003–04 Leahy earmarked \$3–\$4 million in funding for particular Vermont towns to assist in upgrades of sewage treatment plants. Often these STAG grants were prioritized for towns in the Lake Champlain watershed.

181. *Id.*

182. *Id.*

183. *Id.*

184. *Id.*

185. *Id.*

186. POLAR POLITICS: CREATING INTERNATIONAL ENVIRONMENTAL REGIMES 234–35 (Oran R. Young and Gail Osherenko eds., 1993).

Given the importance of leadership in advancing environmental protection, the lack of obvious leaders at the state and local levels with a strong commitment to improving water quality in Lake Champlain impeded the progress in solving the phosphorus problem. Leadership from some long term legislators in the Vermont statehouse has led to legislative action requiring ANR to tighten regulations, consider using improved methods of waste water treatment (such as cloth disk filtration), and provide a thorough report on cost figures for water quality remediation (the Act 138 Report).¹⁸⁷ State legislators in Vermont and New York closed loopholes that allowed phosphorus in lawn fertilizers and automatic dishwasher detergent; the Vermont legislature is currently working to pass a Clean Lakes Bill (H.526) that would reduce shoreline erosion.¹⁸⁸ Vermont, however, still needs leaders with entrepreneurial skills to overcome reluctance to increased regulation or to offer creative solutions that will induce industry, local government, and the farm community to take strong action. Improved water quality was not among the five areas Governor Shumlin listed in January 2013 for “bold transformation and targeted investment” for FY 2014.¹⁸⁹ It seems unlikely that water quality will become a high priority for the Governor in FY 2015, although Commissioner of DEC, David Mears, regards water quality improvement as his department’s “highest priority”.¹⁹⁰ Nonetheless, Commissioner Mears is only recommending a “modest increase in this year’s budget until we know more and can really justify what we are requesting.”¹⁹¹

International and regional cooperation has been a powerful force for getting funding focused on the problem.¹⁹² If those funds do not produce

187. See Email from Tom Joslin, Env'tl. Engineer for the State of Vt. (Apr. 19, 2013) (on file with author) (stating “[f]or years we resisted the increased cost of post-lagoon cloth disk filtration, but eventually our department was specifically directed by the legislature, through a provision in a state capital bill, to reconsider filtration for phosphorous removal”); see WATER QUALITY REMEDIATION, IMPLEMENTATION, AND FUNDING REPORT 5–6 (Jan. 14, 2013), available at http://www.watershedmanagement.vt.gov/erp/docs/erp_act138report.pdf (estimating the costs of addressing Vermont’s “clean water challenges”).

188. Alicia Freese, *Lakeshore Building Regulation Bill Stalls in Senate*, VTDIGGER.ORG, (Apr. 22, 2013), <http://vtdigger.org/2013/04/22/lakeshore-building-regulation-bill-stalls-in-senate/>; see also H. 526 Gen. Assemb., Sess. (Vt. 2013), available at <http://www.leg.state.vt.us/docs/2014/bills/Intro/H-526.pdf> (introducing an act relating to the establishment of “lake shoreland protection standards”).

189. See Governor Peter Shumlin, *Budget Address*, STATE OF VT. (Jan. 24, 2013), available at <http://governor.vermont.gov/blog-gov-shumin-delivers-budget-address-fy-2014> (identifying the Governor’s priority in the environment is aimed at investments in clean energy and efficiency).

190. Telephone Interview with David Mears, Commissioner, Vt. Dept. of Env'tl. Conservation (Oct. 18, 2013).

191. *Id.*

192. See *Phosphorus Reduction Strategies*, LAKE CHAMPLAIN BASIN PROGRAM, <http://www.lcbp.org/water-environment/water-quality/nutrients/phosphorus-reduction-strategy/> (last

visible and meaningful results, however, the public and the actors who could make the most difference will turn on the entity and resist cooperation. International cooperation as evidenced in signing of MOUs for Lake Champlain has helped loosen purse strings in both Québec and the U.S.; politicians see cross border cooperation as politically advantageous, but funded projects need to be more result oriented.

B. Fragmentation of Agency Responsibility Impedes Problem Solving

The case of water quality governance for Lake Champlain is replete with both cooperation (especially international cooperation at the regional level as well as between New York and Vermont) and fragmentation (agencies that do not or will not work together). The cooperation through the LCBP has fostered citizen involvement and science based approaches to watershed protection.¹⁹³ A consensus approach has built trust among leaders in Vermont, New York, and Québec, though voting on decisions is by majority.¹⁹⁴ Michaela Stickney, a Lake Champlain Basin Coordinator with the Vermont DEC, asserts that the LCBP has been a success in agenda setting, overcoming potential interstate and cross-border conflicts, and transcending “litigation, political elections, and regulation to offer a truly integrated partnership-based dialogue for solving difficult problems.”¹⁹⁵

There is no question that the LCBP has been an important factor in keeping Lake Champlain high on the agenda of the multiplicity of agencies working for clean water. It has brought concerned citizens, NGOs, scientists, and agency representatives together to identify and address problems and potential solutions. Creating and adopting the five-year management plans has been important in setting goals and priorities for funding.¹⁹⁶ Nonetheless, the LCBP may have also provided an excuse for delaying regulation and direct action while creating plans with long term goals that agencies fail to meet.

Undoubtedly, the LCBP’s science based approach has led to increased monitoring and ongoing research to understand the nature of the

visited Jan. 11, 2014) (explaining the cost-effectiveness of the collaborative phosphorous reduction strategies).

193. MICHAELA STICKNEY, BUILDING BRIDGES, FORDING STREAMS, REACHING AGREEMENT IN THE LAKE CHAMPLAIN BASIN: ALTERNATIVES TO LEGISLATION AND REGULATION ROOTED IN CITIZEN AND SCIENCE-BASED APPROACHES TO INSPIRE WATERSHED PROTECTION 468 (2008), *available at* http://www.wrc.org.za/Knowledge%20Hub%20Documents/Water%20SA%20Journals/Manuscripts/2008/05/WaterSA_2008_05_Paper%208.pdf.

194. *Id.* at 470.

195. *Id.*

196. *Opportunities for Action, supra* note 25.

phosphorus problem and find solutions.¹⁹⁷ We now know that the continuing input of phosphorus to Lake Champlain will make removal of phosphorus slow, difficult, and costly; we now have critical area studies that will help target the limited funds to the agricultural hot spots from which phosphorus flows into the lake.¹⁹⁸ While coordination, planning, and participation of private and public interests are critical, it is also vital not to allow an elaborate process of planning to replace or delay concrete steps to clean up the lake.

ANR and AAFM's estimated costs of reducing phosphorus from stormwater runoff and agriculture have been a huge impediment to real action. While leaders (especially the Vermont Senators) have been quite successful in channeling federal funds to Lake Champlain and water quality programs within the EPA and AAFM, uses of the funding have not always been strategically focused to direct reduction of phosphorus. Commissioner Mears stated that the DEC is now aiming to allocate one-third of funding to monitoring, one-third to research, and one-third to action on the ground.¹⁹⁹ The department started working for this last year and according to Mears is "already putting more funds into action on the ground" and strategically employing what funds it has.²⁰⁰

C. Sparring Interest Groups Spur or Block Solutions

Powerful lobbying forces including the Chamber of Commerce (representing developers and other business interests) have successfully fought regulatory power for the LCBP and stricter regulation by ANR. As David Deen explained, interest groups with considerable political clout—the Chamber of Commerce, the League of Cities and Towns (representing municipalities in Vermont), and the Farm Bureau—have resisted costs that could increase taxes, burden town budgets, or place the costs of cleanup directly on farmers. Some of the biggest businesses in Vermont are large farms, so even individual farmers have considerable influence in the state legislature.²⁰¹

While Governor Shumlin, has voiced support for clean water, his administration was unwilling to allow the ANR to make specific recommendations to prioritize actions in the Act 138 Report released in

197. *Id.*

198. *Reducing Phosphorus Pollution*, LAKE CHAMPLAIN BASIN PROGRAM, <http://plan.lcbp.org/ofa-database/chapters/introduction> (last updated Sept. 16, 2013).

199. Interview with David Mears, *supra* note 190.

200. *Id.*

201. Interview with David Deen, *supra* note 66.

January 2013 or to include funding in the state budget to carry out specific actions discussed in the report.²⁰² The Report summarizes the average annual cost of reducing nonpoint source pollution at \$91,649,000 annually over ten years, a total that far exceeds normal expenditures for nonpoint source reduction.²⁰³

Agency staff point out that the Act 138 Report was not intended to suggest that the totals in the report were the amount necessary to deal with the stormwater needs of the state, but to suggest strategic investments and target the needs that would have the greatest impact.²⁰⁴ “We don’t have to do all of those things all at once,” DEC Commissioner Mears explained.²⁰⁵ The DEC is waiting to see what the EPA proposes with the new TMDL, thus Commissioner Mears does not expect to request or receive substantial new funding for a year, or more likely two years.²⁰⁶

According to Representative Deen:

[O]ne of the reasons the [Act 138] report is not prioritized was that the Chamber made it known that the business community was against putting more money into cleaning up the waters of Lake Champlain or other waters. Their executive director [Tom Torti] came in and said, “look I can go into any agency budget and find \$10 million;” he knows that’s not possible.²⁰⁷

But finding even part of the \$70 million needed for stormwater according to the Act 138 report, or \$300,000 to hire additional conservation planners to work with small farms is problematic.²⁰⁸ The AAFM is responsible for monitoring and enforcement under a memorandum of understanding (MOU) with the ANR. It has proposed to raise rates on registration of fertilizers and pesticides sold in the state and to put people in the field to monitor Accepted Agricultural Practices (“AAPs”).²⁰⁹ Whether the Vermont Legislature has the political will to approve this relatively small rate increase is uncertain.

202. *Id.*

203. WATER QUALITY REMEDIATION, IMPLEMENTATION, AND FUNDING REPORT, *supra* note 188, at 49.

204. Comments from Kari Dolan, *supra* note 104.

205. Telephone interview with David Mears, *supra* note 190.

206. *Id.*

207. Interview with David Deen, *supra* note 66.

208. WATER QUALITY, REMEDIATION, IMPLEMENTATION, AND FUNDING, *supra* note at 187, at 49.

209. *Id.*

As for the role of the environmental NGOs, they have not proven effective in overcoming the obstacles of business interests in the legislature or the executive branch. But their effectiveness in the courts has forced both the EPA and ANR to develop a TMDL with “a margin of safety” and “reasonable assurance of compliance.” In addition, NGO advocacy in quasi-judicial and legal processes have pushed ANR to enhance and expand stormwater programs, led to DEC’s adoption of a general permit for medium concentrated animal feeding operations (CAFOs), and prevented expansion of WWTF phosphorus discharges.²¹⁰ The agencies are working on a draft of the new TMDL, but it will not be done before the middle of 2014.²¹¹ And as discussed earlier, CLF’s petition for the EPA to take over Vermont’s NPDES program pushed the ANR into issuing a general CAFO permit that brings medium farm operations under the requirements of the NPDES system.²¹²

D. Crisis Galvanizes Action but May Temporarily Set Back Progress

As we know from other studies of what it takes to bring about positive environmental change (or bring a new environmental regime into being), crises (real or manufactured) help.²¹³ Tropical Storm Irene in the summer of 2011 galvanized governmental action to address the excess of phosphorus inputs into Lake Champlain. The storm’s devastating effect on human lives, the economy, and property elevated concern about climate change—especially about the impacts of increasingly large and frequent storms on water quality as well as everyday life for Vermont residents. The more recent storm that devastated the Atlantic coast, Hurricane Sandy, has kept the concerns about climate change and impacts on the environment in the minds of the public and policy makers.

Act 138, passed by Vermont’s General Assembly in 2012, contains a sweeping call for specific actions to regulate flood hazard areas, river corridors, and stream alteration.²¹⁴ Perhaps the resistance within both ANR and AAFM to more aggressive steps to reduce phosphorus from stormwater and farms would have come earlier if the storm had come years before.

210. *EPA Repeals Approval of Champlain TMDL*, *supra* note 96.

211. See EPA Region 1, *Lake Champlain TMDL Development Process—Some Key Steps and Schedule*, EPA.GOV, (Sept. 2011), available at <http://www.epa.gov/region1/eco/tmdl/lakechamplain.html>.

212. See *supra* note 53 (outlining the story of CLF’s petition).

213. POLAR POLITICS, *supra* note 186, at 239.

214. See generally VT. STAT. ANN. TIT. 10 § 751 (2012) (relating to regulation of flood hazard areas, river corridors, and stream alteration).

E. Social and Cultural Attitudes Matter

Vermonters place a high value on the identity of Vermont as a farm state. Vermont Life Magazine and many other publications feature and promote Vermont as an ideal tourist destination using pictures of cows, barns, and rolling green hills.²¹⁵ Ben and Jerry's ice cream company's marketing has always featured Vermont's ubiquitous black and white Holstein cows.²¹⁶ Dairy farming no longer accounts directly for a large part of Vermont's economy, yet dairy farmers still wield outsized power in the state and federal government. Vermont's iconic rural landscape attracts visitors, new residents, and businesses. So it is no surprise that agricultural interests have wide support from the public, and political leaders not only oppose more regulation of farms, but also promote farm subsidies as well as grant and loan programs. Québec, as noted earlier, has a somewhat more communal attitude toward actions that harm neighbors than Vermonters and New Yorkers; thus, they have been more willing to accept environmental and water quality regulations.

IV. THE WAY FORWARD

The Vermont agency staff members interviewed shared a strong optimism for the future. Kari Dolan argued, "we are in an exciting period instigated [by] new political leadership and a new set of initiatives that are rallying sectors [particularly the farm sector] never fully engaged before in water quality restoration."²¹⁷ She, along with others in the ANR and AAFM, shared an optimism that a whole set of new strategies will result in success over time. The ANR has held twenty-five "kitchen table meetings" with farmers, mostly in the Lake Champlain basin, hosted by conservation district officers. Out of these meetings an agricultural working group developed with twenty-four representatives.²¹⁸ For the first time, the ANR has its own agricultural specialist overseeing development of CAFO permits. The ANR now has both deadlines and technical expertise. This is the first time in twenty years that farmers are getting involved in solving the problem. DEC has commissioned a study to identify the hot spots for phosphorus flows. Mapping of slopes, soil types, and land use in proximity to water bodies is helping farmers to see where they need to make changes.

215. See, e.g., *Why Visit Our Region*, VERMONT.ORG, <http://www.vermont.org/visitors/why-visit-our-region> (last visited Jan. 11, 2014).

216. BEN & JERRY'S ICE CREAM, www.benjerry.com (last visited Jan. 11, 2014).

217. Comments from Kari Dolan, *supra* note 104.

218. *Id.*

A memorandum of understanding between the NRCS, DEC, and the conservation districts is making it easier to share data and monitor practices put in place to improve water quality.²¹⁹

There is also hope that Vermont House Bill 291 will pass; this would lead to an inventory of critical areas of gravel roads and mandate standards for road and bridge construction that are now voluntary.²²⁰ And the DEC has a new employee from the conservation districts working to encourage low impact structures such as bioswales, rain gardens, permeable pavement, as well as water capture and reuse systems to reduce the amount of storm water flowing into sewage systems.

Perhaps the most important recent change is that the heads of both Vermont's key agencies are working closely together. Vermont's Secretary of Agriculture, Chuck Ross, and the Secretary of Natural Resources, Deb Markowitz, have appeared together at public meetings with Secretary Ross stressing the importance of clean water and Secretary Markowitz speaking about the importance of farming to Vermont's economy.²²¹ Staff in both agencies noted this new cooperation and leadership in explaining their optimism that new steps will solve the phosphorus problem. Interagency cooperation is also increasing between DEC and the Department of Transportation (DOT). Local roads (both gravel and paved) contribute substantially to pollution in some tributaries, so DEC has been working with road engineers in DOT to develop new statewide standards for road grading.²²²

Another reason some I interviewed expressed optimism is that the state agencies are now finally engaging the local farming community and not just issuing top-down decisions. As many scholarly studies document, there must be trust and effective communication between local people who are affected by government decisions and government decision makers. As DEC's Ecosystem Restoration Program Manager Kari Dolan stated:

Government alone cannot restore our waters. Government needs partners, including municipalities, farmers, loggers, and citizens, as

219. WATER QUALITY, REMEDIATION, IMPLEMENTATION, AND FUNDING, *supra* note 187, at 98.

220. H.291, 2013 Leg. (Vt. 2013), available at <http://www.leg.state.vt.us/docs/2014/bills/Intro/H-291.pdf>.

221. Correspondence with David Deen, Vt. State Rep., Chair of the Fish, Wildlife and Water Res. Comm. (Apr. 20, 2013) (on file with author); *see also* Chuck Ross and Deb Markowitz *How to Deal with the Lake*, ST. ALBANS AREA WATERSHED ASSOCIATION NEWSLETTER, May 2012, at 3, available at http://www.saintalbanswatershed.org/May_2012_Newsletter.pdf (demonstrating Ross and Markowitz's expressed shared commitment to improving the Lake).

222. Interview with David Mears, *supra* note 190.

well as watershed groups, conservation districts, regional commissions, and others. Government can provide the guidance on how to target actions where it will make a difference and monitor our progress. Government will also need to offer technical, educational, and financial assistance, such as grants and loans. Our effectiveness in implementing sound land use practices that will make a difference in safeguarding our lakes and rivers depends on these partnerships.²²³

Despite these positive developments, the Governor of Vermont will need to demonstrate a commitment to water quality backed up by substantial funding to make genuine progress in phosphorus reduction and end the problems of eutrophication and toxic algae blooms. Problems of agency fragmentation of responsibility must be solved, the influence of vested business interests will need to be overcome, and environmental interests will need to develop greater clout in the legislative and executive branches of government. Addressing the problem of toxic algae blooms will require a shift in public attitudes to recognize the importance of clean water to human and environmental health, as well as to a strong economy.

AAFM regulates all agricultural operations, but monitors, enforces, and works only with LFOs and MFOs unless it receives specific complaints about a small farm. The new study of critical source areas allows the AAFM to target funds where it will be the most effective.²²⁴ Additionally, the new commitment by the heads of the AAFM and ANR to work together is a promising sign for the future. The biggest need is some way to work with small farmers to assist and advise them in how to meet both AAPs and BMPs, develop nutrient management plans, and other site specific actions (such as buffers and reduced tillage).²²⁵ Perhaps a cadre of private consulting agricultural conservation planners, akin to consulting foresters, who can establish long-term rapport with farmers, would be more likely to gain the trust of small farmers than government agents. Independent farm consultants are needed to advise on nutrient management, stream bank stabilization, and other accepted agricultural practices.

The problem remains how to pay for these farm consultants. In Vermont, the NRCS funding covers ninety percent of the cost of

223. Interview with Kari Dolan, *supra* note 79; Comments from Kari Dolan, *supra* note 104; Email with Kari Dolan (Jan. 22, 2014) (on file with author).

224. INT'L MISSISQUOI BAY STUDY BD. *supra* note 16, at 23 (the link between the critical area study and ground truthing is far from perfect, but this is an obstacle that the agencies are able to work with assuming they have staff available).

225. See WATER QUALITY, REMEDIATION, IMPLEMENTATION, AND FUNDING, *supra* note 187, at 13–18 (proposing different management approaches on small farms that will improve enforcement of AAPs and provide benefits to the farm and water quality).

preparation of a new forest management plan, including conservation concerns, but NRCS only covers seventy-five percent of the cost of Comprehensive Nutrient Management Plans (“CNMP”) for farmers.²²⁶ Forest landowners need to update their forest plans every ten years to remain in the current use program and retain substantial local property tax reductions.²²⁷ There is now no equivalent incentive for farmers to seek a private consultant to develop conservation management plans that would include land treatment as well as nutrient and waste management.²²⁸ Additionally, consulting foresters may reap the benefits of their work when they supervise a logging job for the landowner. For LFOs and MFOs, the consultant is often an expert from a fertilizer or pesticide company creating a conflict of interest that may not lead to the best conservation advice.

NRCS has grant funds, but until recently has not had sufficient demand from farmers to use even the existing grant money available. The NRCS grant applications require voluminous paperwork, and the NRCS staff writes the application. A shortage of the NRCS field staff results in funds not being spent. Additionally, the NRCS is only allowed to fund the particular solutions approved by regional and national policy, a system that lacks the flexibility farmers may need to participate in the program. With the addition of more conservation planners (whether they are in the private sector, non-profit organizations such as the NOFA, government agencies such as the AAFM, or the NRCS’s own offices), NRCS would be able to use all available funds and target those funds to more effective projects. Additionally, formulas for cost sharing in NRCS’s programs may need to be adjusted to the local realities of farm economics to encourage greater participation in solving water quality problems.

There is a need to fund education to train agricultural conservation planners in Vermont. While K–12 education programs designed for the next generation are useful and potentially will influence parents of current students, the need for action now requires higher level training to develop a cadre of agronomists well versed in conservation planning. Vermont could

226. Comments from Kip Potter, *supra* note 144.

227. *Use Value Appraisal*, VT. DIV. OF FORESTRY, http://www.vtfpr.org/resource/for_forres_useapp.cfm#Overview (last visited Jan. 11, 2014).

228. Email from Bruce Howlett, *supra* note 119 (explaining that large and medium farm operations in Vermont that apply for NRCS funds for manure management must have a CNMP that considers all possible farm operations that could pollute the environment and indicate ways to avoid runoff of manure, sediment, or nutrients. When NRCS funds a CNMP, discrete sections of the plan are written by different people: the Land Treatment Plan by VACD employees working in NRCS office, the NMP (recommending nutrient applications to each field based on planned crops) is most often written by a private contractor affiliated with a fertilizer company, and the Waste Management Plan, if required, includes plans, engineering designs, and management for infrastructure and is written by NRCS staff and signed by a NRCS engineer.)

look at the model of foresters who are successfully working with woodlot owners to institute conservation practices into their land use and forestry plans. The foresters steer and encourage their clients to apply for NRCS grants to cover costs.²²⁹ In a similar way, agricultural conservation planners could encourage small farmers to implement actions that advance water quality by taking advantage of available grants. Even the small farmers now know that if water quality doesn't improve there will be more demand for regulations and more backlash against them.

LCBP needs leadership with the skill and charisma to bring all its members together to keep the phosphorus problem on the front burner and form coalitions that will select projects for funding that make a difference in water quality. LCBP could be a conduit for seeding and funding farm conservation plans. Certainly some of the many studies completed with LCBP funding have been important to better understand the problems and identify solutions. Nonetheless, funds need to be used now for actions that actually reduce phosphorus loading. A more strategic leadership might have speeded cleanup of Lake Champlain by confronting opponents of regulatory action and keeping the public's attention focused on the urgent need to address the phosphorus problem.

As the Vermont Legislature looks at the Act 138 Report, it may need to set priorities for funding in the absence of leadership from the Governor. Vermont's congressional delegation would do well to ensure that the funds it secures for the state go beyond more studies and actually solve the phosphorus problem. State legislators, as well as the heads of the ANR and AAFM, can play key leadership roles by finding ways to overcome agency fragmentation and prioritize funding for actions that actually reduce phosphorus pollution.

229. See Nat. Res. Conservation Serv., *Forestry and Agroforestry Assistance*, http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_006949.pdf (last visited Jan. 11, 2014) (describing forestry assistance, including financial assistance, available from NRCS through the 2008 Farm Bill).