

Basin 17 Water Quality Management Plan

January 2012



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APPENDIX A - BASIN 17 PLANNING PARTNERS

Averill Lakes Association
Beck Pond LLC
City of Newport
Craftsbury Conservation Commission
COGESAF
Echo Lake Protective Association
Essex County Natural Resources Conservation District
Memphremagog Conservation Incorporated
Memphremagog Watershed Association
North Country Union High School
Northeast Vermont Development Association
NorthWoods Stewardship Center
Orleans County Natural Resources Conservation District
Salem Lake Association
Seymour Lake Association
Sterling College
Town of Albany
Town of Brighton
Town of Charleston
Town of Morgan
Town of Westmore
USDA – Farm Service Agency
USDA - Natural Resource Conservation Service
Vermont Agency of Agriculture, Foods and Marketing
Vermont Agency of Transportation
Vermont Better Backroads Program
Vermont Department of Environmental Conservation
Vermont Department of Fish and Wildlife
Vermont Department of Forests, Parks and Recreation
Westmore Association

APPENDIX B - PUBLIC MEETINGS HELD IN BASIN 17

11-14-06 – Meeting on WQ in the Memphremagog watershed

3-29-2007 Meeting on Memphremagog Watershed Association formation

Public forums

8-15-2007 Albany

8-22-2007 Barton

8-27-2007 Norton

9-11-2007 Island Pond

10-24-2007 Orleans VT – watershed council meeting to discuss council formation

Assessment meetings

11-28-2007 Newport -Discussion of impaired and altered waters in the basin and bioassessment results in the basin

12-11-2007 Orleans – Discussion of water quality sampling results for the basin

1-23-2008 Newport - Discussion of Stream geomorphic assessment results in the basin

4-30-2008 Newport – Discussion of fisheries in the basin

3-26-2008 Newport – Assessment of Agriculture in the basin

WQ issue meetings

5-28-2008 Orleans - Prioritization of water quality issues in the basin

7-21-2008 Newport – Discussion of phosphorus in Lake Memphremagog and sources in the basin

8-25-2008 Island Pond –Forests in the basin

10-9-2008 Brownington - Roads in the watershed

11-24-2008 Newport - Stormwater in the watershed

3-9-2009 Newport - Discussion of water classifications in the basin and outstanding resource waters

5-6-2009 Orleans - Discussion of river corridor projects

7-29-2009 Morgan - Discussion of aquatic invasive species

8-10-2009 Westmore – Development along lakeshores and other lake concerns

9-23-2009 Orleans – discussion of river projects

1-11-2010 Newport – Wetlands in the basin

8-12-2010 – Review of the draft agricultural chapter.

9-28-2010 – Discussion of the Total Maximum Daily Load development for Lake Memphremagog

Meetings to receive comment on Basin 17 Draft Plan

12-1-2011 – Island Pond

12-5-2011- Newport

APPENDIX C - Summary of Physical, Chemical, and Biological Assessments of Basin 17

[Lake Memphremagog Watershed Water Quality Assessment Report](#) (March 2006) (pdf, 1 MB)

Stream geomorphic assessments

Clyde River

Final report: [Restoring Water Quality in the Lake Memphremagog Basin:Clyde River Phase I and II Stream Geomorphic Assessments](#) (5mb)

Barton and Johns River Phase I and II Stream Geomorphic Assessments: [Restoring Water Quality in the Lake Memphremagog Basin: River Corridor Plan for the Barton and Johns Rivers](#) (pdf 6.9 MB)

Black River Phase I and II stream geomorphic assessments [Black Corridor Plan FINALREPORT_March2011](#) (pdf, 9.6 MB)

Town of Coventry Bridge and Culvert Survey completed by NVDA and Lyndon state college

Water Quality assessments

2006 Water quality report on the Black, Barton, Clyde and Johns River (Northwoods stewardship Center) currently not available online

[2008 Quebec-Vermont Summary Report on The Water quality of Lake Memphremagog](#) (pdf 5MB)

[2008 Memphremagog Watershed Association Water Quality Sampling Report](#) (pdf, 1 MB)

[2009 Memphremagog Watershed Association Water Quality Sampling Report](#) (pdf, 1 MB)

[2010 Memphremagog Watershed Association Water Quality Sampling Report](#) (pdf, 2.6mb)

[2009 Seymour Lake Association Water Quality sampling final report \(summary\)](#)

Lake assessments

Operation healthy Lake – shoreline and littoral survey of Lake Memphremagog (not available online)

Lake Score Card is available online which has the latest assessments results for lakes in the basin in Google Earth. <http://www.anr.state.vt.us/dec/waterq/lakes.htm>

APPENDIX D - SUMMARY OF GRANT PROGRAMS AND ABBREVIATIONS

Below is a list of the funding sources listed in the basin 17 water quality management plan. These are listed in detail on the Vermont surface water management strategy web page at:

http://www.anr.state.vt.us/dec/waterq/wqd_mgtplan/swms_appD.htm

319 – Federal section 319 program to address NPS pollution

604b – Federal Section 604b pass-through funding for RPC's

ANS grant – Vermont Aquatic Nuisance Species Control Grant

BBR – Better BackRoads Grants

BMP – Vermont Best Management Practices Cost Share Program

CREP – Conservation Reserve Enhancement Program

Eastern Brook Trout Joint Venture – Funding to restore brook trout. see <http://www.easternbrooktrout.org/>

ERP – Ecosystem Restoration Program

EQIP – Environmental Quality Incentives Program

Forest Legacy – funding to protect working forests <http://www.fs.fed.us/spf/coop/programs/loa/flp.shtml>

LaRosa – LaRosa Laboratory Analytical Partnership Program

Partners for Fish and Wildlife

VACB – Vermont Agronomic Practices Program

Watershed Grant – Vermont Watershed (Conservation License Plate) Grants

WHIP – Wildlife Habitat Incentives Program (see Appendix B1)

APPENDIX E - BASIN WATERSHED AGRICULTURAL CHAPTER

INTRODUCTION

Basin 17 is comprised of 4 smaller watersheds: the Black, Barton, Clyde and Memphremagog Direct watersheds. These all flow out of Lake Memphremagog and in to the St Francis River in Canada. The Coaticook River and Tomifobia River watersheds originate within the borders of the United States and yet they flow directly into the St Francis River.

The Memphremagog Watershed (aka Basin 17) covers approximately 313,425 acres or 490 square miles. Forestland is by far the largest land use class with 200,000 acres or 64% of the watershed in forest cover. Agriculture represents about 16% of the land cover (51,000 acres) and surface water and wetlands account for an additional 14% of the land area.

Historically, much of the agricultural information available for this region was collected on a county scale which makes it challenging to characterize the agricultural land use within the watershed. Approximately 75% of Orleans County flows into the Memphremagog Watershed; the other 25% flows west into Lake Champlain via the Mississquoi River. The portions of Essex, Lamoille, and Caledonia Counties that lie within the watershed are primarily forestland and therefore any agricultural contribution from these regions is considered negligible.

The agricultural statistics for this plan will be based on the available NASS data for Orleans County and more recent data for the St Francis hydrologic unit.

The USDA Census of Agriculture completes a survey of agricultural operations every 5 years and uses the following criteria to define a farm: *any place from which \$1000 or more of agricultural products were produced or sold, or normally would have been sold, during the census year.*

According to the USDA Census compiled by National Agricultural Statistics Survey (NASS) there were 635 farms in Orleans County in 2007. This is about the same number of farms counted in the 1987 census however in the intervening years the number of farms dropped to a low of 549 in 1992 and has rebounded steadily since. The average farm size was just 205 acres in 2007 which has steadily declined from an average of 273 acres in 1982.

The statewide trend closely mimics that observed in Orleans County with a decrease in farms from 7,100 in 1987 to 6,600 in 2002 rebounding to 6,984 in 2007. Farms in Orleans County tend to be larger than the statewide average of 177 acres.

Table 1. Number of Farms and Farm Size in Orleans County and the Memphremagog Watershed (Basin 17)

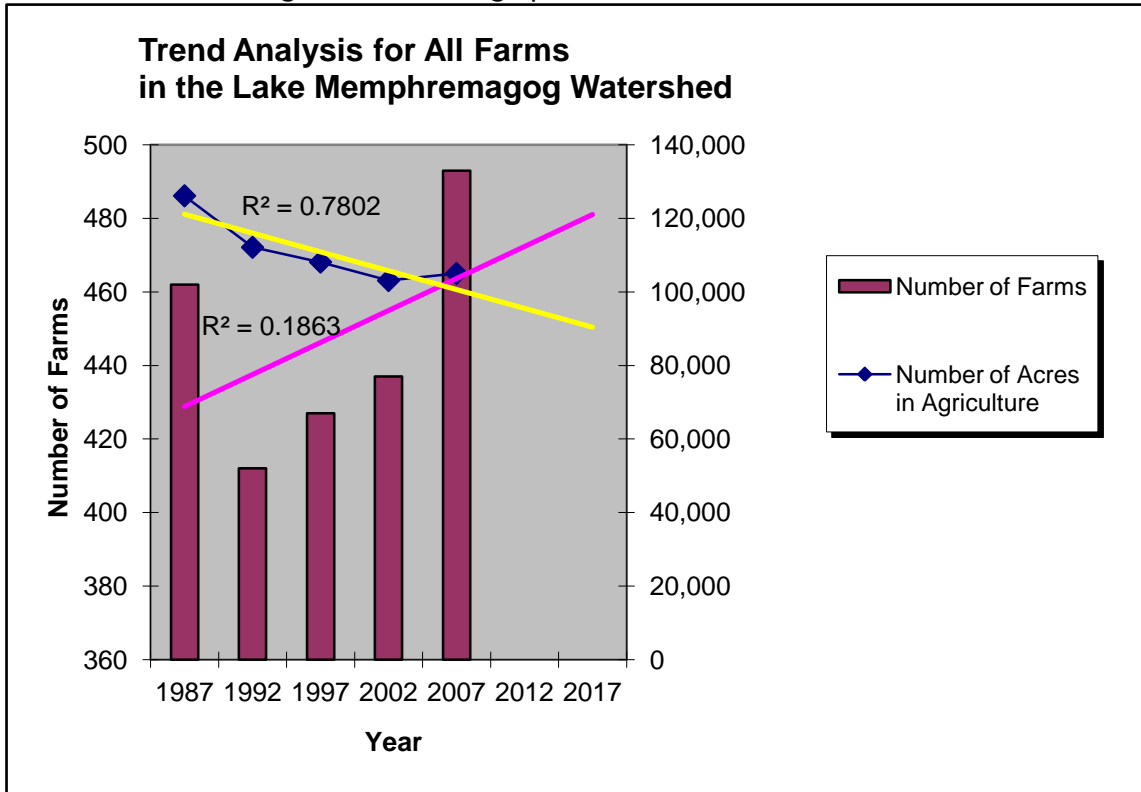
	Orleans County 2007	Basin 17 2007	Orleans County 2002	Basin 17 2002	Orleans County 1997	Basin 17 2002 ¹	Orleans County 1992	Basin 17 1992 ¹	Orleans County 1987	Basin 17 1987 ¹
Number of Farms	635	493	583	437	569	427	549	412	616	462
Acres in Farms*	130,308	105,017	132,240	103,095	144,154	108,115	149,503	112,127	168,175	126,131
Average Farm Size	205	213	227	236	253	253	272	272	273	273

* includes forest, cropland, and pasture associated with all farms (dairy, crop, livestock farms etc)

source: USDA, National Agricultural Statistic Service (NASS) 2007 Census of Agriculture

1: Basin 17 values for 2002 and earlier are prorated based on the assumption that 75% of the county data applies to that part of the county within the Lake Memphremagog

FIGURE 1: Historical Agricultural Demographic



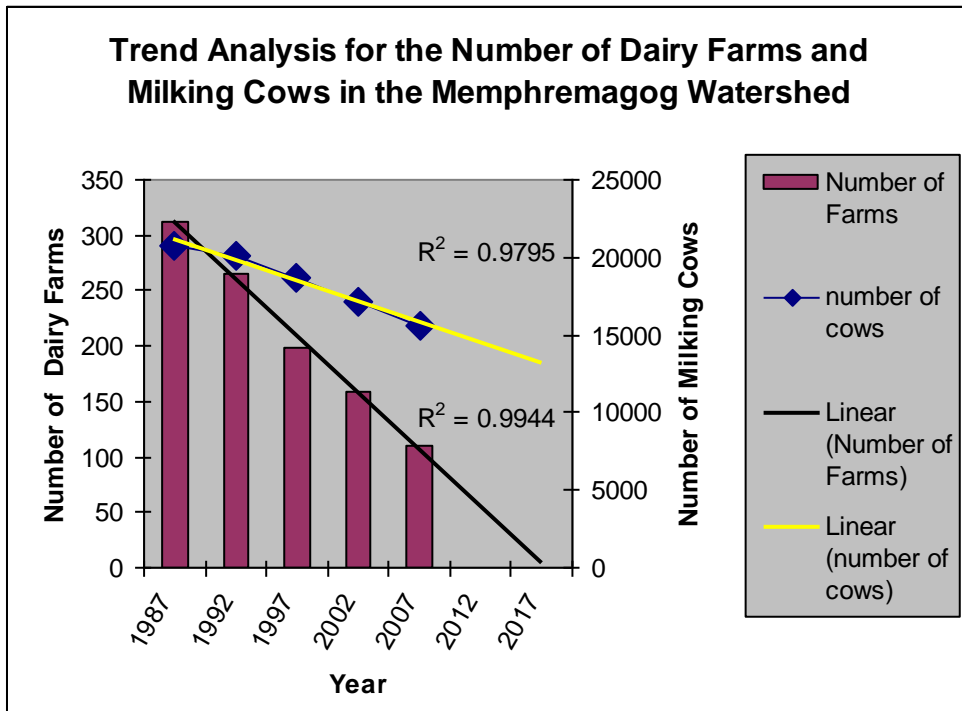
Note: The statistical trend analysis above does not take into account any possible compounding factors such as economics, climate, and the future regulatory environment.

Based on the poor R^2 value for the linear regression for the number of farms a trend is difficult to comprehend. Obviously, from 1992 through 2007 there has been a steady increase in the number of farms. Between 1987 and 1992 there was a government sponsored herd buyout program which likely accounts for some of the drop seen in that period of time.

What is clearly supported by a high R^2 value is the generally decreasing trend in the number of acres in agriculture over that 20 year period. The conversion of agricultural land to residential or commercial enterprises is cause for concern for a number of reasons. The transition of farmland to some other land use may impact water quality in a number of ways. If these acres are developed, they are forever lost to the production of food and fiber and the pastoral landscape that the rest of the country has come to associate with Vermont. Some acres may revert to forestland and others to urban and suburban development. These land uses have very different potentials for water quality concerns so the transition of agricultural land should be considered in creating goals and strategies for the next five years.

In just 20 years we have lost 65% of the dairy farms in the Memphremagog Watershed from a total of 418 in 1987 to just 147 in 2007. Milk prices dropped significantly in 2009 so there are likely even fewer dairies operating now. The prediction for the number of dairy farms in 2017 is tremendously dismal if the current trend continues.

FIGURE 2: The Aggregation of the Dairy Industry



In order to adapt to the changing economics of milk prices and labor expenses the remaining farms have experienced a 113% expansion in herd size. Larger farm operations favor an economy of scale in purchasing, transportation and other expenses not available to the smaller operations. However, that also means bringing on more labor, buying larger equipment, expanding the crop land base and managing larger quantities of manure.

TABLE 2: Number of Dairy Farms and Number of Milk Cows 1987 through 2007

	1987	1992	1997	2002	2007	% Change
Number of Farms	418	354	265	212	147	-65%
Number of Milking Cows	27,642	26,808	24,947	22,794	20,733	-30%
Average Number Cows per Farm	66	76	94	108	141	113%

Source: NASS Census of Agriculture

TYPES OF FARMING IN THE MEMPHREMAGOG RIVER WATERSHED

The trend towards fewer and yet larger dairy farms is balanced by the increasing diversity of agricultural operations in the watershed. According to the USDA Census of Agriculture, Orleans County farmers grow a range of crops including corn, vegetables, potatoes, forages, apples, Christmas trees, berries, nursery and greenhouse plants. In addition they produce eggs, dairy products, beef, pork, lamb, and poultry. Many other small homestead or commercial operations that specialize in herbs, ornamentals, bait, game, and other products are not included in the census data as they do not meet the definition of a farm under USDA. Yet these make up a part of the agricultural demographic which promises to see growth in the future due to the concerns about local food, transportation costs, global warming, and the economy.

TABLE 3: Types of Farms in Orleans County, 2007

Sector	Number of Farms	Number of Animals or Acres
Beef	111	1,109
Dairy	147	20,733
Bees	18	348 (hives)
Goats	36	778
Hogs/pigs	19	89
Horses/ponies	141	702
Poultry (layers)	71	1,199
Poultry (broilers)	6	315
Emu	1	NA
Turkey	4	33
Sheep	20	893
Corn Grain	5	170
Corn Silage/Greenchop	37	9,522
Barley	3	70
Forage	379	39,716
Oats	74	3210
Berries	31	NA
Orchards	16	52
Christmas Trees	24	547
Maple	141	253,562 (taps)
Vegetables	32	70

Source: 2007 USDA Census of Agriculture, County Data
 NA = not available

Of the 635 farms listed in the 2007 Census, farming is listed as the principal occupation for just 349 of them. That means about 45% of those counted as farms are part time occupations for farmers, growers, nurserymen, etc.

The market value of the agricultural products sold in Orleans County for 2007 totaled \$82,348,000. Total farm production expenses for the same time period was \$64,319,000 resulting in a net value of \$18,029,000 which averages out to be less than \$30,000 per farm. Milk prices have dropped significantly since this data was acquired and fuel prices have vacillated so it is difficult to calculate the impact on current farm income yet the anecdotal information from the newspapers and legislature suggest the farm economy is dismal.

SFOs IN THE MEMPHREMAGOG WATERSHED

Small Farm Operations in the watershed comprise a rich diversity including dairy, livestock, vegetable, fiber, and Christmas tree operations. These farms are all subject to the Accepted Agricultural Practices which are a set of rules that are intended to minimize the risk of agricultural non-point runoff. It is important to note these regulations apply equally to all farms whether it is a dairy farm with 175 cows or a farm with just 4 horses in the backyard, or a 2-acre vegetable operation. A link to these rules is included in the appendix. Some of the specific provisions included in the AAPs are:

- 1) a 10-foot buffer of perennial vegetation between the top of the bank of surface water and the edge of an annual crop (corn, pumpkins, sunflowers, etc)
- 2) manure may not be applied to the 10-foot buffer or within 25 feet of surface water at points of runoff
- 3) manure may not be stacked or stored within 100 feet of a well or a property line
- 4) manure may not be stacked on unimproved sites within 100 feet of surface water
- 5) nutrient applications shall be based on soil tests which must be performed every 5 years for fields receiving mechanical applications of manure
- 6) manure may not be spread between December 15 and April 1
- 7) Livestock shall not be pastured within 50 feet of a well
- 8) Adequate vegetated cover shall be maintained on streambanks by limiting livestock trampling and equipment damage (except at defined crossings to protect streambanks from excessive erosion.

MFOs IN THE MEMPHREMAGOG WATERSHED

There are approximately 150 Medium Farm Operations (MFOs) in Vermont. These farms are defined as those with 200 or more mature cows, 300 or more youngstock or heifers, 150 horses, 300 sheep, or 9000 hens. There are 14 MFOs within the boundaries of the Memphremagog Watershed. MFOs are regulated by the VT Agency of Agriculture under a general permit (in addition to the AAPs) and the significant conditions of the general permit are two fold.

- 1) There may not be a discharge from an MFO. This means no waste (manure, spoiled feed, milkhouse liquids, barnyard runoff etc) may leave the production area and enter surface water.
- 2) The MFO must complete and follow a nutrient management plan for the land application of wastes and additional nutrients. Land application of wastes may not result in the primary or secondary groundwater standard being exceeded. There is an on-going inspection program in place to ensure all MFOs are in compliance with the general permit which went into effect in 2008.

LFOs IN THE MEMPHREMAGOG WATERSHED

There are 20 Large Farm Operations (LFO) regulated by the VT Agency of Agriculture in the State of Vermont: 17 dairy, 1 beef, 1 replacement heifer, and 1poultry operation. An LFO is defined as a dairy farm with 700 or more mature cows or a poultry operation with over 30,000 birds. There are two LFOs on the Black River, one on the Barton River and one that drains into the St Francis River. Farms of this size are regulated by individual permits that address runoff as well as odor, noise, traffic, flies, and other pests.

ORGANIC FARMS

There has been a significant increase in the number of organic farms in the past decade. This transition may be beneficial to water quality as the use of pesticides is eliminated and for livestock operations daily pasturing means there is less concentration of manure. However, pasturing may present other water quality challenges due to the requirement to be outside. There are 81 certified organic farms in Orleans County of these about half are dairy farms (NOFA VT, 2009). The remainder includes operations that produce eggs, fruit, vegetable, maple syrup, beef, pork, lamb, hay, honey, grains, and beans.

Many farms in the region practice organic farming but find the actual certification process difficult or uneconomical to pursue and therefore market their products as natural or free range or pesticide free. The diversification on these farms is part of a growing movement to support the demand for local foods.

WATER WITHDRAWALS FOR AGRICULTURE

The number of farms with irrigation for crops has increased steadily since 1992 but the data for the number of acres is too spotty to note any trend. The increase in the number of farms with irrigation mimics the increase in the number of vegetable and berry farms, farm markets and cash crop production.

TABLE 4: Number of Farms with Irrigation and Acres of Irrigated Land in Orleans County (Prorated for the Memphremagog River Watershed)

	Orleans County	Memphremagog Watershed (prorated)	Orleans County	Memphremagog Watershed (prorated)	Orleans County	Memphremagog Watershed (prorated)	Orleans County	Memphremagog Watershed (prorated)
	2007	2007	2002	2002	1997	1997	1992	1992
Number of Farms	39	29	33	25	22	17	13	10

with Irrigated Land								
Number of Acres Irrigated	69	52	NA	NA	246	185	NA	NA

NA = not available, Source: USDA Census of Agriculture, NASS Data

The latest available water use data from the United States Geological Service (USGS) is from 2000. The USGS estimated that irrigation represented about 35% of the total withdrawals for surface water and .01% for groundwater in 2000. Further they estimated that there were a total of 390 acres irrigated entirely by sprinkler systems.

TABLE 5. Estimated Water Withdrawal in Orleans County in 2000

	Surface Water (Million Gallons/Day)	Groundwater (Million Gallons/Day)
Water Withdrawal for All Uses	0.69	2.55
Water Withdrawal for Irrigation	0.24	0.03
Irrigation as a % of All Withdrawals	35	0.01
Water Withdrawal for Livestock Watering	NA	NA

NA = not available

Source: <http://water.usgs.gov/watuse/data/2000/vtco2000.xls>

AGRICULTURAL CHEMICAL USE

Each farm operation uses a unique and specific combination of tools to combat insect, disease and weed problems. Despite the recent conversion of conventional farms to organic operations, there were more acres treated with agrichemicals in 2007 than 15 years ago. The number of farms using herbicides decreased from 157 farms in 1992 to 53 farms in 2007 while the number of acres treated with herbicides has almost doubled. This follows the overall trend of fewer but larger farms. The number of farms using chemical control for diseases for the 15 year period is down as are the total number of acres treated. Insect and disease outbreaks tend to be cyclic and therefore a difficult parameter to analyze.

TABLE 6. Pesticide Use in Orleans County

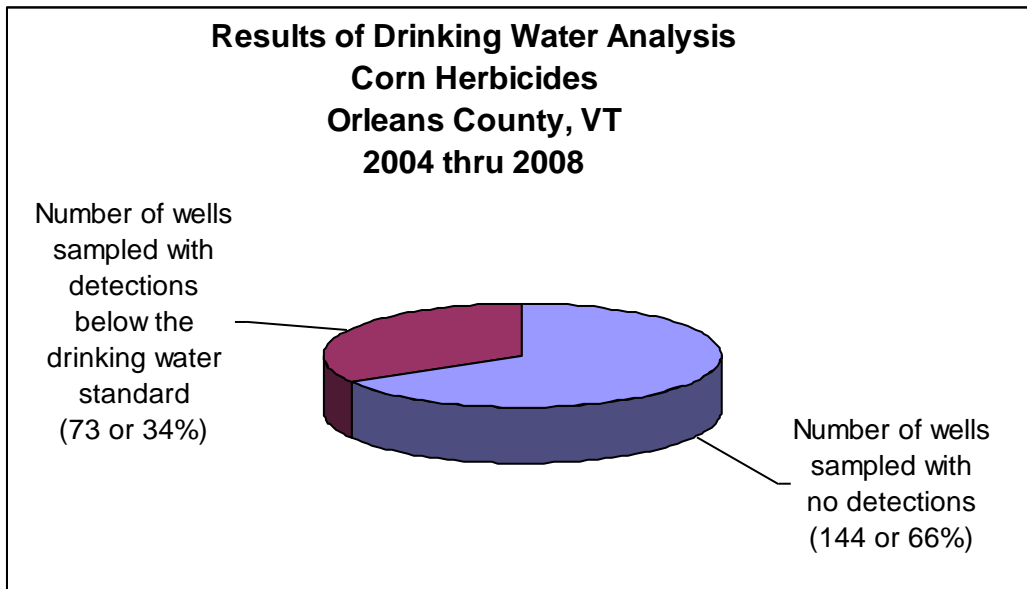
	2007	2002	1997	1992
Number of farms using chemical treatment for insect control	35	27	37	24
Number of acres treated for insects	6,677	2,214	1,479	984
Number of farms using chemical control for weeds	53	62	90	81
Number of acres treated for weeds	10,128	7,518	7,631	5,238
Number of farms using chemical control for plant disease	14	1	23	3
Number of acres treated for diseases	48	NA	505	NA

Source: Data from the USDA Census of Agriculture, County Profile, 2007, 2002, 1997, 1992.

NA = not available

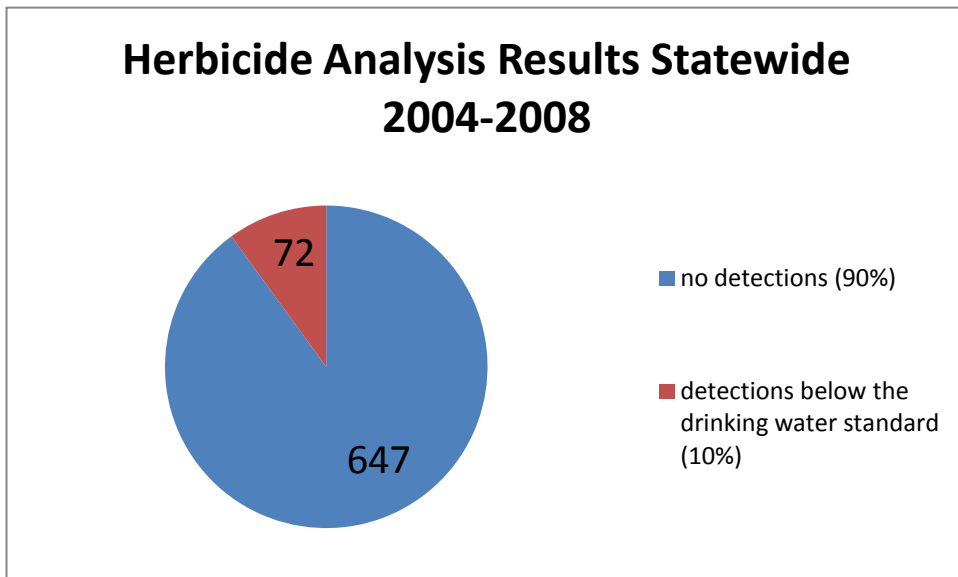
With the development of RoundUp ready corn seed and a slow transition to organic corn production it is likely there will continue to be a decrease in the number of acres of corn sprayed with herbicides.

The Agency of Agriculture has a drinking water monitoring program and collects samples for analysis for a suite of corn herbicides including chemicals such as atrazine and metolachlor. Over a 5 year period, there were 217 water samples collected from domestic water sources in Orleans County that were analyzed for corn herbicides. Of these, 144 had no detections and 73 had detections which were below the drinking water standard. There were no detections above the drinking water standard.



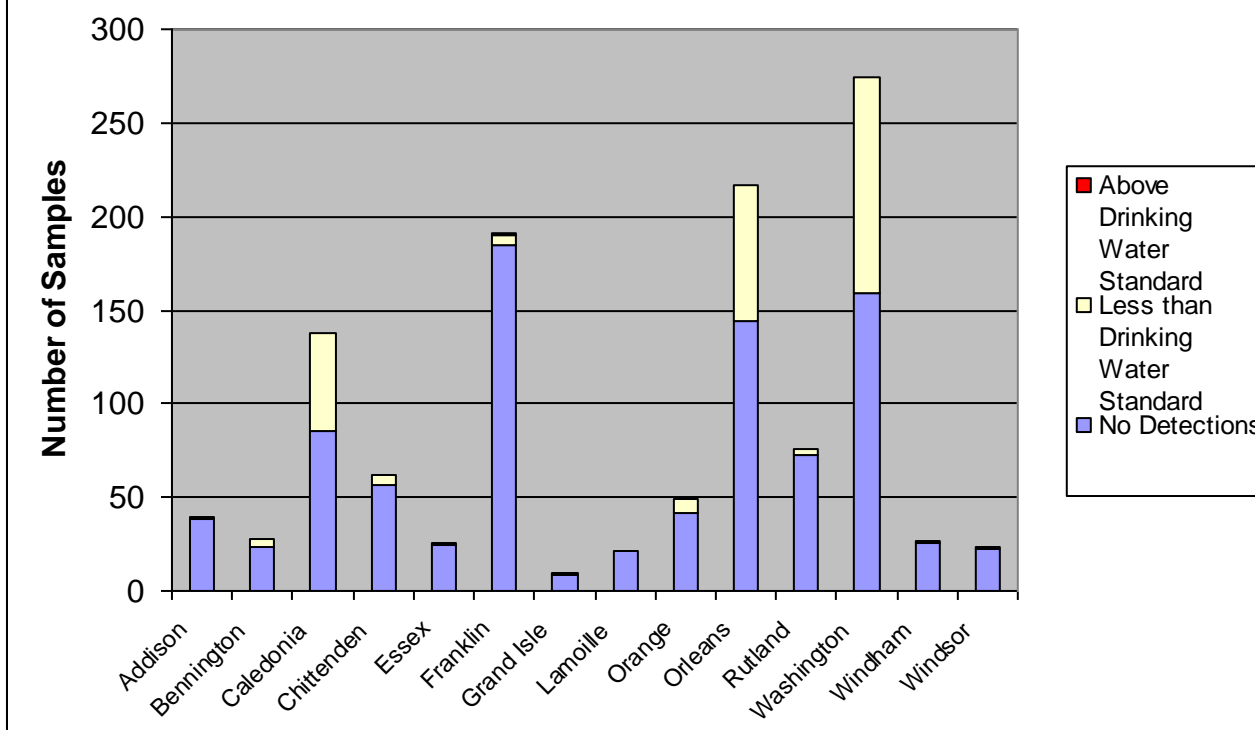
Source: Agency of Agriculture, Comstock 2009

Statewide, 719 water samples were analyzed for herbicides between 2004 and 2008. Of these, 647 had no detectable levels of herbicides, 72 had detections of one or more herbicide below the drinking water standard and one had a concentration above the drinking water standard. Note that these are primarily farms wells or those of adjacent land owners and not representative of the entire well population.



Source: Agency of Agriculture, Comstock 2009

Results of Herbicide Analysis for Vermont 2004 - 2008



Source: Agency of Agriculture, Comstock 2009

Further compounding the complexity of agrichemical use is the weather, cost of chemical control from year to year, the insect and disease resistance of some crops, and the natural lifecycle of pests and diseases. Nitrates and herbicides are good indicators of groundwater quality based on hydrogeologic factors. However, each agrichemical has unique formulations that dictate their behavior and fate in the environment. It is therefore difficult to screen for each and every possible compound in groundwater.

FERTILIZER USE

Commercial fertilizer use has declined as has the number of acres treated in the past 15 years.

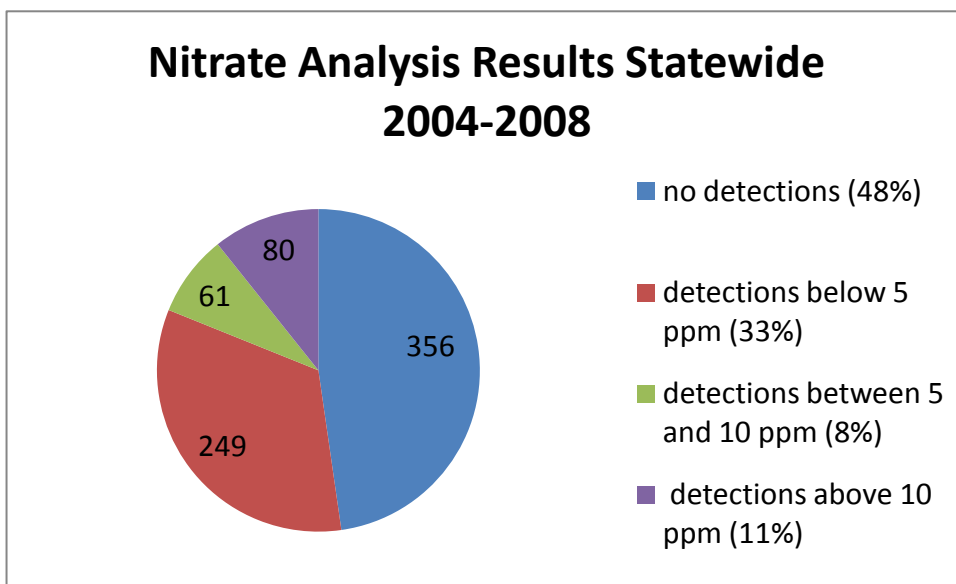
TABLE 7: Fertilizer Use in Orleans County

	2007	2002	1997	1992
Number of farms using commercial fertilizers, lime, soil conditioners	192	190	281	331
Number of acres treated	26,151	31,642	32,253	38,750
Number of farms using manure	194	261	Na	na
Number of acres where manure spread	28,791	38,657	Na	na

Source: Data from the USDA Census of Agriculture, County Profile.
na = not available

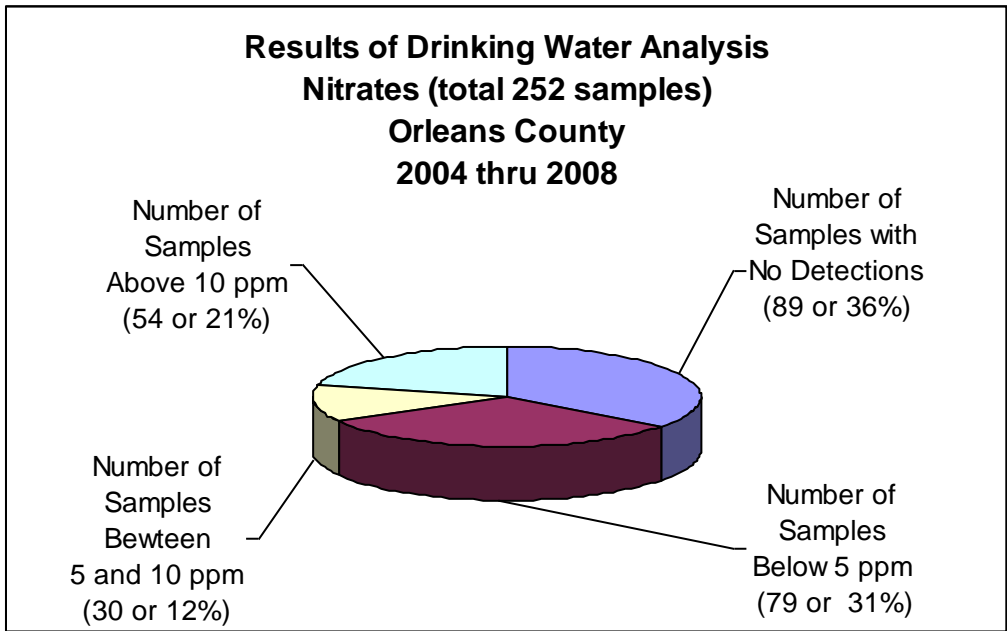
The Agency of Agriculture manages a groundwater monitoring program to determine the quality of groundwater near Vermont farms. The program includes sampling and analysis for nitrates. Given that nitrates are highly soluble and are therefore easily transported with runoff water and leach into permeable soils it is not uncommon to find low levels of nitrates in the groundwater samples extracted from farm wells and those of adjacent landowners.

Between 2004 and 2008 a total of 746 well samples across the state were analyzed for nitrates. These wells are not randomly selected nor representative of the entire well population. Wells that are sampled are usually farm wells or sometimes the wells adjacent to farms or agricultural activity. Of the wells sampled 356 or 48% had no detections of nitrates. Another 310 wells (42%) had detections between 1 and 10 ppm. Therefore, 80 wells or 11% of the total number sampled had detections of nitrates above the drinking water standard of 10 ppm. Sampling continues to monitor those wells that exceed the standard and to provide baseline data for ground water quality on farms that contract for conservation practice cost share dollars. When a well exceeding the drinking water standard is identified, the Agency of Agriculture offers technical and financial assistance to install conservation practices on farms to minimize contamination risks.



Source: Agency of Agriculture, Comstock 2009

Within Orleans County there were 252 water samples collected and analyzed for nitrates. Often wells are sampled repeatedly so these numbers represent the total number of samples analyzed and not individual wells. It is important to note that these samples are targeted at farms and do not represent the general population of wells and ground water quality. Of the samples analyzed, 54 (or 21%) were over the drinking water standard of 10 ppm. Thirty six percent showed no detection and the remaining 43% had detections below the drinking water standard.



Source: Agency of Agriculture, Comstock 2009

CONSERVATION PRACTICES IN THE MEMPHREMAGOG RIVER WATERSHED

For decades farmers in the watershed have been making improvements to their operations to mitigate concerns for water quality and to enhance their operations and the health of their animals. Many of these actions have been accomplished on the farmers own dime and therefore there is no way to account for these. Conservation practices that have included public dollars are somewhat easier to track. The USDA NRCS through the Farm Bill and the Vermont Agency of Agriculture through their BMP program are the largest funders of conservation practices.

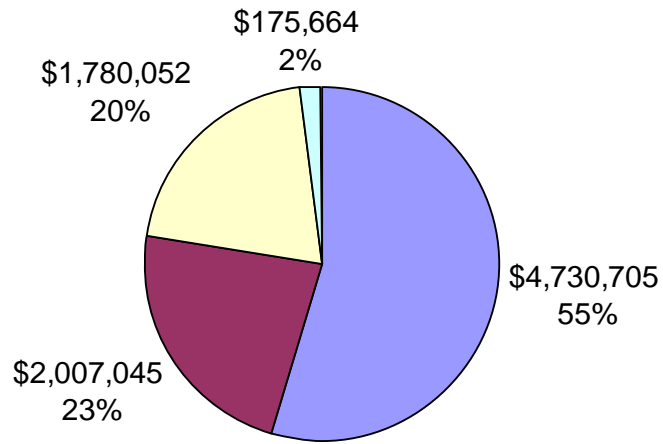
The following information provides the number of practices, the costs of the projects and the specific sub-watersheds for these stewardship efforts. Note that these data only include projects that are funded in part or in whole by the Vermont Agency of Agriculture. Those conservation practices undertaken solely by the farmer or with other funders such as USDA where state BMP dollars were not allocated are not accounted for. Therefore, this list under reports the total number of projects and amount of money dedicated to water quality improvements on agricultural operations.

Close to \$9 million was expended between 1996 and 2008 in Orleans County for water quality improvement projects. These projects range from fencing, walkways, and watering facilities to water diversion around barnyards and manure storage. The cost of the projects is generally split among the farmer, the State of Vermont and the USDA.

Nutrient Management Plans (NMPs) are also funded by USDA and the Agency of Agriculture in concert with some of the infrastructure projects mentioned above. They were required by March 2008 for all MFOs and they have been required of LFOs for years. Numerous small farm operations (SFOs) have also written NMPs. The importance of the NMPs with regard to water quality is that they help the farmer identify crop rotations schemes, manure and fertilizing practices and buffer areas that minimize the possibility of water quality impacts from non-point sources while maximizing the nutrient value of their manure and commercial nutrient inputs.

Farmers have several options for completing a nutrient management plan. Some are written by Technical Service Providers, some are written by the farmer and some are completed with assistance from the Conservation Districts and the USDA.

**Total Cost of Conservation Practices
and Source of Funding
1996 thru 2008**



■ Total Federal Funds ■ Total State Funds ■ Total Landowner Funds ■ Total Other Funds

Summary of Best Management Practice Program Commitments: Lake Memphremagog Basin (As of March 31, 2008)

Fiscal Year	Farms Awarded Grants	Total Projects	Unfinished Projects						Completed Projects					
			Number	Estimated Total Cost	Federal Funding Committed	Other Funding Committed	State Funding Committed	Estimated Land Owner Cost	Number	Actual Project Cost	Federal Funding Awarded	Other Funding Committed	State Funding Awarded	Actual Land Owner Cost
1996	22	33	0	0	0	0	0	0	33	806851	442158	1000	180595	183098
1997	12	14	0	0	0	0	0	0	14	561003	263240	1379	139580	156804
1998	23	32	0	0	0	0	0	0	32	1050748	632110	11606	225699	181332
1999	27	34	2	33279	16640	0	11647	4992	32	1257595	676632	27952	282319	270693
2000	21	26	2	28235	15072	0	8927	4235	24	747025	405828	87734	116407	137056
2001	10	27	4	121775	1984	903	52021	66867	23	512137	224877	45090	154592	87578
2002	13	41	3	34754	25471	0	4070	5213	38	704685	365564	0	209941	129180
2003	9	27	21	268330	188715	0	39364	40250	6	219516	164322	0	21817	33377
2004	5	22	9	31391	16696	0	9987	4709	13	564052	262733	0	126491	174829
2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	6	41	31	425587	250548	0	111201	63838	10	471273	272772	0	125460	73042
2007	4	28	18	433552	262299	0	106220	65033	10	201426	99562	0	41517	60346
2008	2	40	29	101458	68192	0	18048	15219	11	118795	75291	0	21141	22363
TOTAL	154	365	119	\$1,478,360	\$845,616	\$903	\$361,486	\$270,355	246	\$7,215,106	\$3,885,089	\$174,761	\$1,645,559	\$1,509,697

Best Management Practices: Lake Memphremagog Basin

		Number	Completed	Animals Treated	Total Cost	USDA Cost	EPA Cost	Landowner Cost	State Cost
Lake Memphremagog Basin	Production Area Practices	232	193	25,781	\$8,127,062	\$4,392,454	\$174,238	\$1,683,106	\$1,877,264
	Field Practices	132	52	1,128	\$547,391	\$338,251	\$1,426	\$93,144	\$114,570
	AMM Practices	1	1	0	\$19,014	\$0	\$0	\$3,803	\$15,211
	Total Practices	365	246	26,909	\$8,693,466	\$4,730,705	\$175,664	\$1,780,052	\$2,007,045
Lake Memphremagog Direct	Production Area Practices	2	2	178	\$97,640	\$36,259	\$26,853	\$16,083	\$18,446
	Field Practices	0	0	0	\$0	\$0	\$0	\$0	\$0
	AMM Practices	0	0	0	\$0	\$0	\$0	\$0	\$0
	Total Practices	2	2	178	\$97,640	\$36,259	\$26,853	\$16,083	\$18,446
Barton River	Production Area Practices	63	59	6,677	\$1,950,069	\$1,035,722	\$8,705	\$386,588	\$519,053
	Field Practices	10	6	0	\$12,427	\$6,784	\$197	\$1,865	\$3,581
	AMM Practices	1	1	0	\$19,014	\$0	\$0	\$3,803	\$15,211
	Total Practices	74	66	6,677	\$1,981,510	\$1,042,507	\$8,902	\$392,256	\$537,845
Black River	Production Area Practices	66	53	8,189	\$2,320,461	\$1,224,250	\$41,574	\$519,683	\$534,954
	Field Practices	23	7	660	\$132,755	\$79,251	\$0	\$20,857	\$32,647
	AMM Practices	0	0	0	\$0	\$0	\$0	\$0	\$0
	Total Practices	89	60	8,849	\$2,453,217	\$1,303,501	\$41,574	\$540,540	\$567,601
Clyde River	Production Area Practices	63	56	6,904	\$1,924,747	\$1,098,604	\$80,806	\$364,150	\$381,187
	Field Practices	35	22	350	\$137,326	\$89,116	\$1,027	\$21,007	\$26,176
	AMM Practices	0	0	0	\$0	\$0	\$0	\$0	\$0
	Total Practices	98	78	7,254	\$2,062,073	\$1,187,720	\$81,833	\$385,157	\$407,364

Coaticook River	Production Area Practices	2	2	114	\$93,744	\$26,998	\$16,300	\$20,138	\$30,308
	Field Practices	1	0	0	\$2,100	\$848	\$202	\$315	\$735
	AMM Practices	0	0	0	\$0	\$0	\$0	\$0	\$0
	Total Practices	3	2	114	\$95,844	\$27,846	\$16,502	\$20,453	\$31,043
Tomifobia River	Production Area Practices	36	21	3,719	\$1,740,401	\$970,621	\$0	\$376,464	\$393,316
	Field Practices	63	17	118	\$262,782	\$162,252	\$0	\$49,099	\$51,431
	AMM Practices	0	0	0	\$0	\$0	\$0	\$0	\$0
	Total Practices	99	38	3,837	\$2,003,183	\$1,132,873	\$0	\$425,563	\$444,747

AREAS IN NEED OF ATTENTION

The 303(d) List of Waters for the entire state of Vermont includes 15 ponds and 98 streams/ivers for a total of 113 impairments of which 9 are listed as high priority. Within Basin 17 there are three water bodies that are specifically listed and all three involve agricultural runoff and nutrient enrichment. These include Crystal Brook in Derby and Stearns Brook tributary in Holland, both of which are reported to be impaired due to agricultural runoff. In addition, Lake Memphremagog is impaired due to phosphorus which is partly due to the runoff from agricultural activities.

Recent manure handling improvements on a dairy farm adjacent to Crystal Brook have yielded significant reductions in phosphorus sample results. The brook is currently being re-evaluated to see if the biological health in the stream has improved as a result of these infrastructure investments.

While not on the 303(d) list the Johns River that drains directly into the lake near the Canadian border has recently been noted for elevated concentrations of nitrogen and is being studied closely. The area around the river has a large agricultural land base coupled with a surficial geology characterized predominantly by large sand and gravel deposits. Combined, these conditions may represent a region of vulnerability to surface applied nutrients and pesticides. There is some evidence that a hydrologic connection may exist between the groundwater under these large agricultural fields and the surface water and during periods of the year groundwater may be directly contributing to streamflow.

Throughout the watershed there are also areas in need of attention that do not rise to the level of concern as those on the 303(d) list but should not be ignored. The Stream Geomorphic Assessments conducted in this basin have identified areas where agricultural lands are being eroded by the ever deepening of streams. The causes for these incised streams are generally associated with channel straightening, undersized culverts, constricted bridge abutments, and continued development of the land resulting in increased impervious surfaces. There are areas along these waters where riparian buffers may provide multiple benefits such as shade (cooling water temperatures), wildlife habitat (both terrestrial and aquatic, and streambank stability. However, buffers may not be effective in stabilizing stream banks where incisions has become dominant. The trade off to adding buffers to streambanks is loss of production area, and so there

are a number of financial incentive programs available to help offset that cost of lost production. In addition, livestock watering and crossings can contribute significantly to erosion and nutrient enrichment if not managed properly. The Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), the Vermont Buffer Program, and Trees for Streams are all outlined in the Appendix and technical assistance is available to help landowners evaluate these options.

Goals to Maintain and Improve Water Quality on Agricultural Land in the Memphremagog Watershed

The following goals have been derived from public comment, farm visits, and research and are intended to provide a framework for improving the quality of water within Lake Memphremagog which is on the State of Vermont list of impaired waters. There currently exists a large suite of state and federal programs dedicated to this same objective and these goals are not meant in any way to replace them. Rather these goals are intended to affirm the potential of the existing programs, identify ways they could be better implemented, and establish priorities for this specific region. In addition, goals are included that are not part of an existing regulatory or cost share scheme. These are initiatives that are grounded in a more local and grass roots approach.

Goal #1. Establish an agricultural water quality group that will represent the interest of the Memphremagog region and to leverage the positive attention of the legislature, the press, and the watershed community and to promote the best use of government cost share dollars.

ACTIONS	KEY PLAYERS	FUNDING	DATE
1. Create a Steering Committee to look at the different models for such a water quality group and provide overall direction	OCNRCD	C&C grant	2010-2011
2. Assemble a membership from the various ag groups, and create an agenda for targeted funding and technical assistance based on goals below	OCNRCD, Farm Bureau, NOFA, Grange, VT Fruit and Vegetable Growers Assoc, Milk haulers, Large Animal Vets, Grain and Feed Dealers, Farm Equipment Sales, Local Work Group, Watershed Association, local legislators	In-kind from members	2010-2011

3. Identify and implement milk marketing policies that promote overall sustainability that will have a positive impact on water quality	Local agricultural watershed group	In-kind from members, Agency of Agriculture	2011
4. Utilize Local Work Group in identifying projects based on local priorities	OCNRCD, NRCS Agency of Ag	NA	2011 on
5. Incorporate future planned farm expansions when designing new manure storage facilities and examine the records of federally and state funded manure storage practices that are no longer being utilized.	USDA NRCS, Agency of Ag	NA	As needed
6. Refine P reduction estimates for practices funded and prioritize those with highest potential for positive impacts	USDA NRCS, Agency of Ag	NA	2011-2012

Goal #2. Minimize the acreage and number of days of fields in bare soil.

ACTIONS	KEY PLAYERS	FUNDING	DATE
7. Conduct a vulnerability analysis to identify specific areas (based on soil types, land use, agronomic practices, etc) and prioritize technical assistance and funding to these	OCNRCD, NRCS, Agency of Ag, Regional planning/GIS	Watershed grants, Partners	2011

areas			
8. Conduct extensive outreach of existing programs that provide financial incentives for cover crop, conservation cropping, no-till etc. to all farms	NRCS, Agency of Ag, OCNRCD	VACD	on-going
9. Use Local Work Group to provide priority points to NRCS projects that address bare soil.	OCNRCD, NRCS	NA	on-going
10. Conduct research trials on grasses best suited for cover crops for this region and shorter season corn varieties that preserve yields.	UVM Coop Ext	SARE grants	2011

Goal #3. Reduce opportunities for grazing animals to be in streams and break down stream bank vegetation.

ACTIONS	KEY PLAYERS	FUNDING	DATE
11. Make direct contact with producers to promote existing programs (e.g. CREP) that provide incentives for fencing, watering tanks, and stream crossings.	VACD, OCNRCD, NRCS, Agency of Ag	NRCS, Agency of Ag	on-going
12. Encourage use of rotational or planned grazing plans.	NRCS, VOFA, UVM, SARE, Holistic Management Practitioners	NRCS, VT Agency of Ag	on-going
13. Promote preservation and restoration of riparian and wetland areas for their other benefits such as thermal cooling, nutrient retention, and habitat enhancement.	VACD, OCNRCD, NRCS, Agency of Ag, VT Fish and Wildlife, US Fish and Wildlife Services	USDA, Agency of Ag, VT Fish and Wildlife, US Fish and Wildlife Services	on-going

Goal #4. Reduce the number of acres of agricultural land that transition to commercial and residential development thereby keeping land available for food production.

ACTIONS	KEY PLAYERS	FUNDING	DATE
14. Retrain traditional dairy work force to diversify agricultural offerings	Dept of Employment and Labor, UVM WAgN, Vocational Rehab,	Dept of Employment and Labor, UVM WAgN	on-going
15. Create opportunities and incentives for farmers to grow crops for renewable energy purposes (e.g. switchgrass)	VT Sustainable Jobs Fund, UVM Extension	VT Sustainable Jobs Fund, UVM Extension	on-going
16. Transition marginal dairy operations to fruit, vegetable, meat for local markets	VCHB Farm Viability program, UVM Ext	VCHB Farm Viability program, UVM Ext	on-going
17. Incentives through taxes or subsidies	VT State Tax Dept, VT Land Trust, VHCB	VT State Tax Dept, VT Land Trust, VHCB	on-going
18. Identify and protect prime agricultural lands	Agency of Ag, NRCS, VACD	VT Land Trust, VHCB, Local conservation commissions	2011
19. Inventory idle farm land	Agency of Ag, VCGI,	Agency of Ag	2012
20. Promote buying local programs and farmers markets to bring farmers and consumers together	VT Agency of Ag	Agency of Ag	on-going
21. Promote Vermont Farm to Plate Initiatives	VT Agency of Ag, VSJF	Agency of Ag, VSJF, Private Foundations	2011 on

Goal #5. Reduce the amount of pesticide use and dependence on commercial fertilizers

ACTIONS	KEY PLAYERS	FUNDING	DATE
22. Work with farms interested in transition to organic operations	NOFA, NRCS, Northeast SARE	NRCS	on-going
23. Promote grass fed/pasture farming through increased education, research, technical and financial support	Northeast SARE, VT Pasture Network, VT Grass Farmers Assoc.	VACD	on-going
24. Promote use of integrated pest management (IPM) where organic is not	USDA NRCS, Agency of Ag, OCNRC	NRCS	on-going

desired or feasible			
25. Utilize the educational elements of the VAAFM pesticide training and certification programs	Agency of Ag	NA	on-going

Goal #6. Improve Nutrient Management and soil health on all Farms

ACTIONS	KEY PLAYERS	FUNDING	DATE
26. Conduct NMP workshops for small and hobby farms	VACD, NERC, UVM Ext	VT Agency of Ag, UVM Ext, SARE, VACD,	2011 on
27. Provide outreach on N and P to vegetable operations	VACD, UVM Ext, VT Fruit &Vegetable Growers Assoc.	VACD, UVM Ext, VT Fruit & Vegetable Growers Assoc.	2011 on
28. Promote soil testing to determine nutrient requirements for individual fields	VACD, UVM Ext	NA	on-going
29. Promote workshops, programs, and materials specific to equine operations	VACD, VT Pasture Network, UVM Ext, Vermont Horse Association	VT Agency of Ag	on going
30. Create programs to improve infiltration and water holding capacity of soils through addition of organic material, avoiding compaction,	NRCS USDA, VT Agency of Ag, UVM Coop Ext, Highfields Center for Composting	NRCS, VT Agency of Ag, UVM, VACD, SARE	2011

Goal #7. Create a River Friendly Farm Program where local farms that go above and beyond the prescribed AAPs to help maintain healthy rivers are recognized for their efforts

ACTIONS	KEY PLAYERS	FUNDING	DATE
31. Establish criteria by which farms evaluated	VT DEC, VACD	VT DEC, Agency of Ag, VACD	2011
32. Select pilot area and begin evaluations	VT Agency of Ag, VT DEC, VACD	VT DEC, Agency of Ag, VACD	2011-2012
33. Award farms and promote their products	OCNRCD, VACD	VT DEC, Agency of Ag, VACD	2012 on

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APPENDIX F – VERMONT ANTI-DEGRADATION IMPLEMENTATION (4/2/08 DRAFT)

EXISTING USE DETERMINATION FOR USE DURING RIVER BASIN PLANNING

It is the policy of the State of Vermont to protect and enhance the quality, character and usefulness of its surface waters, prevent the degradation of high quality waters, and prevent, abate or control all activities harmful to water quality. Further, Vermont's Anti-Degradation Policy requires that the existing uses and the level of water quality necessary to protect those existing uses shall be protected and maintained (Section 1-03, Vermont Water Quality Standards). Determinations on the presence of an existing use can be made during basin planning or on a case-by-case basis such as during consideration of a permit application.¹ The Agency of Natural Resources will use the following process to identify existing uses of contact recreation, fishing, boating and public drinking surface water supplies during river basin planning and the development of river basin water quality management plans.

1. The Agency will presume that all lakes and ponds that exist within a river basin have existing uses of fishing, contact recreation and boating. This simplifying assumption is being used for two principal reasons: first, the well known and extensive use of these types of waters for these activities based upon their intrinsic qualities; and, secondly, to avoid the tedium associated with the production and presentation of exhaustive lists of all of these types of waterbodies across any given river basin. This presumption may be rebutted on a case-by-case basis during the Agency's consideration of a permit application which might be deemed to affect these types of uses.
2. Each river basin plan will include a list of existing uses of contact recreation, fishing, boating in/on flowing waters and a list of public drinking surface water supplies, which will be identified using the criteria set forth below.
3. To determine the presence of an existing use of contact recreation, fishing or boating on/in flowing waters or a public drinking water supply during the river basin planning process, positive findings with respect to several conditions need to be made. The unique set of criteria for each particular existing use is set forth below.
4. The list of existing uses in each river basin plan is not intended to represent an exhaustive list of all existing uses, but merely an identification of very well known existing uses. Additional existing uses of contact recreation, boating and fishing

¹ As per the Vermont Water Quality Standards, "existing use means a use which has actually occurred on or after 11/28/1975, in or on waters, whether or not the use is included in the standard for classification of the waters, and whether or not the use is presently occurring."

on/in flowing waters and additional public drinking water supplies may be identified during the Agency's consideration of a permit application.

Contact Recreation in Flowing Waters

The Agency may base its determination of the presence of an existing use for contact recreation in flowing waters if it can be shown there is more than an incidental level of use of the specified water body. The application of existing use determination criteria for contact recreation shall not apply to contact recreation situations that may be occurring but at a level deemed to be incidental, irregular and/or infrequent or in situations where there is no clearly defined or previously established access to the water. In determining the presence and level of use in a specified water body, positive findings are needed for both condition 1 and 2:

Condition 1. There is documentation and/or physical evidence that people have access to the waters for contact recreation.

Documentation or physical evidence may consist of:

- a. Existence of road pull-off areas, public parking areas, and public access trails.
 - ☞ Video and/or pictures taken from adjacent roads and from the water.
- and
- b. Status of land ownership: public lands and/or public easements defining access locations
 - ☞ Previously designated public contact recreation or public beach area.
 - ☞ Maps of municipal, state, or federal lands (including road rights-of-ways and bridge crossings).
 - ☞ Documents referring to easements on private lands granting public access to the water for contact recreation purposes;

Condition 2. There is documentation and/or physical evidence of attractive contact recreation sites in and along the affected water.

Documentation or physical evidence may consist of:

- a. Presence of any sandy or grassy beach or rock outcropping areas where people can comfortably rest out of the water.
 - ☞ Maps, video or pictures taken along the shore land of the affected waters.
- b. Presence of area with sufficient depth, deep water holes, cascades, gorges, rock outcroppings or large boulders in or along the affected waters that create a slow and safe water area for swimming, wading, floating, tubing and/or bathing.
 - ☞ Maps, video or pictures taken of the affected waters.
- c. Presence of aesthetically pleasing waters.
 - ☞ Observations concerning water clarity and substrate composition.
 - ☞ Water quality data concerning level of human health risk (such as E.coli abundance) has been regularly collected.

Recreational Boating on Flowing Waters

The Agency may base its determination of the presence of an existing use for recreational boating if it can be shown there is more than an incidental level of use of the specified water body. The application of existing use determination criteria for boating shall not apply to those recreational boating situations that may be occurring but at a level deemed to be incidental, irregular and/or infrequent or in situations where there is no clearly defined or previously established public access to the water. In determining the presence and level of boating use in, on or along a specified water body, positive findings are needed for both condition 1 and 2:

Condition 1. There is documentation and/or physical evidence that people have access to the specified reach of water for recreational boating.

Documentation or physical evidence may consist of:

a. Evidence of road pull-off areas, public parking areas, and public access to the waters edge for boat put-ins, take-outs and portage routes.

- ☞ Maps (digital or hardcopy) of designated public boating access points and public pathways to the water.
- ☞ Video and/or pictures taken from adjacent roads and from the water.
- ☞ Video and/or pictures taken of specified access area in use.
- ☞ Video and/or pictures taken of designated public boating access points and public pathways to the water.

and

b. Status of land ownership: public lands and/or public easements defining access locations.

- ☞ Maps of municipal, state, or federal lands (including road rights-of-ways and bridge crossings) detailing public boating access points and public pathways to the water.
- ☞ Documents referring to easements on private lands that grant public access to the water for recreational boating purposes;

Condition 2. There is documentation and/or physical evidence of attractive recreational boating in, on or along the specified reach of water.

Documentation or physical evidence may consist of:

a. Features (unique or otherwise noted) valued for recreational boating (whitewater or flat-water).

- ☞ Video or pictures taken along the shore land of the specified waters and features.

b. Pooled water, rapids, ledges, cascades, gorges, rock outcroppings or large boulders in or along the specified reach that create rapids or pools for boating.

- ☞ Video or pictures taken of the specified waters.

- c. Aesthetically pleasing waters.
 - ☞ Observation of water clarity and substrate composition.

Recreational Fishing in Flowing Waters

The Agency may base its determination of the presence of an existing use for recreational fishing if it can be shown there is more than an incidental level of use of the specified water body. The application of existing use determination criteria for fishing shall not apply to situations where fishing may be occurring but it is being done at a level deemed to be incidental, irregular and/or infrequent or in situations where there is no clearly defined or previously established public access to the water. In determining the presence and level of use in a specified water body, positive findings are needed for both condition 1 and 2 or for either condition 3 or 4:

Condition 1. There is documentation and/or physical evidence that people have public access to the waters for recreational fishing.

Documentation or physical evidence may consist of:

- a. Existence of road pull-off areas with public parking areas, public access trails, publically accessible streambanks or similar features.
 - ☞ Video and/or pictures taken from adjacent roads and from the water.

and

b. Status of land ownership: public lands and/or public easements defining access locations.

- ☞ Previously designated public boat launching area with vehicle parking.
- ☞ Maps of municipal, state, or federal lands (including road rights-of-ways and bridge crossings).
- ☞ Documents referring to easements on or across private lands granting public access to the water for recreational fishing purposes.
- ☞ Documentation of private ownership by 501c3 non-profit conservation organizations and/or land trusts that promote or grant public access for fishing.

AND

Condition 2. There is documentation and/or physical evidence of sites to fish in, on or along the specified reach of water.

Documentation or physical evidence may consist of:

- a. Presence of any land areas along rivers where people can comfortably engage in angling.
 - ☞ Video or pictures taken along the shore land of the affected waters.
- b. Presence of pools, fish refuge areas and other habitats in, on or along the affected waters (especially rivers) that create sufficient habitat structure and diversity suitable for fish targeted by Vermont anglers.
 - ☞ Video or pictures taken of the affected waters.

- c. Presence of fish populations targeted by Vermont anglers.
 - ☞ Fish population surveys documenting the presence of target species.
 - ☞ Survey data concerning angler use and catch rates.
 - ☞ Water quality data concerning target fish suitability and sustainability has been regularly collected.

OR

Condition 3. There is documentation of reaches where special regulations for fishing have been imposed by the State of Vermont (whether stocked fish or not).

Documentation or evidence may consist of:

- a. Type, nature and subject species of special fishing regulation(s).

OR

Condition 4. There is documentation of reaches or affected waters that are stocked as a result of being identified on the State's Managed Request for Cultured Fish.

Documentation or evidence may consist of:

- a. Species being stocked and stocking history of affected waters.

Public Drinking Surface Water Supply

The Agency may base its determination of the presence of an existing use for a public drinking surface water supply if there is more than an incidental use of the specified water body as a public drinking surface water supply. The application of existing use determination criteria for public drinking surface water supplies shall not apply to non-public or domestic water supply withdrawals (e.g. single family residence) from a specified surface water. In determining the presence of an existing use of a public drinking surface water supply source in a specified water body, positive findings are needed for one the following two conditions:

Condition 1. Documentation and/or physical evidence exists that the specified waters are used as a source for public drinking water supply.

Documentation and physical evidence may consist of:

- a. Recorded regular use of specified water body as an active public drinking water supply source.
 - ☞ Maps and documents detailing supply intake locations, permits, source protection areas and approximate number of connections or people served.
- b. Recorded use of specified water body as a designated emergency (not in active use) public drinking water supply source.
 - ☞ Maps and documents detailing supply intake locations and inclusion in source protection areas, plans or permits, etc.
- c. A physical intake for treatment and distribution of water for public drinking water supply from specified water body.

OR

Condition 2. Documentation and/or physical evidence exists that the specified groundwater source for public water supply meets the State's criteria for "groundwater under the direct influence of surface water."

Documentation and physical evidence may consist of:

- a. Maps and documents detailing surface water infiltration of public drinking water groundwater source from specified surface water body, including but not limited to pumping tests results and microscopic particulate analysis.
- b. Infiltration of groundwater sources from specified surface water body.
- c. Proximity and depth of groundwater source to adjacent surface water.

APPENDIX G - MUNICIPAL PLANNING AND ZONING REVIEW

Review of town planning documents for Towns in Basin 17. Lake River and Wetland protections are categorized based in general on recommended protections for these resources.

Town	Year	Lake	River	Wetland	NFIP	Comments on town plans
ALBANY					no	No Town Plan
AVERILL	2006	yes	yes	no	no	See Unified Towns and Gores
BARTON	2008	yes	yes	yes	yes	The Barton town plan has a Shoreland district around 3 ponds: Crystal Lake, May Pond, and Baker Pond. The district was established because "the town has a vested interest in preserving water quality.." It also has a section on Wetlands where the values are described and state and federal protections are discussed. The town proposes no additional local wetland protection but does want citizens to be aware of existing rules. The plan also discusses the importance of its natural resources highlighting the rivers, streams, and ponds. It describes the amount of Fish & Wildlife Department land along the Barton and Willoughby Rivers. It notes that one of the town's primary natural resources are its water bodies and "these bodies should be protected through floodplain management, buffer zones and setbacks."
BRIGHTON	2008	no	yes	yes	yes	The Brighton town plan states that "protecting water quality should be a high priority for the Town." The plan highlights the importance of buffer strips and discusses what activities have an impact on water quality. There is also good coverage of wetlands in the plan including the statement that "the preservation of these wetlands should be a priority in Island Pond's conservation effort." An update to the town plan in 2008 reduced the buffer strip previously mentioned from 50 to 30 feet and now allows "grass" in the buffer.
BROWNINGTON	2006	no	no	no	no	The Brownington town plan describes its major water resources which includes the Willoughby River and its tributaries as well as Brownington Pond. The only recommended actions, however, are to "to encourage stewardship of the towns natural resources through information and education" and to "Inventory rare and irreplaceable areas, wetlands, pond shore lands and riparian buffers"
CHARLESTON	Charleston has no town plan and does not participate in the NFIP program					
COVENTRY	2009	some	some	some	yes	The Coventry town plan has sections on lakes, ponds, and watersheds and on wetlands, which identify well the threats to these resources. Watersheds and wetlands are considered to be "fragile areas" by the town and the planners feel that education of town residents about these resources and threats to them is the best way to "create an effective deterrent against the misuse and/or pollution of our watershed and wetland areas.". The town backs state and federal wetland regulation as well as wetland acquisition.
CRAFTSBURY	2006	some	some	some	yes	Great discussion of town water resources, watersheds and water quality threats and support for protection of riparian areas although no specific recommendations. The town plan states "Conserving riparian ecosystems allows them to carry out their many functions, which include.." and has a recommendation to "Collect and utilize maps of surface waters, wetlands and key watersheds and riparian habitats that should be protected or conserved to support habitat for fish, aquatic plants, aquatic invertebrates and other organisms important to our natural heritage."

Town	Year	Lake	River	Wetland	NFIP	Comments on town plans
DERBY	2009	yes	yes	yes	yes	The Derby town plan states that " the zoning regulations and the State of Vermont Conditional Use Determinations will address streams, ponds, and wetlands and their preservation in their natural state. Natural vegetation within at least 100 feet of streams, ponds, and wetlands shall be preserved."
GLOVER	2006	yes	yes	yes	yes	The town plan has three strategies related to water "Support watershed studies, monitoring and education to maintain and improve water quality within the town." "Help preserve and protect glovers wetlands according to the most recent rules.." "Maintain all lakefront areas, the South Barton River and other streams in their natural, Pristine condition to the maximum extent possible, including the establishment of buffer strips to stabilize stream banks and prevent erosion."
GREENSBORO	2007	yes	yes	yes	yes	One of 6 major objectives for the town of Greensboro is to "preserve the quality of all Greensboro's surface waters, including lakes, ponds, rivers, streams, and wetlands as sources of water supply; absorption areas for flood waters; habitats for wildlife, waterfowl, and vegetation; recreation areas; and aesthetic enjoyment." The town's policy is to maintain a Lakeshore District for each of its lakes and major ponds that will include shoreland zoning. Other policies include: monitoring septic regulations, maintaining all rivers and streams in the natural pristine condition to the maximum extent possible; preserving and protecting all of Greensboro's wetlands among others.
HOLLAND	2007	no	no	some	no	2007 town plan only briefly touches on waters in the town and the only objective is to "work with the State Agency of Natural Resources to provide appropriate protection to wetlands, recognizing that in some circumstances tradeoffs can be made in which the functions of wetlands areas can be improved"
IRASBURG	No Town Plan or participation in NFIP program					
MORGAN	2004	some	no	some	no	A goal in the Morgan town plan is to "reduce or eliminate the pollution of Lake Seymour and other surface waters by regulating shoreland development, septic systems, logging operations, boating, surface run-off, and/or ice fishing operations." The plan also states that "major wetlands in the community should be recognized and protected from filling and development."
NEWPORT CITY	2009	some	no	no	yes	The 2009 town plan includes a description of the lakes and it importance to the city with the following recommendations "adopt a waterfront or lakeside zone in the bylaws to guide development to common best interest." "support the Memphremagog Watershed Association and other environmental organizations working to protect and reclaim the natural environment within and surrounding the City" "The city should develop regulations that deal with the health and welfare of the lake" No specific protections are suggested.
NEWPORT TOWN	2009	some	some	some	yes	The Town of Newport town plain includes a good description of water resources and threats and includes the following two objectives/recommendations: "The town needs to maintain and encourage establishment and maintenance of vegetated buffer zones along shorelines or Lake Memphremagog, streams, ponds and Mud Creek in order to prevent bank erosion, bank collapse and the flow of detrimental sediments into the water." and "The town should adopt a riparian buffer ordinance"

Town	Year	Lake	River	Wetland	NFIP	Comments on town plans
NORTON	2006	yes	yes	no	no	The Norton town plan lists the following 3 (out of a total of 5) priorities directly or indirectly related to protecting water quality "The number of town-maintained roads (class 3 and 4) should be kept to a minimum and environmental quality should be given priority when new roads are constructed.", "Minimizing environmental degradation caused by development activities is a priority" and "Maintaining and protecting water quality in our lakes ponds rivers wetlands and streams is a priority." The town plan also states that "Norton endorses strict set-back requirements, vegetated buffer strips, and enforcement of Vermont State standards for sewage disposal systems."
UNIFIED TOWNS AND GORES, AVERILL AND WARNERS, WARREN, AVERILL GORES	2006	yes	yes	no	no	The Unorganized Towns and Gores town plan has strong statements in support of water quality protection. The town plan includes following 3 priorities "The number of roads should be kept to a minimum and consideration of environmental quality given priority." "Minimizing the amount of soil erosion caused by logging or new development is a priority." "Maintaining and protecting water quality in our lakes, ponds, rivers, wetlands, and streams is a priority." The activities and impacts that can affect water quality are discussed and the plan states "Maintaining and protecting the water quality of our lakes, ponds, rivers and streams is a high priority for the planning commission." and that they will " Monitor and enforce local ordinances created to maintain and protect the existing water quality." The town plan also states "we shall require strict set-back requirements with vegetated buffer strips." Only general mention is made of wetlands
WESTMORE	2008	yes	yes	yes	yes	The Westmore town plan had a relatively long and thorough discussion of water quality issues: gray water and black water and impacts on the lakes and ponds, buffer strips, lighting, undeveloped shorelines, and nonpoint runoff. The plan mentions the zoning changes of 2000 and says the new zoning has restrictions on expansion of existing structures towards the water, "appropriate setbacks from the water for all new structures" and creating vegetative buffer strips. The zoning also addresses erosion in the shoreline protection area with the following provision "Construction: All construction which involves excavating, grading, filling, or otherwise disturbing the soil, shall be done in accordance with the guidelines in Chapter 4 of the Vermont Handbook for Soil Erosion and Sediment Control on Construction Sites, Special Publication No. 3. 1. Only the smallest area necessary for the construction shall be disturbed at any one time, and completed areas shall be permanently stabilized when another area is opened."

Review of town zoning documents for Towns in Basin 17. Protections for lake river and wetland resources are categorized based the general level of protections for these resources.

Town	Year	Lake	Stream	Wetland	Comments on town zoning documents
ALBANY					No Zoning
AVERILL	2006	yes	yes	yes	See comments Unified Towns and Gores
AVERYS GORE	2006	yes	yes	yes	See comments Unified Towns and Gores
BARTON	2006	minimal	some	no	The Barton zoning bylaw does have a Shoreland district for four of its lakes and ponds and it does have a stream or river setback provision "Sec 328: Streambanks No development shall occur within 50 feet of the seasonal high water mark of any stream or river shown on the official zoning maps. If such stream or river is within a designated flood plain area, Sec 327, Flood Hazard Area Requirements, shall control ." but neither would provide much water quality protection. Many uses, and some rather intense uses, are permitted in the Shoreland District. The shoreline setback from 4 identified lakes is only 25 feet from mean water level and independent accessory use structures can be closer. Parking areas could also be closer if the planning commission approves.
BRIGHTON	2009	minimal	no	no	The Brighton zoning regulations state that any development within 500 feet of a lake or "other major waterbody" (not defined) has to be reviewed by the planning commission as for a conditional use. New septic systems must be at least 100 feet back from the shoreline where possible. An update of the town zoning in 2008 removed the protections of the buffer reducing this to 30 feet and allowing grass. "A 30-foot vegetative buffer, consisting of grass, shrubs and/or trees, shall be maintained adjacent to the shoreline. Limited access to the water is provided through the buffer, but no applications of fertilizer, pesticides, or nutrients in the buffer zone are permitted."
BROWNINGTON		-	-	-	No zoning
CHARLESTON		-	-	-	No zoning.
COVENTRY		-	-	-	No zoning.
CRAFTSBURY		-	-	-	No zoning. The town only has Flood Plain regulations.
DERBY	2009	no	no	no	The Derby zoning has a shoreland district whose purpose is to "provide for the protection of public waters, control of water pollution, preservation of shore cover and natural beauty.." but the only requirement that will actually provide some protection is a 100 foot setback for septic tanks and leach fields from the mean high watermark of a body of water.. Derby has an interesting prohibited use in the SPA : "the rendering of more than twenty percent (20%) of a lot into impermeable area."
GLOVER		-	-	-	No zoning
GREENSBORO	2009	yes	yes	no	150 ft setback 75ft buffer for Lake Elligo. 25 foot buffer and setback for all perennial streams. "Within the buffer area (excepting Long Pond, see below), existing healthy trees, shrubs, and ground cover shall be maintained and enhanced by selective cutting, pruning, and appropriate planting" Mention of VT wetland rules but no additional protections.
HOLLAND		-	-	-	No zoning
IRASBURG		-	-	-	No zoning

Town	Year	Lake	Stream	Wetland	Comments on town zoning documents
MORGAN	2004	some	no	no	The Morgan zoning regulations have a lakeshore district that includes shoreland on Lakes Seymour and Salem. However, the district standards do not afford much protection - only a 20-foot setback for structures from the lake is required along with the land capability to handle sewage.
NEWPORT CITY	2010	minimal	no	no	The only areas named as conservation is water and wetlands that are owned by the state. "All structures, except boathouses, docks and uncovered porches, shall be at least seventy-five (75) feet from the shoreline in those portions of the General Residential District that are located within the Shoreland Control District." For three or more lot subdivisions the zoning states that "Vegetated buffers along stream banks are to be maintained or enhanced"
NEWPORT TOWN	2006	no	no	no	No specific surface water or wetland protections at all in zoning regulations. Rear yard setback of 25 feet would apply to lots on Lake Memphremagog, but setback is only 5 ft for utility sheds.
NORTON	1994	yes	yes	no	The Norton zoning regulations have a lakeshore and streambank district that includes land "within 100 feet of major streams and bodies of water." The standards are not strong but there are limited permitted uses. There is a 100 foot setback for forestry, outdoor recreation, camps, and accessory uses but not single family dwellings (which should have the setback!).
UNIFIED TOWNS AND GORES, AVERILL AND WARNERS, WARREN, AVERILL GORES	2006	yes	yes	yes	The January 2006 zoning regulations for the Unorganized Towns and Gores (6 towns) includes a Shoreland District and a Conservation Overlay District which provide protection to surface waters and wetlands. The Shoreland District, which is the land within 250 feet of lakes and ponds over 5 acres in size, has a 100 foot setback from seasonal high water and a minimum 50 foot vegetative buffer requirement. The minimum frontage is 200 feet on the shoreline. Section 306 of the zoning states that "the area of natural vegetation and trees at least 50 feet in width along the shoreland shall not be cut." Shoreland is defined as the land within 250 feet of any streams, rivers, lakes and ponds. This section also has the protective strip width guide from the AMPs. Wetlands are protected through the Conservation Overlay District. Roads, buildings, structures and sewage systems have to be set back 100 feet from the wetland.
WESTMORE	2006	yes	yes	no	The Westmore zoning bylaw includes a shoreline protection area and a vegetative buffer zone. The Shoreline Protection Area and required setback is either 100 feet or 50 feet depending on the slope or depth to bedrock or depth to groundwater table. The buffer zone is only 15 feet or top of bank, whichever is greater. Clearing for lawns is allowed in the Shoreline Protection Area but outside the vegetative buffer zone. Other activities are allowed in the SPA but they are somewhat limited. The zoning also addresses erosion in the shoreline protection area with the following provision "Construction: All construction which involves excavating, grading, filling, or otherwise disturbing the soil, shall be done in accordance with the guidelines in Chapter 4 of the Vermont Handbook for Soil Erosion and Sediment Control on Construction Sites, Special Publication No. 3. 1. Only the smallest area necessary for the construction shall be disturbed at any one time, and completed areas shall be permanently stabilized when another area is opened."

APPENDIX H - PROJECTS COMPLETED DURING THE PLANNING PROCESS

Better Back Roads projects

The Better Backroads Program offers improved infrastructure and maintenance practices for eroding ditches, unstable culvert inlets or outlets, and eroding roadside banks which can also help prevent flash flood damage during heavy rain events. Grants are provided for two general categories of projects including (A) developing a town-wide inventory of erosion control needs and a capital budget plan to address these needs, and (B) correcting existing erosion control problems. The following projects have been completed in the basin since 2006:

- Wayesses Road BBroads project in Morgan
- Sugarbush Road gully stabilization project in Morgan
- Old Cottage Road BBroads project in Westmore
- Long Pond BBroads project in Westmore
- Newport Town BBroads project
- Schoolhouse Road BBroads project in Brownington
- Brosseau Mountain Road Bbroads project in Norton
- Cottage Road BBroads project in Averill
- Road inventory (category A) and Church Hill Road projects in Charleston
- Tice hill Road BBroads Project in Holland
- Culvert inventory (category A) and follow up BBroads projects around Daniels Pond and Dexter Mt Road in Glover

Buffer planting projects

The other major focus of projects in the basin have been lake and river buffer planting projects. These projects have been funded through a variety of funding sources and have taken place on both public and private lands. A full map and table of planting projects done in 2009 and 2010 is shown on the following page.

- The Orleans County Natural Resources Conservation District received funds in 2009-2011 through the Ecosystem Restoration program to support the Northeast Kingdom Lake Shore Buffering Program and the Trees for Streams program. These programs include consultation with landowners to plan buffer plantings, and included a 10 percent match provided by the landowner to support the purchase of plant materials for planting buffers on 6-8 sites per year.
- The City of Newport working closely with the Memphremagog Watershed Association to plant buffers along Lake Memphremagog at Prouty Beach, and along the Clyde River funded through an Ecosystem Restoration Grant.
- Two watershed grants have funded planting projects led by the Orleans County Natural Resources Conservation District in the Black River watershed along McCleary and Cass Brooks and the Black River.
- The Vermont Department of Fish and Wildlife has completed large buffer planting projects along the Lower Barton River in both the South Bay and Willoughby Falls WMA's covering well over a mile of streambank.
- A small buffer planting project on the Clyde River on property owned by Great Bay Hydro was completed by the Vermont Department of Environmental Conservation with volunteer support from the Memphremagog Watershed Association and funding by Great Bay Hydro.

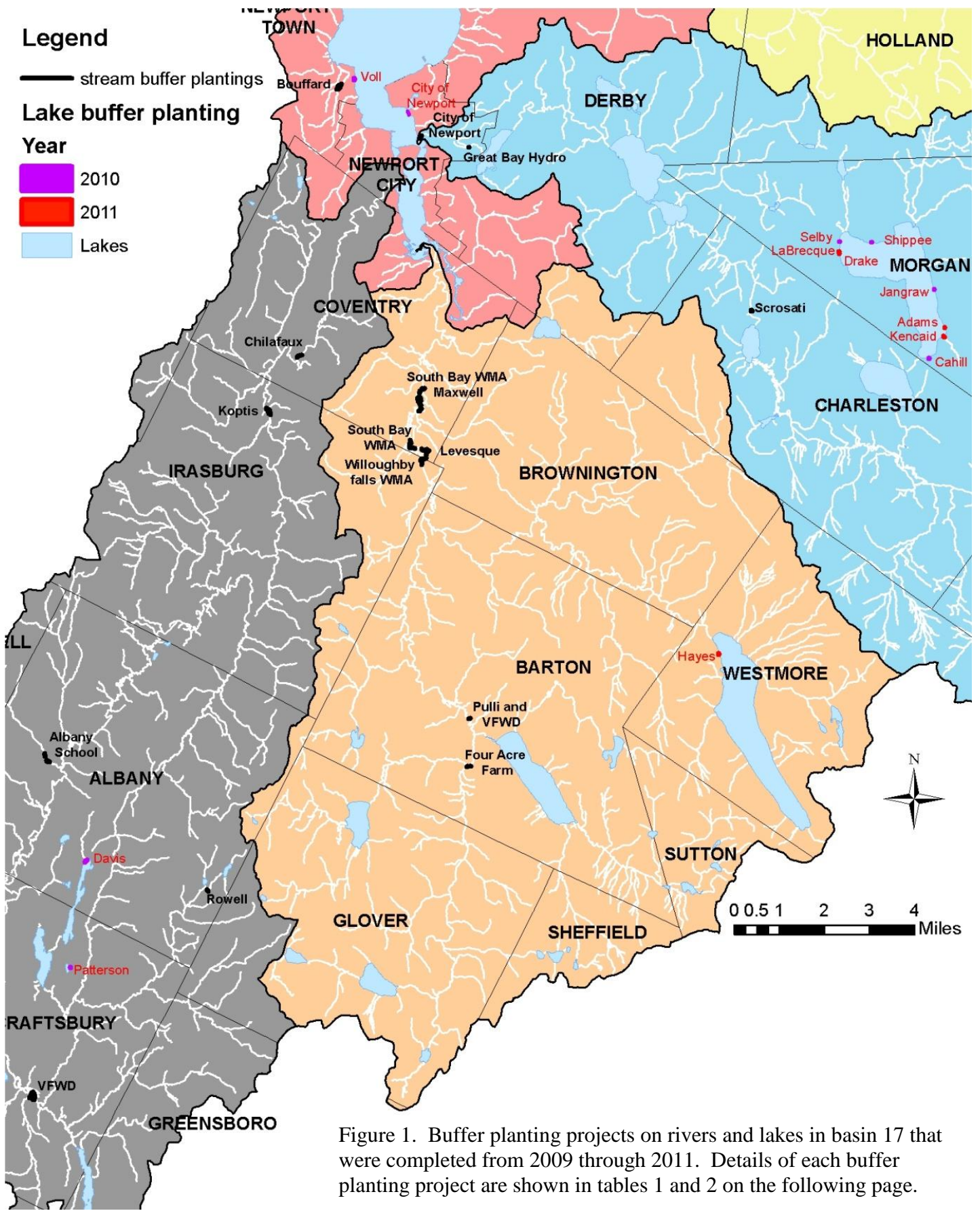


Figure 1. Buffer planting projects on rivers and lakes in basin 17 that were completed from 2009 through 2011. Details of each buffer planting project are shown in tables 1 and 2 on the following page.

Landowner	year	Area in Meters
City of Newport	2009	2204
Jangraw	2010	66
Cahill	2010	130
Selby	2010	147
Shippee	2010	63
Davis	2010	357
Voll	2010	263
Patterson	2010	337
Kencaid	2011	294
Drake	2011	156
LaBrecque	2011	73
Hayes	2011	395
Adams	2011	48
Total buffer area		4533

← Table 1. Buffer plantings on lakes and ponds in the basin from 2009 through 2011. All plantings were part of the Northeast Kingdom Lakeshore Buffer Planting program funded through Ecosystem restoration grants except for the 2009 buffer planting on property owned by the City of Newport which was completed by the Memphremagog Watershed Association and also funded through an ecosystem restoration grant.

Table 2. Buffer plantings on rivers and streams in the basin from 2009 through 2011. Buffer plantings were done by a variety of partners in the basin through a wide variety of funding sources.

Length in feet	landowner	Project lead	comments	Year	Bank Planted	funding	River
2293	Willoughby falls WMA	VFWD	Silver & red maple, boxelder, cedar	2009/2010	Left	Duck Stamp	Barton River
1661	South Bay WMA	VFWD	Silver & red maple, boxelder, cedar	2009/2010	Right	Duck Stamp	Barton River
409	City of Newport	MWA, City of Newport	2009 planting + 2010 and 2011 plantings	2009/2010/2011	Right	ERP, MWA donations	Clyde River
2680	South Bay WMA Maxwell	VFWD	alder, willow, R&S maple, dogwood, n arrowood	2010	Both	Duck Stamp, P&R, Ducks unlimited	Barton River
2071	VFWD	OCNRCD, Northwoods, MWA	R&S maple, Willow, dogwood, cedar, ninebark,	2010	Left	Watershed Grant	Black River
1376	Koptis	OCNRCD	2010 Trees for streams	2010	Both	ERP	Black River
168	Levesque	OCNRCD	2010 Trees for streams	2010	Right	ERP	Barton River
185	Scrosati	OCNRCD	2010 Trees for streams	2010	Right	ERP	Clyde River
744	Chilafaux	OCNRCD	2010 Trees for streams	2010	Right	ERP	Black River
212	Pulli and VFWD	OCNRCD	2010 Trees for streams	2010	Right	ERP	Barton River
17	Great Bay Hydro	VDEC, MWA	small buffer planting to stabilize mass failure	2010	Right	Great Bay Hydro	Clyde River
1013	Albany School	ONRCD, Northwoods	2011 trees for streams	2011	Right	Watershed Grant, ERP	McCleary Brook
317	Rowell	ONRCD, Northwoods	2011 trees for streams	2011	Left	ERP	Seaver Brook
346	Four Acre Farm	ONRCD, Northwoods	2011 trees for streams	2011	Right	ERP	Barton River
299	Scrosati	ONRCD, Northwoods	2011 trees for streams	2011	Right	ERP	Clyde tributary
1425	Bouffard	ONRCD, Northwoods	2011 trees for streams	2011	Both	ERP	Holbrook Bay
15216	Total length of buffer plantings						

Other projects completed during the Planning process

- **Rain Barrel workshop and instillation at the North Country Chamber in the City of Newport-** The Northwoods Stewardship Center held a workshop on how to mitigate the effects of storm water runoff in your community through proactive town planning to individual efforts. The workshop including building your own barrel, and learning how to install and maintain it. Also as part of the project a rainbarrel was placed at the North Country Chamber of Commerce on the banks of the Clyde River.
- **Wetlands Assessment along the Clyde River in Charleston and Brighton-** The Northwoods Stewardship Center received funds through a 604(b) grant passed through the NVDA to identify priority wetlands within the upper Clyde River watershed. The project included natural community mapping within these wetlands, in coordination with the Vermont Agency of Natural Resources and outreach through one public presentation and through letters to wetland landowners. The project is continuing through funding provided by another 604(b) grant in 2011.
- **ANR Culvert assessment covering the Town of Coventry** - In 2007 NVDA conducted an ANR Bridge and Culvert Assessment for 50 sites in the Town of Coventry using the VT Stream Geomorphic Assessment Tool (SGAT) database. NVDA and the VANR Watershed Coordinator created a powerpoint presentation summary of the above results to be used for presenting the data to the Town of Coventry and discussed the next steps to repairing or replacing the highest priority bridges and culverts identified in the study.
- **Public meetings and Canoe paddles along the Black and Clyde Rivers** - The Memphremagog Watershed Association and partners hosted public meetings on the historical use and water quality of the Black River and paddles on the Clyde and Black Rivers to increase public awareness.
- **South Bay Clean-up** - The Memphremagog Watershed Association and Agency of Natural Resources completed a trash clean up of South Bay.
- **Lakeshore land management workshops** - The Seymour Lake Association and Memphremagog Watershed Association worked with the Department of Environmental Conservation to host public workshops on the management of lakeshore to improve water quality and habitat along lakes and ponds.
- **Establishment of the Eagle Point Wildlife Management Area on Lake Memphremagog** ([link](#)) - In the summer of 2010 the USFWS acquired the Eagle Point property in accordance with the terms of the Michael Dunn Trust, which offered the land to the federal government as a donation. It is owned by the US Fish and Wildlife Service (USFWS) and managed by the Vermont Fish & Wildlife Department in partnership. The property consists of nearly a mile of lakeshore habitat on Lake Memphremagog and numerous wetlands, large meadows, hemlock and mixed forest.
- **Expansion of South Bay WMA along the Lower Barton River** ([link](#)) - The VT Department of Fish and Wildlife has expanded the South Bay WMA including lands along the Barton River where numerous riparian buffer plantings have taken place.
- **Conservation of Clyde River Parcel west of 105 bridge** – As part of a wetland mitigation project Great Bay Hydro and the Nature Conservancy conserved land including wetlands along the Clyde River west of the Route 105 bridge.

A summary of Agricultural projects completed in the basin is shown in Appendix E.

APPENDIX I – WASTE WATER TREATMENT FACILITIES.

WWTF location	Type of Treatment	Permitted flow	Phosphorus effluent Limit	Permit expiration date	Outfall location	Recent or planned updates
Village of Barton	Aerated lagoon with filtration	265,000 gpd	1.0 mg/l	March 31, 2012	Barton River	
Village of Orleans	Activated sludge with chemical addition and filtration	190,000 gpd	1.0 mg/l	December 31, 2012	Barton River	1998
Town of Brighton	Aerated lagoon	150,000 gpd	None	June 30, 2012	Pherrins River	
City of Newport	Extended aeration with chemical addition	1,300,000 gpd	0.8 mg/l	June 30, 2009	Clyde River	2008

APPENDIX J – PERMITTING FOR KINGDOM COMMUNITY WIND AND FOR NEWSVT LANDFILL

Kingdom Community Wind:

The Agency of Natural resources has issued Kingdom Community Wind the following permits or certifications to that address protections for water quality: individual wetlands permit #2008-364, individual stormwater construction permit # 6216-INDC, individual stormwater permit #6216-INDS, and a 401 water certification which are linked on the Watershed Management Division website at <http://www.anr.state.vt.us/dec/waterq/kingdomwind.htm> as well as by the direct links to each permit below.

Wetlands

- [Individual Wetlands Permit #2008-364](#)
- [Notice of Final Issuance](#)

Stormwater

- Individual Construction Permit #6216-INDC
 - [Permit #6216-INDC](#)
 - [Notice of Authorization of Permit #6216-INDC](#)
 - [Response Summary](#)
- Individual Stormwater Permit #6216-INDS
 - [Permit #6216-INDS](#)
 - [Response Summary](#)

401 Water Quality Certification

- [401 Water Quality Certification](#)
- [Response Summary](#)

The stormwater construction permit for Kingdom Community Wind, Permit # 6216-INDC, requires sampling of visibly discolored waters leaving the construction site and actions if these levels exceed 25 NTU. Through the water quality certification for the project, macroinvertebrate and fish community sampling is required for 5 years on the Shalney Branch, McCleary Brook and the Rogers Branch, which also has a requirement for continuous temperature monitoring. If the Agency determines that the data reflects a change in biological integrity indicative of a deterioration of water quality conditions, the Agency shall inform the applicant and the applicant shall meet with the Agency to discuss the data and any necessary measures to address the deterioration of water quality. The Agency retains the authority to require and the applicant shall take any actions necessary to address the identified deterioration in water quality.

NEWSVT Landfill:

The Agency of Natural resources has issued NEWSVT the following permits or certifications to that address protections for water quality: a certification for Phase IV with regards to the solid waste management rules, an operational and construction stormwater, the Multi-Sector General Permit (permit #4795-9003 and a pre-treatment discharge permit (# 3-1406) which allows for treatment of 15,000 GPD of leachate at the Newport City wastewater facility. The District Environmental Commission has also issued an act 250 land use permit covering the site.

NEWSVT Certification Phase IV:

http://www.anr.state.vt.us/dec/wastediv/solid/documents/NEWSVT_LFCert_18OCT2010.pdf

Act 250 landuse permit:

<http://www.anr.state.vt.us/site/cfm/act250/detail.cfm?ID=20793>

NEWSVT has requested and received a variance from the following Solid Waste Management Rules and Procedures: §6-503 (b)(4) requiring a 300' setback from the edge of landfill liner to surface waters; Section 6-606 (a)(2) requiring the facility to control the emission of objectionable odors; and, from Section 6-802 (e) and the Procedure Addressing Liquid Waste Disposal in landfills requiring no free liquids be disposed of in the landfill. The set back portion of the variance was apparently requested in order to use the maximum area between the existing lined cells and the Black River Wetlands Complex, extending the capacity of the landfill. The remaining variance requests are temporary in nature and are required to address potential problems while the unlined landfill is being excavated and waste is placed in the new lined cells. The Agency found that because the variance addresses the elimination of the unlined portion of the landfill, the variance will reduce the potential for water quality and groundwater impacts related to the deposition of waste in the unlined portion of the facility. To further proceed with the development of Phase V at the Coventry landfill, NEWSVT would need to apply for and receive a solid waste lined landfill certificate and an Act 250 land use permit.

There is monitoring of the landfill including leachate, groundwater, and surface waters and biannual reports are produced and available on the web at:

http://www.anr.state.vt.us/dec/wastediv/solid/Waste_USA_Monitoring.htm

APPENDIX K - RESPONSIVENESS SUMMARY TO PUBLIC COMMENTS

Vermont Department of Environmental Conservation Agency of Natural Resources Responsiveness Summary to Public Comments Regarding:

Basin 17 Water Quality Management Plan Covering the Lake Memphremagog, Tomifobia and Coaticook river Watershed.

On November 14, 2011 the Vermont Department of Environmental Conservation (DEC) of the Agency of Natural Resources (ANR) released a final draft of the Basin 17 Water Quality Management Plan for public comment. The public comment period, which ended on December 21st, included two public meetings. The meetings were held in Island Pond on December 1st and in Newport on December 5th 2011.

The DEC prepared this responsiveness summary to address specific comments and questions and to indicate how the plan has been modified. The comments below follow the outline of the final draft plan. Comments may have been paraphrased or quoted in part. The full text of the comments is available for review or copying at the Saint Johnsbury Regional Office of the Department of Environmental Conservation, Suite 201, 1229 Portland Street, Saint Johnsbury, Vermont 05819.

Preface: The importance of basin planning in the face of tropical storm Irene

Comment/question: Has tropical storm Irene taught us anything that relates to actions in the plan?

Response: The Agency of Natural Resources is in the process compiling what we have learned from tropical storm Irene to reduce our future vulnerabilities to flooding in Vermont. As noted in the preface, tropical storm Irene clearly highlighted the importance of actions to reduce runoff from developed lands, to improve infrastructure to handle more intense storms, and most importantly to minimize conflicts in the river corridor which together can help to reduce future vulnerabilities to flooding.

Chapter 1 –Progress reporting

Comment/Question: How will this plan be evaluated over time? What accountability is there to make sure the actions are completed?

Response: The draft plan lays out a process by which actions listed in the final plan will be reviewed on an annual basis with partners in the basin. The review will include updating the status of actions, potential changes to actions based on new knowledge, and a discussion on what needs to be done to achieve actions listed to be completed in the coming year. Chapter Four of the Vermont Surface Water Management Plan also lays out the process for adaptive watershed management using a tactical planning process. See www.vtwaterquality.org/swms.html

Chapter 2 -Basin description

Comment: The watershed doesn't end at the Quebec/Vermont border so a map of the watershed showing rivers that flow north into Quebec including the Sterns Brook watershed would be helpful for providing the larger watershed context for the Vermont portions of the basin.

Response: A map has been produced to show the Saint Francis River watershed and the full watersheds of Lake Memphremagog, Lake Massawippi, which includes the Sterns and Holland Brooks, and the Massawippi River, which includes the Coaticook River and this map replaced Figure 2 which had shown just the Vermont portions of the Saint Francis River Watershed. The basin plan is limited to the portions of the basin in Vermont but such a map does provide helpful context for the watershed as a whole.

Chapter 2 -Basin Assessment and priority water quality concerns

A single response to comments regarding both the NEWSVT landfill and Kingdom Community Wind is provided below since the change in the draft plan addresses the comments together.

Comment from MCI (and similar input from others): The first concern is potential environmental threat to Lake Memphremagog represented by the presence of the New England Waste Services of Vermont Coventry landfill adjacent to the Black River. This is a long standing concern on our part that needs to be emphasized again at this time, precisely as a result of the draft report.

Comment #1 regarding Kingdom Community Wind: This comment is regarding the largest development in the area currently proceeding on the Lowell Mountain Range. There should have been baseline assessment of streams before this development was started. This is a top priority issue for the basin and should be addressed in the plan. Flows and flashiness as well as sedimentation should all be addressed with monitoring before and after any such development.

Comment #2 regarding Kingdom Community Wind: This plan should address the watershed not just waters and the protection of the landscape is essential to protecting our waters. I would like to provide three comments regarding the development of a wind project on the Lowell Mountain range.

- 1) We need to maintain vegetative cover as a key to maintaining water quality in the basin.
- 2) Priority needs to be on sediment and nutrient discharges into waterbodies.
- 3) Upper elevation watersheds are particularly of importance because:
 - a. These watersheds provide baseflow for the Black River including Seaver, Shalney, McCleary, and Lamphere brooks as well as flows for these brooks themselves.
 - b. These upper elevation streams provide important temperature buffering
 - c. These upper elevation streams and watersheds provide flood storage and protection

The Lowell Mountain streams are key to maintaining healthy waters in the Black River watershed.

Response: Both the Kingdom Community Wind and NEWSVT projects have gone through extensive permitting processes and involve continued monitoring to ensure Vermont Water Quality Standards are being met. With regard to Kingdom Community Wind project, baseline monitoring has taken place in several locations downstream of the development area, by project developers and DEC program scientists. The permitting for each of these projects is discussed in

detail in Appendix J which has been added to address these comments. The following will be added to the final plan:

Public concerns have been raised regarding potential water quality impacts from the Kingdom Community Wind development and NEWSVT landfill in Coventry. Both of these projects have gone through extensive permitting processes and involve continued monitoring to ensure Vermont Water Quality Standards are being met. The permitting and monitoring requirements for each of these projects is discussed in detail in Appendix J.

Appendix J - Permitting for Kingdom Community Wind and for NEWSVT landfill was added to detail permitting for these two projects.

Chapter 2 – Nutrient Enrichment

Comment: Instead of the plans focus on Algae in Lake Memphremagog which largely impacts just the people who recreate on the lake the plan should also address the importance of protecting the lakes quality as a drinking water supply for a large population in Quebec.

Response: Blue-green algae can also impact the quality of the water as a drinking water supply and this is noted in the plan on page 13 of the draft plan.

Comment: There was also a blue-green algae bloom in Island Pond which should be referenced in the plan along with those in Lake Memphremagog and Lake Salem.

Response: A *Gloeotrichia* bloom was confirmed in Island Pond in 2010 and this will be noted in the plan. This species is considered a nuisance cyanobacterium. It can form thick layers on the water, and is frequently associated with strong taste and odor events in drinking water and while this species may be able to produce toxins, toxins have not been observed in Lake Champlain associated with blooms of this species. There were also blooms cyanobacteria in Lake Memphremagog and Lake Salem in the fall of 2011 so this will be noted in the final plan as well.

Language used in the final plan:

Cyanobacteria (blue-green algae) have been observed in numerous locations in Lake Memphremagog with increasing frequency, particularly in 2006 and again in 2008 *and 2011 when there were also blue-green algae blooms in nearby Lake Salem. In 2010 a bloom was confirmed in Island Pond.*

Chapter 2 – Alterations to Physical habitat

Comment: Figure 10 in the draft plan does not include any river corridor protection priorities in the Barton River watershed. Does this accurately reflect the protection priorities or is this some artifact of how these areas were identified because there should be some priorities river corridor protection projects in the Barton River watershed?

Response: The lack of river corridor protection priorities in the Barton River watershed was an artifact of how the figure was generated and was not accurate as noted in the comment. A new map has been created that shows all of the river corridor protection priorities in the basin including those in the Barton and Clyde River watersheds and this has been used to replace Figure 10 in the draft plan. Figure 9 was also updated based on new information regarding buffer plantings completed in the basin in 2011.

Chapter 3 – Phosphorus impairment of Lake Memphremagog

Comment: The focus for phosphorus reductions should not target wastewater treatment facilities (WWTF) due to the relatively small proportion of phosphorus loading coming from treatment plants in the basin and the significant costs associated with upgrading these facilities as compared with other phosphorus reduction actions.

Response: The draft plan does not make any specific recommendation regarding requirements for upgrading WWTF in the basin. Such recommendations, if appropriate, will be addressed through the TMDL development process. The plan makes note of the relatively low percentage of phosphorus which comes from WWTF in the basin but also notes that the TMDL will need to include an evaluation of phosphorus effluent levels for the four waste water treatment plants in the basin to determine if additional phosphorus reductions are necessary from these sources.

Chapter 3 – Flow alterations on dams in the Coaticook River watershed

Comment: The final plan should recommend setting the ordinary high water mark of Norton Pond a foot lower than current levels to reduce extent of shoreline erosion caused by high water levels on this waterbody.

Response: The Agency does not have enough information at this time to suggest any specific change in the management of the Norton Pond dam. Changes in the management of the dam may have impacts on a number of resources in the pond and downstream on the Coaticook River so the plan proposes a process by which local residents, the PSB, Hydro Coaticook and ANR will meet to evaluate all these resources and concerns and then address the management of Dam to ensure compliance with the Vermont Water Quality Standards.

Chapter 4 – Implementation Table

Comment: The final plan should target phosphorus reductions from farm land due to the large amounts of phosphorus coming from this land use.

Response: The draft plan includes 17 actions targeting phosphorus reductions from farm land in the Lake Memphremagog watershed out of a total of 38 actions focused on nutrient reduction which is similar to the estimated proportion of phosphorus coming from farm lands in the basin (46%). Specific targets for phosphorus reduction from each land use are not included in the plan because these will be set as part of phosphorus based Total Maximum Daily Load for Lake Memphremagog which is in development.

Comment: Septic systems on lakes in the lake Memphremagog basin should be addressed in the final plan. There are large numbers of camps on small lots in the basin that have been turned into year round homes and do not have sufficient soils for septic systems and so are contributing to phosphorus loading to Lake Memphremagog.

Response: Regulations for septic systems in Vermont were updated in 2007, and these regulations now cover previously exempt lots, including the transition of camps from seasonal to year round use which now requires a septic permit. This change in regulations addresses the change in use of previously exempt lots after 2007 however properties that were converted from seasonal to year round use on previously exempt lots before this date are only covered under the law if the septic system fails, in which case a permit for a replacement system is required, or if the owner would like to make changes in the use of the property that requires a septic system permit. Detailed analysis and modeling from other nutrient- impaired lakes in Vermont (Carmi

in Franklin; Ticklenaked in Ryegate; St. Albans Bay of Champlain) indicates that typical nutrient loads from septic systems account for no more than 5% of the phosphorus loads to lakes. Estimated total phosphorus loads attributed to septic systems from the Vermont portion of the Lake Memphremagog watershed is approximately 2.7% of the phosphorus load based on a refined phosphorus export model originally developed by SMi Amematech (Vezina, 2009.) As a TMDL is developed for Lake Memphremagog, septic systems, as a source of phosphorus, will be evaluated as part of the phosphorus load and wasteload allocation process, similar to other point and non-point sources..

Comment: The plan should recommend towns adopt the VLCT guidelines for zoning to protect lakes as well as improving town flood plain ordinances to better prevent flood damage.

Response: The Draft plan does recommend towns adopt buffer language in the following action:

64. Contact all towns in the basin without existing buffer language for lakes in town zoning to offer support for the development of such regulations.

This will be modified as follows in the final plan to include the VLCT recommended language:

64. Contact all towns in the basin without existing buffer language for lakes in town zoning to offer support for the development of such regulations such as those included in the VLCT Model Lake Shoreland Protection District Bylaw.

Comment: Wetlands protection and restoration should be a priority for the plan due to the low cost of conserving these areas and the potential for phosphorus reduction that this would achieve, and these wetlands could be left open for duck hunting and engage Ducks Unlimited as a partner.

Response: Wetlands protection and restoration is a priority in the plan including 7 actions directly addressing this issue in the water quality management plan.

Chapter 5 – Water management typing and classification

Comment from MCI: The plan implies that if Vermont does not use Lake Memphremagog for drinking water, than it cannot be classified A(2) waters. This statement defies logic and runs counter to the principle we have jointly applied throughout the history our cooperation, based on our shared watershed. It seems self evident that Lake Memphremagog needs to be reclassified as a A(2) water surface so that the more stringent management goals are applied to it.

Response: The plan does not recommend a reclassification of Lake Memphremagog to a Class A(2) because the lakes existing classification as a Class B water is in-fact protective of continued use of the water as a public drinking water supply and the Agency does not consider it to be in the public interest to recommend a change in the classification of this water to Class A(2). The 2008 Vermont Water Quality Standards state in the management objectives for Class B waters that Class B waters shall be managed to achieve and maintain a level of quality that fully supports the designated use of the water as a public water supply and be suitable for use as a source for a public water supply with filtration and disinfection.

The closest analogy to the use of Lake Memphremagog as a public water supply is Lake Champlain, which is the largest public drinking water source in Vermont, servicing in excess of 150,000 users. Class A(2) waters in Vermont are typically smaller largely undeveloped waterbodies and watersheds that are used primarily or exclusively as managed surface water supplies. As such, Class A(2) waters in-fact have *less* protective criteria for aesthetics and boating than Class B waters because the primary focus is for management as drinking water

supplies, which commonly features exclusion of other designated uses such as swimming, boating, or fishing. The language in the draft plan has been revised to clarify the point that Class B waters shall be managed to achieve and maintain a level of quality that fully supports the designated use of the water as a public water supply.

While the Agency of Natural resources can recommend and petition for reclassification of waters to the water resources board, pursuant to 10 VSA 1253, the reclassification of surface waters is the responsibility of the Natural Resources Board, not the Agency of Natural Resources. The reclassification process is initiated by a petition to the Board. In deciding on the best course of action, the Board would first evaluate the public interest relative to such a petition, and then potentially initiate rulemaking to amend the Water Quality Standards to accomplish a reclassification.

The following language was added to the final plan under the heading of water management typing and classification:

The Cities of Sherbrooke and Magog use water from Lake Memphremagog as a water supply for approximately 160,000 people and similar to Lake Champlain which is used as a drinking water source in Vermont, Lake Memphremagog is classified as a Class B water. Management objectives for class B waters state that Class B waters shall be managed to achieve and maintain a level of quality that fully supports the designated use of the water as a public water supply and be suitable for use as a source for a public water supply with filtration and disinfection and so this classification is protective of the continued use of Lake Memphremagog as a drinking water supply. Most other municipalities and private individuals in the watershed use ground water wells for drinking water supplies.

Appendix

Comment: Add Beck Pond LLC as a partner

Response: Added Beck Pond LLC to the list of partners because they were consistent participant in the process.



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