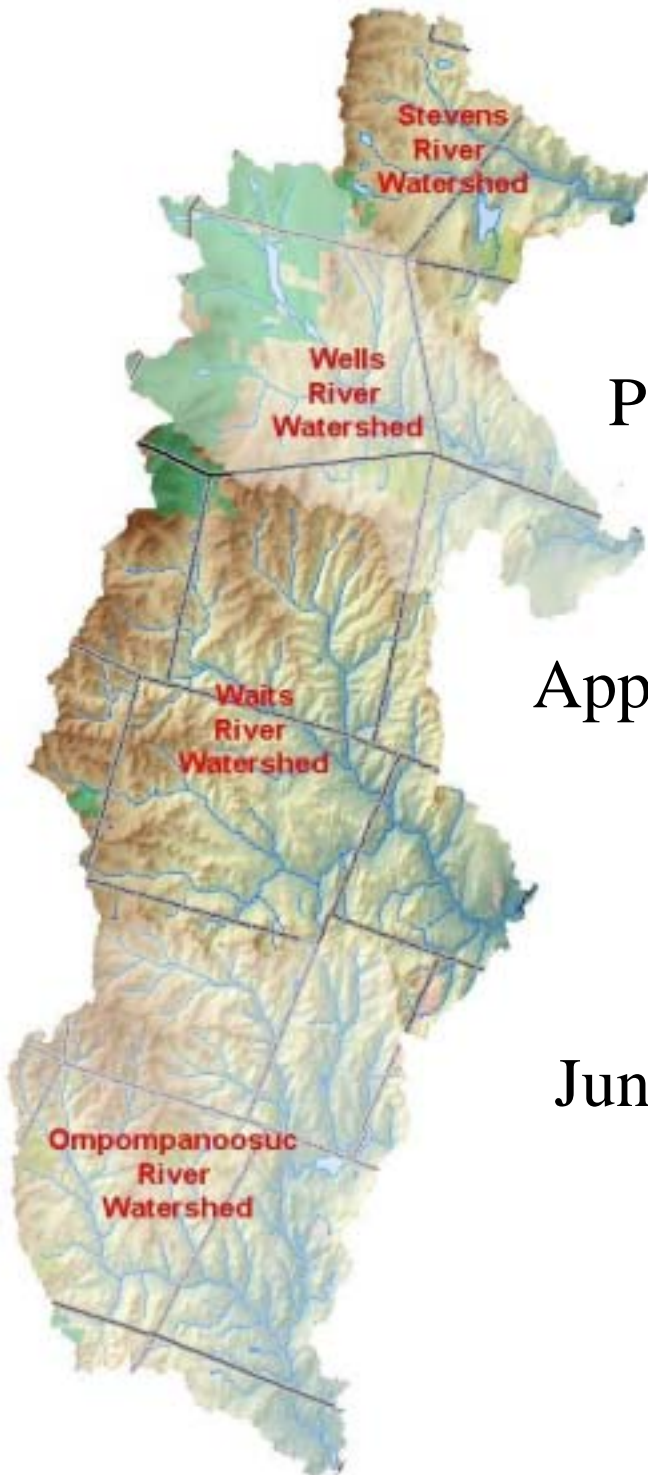


Basin 14 “Little Rivers” Water Quality Management Plan Covering the Stevens, Wells, Waits, and Ompompanoosuc River Watersheds



Part II

Appendices

June 2008

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APPENDIX A

APPENDIX A.1 - Statutory Index

Federal and State law and regulation call for the review of specific topics in each basin plan. The following is a listing of basin planning requirements that have been extracted from the Vermont Water Quality Standards (WQS), the Federal Register and the Memorandum of Understanding between the ANR and the AAFM. The requirements below are addressed in this basin plan in the section noted in bold adjacent to each requirement.

The Vermont Water Quality Standards

1. Basin plans inventory the existing and potential causes and sources of pollution that may impair the waters. **Sections 2-2, 3-2, 4-1, 5-1**
2. Basin plans establish a strategy to improve or restore waters. **Sections 1-2 through 1-6 and Sections 2 through 7 in Chapters 2, 3, 4 and 5**
3.shall seek public participation to identify and inventory problems, solutions, high quality waters, existing uses, other water uses, and significant resources of high public interest. **Sections 1 and 2 in Chapters 2-5, Section 6-1**
4.shall consider approved municipal and regional plans adopted under 24 V.S.A. Chapter 117. **Appendix A.7**
5.shall coordinate and cooperate with the Commissioner of VAAF, as provided for in 6 V.S.A. Chapter 215. **Appendix A.3, A.4, A.5, A.6**
6.shall identify strategies, where necessary, by which to allocate levels of pollution between various sources as well as between individual discharges. **Section 3-6**
- 7.....should, to extent possible, contain specific recommendations by the secretary that include, but are not limited to the identification of all known:
 - existing uses **Section 6-1**
 - salmonoid spawning or nursery areas important to the establishment or maintenance of such fisheries **Appendix A9**
 - reference conditions appropriate for specific waters **Section 1 in Chapters 2-5**
 - any recommended changes in classification and designation of waters (**Not included in accordance with 2007 house bill H 154**)
 - schedules and funding for remediation **Sections 2-7 in Chapters 2-5**
 - stormwater management **Sections 1-3, 2-3, 3-3, 4-3 and 5-2**
 - riparian zone management **Sections 2-4, 3-4, 4-4, and 5-3**
 - other measures or strategies pertaining to the enhancement and maintenance of the quality of waters within the basin. **Sections 2-7 in Chapters 1-5**

8. In basins that include class B waters which have not been allocated into one or more Water Management Type or Types pursuant to Section 3-06 of the WQS, the basin planshall propose the appropriate Water Management Type or Types based on both the existing water quality and reasonably attainable and desired water quality management goals. **Not included in accordance with 2007 house bill H154.**

40 CFR, Section 130.6

9. Water Quality Management (WQM) plans.....consist of initial plans produced in accordance with sections 208 and 303e of the Clean Water Act (CWA) and certified and approved updates of those plans.

10. State water quality planning should focus annually on priority issues and geographic areas and on the development of water quality controls leading to implementation measures. **Section 2-7 in chapters 1-5**

11. WQM plans are used to direct implementation. **Sections 2 through 7 in chapters 1 through 5**

12. WQM plans draw upon the water quality assessments to identify priority point and non-point water quality problems, consider alternative solutions and recommend control measures, including the financial and institutional measures necessary for implementing recommended solutions. **Sections 2 through 7 in chapters 1 through 5**

13. State annual work programs shall be based upon the priority issues identified in the State WQM plan. **Sections 2 through 7 in chapters 1 through 5**

14. The following plan elements shall be included in the WQM plan or referenced as part of the WQM plan if contained in separate documents when they are needed to address water quality problems:

- (1) Total maximum daily loads. **Section 3-6, 4-6, and 5-6**
- (2) Effluent limitations - including water quality based effluent limitations and schedules of compliance. **No waste water treatment plants in Basin 14**
- (3) Identification of anticipated municipal and industrial waste treatment works, including
 - (a) facilities for treatment of stormwater-induced combined sewer outfalls; **Appendix B.2**
 - (b) programs to provide necessary financial arrangements for such works; **Appendix B.2**
 - (c) establishment of construction priorities and schedules for initiation and completion of such treatment works. **Appendix B.4**
- (4) Nonpoint source management and control
 - (a) describe the regulatory and non-regulatory programs, activities and best management practices (BMPs). (Economic, institutional and technical factors shall be considered.....)..... BMPs shall be identified for the nonpoint sources

identified in Section 208(b)(2)(F)-(K) of the CWA and other nonpoint sources as follows:

- (i) Residual waste **Appendix B.6**
- (ii) Land disposal **Appendix B.3**
- (iii) Agricultural and silvicultural **Sections 1-3, 2-3, 3-3, 4-3, 5-2, and Appendix B.1**
- (iv) Mines **Section 4-6, 5-6 and Appendix B.7**
- (v) Construction **Sections 1-3, 2-3,3-3, 4-3, 5-2, and Appendix B.4**
- (vi) Urban stormwater **Sections 1-3, 2-3,3-3, 4-3, and 5-2**

The nonpoint source plan elements outlined in #14 above shall be the basis of water quality activities implemented through agreements or memoranda of understanding between EPA and other departments, agencies or instrumentalities of the United States in accordance with section 304(k) of the CWA.

(5) Identification of management agencies necessary to carry out the plan and provisions for adequate authority for intergovernmental cooperation..... **Chapters 1-5**

(6) Identification of implementation measures necessary to carry out the plan, including financing, time needed to carry out the plan, and the social, economic and environmental impact of carrying out the plan in accordance with 208(b)(2)(E). **Chapters 1-5**

(7) Identification and development of programs for the control of dredge or fill material in accordance with section 208(b)(4)(B) of the CWA. **Appendix B.10**

(8) Identification of any relationship to applicable basin plans developed under section 209 of the CWA. **This is the basin plan**

(9) Identification and development of programs for control of groundwater pollution including the provisions of section 208(b)(2)(K) of the CWA. States are not required to develop groundwater WQM plan elements beyond the requirements of section 208(b)(2)(K) of the CWA, but may develop a groundwater plan element if they determine it is necessary to address a groundwater (water) quality problem [see section 130.6(c)(9) for specifics of the groundwater plan element]. **Appendix B.11**

APPENDIX A.2 - The Public Process for the Stevens, Wells, Waits and Ompompanoosuc River Watershed Councils

The public process for the Stevens River Watershed Council

2004

February 11th – Barnet School – Public forum led by the Annalie Babson of NVDA

February 18th – S. Ryegate Presbyterian Church – Daytime Public forum for the Little Rivers Watershed

June 7th – Barnet School – Panel discussion on river management issues with Barry Cahoon

July 20th –Groton— Stevens and Wells River Watershed panel discussion on Lake and Pond issues

September 21st – Barnet School –Presentation of Bridge and culvert survey results to the Stevens River watershed council

December 8th – Barnet School – Stevens River Watershed council meeting to develop strategies addressing lake and pond issues.

2005

January 27th – Barnet School – Stevens River Watershed Council meeting covering forestry and road issues

March 10th – Barnet School – Stevens River Watershed Council meeting covering NPS pollution issues including roads, forestry, and agricultural issues

June 2nd Barnet School – Stevens River Watershed Council meeting covering river corridor issues with Barry Cahoon and Kerry Gemmett giving presentations

July 2nd - –Peacham Library – Stevens River Watershed Council meeting on lake and pond issues

November 15th – Barnet School – Stevens River Watershed Council meeting covering the results of water quality sampling and stream geomorphic assessments

2007

January 24th – Barnet School – Stevens River Watershed Council meeting to review draft agricultural section and basin plan

July 7th – Barnet School – Stevens River Watershed Council meeting to review draft plan and discuss water sampling.

May 5th – Barnet School – Stevens River Watershed Council meeting to receive public comments on final draft Basin 14 water quality management plan.

The public process for the Wells River

2004

February 17th – Groton Town Hall – Public forum led by the Two Rivers Ottauquechee Regional Commission and the Newbury Conservation Commission.

February 18th – S. Ryegate Presbyterian Church – Daytime Public forum for the Little Rivers Watershed

April 6th – Tenney Memorial Library – Wells River Watershed Council Meeting setting up the watershed Council.

May 5th – Blue Mountain School – Expert presentation of water quality in the Wells River by Rich Langdon from the Bass Lab with DEC.

June 7th – Barnet School – Stevens and Wells River combined panel discussion on river management issues with Barry Cahoon.

July 20th – Groton – Stevens and Wells River Watershed panel discussion on Lake and Pond issues

September 16th – Blue Mountain School Library – Wells River Watershed Council meeting on Lake and Dam issues.

December 6th – Blue mountain School Library – Wells River Watershed Council meeting on water quality assessment needs.

2005

January 24th – Blue Mountain School – Wells River Watershed Council meeting on River Corridor issues in the Wells River Watershed.

March 3rd – Baldwin Library – Wells River Watershed Council meeting reviewing draft section on river corridor section of the Wells River basin plan.

April 7th – Baldwin Library – Wells River Watershed Council meeting discussing issues with the Longmore gravel pit and.

May 25th – Blue Mountain School – Wells River Watershed Council meeting on nps pollution in the Wells River watershed

July 25th – Groton Community Center – Wells River Watershed Council I meeting on Lake related issues in the Wells River Watershed.

September 20th – Blue Mountain School – Wells River Watershed Council meeting on Fluvial erosion hazard Mapping.

October 18th – Blue Mountain School – Wells River Watershed Council meeting on lake related strategies to include in the plan.

December 7th – Blue Mountain School – Wells River Watershed Council meeting on road related water quality issues.

2006

June 21st – Blue Mountain School – Wells River Watershed Council meeting on water quality monitoring and other issues.

October 12 – Blue Mountain Grange Hall – Wells River agricultural meeting.

November 8th – Blue Mountain School – Wells River Watershed Council meeting on results of a bridge and culvert survey and related strategies.

2007

February 1st – Blue Mountain School – Wells River Watershed Council meeting on the Agricultural section of the Wells basin plan.

April 18th – Baldwin Library – Wells River Watershed Council meeting to discuss water sampling and draft plan

July 18th – Baldwin Library – Wells River Watershed Council meeting to discuss water sampling and draft plan and appendix

2008

April 29th – Groton town Library – Wells River Watershed Council meeting to receive public comments on final draft Basin 14 water quality management plan.

The public process for the Waits River

2004

February 28th – Waits River Valley School – Public forum led by the Two Rivers Ottauquechee Regional Commission

April 13th – Bradford Fire House – Waits River Watershed Council Meeting setting up the watershed Council and presenting existing water quality data.

May 11th – Northern Woodlands Corinth – Panel discussion on forestry issues in the Watershed with Dave Paganelli Orange county Forester, Mike Batten Director of the Center for woodland education, Steve Long of Northern Woodlands and Ginny Barlo of Redstart Consulting.

June 23rd – Bean Hall, West Fairlee – Combined Waits and Ompompanoosuc River Panel discussion on water quality with Steve Fiske from the Bass Lab with DEC and Anne Hunter from DFW.

2005

During 2005 a number of meetings were planned but attendance was extremely limited. During the end of 2005 watershed partners including Northern Woodlands and the Bradford Conservation Commission were contacted and the watershed council was reconstituted.

2006

January 11th – Bradford Academy – Waits River Watershed Council meeting reviewing issues and reconstituting the Waits River watershed council

February 13th – Northern Woodlands Office, Corinth – Waits River Watershed Council to drafting of NPS pollution strategies.

March 15th – Waits River Valley School – Presentation about river corridor issues by Kari Dolan and discussion of Waits River river corridor issues.

April 12th – Waits River Valley School– Waits River Watershed Council meeting to review NPS pollution and River Corridor strategies

May 10th - –Waits River Valley School – Waits River Watershed Council meeting with discussion of field trips on River Related issues for the summer

June 14th –Bradford Academy – Waits River Watershed Council meeting with discussion of field trips and the Agricultural section of the basin plan.

September 28th – Waits River Valley School – Waits River Watershed Council meeting to discuss geomorphic assessments and the Agricultural section of the Waits River basin plan

November 15th – Bradford Library– Waits River Watershed Council meeting to plan winter field trips and discuss geomorphic assessment

2007

January 10th –Thetford Academy – Waits River Watershed Council meeting to view Vermont river management program DVD and review strategies related to river corridor issues and water quality outreach and testing strategies

February 21st –Bradford Academy – Waits River Watershed Council meeting to discuss NPS pollution strategies

April 5th –Corinth Town Hall – Corinth Conservation Commission and Waits River Watershed Council meeting to discuss river corridor management with a presentation by Kari Dolan.

May 9th –Bradford Academy – Waits River Watershed Council meeting to discuss the agricultural chapter and water based Resources.

June 13th – Waits River Valley School – Waits River Watershed Council meeting to review of draft Waits River basin plan.

June 21st – Blake Memorial Library – Waits River Watershed Council Meeting to discuss the Pike Hill mine with EPA and Sites Management Program.

September 6th – Bradford Academy. Watershed Council meeting to review draft plan and discuss geomorphic assessment

October 25th – Bradford Academy – Watershed Council meeting to review geomorphic assessment work completed and develop proposal for next year

2008

May 8th – Bradford Academy – Waits River Watershed Council meeting to receive public comments on final draft Basin 14 water quality management plan.

The public process for the Ompompanoosuc River

2004

January 29th – Tracy Hall Norwich – Public forum led by the upper valley Lake Sunapee RPC

April 15th – Thetford Community Center – Review of threats and concerns and formation of watershed council

June 23rd – Bean Hall, West Fairlee – Panel discussion on water quality with Steve Fiske from the Bass Lab with DEC and Anne Hunter from DFW

September 29 – Strafford Town Office – Watershed Council Meeting to discuss Geomorphic assessments on the West Branch, erosion issues at the Elizabeth Min, E. coli impairments, and Road and water quality issues.

2005

January 19th – Strafford Town Office – Watershed Council meeting covering E. coli impaired sites, roads, and River Corridor Management

March 2nd – Thetford Academy – Review of draft River Corridor Management section

April 12th – Thetford Academy – Ompompanoosuc River Watershed Council meeting to review draft Non point source section

May 26th – Thetford Academy – Ompompanoosuc River Watershed Council meeting to review forestry issues and road related erosion

July 21 - –Bean Hall – Presentation of Lake related issues to the watershed council

November 16th –Thetford Academy – Ompompanoosuc River Watershed Council meeting to discuss impaired and altered waters and the Ely and Elizabeth Mines

2006

January 31st – Bean Hall – Ompompanoosuc River Watershed Council meeting to discuss lake and pond issues and water sampling proposal

March 2nd – Bean Hall– Ompompanoosuc River Watershed Council meeting to plan volunteer water sampling

May 8th –Thetford Academy – Ompompanoosuc River Watershed Council meeting to complete quality assurance plan and plan water sampling

August 8th – Latham Library Thetford – Ompompanoosuc River Watershed Council meeting to discuss mid year water sampling results and Agricultural section of the basin plan

September 21st –Thetford Academy – Ompompanoosuc River Watershed Council meeting to discuss water sampling results

October 19th –Latham Library – Ompompanoosuc River Watershed Council meeting to discuss water sampling results

2007

January 9th –Thetford Academy – Ompompanoosuc River Watershed Council meeting to discuss water proposal for 2007 and review draft plan

February 13th –Thetford Academy – Ompompanoosuc River Watershed Council I meeting to discuss water sampling grant next summer and review the Agricultural section of the draft plan

March 14th –Thetford Academy – Ompompanoosuc River Watershed Council meeting to review draft Plan.

May 1st –Thetford Academy – Ompompanoosuc River Watershed Council meeting to review the agricultural chapter of the basin plan, Water based resources, and plans for water sampling.

July 9th –Latham Library – Ompompanoosuc River Watershed Council meeting to review draft plan, Water sampling, and Nutrient loading appendix.

September 5th – Review water quality sampling results and discuss plans for geomorphic assessment grant.

November 15th – Bean Hall – Public presentation of 2007 water quality sampling results.

February 4th – Thetford Academy – Ompompanoosuc River Watershed Council meeting to develop LaRoas grant proposal for water sampling in 2008.

May 13th – Thetford Academy – Ompompanoosuc River Watershed Council meeting to receive public comments on final draft Basin 14 water quality management plan.

APPENDIX A.3 - Agriculture in the Stevens River Watershed

INTRODUCTION

Basin 14 is comprised of 4 smaller watersheds: the Stevens, Wells, Waits, and Ompompanoosuc. The Stevens River Watershed is approximately 49 square miles or 31,360 acres (ANR 1999). Of this area approximately 17 percent or roughly 5,151 acres are used for agricultural purposes (ANR 1999).

Much of the agricultural information available for this region is collected on a county-wide basis. The Stevens River Watershed represents less than 10% of the area of Caledonia County. Therefore, the county level information provided here must be used with that caveat. Where possible, the county level data was prorated to reflect watershed level data more precisely. This was done by calculating a ratio of the farm land in Caledonia County to farm land in the Stevens River Watershed. In 1997 there were 96,704 acres of farm land in Caledonia County (NASS 1997) and 5,151 acres of farm land in the Stevens River Watershed (ANR 1999). This means the Stevens River Watershed contains about 5% of the farm land in Caledonia County and therefore the agricultural census data for Caledonia County can be prorated accordingly.

Table 1. Number of Farms and Farm Size in Caledonia County and Prorated Values for the Stevens River Watershed

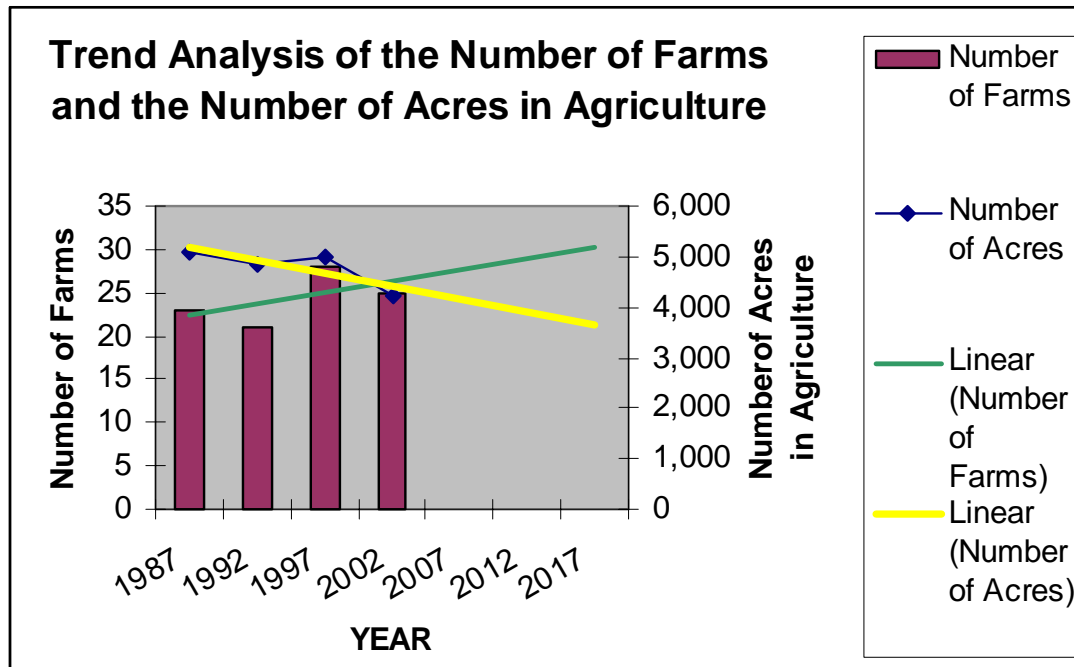
	Caledonia County 2002	Stevens River Watershed 2002 (prorated)	Caledonia County 1997	Stevens River Watershed 1997 (prorated)	Caledonia County 1992	Stevens River Watershed 1992 (prorated)	Caledonia County 1987	Stevens River Watershed 1987 (prorated)
Number of Farms	505	25	550	28	430	21	461	23
Acres in Farms	84,318	4,216	99,488	4,974	96,704	4,835	102,126	5,106
Average Farm Size	167	169	181	178	225	230	222	222

Source: USDA 2002 Census of Agriculture, County Profile
 USDA 1992 Census of Agriculture, County Profile
 Note: Census data is published every 5 years

According to the USDA Census of Agriculture compiled by NASS there were 505 farms in Caledonia County in 2002. The Census 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.*

The number of farms increased approximately 9% in the 15 years between 1987 and 2002. However, the average farm size in acres dropped by 22% and the number of total acres in agriculture dropped about 18%.

The statewide trend is opposite that observed in Caledonia County with a decrease in farms from 7,100 in 1987 to 6,600 in 2002; a net loss of 7%. However, the total number of acres in agriculture statewide also dropped 18% in that same time period.



Based on the trend of the past 15 years a continued increase in the number of farms and inversely a decrease in the number of acres in agricultural production is forecasted. However, the statistical analysis does not necessarily take into account the compounding factors of economics, climate, and the future regulatory environment.

This trend suggests the composition of agricultural operations might look different in the future. Likely there will be fewer dairy farms and more diversified operations in pork, beef, lamb, vegetables and on-farm processing. The larger concern may be the shrinking acreage of farmland. The transition of this farm land to some other land use may impact water quality in many 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.

TYPES OF FARMING IN THE STEVENS RIVER WATERSHED

According to the USDA Census of Agriculture, Caledonia County farmers grow a diversity of crops including corn for grain and silage, barley, potatoes, forage, vegetables, dry edible beans, apples, grapes, blueberries, raspberries, and strawberries. In addition they produce dairy products, beef, pork, lamb, and poultry.

Table 2. Types of Farms in Caledonia County, 2002

(Values in parentheses are prorated for Stevens River Watershed)

Sector	Number of Farms	Number of Animals or Acres
Beef	81 (4)	530 (27)
Dairy	104 (5)	7,716 (386)
Bees¹	95 (5)	254 (13) hives
Goats	na	na
Hogs/pigs	20 (1)	138 (7)
Horses/ponies	na	1,207 (60)
Llama	na	na
Poultry (layers)	88 (4)	2,268 (113)
Sheep	44 (2)	733 (37)
Corn Grain	3 (na)	na (na)
Corn Silage/Greenchop	54 (3)	3,543 (177)
Barley	1	na
Forage	300 (15)	24,382 (1,219)
Dry beans	1 (na)	nr
Berries	16 (1)	10 (1)
Plums/Prunes	4 (na)	na
Apples	17 (1)	113 (6)
Grapes	1(na)	na
Potatoes	7 (na)	55 (2)
Vegetables	37 (2)	168 (8)

Source: 2002 USDA Census of Agriculture, County Data

na = not available

nr = not reportable

1 = Agency of Agriculture: Parise, 2006

Of the 505 farms listed in the 2002 Census, about half of them (250) are the primary occupation of the operator. That means the other half of those counted as farms are part time occupations for farmers, growers, nurserymen, etc.

The total market value of the agricultural products sold \$23,789,000. Total farm production expenses are \$21,577,000, resulting in a net value of \$2,212,000

During an informal discussion of the Watershed Council it was estimated by those in the room that for the Stevens River Watershed there are currently 11 dairy farms, of which 2 are medium farm operations (MFOs) and 2 are organic farms. In addition, this group surmised there are 4 vegetable farms of which 3 are organic; 1 beef farm, 5 sheep farms, 1 alpaca farm, 3 horse farms producing breeding stock and 6 farms that produce just hay. Specific numbers are not available on a watershed basis and these numbers are anecdotal at best. Where there is a connection with water quality these numbers could be refined in the future.

LFOS IN THE STEVENS RIVER WATERSHED

There are 19 Large Farm Operations (LFO) in the State of Vermont: 17 dairy, 1 beef, and 1 poultry operation. An LFO is defined as a dairy farm with 700 or more mature cows or a poultry operation with over 30,000 birds. None of these facilities are located in the Stevens River watershed.

MFOS IN THE STEVENS RIVER WATERSHED

There are approximately 200 Medium Farm Operations (MFOs) in Vermont. Of these, two are within the boundaries of the Stevens River Watershed. The MFO general permit was recently approved and has specific requirements for these operations. These requirements apply to farms with 200 or more mature cows, 300 or more youngstock or heifers, 150 horses, 300 sheep, or 9000 hens. The significant conditions of the general permit are two fold. First, 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. Second, the MFO must complete (by March 2008) 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.

ORGANIC FARMS

There has been a significant increase in the number of organic dairy farms in the past few years. This transition may be beneficial to water quality as the use of pesticides is eliminated and daily pasturing means there is less concentration of manure. As of 2006 there are currently 18 organic dairy farms in Caledonia County (NOFA-VT 2007) and it is expected that number will rise in 2007. These 18 farms encompass 4,821 acres of farmland in organic hay and pasture. Another 304 acres of field crops are grown on 2 farms and approximately 424 acres has been certified as organic for the production of fruits and vegetables on 10 separate farms.

WATER WITHDRAWALS FOR AGRICULTURE

Both the number of farms irrigating crops and the number of acres being irrigated have increased steadily since 1987. This is primarily due to the increase in the number of farm markets and cash crop production.

TABLE 3. Number of Farms with Irrigation and Acres of Irrigated Land in Caledonia County (Prorated for the Stevens River Watershed)

	Caledonia County	Stevens River Watershed (prorated)	Caledonia County	Stevens River Watershed (prorated)	Caledonia County	Stevens River Watershed (prorated)	Caledonia County	Stevens River Watershed (prorated)
	2002	2002	1997	1997	1992	1992	1987	1987
Number of Farms with Irrigated Land	31	2	26	1	11	1	5	na
Number of Acres Irrigated	92	5	245	12	18	1	na	na

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

Irrigation represents about 34% of the total withdrawals for surface water and 46% for groundwater.

TABLE 4. Estimated Water Withdrawal in Caledonia County in 2000)

	Surface Water (Million Gallons/Day)	Groundwater (Million Gallons/Day)
Water Withdrawal for All Uses	1.64	2.68
Water Withdrawal for Irrigation	0.12	0.02
Irrigation as a % of All Withdrawals	7	1
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 than 15 years ago. The use of these products is however concentrated on fewer farms. In fact, the number of farms using insecticides has dropped by approximately 30% in 15 years. The number of farms using herbicides decreased in 1992 and 1997 but was nearly back to 1987 levels by 2002. The number of farms using chemical control for diseases has been sporadic for the 15 year period but overall is down from 1987 to 2002.

**TABLE 5. Pesticide Use in Caledonia County
(Prorated for Stevens River Watershed)**

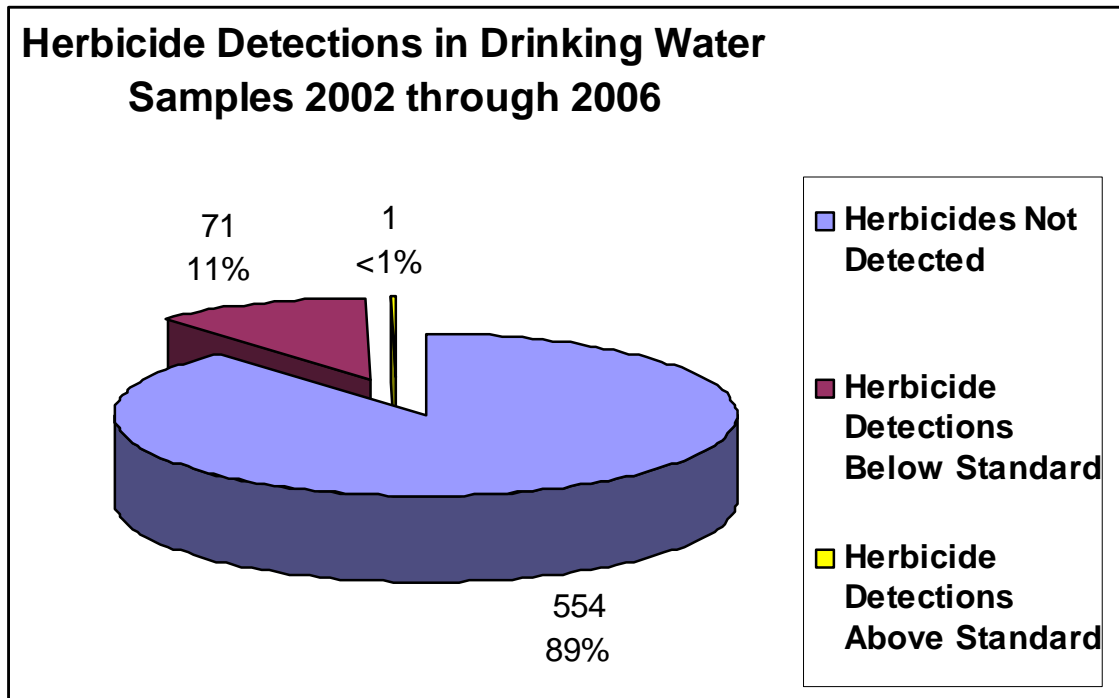
	2002	1997	1992	1987
Number of farms using chemical treatment for insect control	20 (1)	35 (2)	40 (2)	32 (2)
Number of acres treated for insects	1,127 (56)	1,182 (59)	798 (40)	980(49)
Number of farms using chemical control for weeds	101 (5)	59 (3)	83 (4)	109 (5)
Number of acres treated for weeds	4,481 (224)	3,148 (157)	2,873 (144)	3,470 (174)
Number of farms using chemical control for plant disease	2 (na)	16 (1)	16 (1)	11 (1)
Number of acres treated for diseases	na (na)	278 (14)	45 (2)	215 (11)

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

na = not available

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 the past 10 years, there were 37 water samples collected from domestic wells in Basin 14 that were analyzed for corn herbicides. There were no detections. Statewide, 625 water samples were analyzed for herbicides between 2002 and 2006. Of these, 70 had detections of one or more herbicide with just one sample having 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, 2007

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

The number of farms using commercial fertilizers has decreased as has the number of acres treated in the past 15 years.

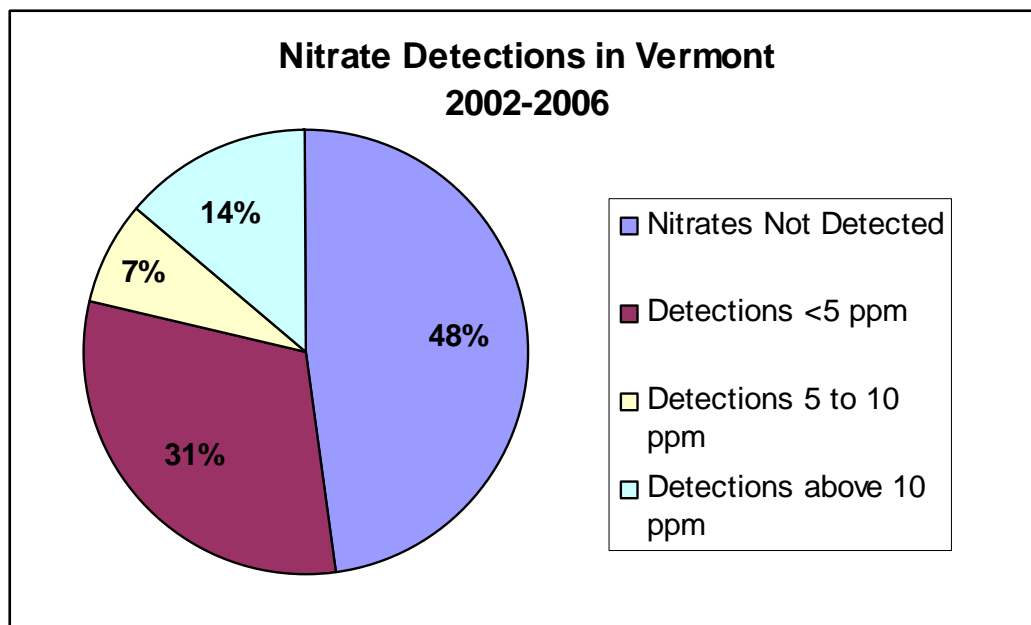
**TABLE 6. Fertilizer Use in Caledonia County
(Prorated for Stevens River Watershed)**

	2002	1997	1992	1987
Number of farms using commercial fertilizers, lime, soil conditioners	196 (10)	227 (11)	216 (11)	330 (17)
Number of acres treated	14,504 (725)	15,400 (770)	15,529 (776)	21,146 (1,057)
Number of farms using manure	184 (9)	na	na	na
Number of acres where manure spread	18,202 (910)	na	na	na

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

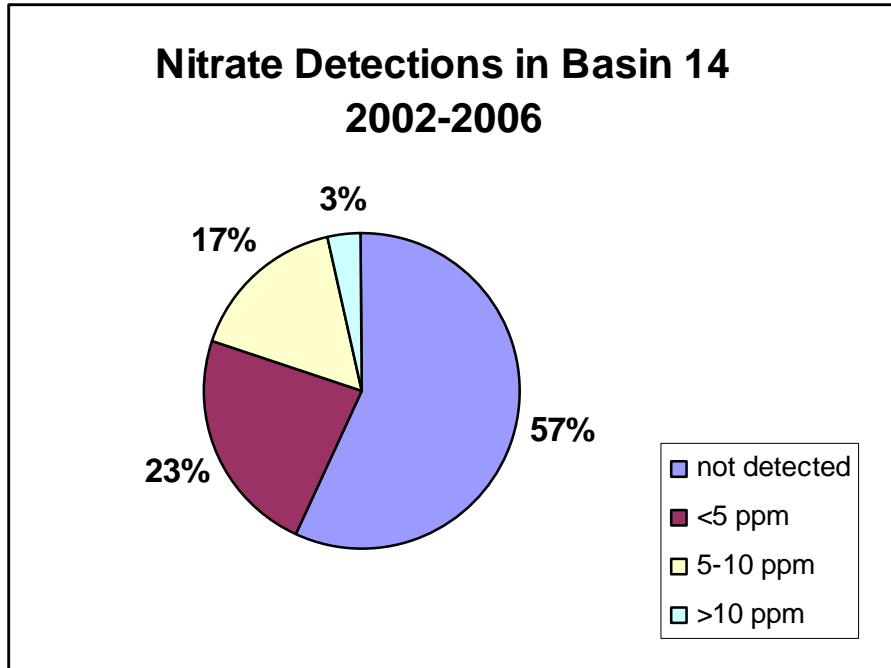
The Agency of Agriculture manages a groundwater monitoring program to determine the quality of groundwater near Vermont farms. The program includes sampling and analysis for nitrates. Given that nitrates are highly soluble and are therefore easily transported with runoff water and leach into permeable 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 2002 and 2006 a total of 625 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. Of the wells sampled 298 or 48% had no detections of nitrates. Another 240 wells (38%) had detections between 1 and 10 ppm. Therefore, 87 wells or 14% 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 groundwater quality on farms that contract for conservation practice cost share dollars.



Source: Agency of Agriculture, Comstock 2007

Within Basin 14 there were 30 water samples collected and analyzed for nitrates. Of these, just one (or 3%) was over the drinking water standard of 10 ppm.

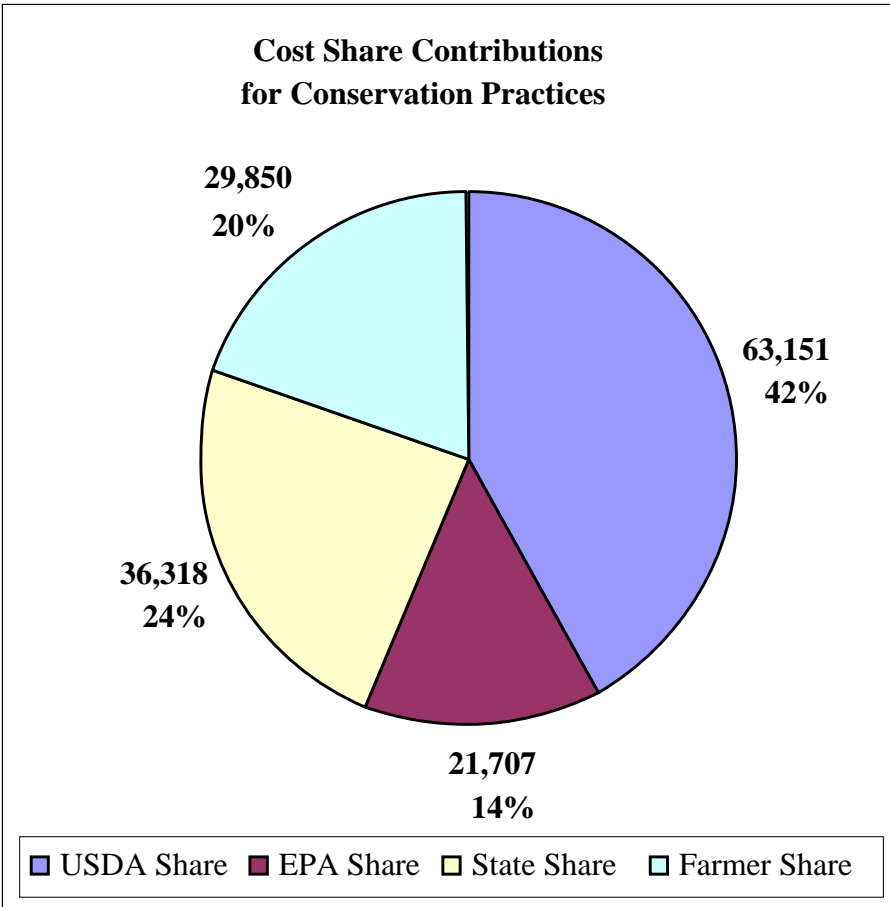


Source: Agency of Agriculture, Comstock 2007

CONSERVATION PRACTICES IN THE STEVENS RIVER WATERSHED

To date 22 projects for Best Management Practices (BMP) have been initiated in the Stevens River Basin (Agency of Agriculture: Cook 2006). Fifteen projects are for production area practices (*e.g.* barnyard runoff, manure storage, leachate collection). The remaining 7 projects are for field practices (*e.g.* stream bank stabilization, stream crossing). The total cost of these practices is \$315, 916 with the Vermont Agency of Agriculture, USDA, EPA and landowners all contributing a share. A total of 763 animals are covered by these practices.

It should be noted that only those practices that are covered in part by cost share money through the State are reported here and that landowners often work on conservation practices without the benefit of state and federal programs. Unfortunately, there is no system for tracking those efforts or those of volunteer groups and other private landowners.



Source: Agency of Agriculture, Cook 2006

Nutrient Management Plans (NMPs) are required for all MFOs by March 2008 (they have been required of LFOs already). Numerous plans have been written by MFOs as well as small farm operations (SFOs). The Conservation Districts recently completed a NMP class in which 8 farmers wrote their own 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.

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.

There are 11 NMPs written for Caledonia County farms through the Agency of Agriculture Nutrient Management Plan Incentive Program (Agency of Agriculture, Weber 2007). This represents 4,378 acres with a total of \$50,974 allocated for these plans. Three of the 11 NMPs were completed in the Stevens River watershed representing 477 acres.

Additional NMPs have been developed through other programs yet they are not available for summary here.

AREAS IN NEED OF ATTENTION

The State of Vermont Draft 303(d) list for 2006 does not include any agriculturally impaired surface water bodies within the Stevens River Watershed. This should be celebrated as testimony to the excellent stewardship the residents of the watershed have and encourage them to remain off this list.

Residents have raised concerns about diversion of water around Harvey's Lake that should be revisited. Also, concerns have been voiced about abandoned agricultural operations and the potential for manure to eventually leak off the property.

The State of Vermont Water Quality Division has a listed two river segments that they feel warrant further consideration for evaluation of impairment. The first is the Stevens River from Rt 5 up to Interstate 91 which may be morphologically unstable. The other is Ewell Pond in Peacham which has low dissolved oxygen (DO). Whether this is a natural condition of the pond is yet unknown.

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USDA Census of Agriculture, 1997 County Profile Data

USDA Census of Agriculture, 1992 County Profile Data

USDA Census of Agriculture, 1987 County Profile Data

APPENDIX A.4 - Agriculture in the Wells River Watershed

INTRODUCTION

Basin 14 is comprised of 4 small watersheds: the Wells, Stevens, Waits, and Ompompanoosuc. The Wells River Watershed is approximately 99 square miles or 63,400 acres (ANR 1999). Of this area approximately 8 percent or roughly 4,660 acres are used for agricultural purposes (ANR 1999).

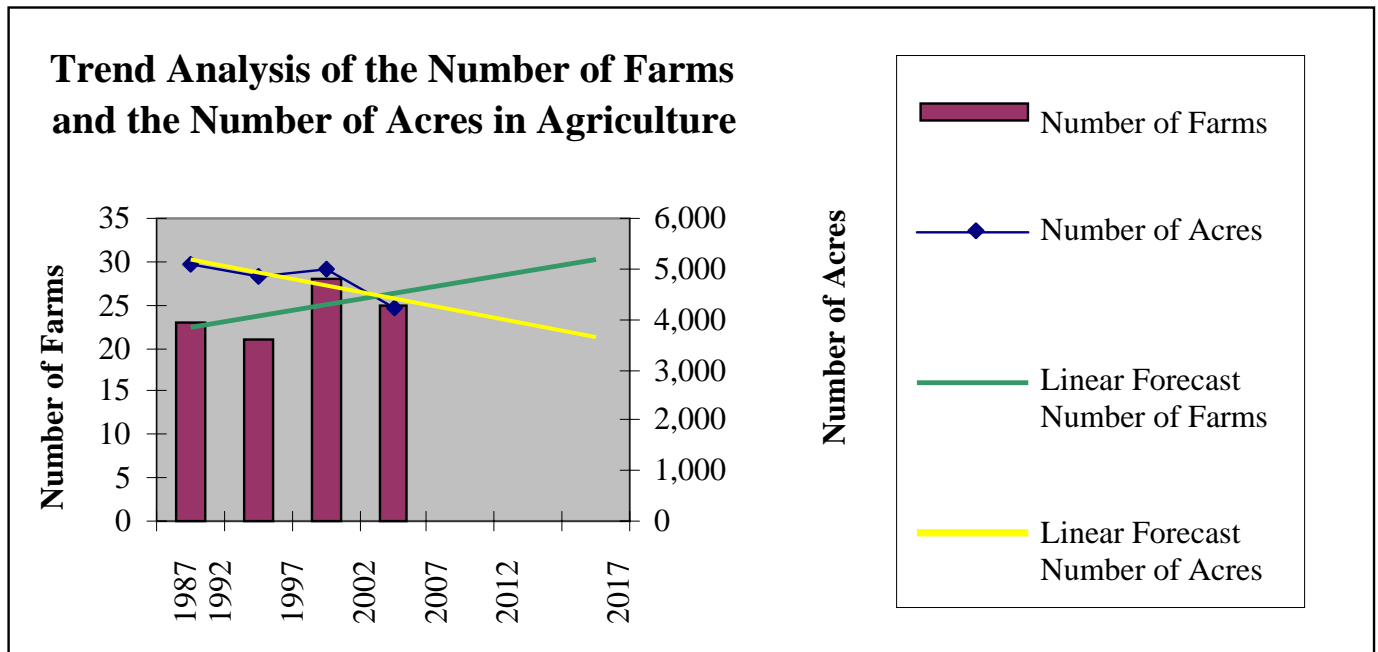
Most of the agricultural information available for this region is collected on a county-wide basis. Since this watershed represents only about 15% of the total land area of Caledonia County the information provided here must be used with that caveat. Where possible, the county level data was prorated to reflect watershed level data more precisely. This was done by calculating the ratio of the farm land in Caledonia County compared to farm land in the Wells River Watershed. In 1997 there were 99,488 acres of farm land in Caledonia County (NASS 1997) and 4,660 acres of farm land in the Wells River Watershed (ANR 1999). This means the Wells River Watershed contains about 5% of the farm land in Caledonia County and therefore the agricultural census data for Caledonia County can be prorated accordingly. It should be noted that a part of the Wells River Watershed falls within Orange County. Orange County data was not used in this chapter as the area within Orange County closely resembles the area that falls within Caledonia County and therefore prorating the Caledonia County data appropriately represents the watershed.

According to the USDA Census of Agriculture there were 505 farms in Caledonia County in 2002 (using the 5% proration this equates to 25 farms in the Wells River watershed). The Census 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.*

Table 1. Number of Farms and Farm Size in Caledonia County and Prorated Values for the Wells River Watershed

	Caledonia County 2002	Wells River Watershed 2002	Caledonia County 1997	Wells River Watershed 1997	Caledonia County 1992	Wells River Watershed 1992	Caledonia County 1987	Wells River Watershed 1987
Number of Farms	505	25	550	28	430	21	461	23
Acres in Farms	84,318	4,216	99,488	4,974	96,704	4,835	102,126	5,106
Average Farm Size	167	168	181	178	225	230	222	222
Source: USDA 2002 Census of Agriculture, County Profile and USDA 1992 Census of Agriculture, County Profile								

The number of farms in Caledonia County has increased approximately 9% in the 15 years between 1987 and 2002. However, the average farm size dropped by 22% and the total number of acres in agriculture dropped about 18%. The statewide trend is opposite that observed in Caledonia County with a decrease in farms from 7,100 in 1987 to 6,600 in 2002; a net loss of 7%. However, the total number of acres in agriculture statewide also dropped 18 percent in that same time period.



Based on the trend of the past 15 years a continued increase in the number of farms and inversely a decrease in the number of acres in agricultural production is forecasted. However, this statistical analysis does not necessarily take into account the compounding factors of economics, climate, and the future regulatory environment.

This trend suggests the composition of agricultural operations might look different in the future. Likely there will be fewer dairy farms and more diversified operations in pork, beef, lamb, vegetables and on-farm processing. The larger concern may be the shrinking acreage of farmland. The transition of this farm land to some other land use may impact water quality in many 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.

TYPES OF FARMING IN THE WELLS RIVER WATERSHED

Caledonia County farmers grow a diversity of crops including corn for grain and silage, oats, barely, potatoes, forage, vegetables, dry edible beans, apples, grapes, peaches, pears, blueberries,

raspberries, and strawberries. In addition they produce dairy products, beef, pork, lamb, and poultry. Currently, there are approximately 95 dairy farms in Caledonia County (McKay, 2006).

Table 2. Types of Farms in Caledonia County, 2002
(Values in parentheses are prorated for Wells River Watershed)

Sector	Number of Farms	Number of Animals or Acres
Beef	81 (4)	530 (27)
Dairy	104 (5)	7,716 (386)
Bees ¹	95 (5)	254 (13) hives
Goats ²	na	na
Hogs/pigs	20 (1)	138 (7)
Horses/ponies	na	1,207 (60)
Llama	na	na
Poultry (layers)	88 (4)	2,268 (113)
Sheep	44 (2)	733 (37)
Corn Grain	3 (na)	na (na)
Corn Silage/Greenchop	54 (3)	3,543 (177)
Barley	1	na
Forage	300 (15)	24,382 (1,219)
Potatoes	15 (1)	14 (1)
Dry beans	1 (na)	nr
Berries	16 (1)	10 (1)
Plums/Prunes	4 (na)	na
Apples	17 (1)	113 (6)
Grapes	1 (na)	na
Potatoes	7 (na)	55 (2)
Vegetables	37 (2)	168 (8)

Source: 2002 USDA Census of Agriculture, County Data

na = not available

nr = not reportable

1 = Agency of Agriculture: Parise, 2006

2 = at the time of this plan, there are 200 milking goats in the County

LFOS IN THE WELLS RIVER WATERSHED

There are 19 Large Farm Operations in the State of Vermont; 17 are dairy farms and one each poultry and beef operations. An LFO is defined as a dairy farm with 700 or more mature cows (dry or lactating), 1000 beef animals or a poultry operation with over 30,000 hens with a liquid manure system. None of these facilities are located in the Wells River watershed.

MFOS IN THE WELLS RIVER WATERSHED

There are approximately 200 Medium Farm Operations (MFOs) in Vermont. Of these one or two may be all or partially within the boundaries of the Wells River Watershed. An MFO is a farm with 200 or more mature cows (dry or lactating), 300 or more youngstock or heifers, 150 horses, 3000 sheep, or 9000 hens with a liquid manure system. The significant conditions of the MFO general permit are two fold. First, there may not be any discharge from an MFO. This means no waste (manure, spoiled feed, milk house liquids, barnyard runoff etc) may leave the production area and enter surface water. Second, the MFO must complete (by March 2008) 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.

ORGANIC FARMS

There has been a significant increase in the number of organic dairy farms in the past few years. This transition may be beneficial to water quality as the use of pesticides and antibiotics is eschewed and daily pasturing may ensure less concentration of manure. As of 2006 there were 18 organic dairy farms in Caledonia County (NOFA-VT 2007) and it is expected that number will rise in 2007. These 18 farms encompass 4,821 acres of farmland in organic hay and pasture. Another 304 acres of field crops are grown on 2 farms and approximately 424 acres has been certified as organic for the production of fruits and vegetables on 10 separate farms.

FARM ECONOMICS

Of the 505 farms listed in the 2002 Census, farming is the primary occupation of only about half of the farm operators. The operators of the other half of the farms are also employed off the farm. The total market value of the agricultural products sold in Caledonia County in 2002 was \$23,789,000 (USDA Census of Agriculture, 2002 County Data). Total farm production expenses are \$21,577,000, resulting in a net value of \$2,212,000.

WATER WITHDRAWALS FOR AGRICULTURE

Irrigation may not be a common practice in Caledonia County but it is a valuable tool for those farms with high value fruit, vegetable, and nursery crops. Using the proration formula for the Wells River Watershed just 2 farms utilize irrigation on 5 acres of farm land.

TABLE 3. Number of Farms with Irrigation and Acres of Irrigated Land in Caledonia County and Prorated for the Wells River Watershed

	Caledonia County	Wells River Watershed	Caledonia County	Wells River Watershed	Caledonia County	Wells River Watershed	Caledonia County	Wells River Watershed
	2002	2002	1997	1997	1992	1992	1987	1987
Number of Farms with Irrigated Land	31	2	26	1	11	1	5	na
Number of Irrigated Acres	92	5	245	12	18	1	na	na

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

Irrigation sources include surface water and groundwater. Irrigation represents about 7% of the total withdrawal of surface water and 1% of withdrawal for all groundwater uses.

TABLE 4. Estimated Water Withdrawal in Caledonia County in 2000

	Surface Water (Million Gallons/Day)	Groundwater (Million Gallons/Day)
All Withdrawal Uses	1.64	2.68
Withdrawal for Irrigation	0.12	0.02
Irrigation as a % of All Withdrawals	7	1
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 many conventional farms to organic operations, there were more acres treated with agrichemicals in 2002 than 15 years earlier. However, the use of these products is concentrated on fewer farms. The number of farms using insecticides dropped by approximately 30% between 1987 and 2002. The number of farms using herbicides dropped in 1992 and 1997 but was back to 1987 levels by 2002. The number of farms using chemical control for plant diseases has consistently dropped by about 80 percent during the same 15 year period.

**TABLE 5. Pesticide Use in Caledonia County
(Values in Parentheses are Prorated for Wells River Watershed)**

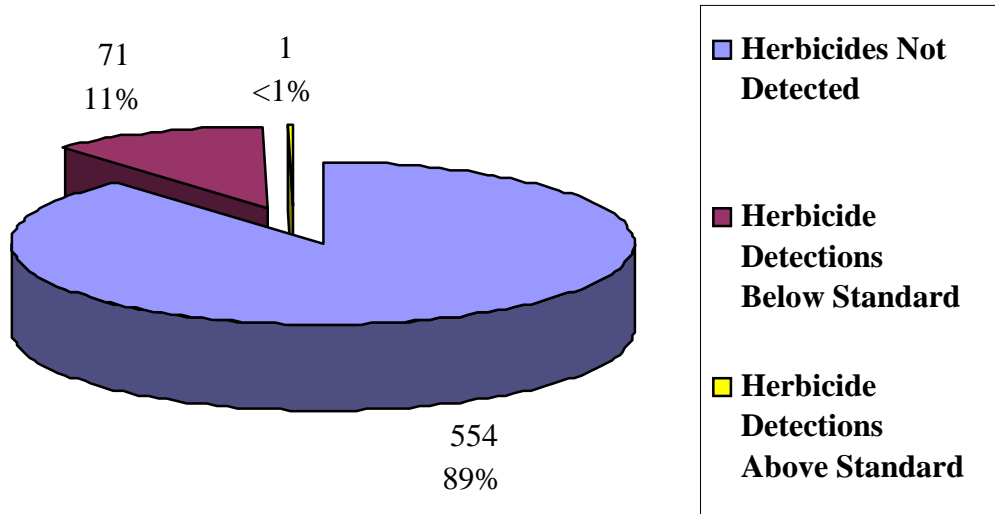
	2002	1997	1992	1987
# of Farms Using Chemical Treatment for Insect Control	20 (1)	35 (2)	40 (2)	32 (2)
Acres Treated for Insects	1,127 (56)	1,182 (59)	798 (40)	980 (49)
# of Farms Using Chemical Control for Weeds	101 (5)	59 (3)	83 (4)	109 (5)
Acres Treated for Weeds	4,481 (224)	3,148 (157)	2,873 (144)	3,470 (174)
# of Farms using Chemical Control for Plant Disease	2 (na)	16 (1)	16 (1)	11 (1)
Acres Treated for Diseases	na (na)	278 (14)	45 (2)	215 (11)

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

na = not available

Through a voluntary farm well program, drinking water samples are collected and analyzed for a suite of corn herbicides including chemicals such as atrazine and metolachlor. Over the past 10 years, there were 37 water samples collected from domestic wells on or adjacent to farms in Basin 14 and analyzed for corn herbicides. There were no detections. Statewide, there were 625 water samples analyzed for herbicides between 2002 and 2006. Of these, 70 had detections of one or more herbicide with just one sample having a concentration above the drinking water standard.

Herbicide Detections in Drinking Water Samples Statewide 2002 through 2006



Source: Agency of Agriculture, Comstock, 2007

Further compounding the complexity of agricultural 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. However, each agricultural chemical has unique formulations that dictate their fate and transport in the environment making it difficult if not impossible to screen for each and every possible compound in groundwater. Therefore, nitrates and corn herbicides are good indicators of groundwater quality based on hydrogeologic factors.

FERTILIZER USE

The number of farms using commercial fertilizers and the numbers of acres treated with fertilizers has decreased in the past 15 years.

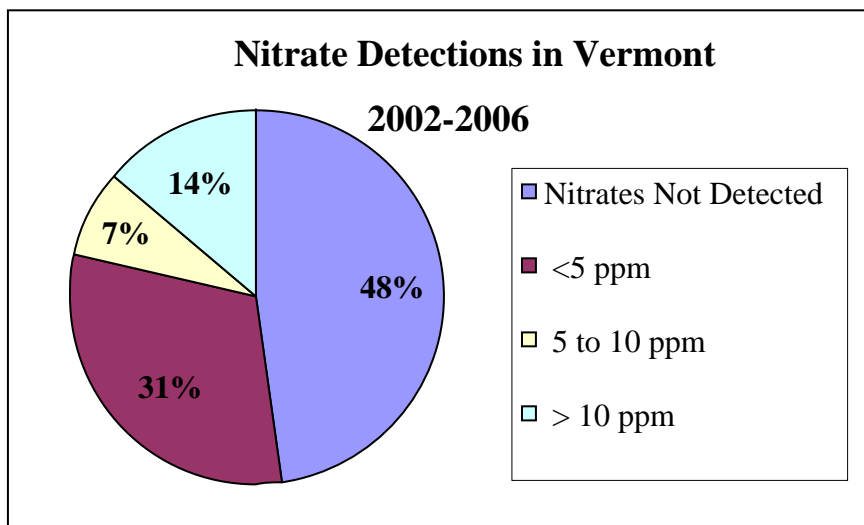
TABLE 6. Fertilizer Use in Caledonia County
(Values in parentheses are prorated for Wells River Watershed)

	2002	1997	1992	1987
Number of farms using commercial fertilizers, lime, soil conditioners	196 (10)	227 (11)	216 (11)	330 (17)
Number of acres treated	14,504 (725)	15,400 (770)	15,529 (776)	21,146 (1,057)
Number of farms using manure	184 (9)	na	na	na
Number of acres where manure spread	18,202 (910)	na	na	na

Source: Data from the USDA Census of Agriculture
na = not available

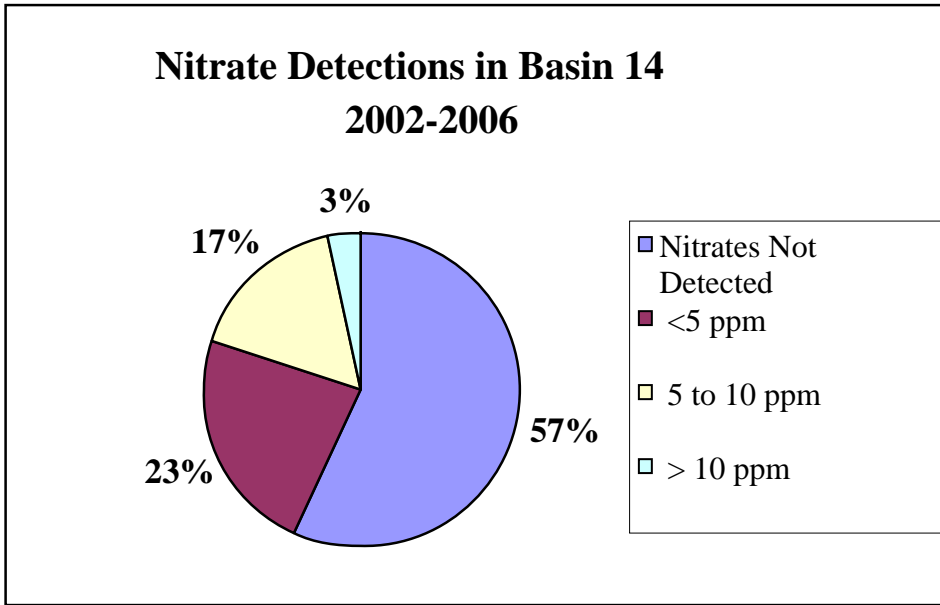
The Agency of Agriculture manages a groundwater monitoring program to determine the quality of groundwater near Vermont farms. Given that nitrates are highly soluble and are therefore transported with runoff water and leach into permeable soils it is not uncommon to find low levels of nitrates in the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

Between 2002 and 2006 a total of 625 well samples across the state were analyzed for nitrates. Of those sampled 298 or 48% had no detections of nitrates. Another 240 wells (38%) had detections between 1 and 10 ppm. Therefore, 87 wells or 14% 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 groundwater quality on farms that contract for conservation practice cost share dollars.



Source: Agency of Agriculture, Comstock 2007

Within Basin 14 there were 30 water samples collected and analyzed for nitrates. Of these, just one (or 3%) was over the drinking water standard of 10 ppm.

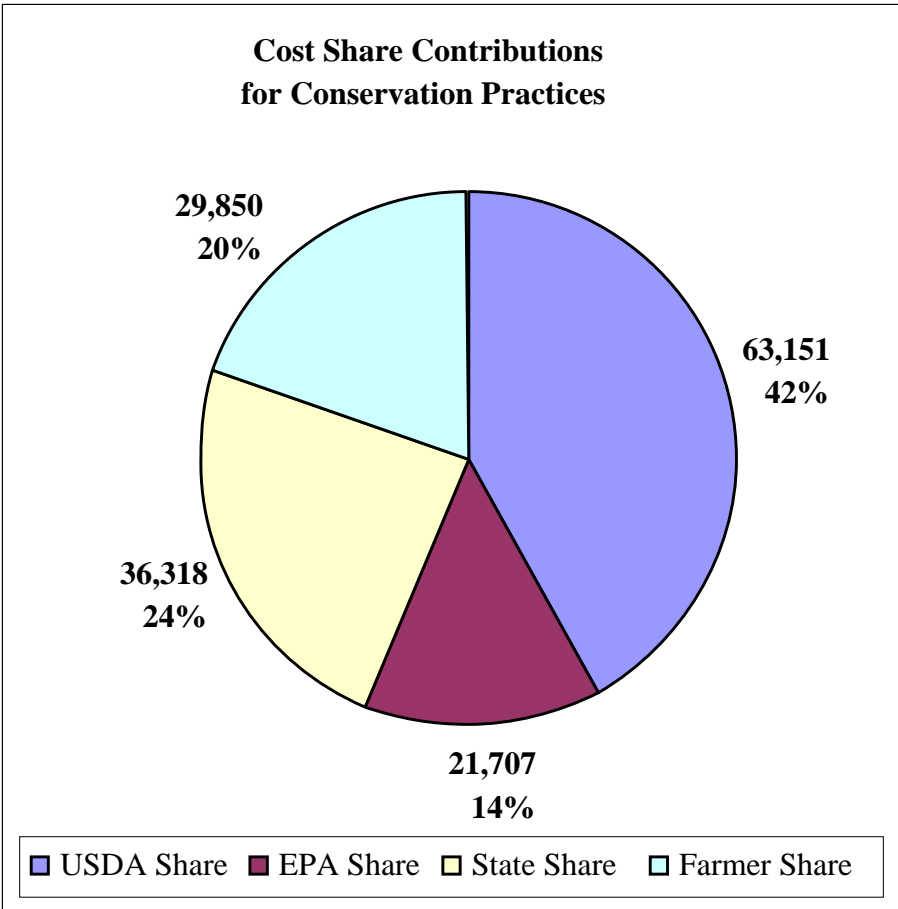


Source: Agency of Agriculture, Comstock 2007

CONSERVATION PRACTICES IN THE WELLS RIVER BASIN

Water quality issues associated with agriculture have been addressed on many farms in the watershed through conservation practices. In the past 10 years 19 projects for Best Management Practices (BMP) have been initiated in the Wells River Basin. Twelve projects are for production area practices (*e.g.* barnyard runoff, manure storage, leachate collection) covering 493 animals. The remaining 7 projects are for field practices (*e.g.* stream bank stabilization, stream crossing) of which 3 have been completed. The total cost of these practices is \$151,026 with the Vermont Agency of Agriculture, USDA, EPA and landowners all contributing a share to the total cost. The total number of animals that are included in these treatment practices is 493.

It should be noted that only those practices that are covered in part by cost share money through the State are reported here and that landowners often work on conservation practices without the benefit of state and federal programs. Unfortunately, there is no system for tracking those efforts or those of volunteer groups and other private landowners.



Source: Agency of Agriculture, Cook 2006

In addition, in 2006 Land Treatment Plans were completed for 20 farms in Caledonia County with another 6 in progress at the end of the year. Of these 20 farms, 8 were for Medium Farm Operations (MFOs) and 12 were for Small Farm Operations (SFOs). Together these farms represent 7,844 acres of land in Caledonia County for which management plans were written in 2006 to meet soil loss requirements. The requirement for MFOs is that all acreage be managed to the soil loss tolerance specific to each field. For SFOs the requirement is for soil loss to be managed to twice the tolerance for soil loss for each field. However, when working with programs offered by the NRCS, farmers are required to meet the specific soil tolerance.

Nutrient Management Plans (NMPs) are required for all MFOs by March 2008. 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 2005 through 2007 there were 11 NMPs submitted to the Agency of Agriculture representing 4,378 acres in Caledonia County and a total of \$50,974 was allocated (Agency of Agriculture, Weber 2007). For the Wells River Watershed, there was one NMP completed representing 209 acres.

AREAS IN NEED OF ATTENTION

The Vermont 303(d) List of Impaired Waters includes Ticklenaked Pond within the Wells River watershed. This surface water body has elevated levels of phosphorus resulting in excessive algal blooms. An intensive monitoring program is underway, corrective actions upstream have been initiated, and long term solutions are being considered. In addition, at least one farmer in the Ticklenaked Pond watershed has written a nutrient management plan for his farm and the plan is being implemented beginning in 2007.

Other waters that warrant further consideration for evaluation of impairment includes one segment in the Wells River where the old landfill may be leaching metals into groundwater that are then released into the river. Also further investigation of Ticklenaked Pond for E. coli concerns may be warranted.

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ANR, DEC WQD, Basin 14 Water Quality and Aquatic Habitat Assessment Report, April 1999.

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USDA Census of Agriculture, 1997 County Profile Data

USDA Census of Agriculture, 1992 County Profile Data

USDA Census of Agriculture, 1987 County Profile Data

APPENDIX A.5 - Agriculture in the Waits River Watershed

INTRODUCTION

Basin 14 is comprised of 4 small watersheds: the Stevens, Wells, Waits, and Ompompanoosuc. The Waits River Watershed is approximately 144 square miles or 92,000 acres (ANR 1999). Of this area 8 percent or approximately 8,177 acres are used for agricultural purposes (ANR 1999).

The Waits River runs west to east towards the Connecticut with two large tributaries: the South Branch and the Tabor Branch. A tributary to the Tabor Branch is included on the State of Vermont list of impaired waters due to agricultural runoff. This is the only segment in the watershed that appears on the 303(d) list for agriculture.

Many of the statistics about this area are collected on a county-wide basis. Since this sub-basin represents only about 25% of Orange County and not necessarily the most active agriculturally, the information provided here must be used with that caveat. Where possible the county level data was prorated to reflect watershed level data more precisely. This was done by calculating a ratio of farm land in Orange County to farm land in the Waits River Watershed. In 1997 there were 102,549 acres of farm land in Orange County (USDA 1997) and 8,177 acres of farm land in the Waits River Watershed (ANR 1999). This means the Waits River Watershed contains about 8% of the farm land in Orange County and therefore all the agricultural census data for Orange County was prorated accordingly.

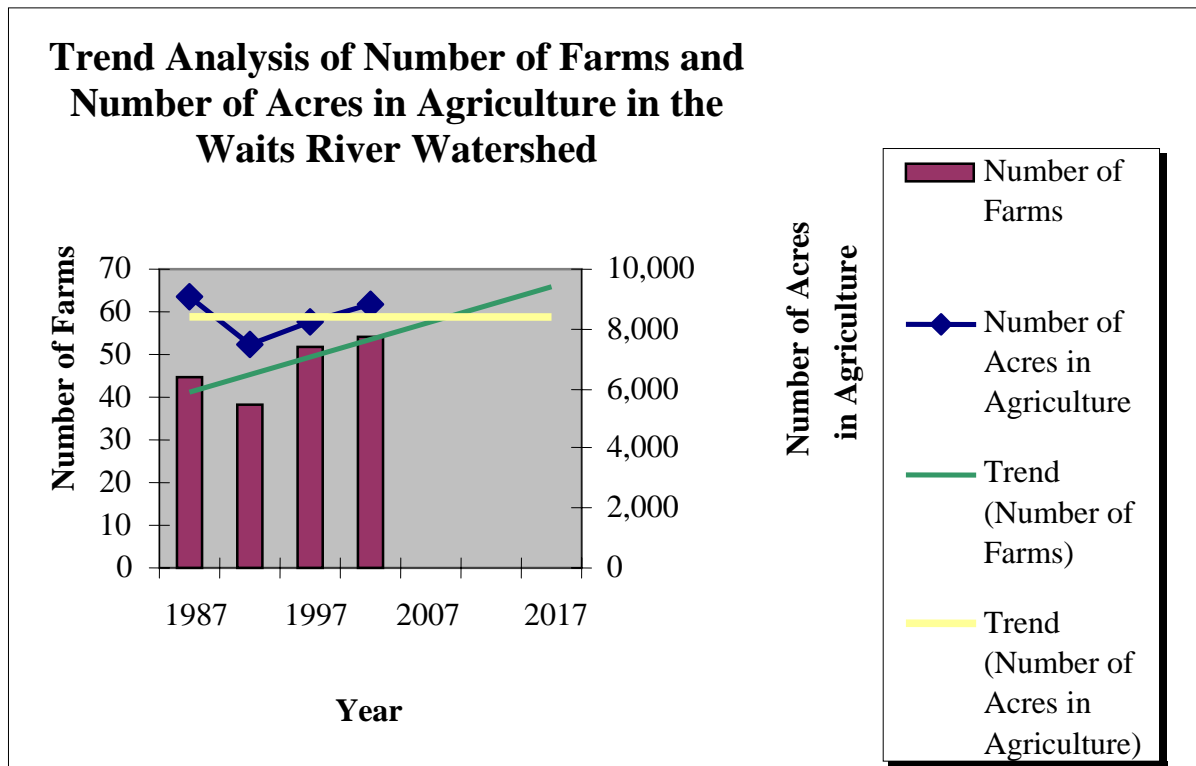
**TABLE 1: USDA Farm Statistics for Orange County, Vermont
(Values in parentheses are prorated for Waits River Watershed)**

	2002	1997	1992	1987
Number of Farms	680 (54)	654 (52)	480 (38)	560 (45)
Acres in Farms	110,415 (8,833)	102,549 (8,204)	93,364 (7,469)	113,305 (9,064)
Average size of Farms	162 (164)	157 (158)	195 (197)	202 (201)

Source: USDA 2002 Census of Agriculture, County Profile
USDA 1992 Census of Agriculture, County Profile

According to the 2002 Census of Agriculture compiled by USDA there are 680 farms in Orange County. The Census 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.* The number of farms has increased 18 percent in the past 15 years. The average farm size has dropped by 20 percent while the total number of acres in agriculture has only dropped about 3 percent. This is consistent with the statewide trend increasing from 5436 farms in 1992 to 6571 in 2002. The number of acres in agriculture statewide dropped 3 percent in that same decade.

The continuation of these trends suggests there is considerably more work to be done to provide outreach and education for the increasing number of farmers in the watershed. Likely there will be fewer dairy farms but more livestock and vegetable farms to provide a local source of food for the growing farmer markets and restaurant demands. Agricultural land is projected to decrease approximately 3% in the next 15 years and the transition of that land to urban and suburban development may have different and perhaps more detrimental impacts on water quality.



TYPES OF FARMING IN THE WAITS RIVER WATERSHED

Orange County farmers grow a diversity of crops including corn for grain and silage, oats, barely, potatoes, forage, vegetables, dry edible beans, apples, grapes, pears, blueberries, raspberries, and strawberries. In addition they produce dairy products, beef, pork, lamb, and poultry. There are two cheese makers in the watershed producing cow's milk cheese right on the farm. The total market value of the agricultural products sold \$32,008,000. Total farm production expenses are \$32,092,000, exceeding the value of the products by \$84,000. Since there are about 600-700 farms this averages out to approximately \$130 per farm.

Table 2: Types of Farms in Orange County, 2002
(Values in parentheses are prorated for Waits River Watershed)

Sector	Number of Farms	Number of Animals or Acres
Beef	127 (10)	1,247 (100)
Dairy	164 (13)	9,643 (771)
Other cattle	229 (18)	8,505 (680)
Bees ²	176	444
Goats	na	na
Hogs/pigs	35 (3)	362 (29)
Horses/ponies		1,207 (97)
Llama	na	na
Poultry (layers)	76 (6)	2,406 (192)
Sheep	60 (5)	1,813 (145)
Corn Grain	3 (na)	27 (na)
Corn Silage	96 (8)	4,928 (394)
Oats	1 (na)	nr
Barley	1 (na)	nr
Dry beans	1 (na)	nr
Berries	26 (2)	39 (3)
Christmas Tree		4,928 (394)
Hay	382 (31)	27,022 (2,162)
Nursery ¹	17 (1)	na
Pears	1 (na)	nr
Apples	9 (1)	44 (4)
Grapes	4 (na)	nr
Potatoes	7 (1)	55 (4)
Vegetables	34 (3)	276 (22)

Source: 2002 USDA Census of Agriculture, County Data

¹ = <http://www.vermontagriculture.com/certnurse.htm#Orange>

² = Agency of Agriculture: Parise, 2006

Of the 680 farms listed in the 2002 Census, less than half of them (304) are the primary occupation of the operator. That means the majority are part time farmers, growers, nurserymen, etc.

ORGANIC FARMING IN ORANGE COUNTY

There are approximately 120 dairy farms in Orange County (Koloski 2006). Of these 16 are certified organic by NOFA representing 3860 acres (NOFA-VT, 2007). The number of organic dairy farms is expected to increase significantly in 2007. Organic vegetable farms account for another 612 acres; organic livestock operations 348 acres, and organic field crops another 405 acres for a total of 5225 acres of organic farms in Orange County.

LFOS IN THE WAITS RIVER WATERSHED

There are 19 Large Farm Operations in the State of Vermont. An LFO is defined as a dairy farm with 700 mature cows or more or a beef operation with over 1000 head of cattle. None of these facilities are located in the Waits River watershed.

MFOS IN THE WAITS RIVER WATERSHED

There are approximately 200 Medium Farm Operations (MFOs) in Vermont. Of these none appear to be within the boundaries of the Waits River Watershed. An MFO is defined as a farm with 200 or more mature cows, 300 or more youngstock or heifers, 150 horses, 300 sheep, or 9000 hens. The significant conditions of the general permit are two fold. First, there may not be a discharge from an MFO. This means no waste (manure, spoiled feed, millhouse liquids, barnyard runoff etc) may leave the production area and enter surface water. Second, the MFO must complete (by March 2008) 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.

WATER WITHDRAWALS FOR AGRICULTURE

Both the number of farms irrigating crops and the number of acres being irrigated have increased steadily since 1987. This is primarily due to the increase in the number of farm markets and cash crop production.

TABLE 3: Number of Farms Using Irrigation and Acres of Irrigated Land in Orange County

(Values in parentheses are prorated for Waits River Watershed)

	2002	1997	1992	1987
# of Farms with Irrigated Land	48 (4)	31 (2)	23 (2)	11 (1)
# of Acres Irrigated	152 (12)	na	91 (7)	89 (7)

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

Irrigation sources include surface water and groundwater. There is no state limitation on pumping water from these sources for agricultural use. As a percentage of all water withdrawals, irrigation represents about one quarter the total withdrawals for surface water and almost insignificant amount from ground water.

The Accepted Agricultural Practices require anti-siphon devices between the system and the water source on any equipment used for fertigation and chemigation.

TABLE 4: Estimated Water Withdrawal in Orange County in 2000

	Surface Water (Million Gallons/Day)	Groundwater (Million Gallons/Day)
All Withdrawals	0.55	2.41
Irrigation	0.13	0.01
Irrigation as a % of All Withdrawals	24	<1
Livestock Watering	na	na

Source: <http://water.usgs.gov/watuse/data/2000/vtco2000.xls>
na = not available

Irrigation represents about one-quarter of the overall withdrawal of surface water and an insignificant amount of withdrawal for all groundwater uses.

AGRICULTURAL CHEMICAL USE

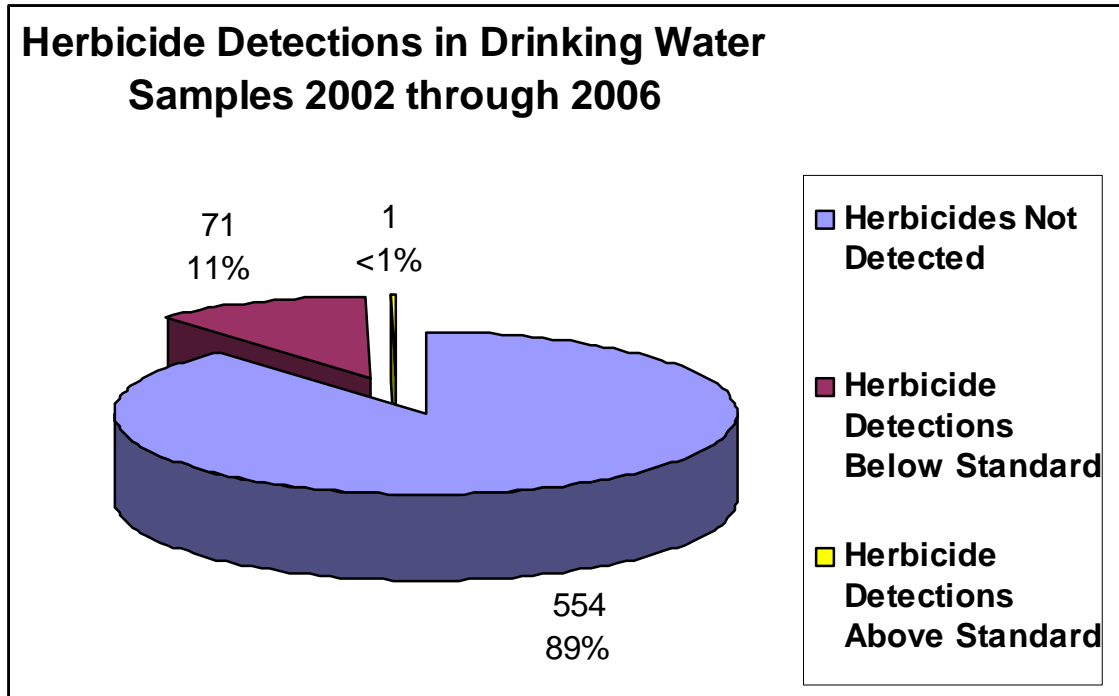
**TABLE 5: Pesticide Use in Orange County
(Values in parentheses are prorated for Waits River Watershed)**

	2002	1997	1992	1987
Number of Farms using Chemical Treatment for Insect Control	34 (3)	29 (2)	47 (4)	70 (6)
Acres Treated for Insect Problems	2,034 (163)	350 (28)	1,492 (119)	1,351 (108)
Number of Farms using Chemical Control for Weeds	146 (12)	109 (9)	102 (8)	140 (12)
Acres Treated for Weed Problems	5,238 (419)	3,905 (312)	3,484 (279)	4,065 (325)
Number of Farms using Chemical Control for Plant Disease	9 (1)	13 (1)	31 (2)	36 (3)
Acres Treated for Disease Problems	209 (17)	67 (5)	911 (73)	576 (46)

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

Each farm operation uses a unique and specific combination of tools to combat insect, disease and weed problems. Despite the recent conversion of many conventional farms to organic operations, there were more acres treated with agrichemicals in 2002 than 15 years ago. However, the use of these products is concentrated on fewer farms. In fact, the number of farms using insecticides has dropped by half in 15 years. The number of farms using herbicides dropped in 1992 and 1997 but was back to just above 1987 levels by 2002. The number of farms using chemical control for plant diseases has consistently dropped by about 75 percent during the same 15 year period.

The Agency of Agriculture has a drinking water program where they collect samples for analysis for a suite of corn herbicides including chemicals such as atrazine and metolachlor. Over the past 10 years, there were 37 water samples collected from domestic wells in Basin 14 and analyzed for corn herbicides. There were no detections. Statewide a total of 625 samples were collected in Vermont in the past five years and there were 71 detections (11 %) and just 1 sample above the drinking water standard. The wells included in this program are generally farm water supplies although some drinking water sources adjacent to farms are also included. The program is voluntary and therefore not representative of the entire population of domestic water supplies.



source: Agency of Agriculture, Comstock, 2007

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. However, each agrichemical has unique formulations that dictate their fate and transport in the environment making it difficult if not impossible to screen for each and every possible compound in groundwater. Therefore, nitrates and herbicides are good indicators of groundwater quality based on hydrogeologic factors.

FERTILIZER USE

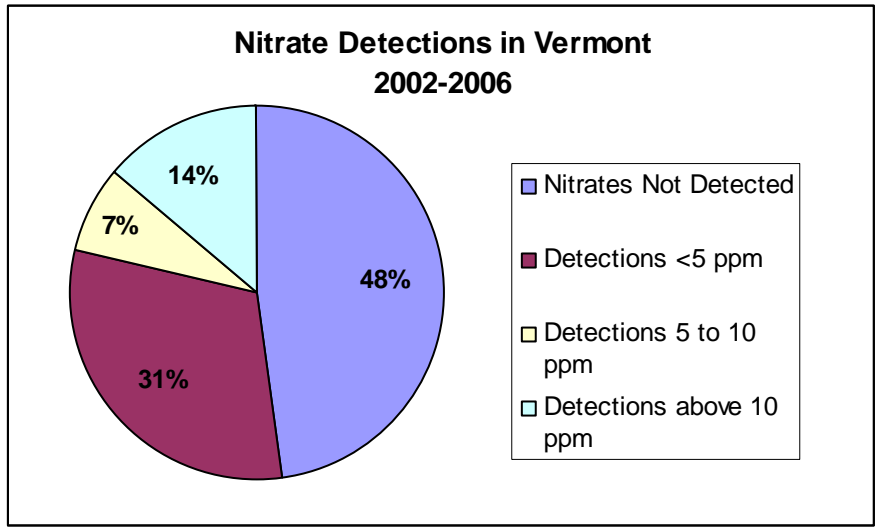
The number of farms using commercial fertilizers has decreased while the number of acres treated has increased in the past 15 years. This may be explained by the increase in organic farm operations and the increasing size of conventional farms.

**TABLE 6: Fertilizer Use in Orange County
(Values in parentheses are prorated for Waits River Watershed)**

	2002	1997	1992	1987
Number of Farms using Commercial Fertilizers, Lime, Soil Conditioners	253 (20)	265 (21)	263 (21)	297 (24)
Number of Acres Treated	18,140 (1,451)	14,542 (1,163)	16,853 (1,348)	15,115 (1,209)
Number of Farms Using Manure	266 (21)	na	na	na
Number of Acres Where Manure is Spread	15,191 (1,215)	na	na	na

Source: Data from the USDA Census of Agriculture, County Profile.

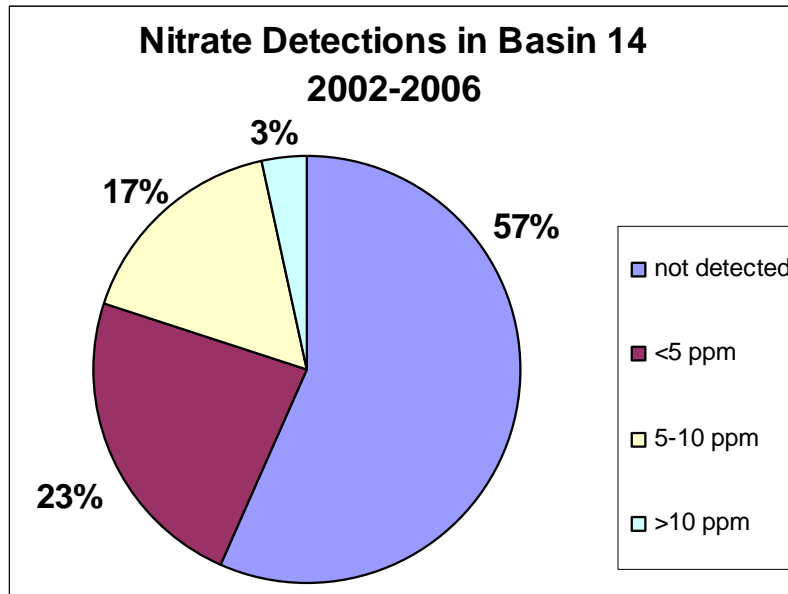
The Agency of Agriculture manages a nitrate groundwater monitoring program to determine the quality of groundwater near Vermont farms. The drinking water samples are not representative of the entire population since inclusion in the program is voluntary and most of the samples are taken from farms or lands adjacent to farms. Given that nitrates are highly soluble and are therefore available for transport with runoff water and to leach into permeable soils it is not uncommon to find low levels of nitrates in the groundwater samples extracted from farm wells or springs and those of adjacent landowners.



source: Agency of Agriculture, Comstock 2007

Between 2002 and 2006 a total of 625 water samples across the state were analyzed for nitrates. Of those sampled 298 or 48% had no detections of nitrates. Another 240 drinking water samples (38%) had detections between 1 and 10 ppm. Therefore, 87 or 14% of the total number of

drinking water supplies sampled had detections of nitrates above the drinking water standard of



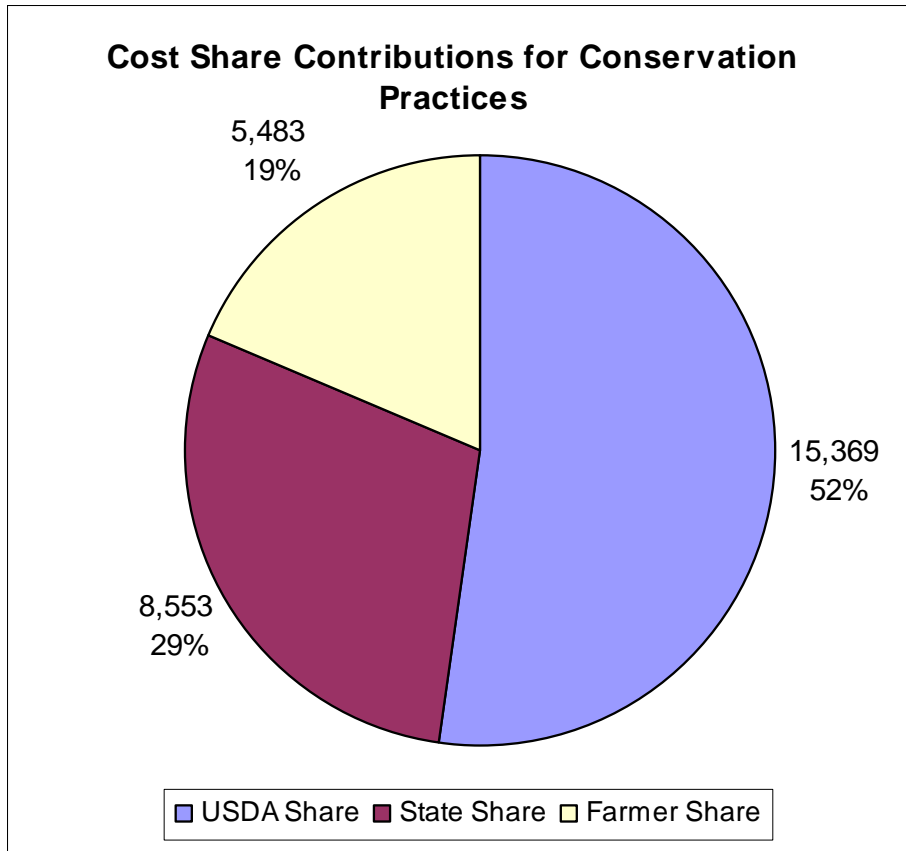
10 ppm. Sampling continues to monitor the levels in those wells that exceed the standard and to provide baseline data for groundwater quality on farms that contract for conservation practice cost share dollars.

For Basin 14 nitrate detections and exceedances of the drinking water standard are significantly lower than the state wide figures. Only 1 of the 30 samples analyzed for nitrates was above the state standard and 57% of all samples analyzed had no detectable levels of nitrates.

CONSERVATION PRACTICES IN THE WAITS RIVER BASIN

For all of Basin 14 there have been 29 Best Management Practices implemented in the past decade (Agency of Agriculture 2006). Specifically, in the Waits River Basin there was one production area improvement (25 animal units) and one field practice. These measures are funded through a combination of State, Federal, and Landowner dollars. Other practices have been implemented but are not tracked if they do not include State cost share dollars.

Through the Agency of Ag Nutrient Management Incentive Grant Program one farm in the Waits River Watershed has completed a nutrient management plan cover 200 acres of agricultural land (Weber, 2007).



source: Agency of Agriculture, Cooke 2006

AREAS IN NEED OF ATTENTION

There are two stream reaches within the watershed that are currently on the State of Vermont’s list of impaired waters. These include Pike Hill Brook (from mouth to 3 miles upstream) which is impaired due to metals from former mining operations. Also, a tributary to the Tabor Branch is impaired for 0.1 mile by “undefined” pollutants. Agricultural runoff and milk house effluent are listed as the surface water quality problems for this tributary

The State of Vermont Water Quality Division has a list of river segments that they feel warrant further consideration for evaluation of impairment. Two segments in the Waits River watershed exist between West Topsham and the confluence of the South Branch and Below the Confluence of the South Branch to the Connecticut River. The concerns associated with these reaches include channel widening, erosion, and runoff.

REFERENCES

ANR, DEC WQD, Basin 14 Water Quality and Aquatic Habitat Assessment Report, April 1999.

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Agency of Agriculture, e-mail correspondence with Steve Parise, December 1, 2006.

Agency of Agriculture, email correspondence with Dave Weber, August 6, 2007.

Koloski, Dan, Soil Conservationist, White River NRCS, personal communication, August 18, 2006.

NOFA-VT, e-mail from Erin Clark, January 15, 2007.

USDA 2002 Census of Agriculture, County Profile

APPENDIX A.6 - Agriculture in the Ompompanoosuc River Watershed

INTRODUCTION

Basin 14 is comprised of 4 small watersheds: the Stevens, Wells, Waits, and Ompompanoosuc. The Ompompanoosuc River Watershed is approximately 136 square miles or 87,040 acres (ANR 1999). Of this area approximately 5 percent or roughly 4,507 acres are used for agricultural purposes (ANR 1999).

Many of the statistics about this area are collected on a county-wide basis. Since this sub-basin represents only about 20 to 25% of Orange County and not necessarily the most active agriculturally, the information provided here must be used with that caveat. Where possible, county level data was prorated to reflect watershed level data more precisely. This was done by calculating a ratio between the farm land in Orange County to farm land in the Ompompanoosuc River Watershed. In 1997 there were 102,549 acres of farm land in Orange County (NASS 1997) and 4,507 acres of farm land in the Ompompanoosuc River Watershed (ANR 1999). This means the Ompompanoosuc River Watershed contains about 4% of the farm land in Orange County and therefore the agricultural census data for Orange County can be prorated accordingly.

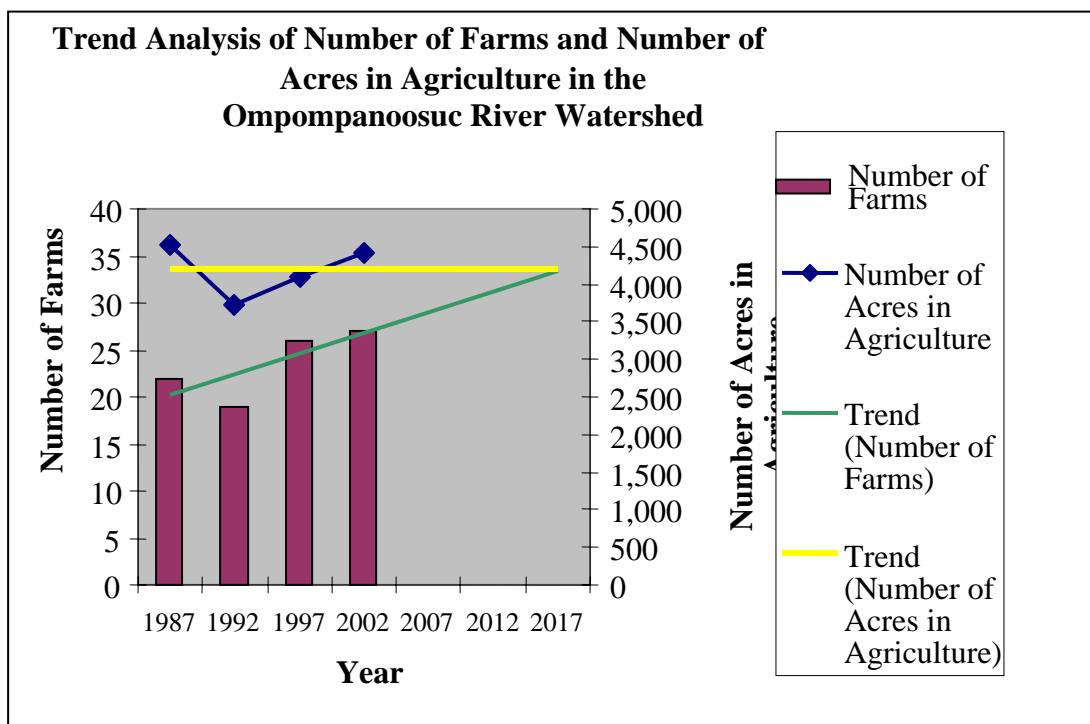
Table 1. Number of Farms and Farm Size in Orange County and Prorated Values for the Ompompanoosuc River Watershed

	Orange County 2002	Ompomp 2002 (prorated)	Orange County 1997	Ompomp 1997 (prorated)	Orange County 1992	Ompomp 1992 (prorated)	Orange County 1987	Ompomp 1987 (prorated)
Number of Farms	680	27	654	26	480	19	560	22
Acres in Farms	110,415	4,417	102,549	4,102	93,364	3,735	113,305	4,532
Average Farm Size	162	164	157	158	195	197	202	206

Source: USDA 2002 and 1992 Census of Agriculture, County Profile
 Note: census data is collected every 5 years

According to the 2002 Census of Agriculture compiled by NASS there are 680 farms in Orange County. For purposes of compiling these statistics, the USDA defines a farm as “any place from which \$1,000 or more in agricultural products were produced and sold, or normally would be sold, during the census year.” The number of farms has increased 18 percent in the past 15 years. The average farm size has dropped by 20 percent and yet the number of acres in agriculture has only dropped about 3 percent.

Of the 680 farms listed in the 2002 Census, less than half of them (304) are the primary occupation of the operator. That means the majority are part time farmers, growers, nurserymen, etc. There are approximately 120 dairy farms in Orange County (Koloski 2006).



Based on the trend of the past 15 years a continued increase in the number of farms with a slight decrease in the total number of acres in agricultural production is forecasted. However, the statistical analysis does not necessarily take into account the compounding factors of economics, climate, and the future regulatory environment.

TYPES OF FARMING IN THE OMPOMPANOOSUC RIVER WATERSHED

Orange County farmers grow a diversity of crops including corn for grain and silage, oats, barely, potatoes, forage, vegetables, dry edible beans, apples, grapes, blueberries, raspberries, and strawberries. In addition they produce dairy products, beef, pork, lamb, and poultry. The total market value of the agricultural products sold in 2002 was \$32,008,000. Unfortunately, the total farm production expenses are \$32,092,000, exceeding the value of the products by \$84,000. When considering the impacts of agriculture on water quality and possible solutions it is

imperative to take into account the already difficult economic picture. Low cost approaches, cost share programs, and grass roots volunteer efforts may yield the most cooperation and success.

Table 2. Types of Farms in Orange County, 2002
(Values in parentheses are prorated for Ompompanoosuc River Watershed)

Sector	2002	
	Number of Farms	Number of Animals or Acres
Beef	127 (5)	1,247 (50)
Dairy	164 (7)	9,643 (385)
Other cattle	229 (9)	8,505 (340)
Bees ²	176 (7)	244 (10) hives
Goats	na	na
Hogs/pigs	35 (1)	362 (14)
Horses and ponies		1,207 (48)
Llama	na	na
Poultry (layers)	76 (3)	2,406 (96)
Sheep	60 (2)	1,813 (73)
Corn Grain	3 (na)	27 (na)
Corn Silage	96 (4)	4,928 (197)
Oats	1 (na)	nr
Barley	1 (na)	nr
Dry beans	1 (na)	nr
Berries	26 (1)	39 (2)
Christmas Tree	Na	4,928 (197)
Hay	382 (15)	27,022 (1080)
Nursery	17 ¹ (1)	na
Pears	1 (na)	nr
Apples	9 (na)	44 (2)
Grapes	4 (na)	nr
Potatoes	7 (na)	55 (2)
Vegetables	34 (1)	276 (11)

Source: 2002 USDA Census of Agriculture, County Data

¹ = <http://www.vermontagriculture.com/certnurse.htm#Orange>

² = Agency of Agriculture: Parise, 2006

na = not available, nr = not reported

ORGANIC FARMING IN ORANGE COUNTY

There are approximately 120 dairy farms in Orange County (Koloski 2006). Of these, 16 are certified organic by NOFA representing 3860 acres (NOFA-VT, 2007). The number of organic dairy farms is expected to increase significantly in 2007. Organic vegetable farms account for another 612 acres; organic livestock operations 348 acres, and organic field crops another 405 acres for a total of 5225 acres of organic farms in Orange County.

LFOS IN THE OMPOMPANOOSUC RIVER WATERSHED

There are 19 Large Farm Operations in the State of Vermont: 17 dairy, 1 beef and 1 poultry. An LFO is defined as a dairy farm with 700 or more mature cows or a beef operation with over 1000 head of cattle. None of these facilities are located in the Ompompanoosuc River watershed.

MFOS IN THE OMPOMPANOOSUC RIVER WATERSHED

There are approximately 200 Medium Farm Operations (MFOs) in Vermont. None of these appear to be within the boundaries of the Ompompanoosuc River Watershed. An MFO is defined as a farm with 200 to 699 mature cows, 300 to 999 youngstock or heifers, 150 to 499 horses, or 9000 to 29,999 hens. The significant conditions of the general permit are two fold. First, there may not be a discharge from an MFO. This means no waste (manure, spoiled feed, millhouse liquids, barnyard runoff etc) may leave the production area and enter surface water. Second, the MFO must complete (by March 2008) 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.

WATER WITHDRAWALS FOR AGRICULTURE

Both the number of farms irrigating crops and the number of acres being irrigated have increased steadily since 1987. This is primarily due to the increase in the number of farm markets and cash crop production.

TABLE 3. Number of Farms With Irrigation and Acres of Irrigated Land in Orange County and Prorated for the Ompompanoosuc River Watershed

	Orange County	Ompomp (prorated)	Orange County	Ompomp (prorated)	Orange County	Ompomp (prorated)	Orange County	Ompomp (prorated)
	2002	2002	1997	1997	1992	1992	1987	1987
Number of Farms with Irrigated Land	48	2	31	1	23	1	11	na
Number of Acres Irrigated	152	6	na	na	91	7	89	na

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

Irrigation sources include surface water and groundwater. There is no state limitation on pumping water from these sources for agricultural use. As a percentage of all water withdrawals, irrigation represents about one quarter the total withdrawals for surface water and almost insignificant amount from ground water.

The AAPs require anti-siphon devices between the system and the water source on any equipment used for fertigation or chemigation.

TABLE 4. Estimated Water Withdrawals in Orange County in 2000

	Surface Water (Million Gallons/Day)	Groundwater (Million Gallons/Day)
All Withdrawals	0.55	2.41
Irrigation	0.13	0.01
Irrigation as a % of All Withdrawals	24	<1
Livestock Watering	na	na

na = not available

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

AGRICULTURAL CHEMICAL USE

**TABLE 5. Pesticide Use in Orange County
(Values in parentheses are prorated for Ompompanoosuc River Watershed)**

	2002	1997	1992	1987
Number of Farms using Chemical Treatment for Insect Control	34 (1)	29 (1)	47 (2)	70 (3)
Acres Treated for Insect Problems	2,034 (81)	350 (14)	1,492 (60)	1,351 (54)
Number of Farms using Chemical Control for Weeds	146 (6)	109 (4)	102 (4)	140 (6)
Acres Treated for Weed Problems	5,238 (210)	3,905 (156)	3,484 (139)	4,065 (163)
Number of Farms using Chemical Control for Plant Disease	9 (na)	13 (na)	31 (1)	36 (1)
Acres Treated for Disease Problems	209 (8)	67 (3)	911 (36)	576 (23)

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

na = not available

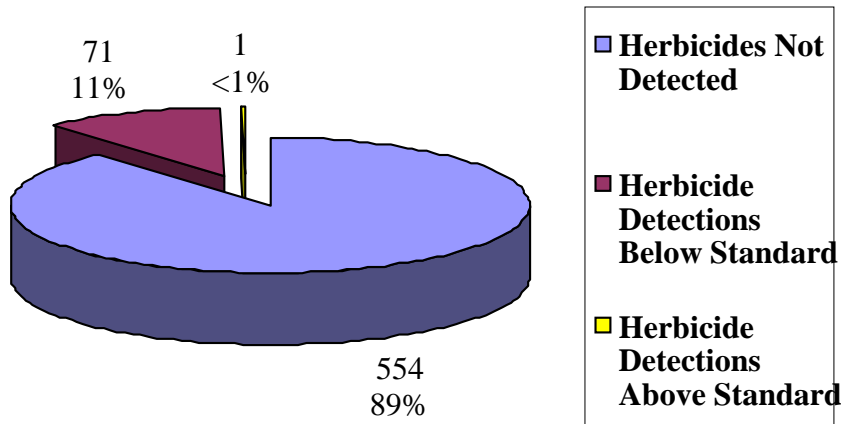
Each farm operation uses a unique and specific combination of tools to combat insect, disease and weed problems. Despite the recent conversion of conventional farms to organic operations, there were more acres treated with agrichemicals than 15 years ago. The use of these products is however concentrated on fewer farms. In fact, the number of farms using insecticides has dropped by half in 15 years. The number of farms using herbicides dropped in 1992 and 1997 but were back to just above 1987 levels by 2002. The number of farms using chemical control for diseases has consistently dropped by about 75 percent during the same 15 year period.

Through a voluntary state program, drinking water samples are collected and analyzed for a suite of corn herbicides including chemicals such as atrazine and metolachlor. Over the past 5 years, there were 71 detections (11 %) statewide with just 1 sample above the drinking water standard.

Over the past 10 years, there were 37 water samples collected from domestic wells in Basin 14 and analyzed for a suite of corn herbicides. There were no detections.

There are a growing number of vegetable farms and flower and nursery operations in the Ompompanoosuc River Watershed. However, the specific chemicals used at these operations are not specifically targeted in any sampling program.

**Herbicide Detections in Drinking Water Statewide
2002 through 2006**



Source: Agency of Agriculture, Comstock, 2007

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. However, each agrichemical has unique formulations that dictate their fate and transport in the environment making it difficult if not impossible to screen for each and every possible compound in groundwater. Therefore, nitrates and herbicides remain good indicators of groundwater quality based on hydrogeologic factors.

FERTILIZER USE

The number of farms using commercial fertilizers has decreased while the number of acres treated has increased in the past 15 years. This may be explained by the increase in organic farm operations and the increasing size of conventional farms.

**TABLE 6. Fertilizer Use in Orange County
(Values in parentheses are prorated for Ompompanoosuc River Watershed)**

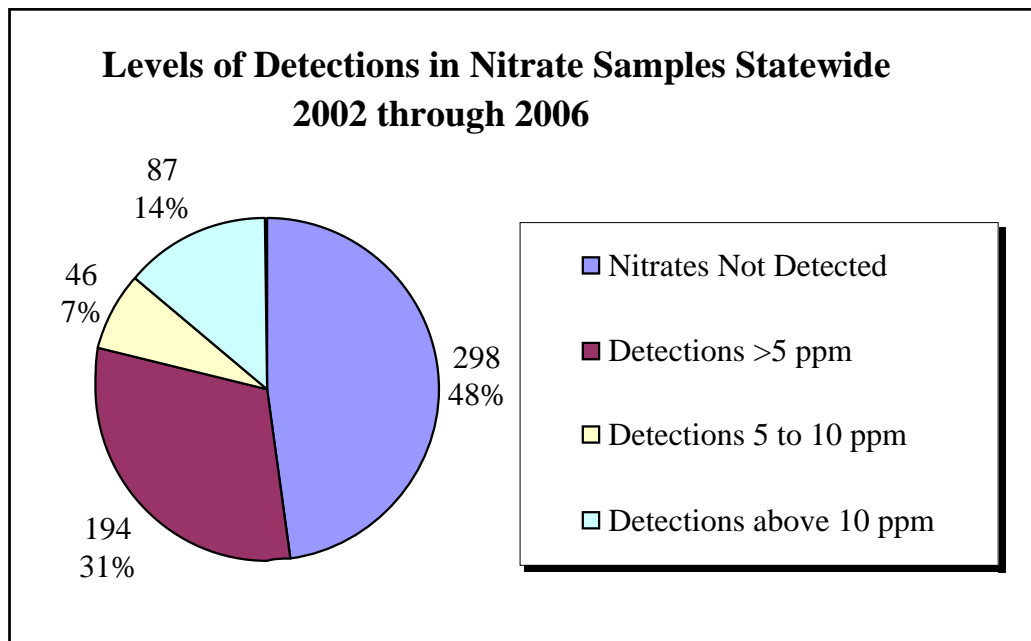
	2002	1997	1992	1987
Number of Farms using Commercial Fertilizers, Lime, Soil Conditioners	253 (10)	265 (11)	263 (11)	297 (12)
Number of Acres Treated	18,140 (726)	14,542 (582)	16,853 (674)	15,115 (605)
Number of Farms Using Manure	266 (11)	na	na	na
Number of Acres Where Manure Spread	15,191(608)	na	na	na

Source: Data from the USDA Census of Agriculture, County Profile, 2002, 1997, 1992, 1987.
na = not available

The Agency of Agriculture manages a voluntary nitrate groundwater monitoring program to determine the quality of groundwater near Vermont farms. Given that nitrates are highly soluble

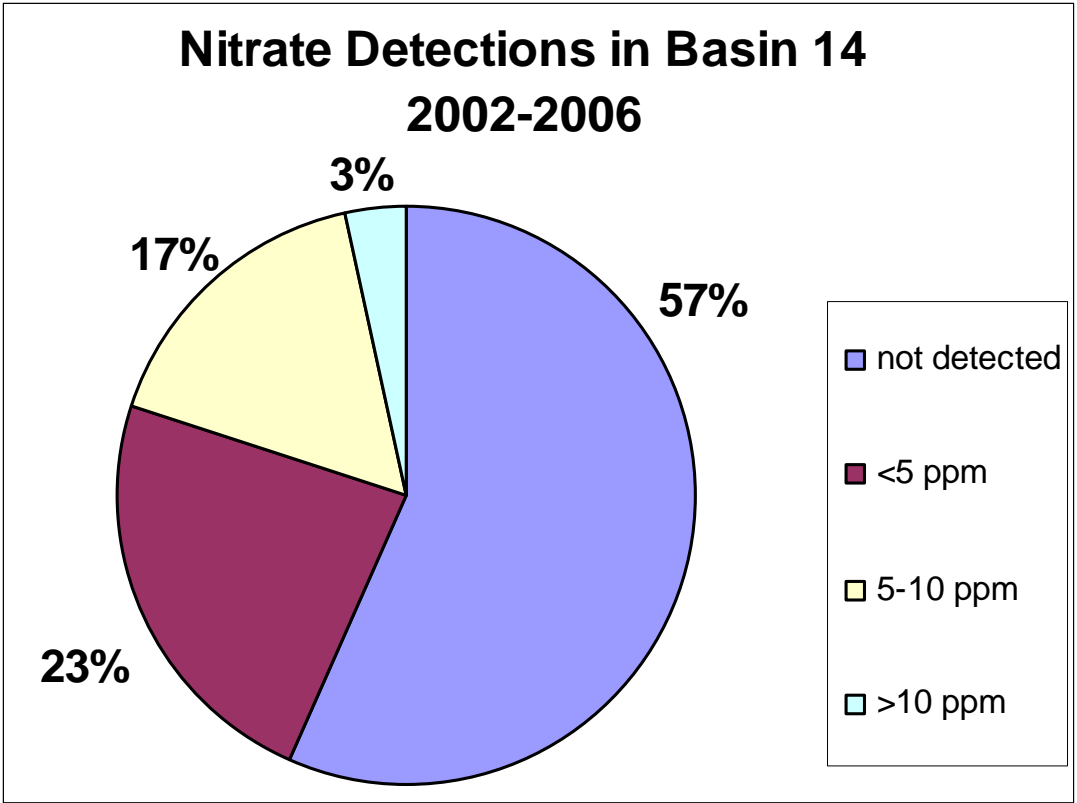
and are therefore transported with runoff water and leach into permeable soils it is not uncommon to find low levels of nitrates in the groundwater samples extracted from farm wells and those of adjacent landowners.

Between 2002 and 2006 a total of 625 well samples across the state were analyzed for nitrates through this voluntary program. Of those sampled 298 or 48% had no detections of nitrates. Another 240 wells (38%) had detections between 1 and 10 ppm. The remaining 87 samples or 14% 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 groundwater quality on farms that contract for conservation practice cost share dollars.



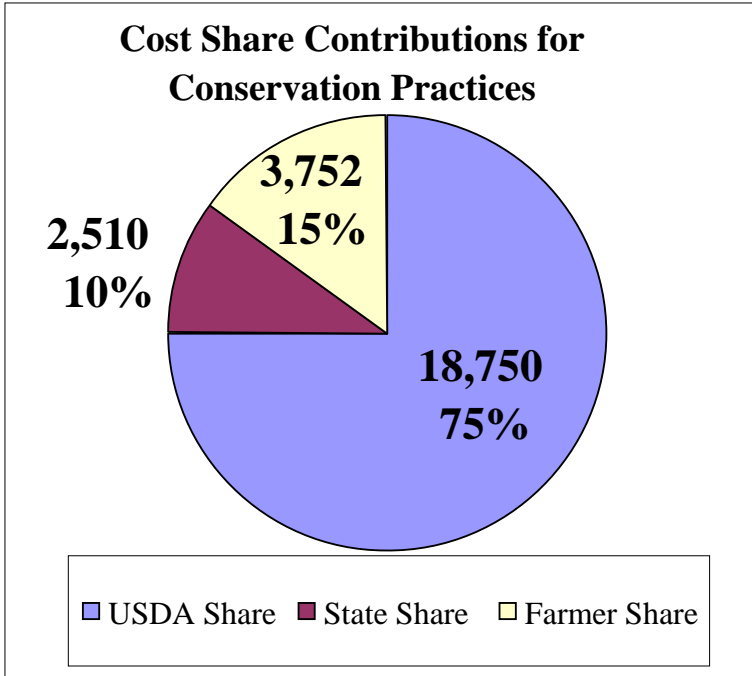
Source: Agency of Agriculture, Comstock 2007

Within Basin 14 there were 30 water samples collected and analyzed for nitrates. Of these, just one (or 3%) was over the drinking water standard of 10 ppm.



CURRENT CONSERVATION PRACTICES

For all of Basin 14 there have been 29 Best Management Practices implemented in the watershed over the past decade. One of these was a production area practice that covered 115 animals at a cost of approximately \$25,000 (Agency of Agriculture: Cook, 2006). State, federal, and landowner dollars are combined to cover the cost of these practices. Other practices have been implemented but are not tracked if they do not include cost share dollars.



Source: Agency of Agriculture, Cooke 2006

AREAS IN NEED OF ATTENTION

The State of Vermont Water Quality Division has a list of river segments that they feel warrant further consideration for evaluation of impairment.

There are a three reaches in the watershed that are listed on the State of Vermont’s 303(d) list of impaired waters. These include Coppras Brook, Lords Brook, West Branch and the lower Ompompanoosuc River. These streams are adjacent to old mining operations and the concerns are with metals and acidic conditions.

There are two sections on the Lower Ompompanoosuc River also on the 303 (d) list Part A for elevated levels of E. coli from unknown sources. These run from Brimstone Corners to below West Fairlee Village and from Sawnee Bean Brook to the beach area at the Army Corps facility.

The Watershed Council conducted a stream monitoring program during Summer 2006 to learn more about the contaminants and subsequent impairments. The data suggests that E. coli levels continue to be elevated well above the Vermont standard. A reconnaissance of these areas show they are densely populated residential areas with on-site septic systems. While there are a few small agricultural operations, livestock numbers are very low and fields are primarily hay fields with some buffering.

Part C of the 2006 DRAFT 303(d) list includes another stretch of the Ompompanoosuc River as being in need of further assessment for elevated levels of E. coli with the possible impairment for contact recreation. Again, agriculture is a minor land use in this area and on-site septic systems may need to be investigated.

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ANR, DEC WQD, Basin 14 Water Quality and Aquatic Habitat Assessment Report, April 1999.

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NOFA-VT, e-mail from Erin Clark, January 15, 2007.

Koloski, Dan, Soil Conservationist, White River NRCS, personal communication, August 18, 2006.

USDA 2002, 1997, 1992, 1987 Census of Agriculture, County Profile

APPENDIX A.7 - Town Plan Review in Basin 14

Town Plan Review

Town plans can provide protection for water resources by setting goals for water protection in the town and through recommendations on land use and stream, lake, wetland and riparian policies in the town. The town plan is used in act 250 determinations and sets the stage for zoning regulations which can specifically regulate activities along river ways and determine growth patterns which can impact water quality in many ways. Each town plan in Basin 14 was reviewed to see if it covered a number of areas which relate closely to water quality. Below are the areas and basis for which each town plan was reviewed.

Water Quality: Does the town plan make mention of the importance of and goals to protect water quality?

Classification: Does the town plan make mention of different water classifications or management types in town?

Rivers and Streams: Does the town plan make mention of the river and streams in town?

Inventory: Does the town plan include an inventory of rivers and streams in town?

Lakes and Ponds: Does the town plan make mention of the lakes and ponds in town?

Inventory: Does the town plan include an inventory of lakes and ponds in town?

Buffers: Does the town plan make mention of the importance of buffers?

Floodplains: Does the town plan make mention of the importance of floodplains?

Flood Hazard Areas: Does the town plan make mention of development considerations in relation to Flood Hazard Areas?

Shorelands: Does the town plan make mention of the importance of shorelands?

Swimming Areas: Does the town plan make mention of swimming areas?

Water Recreation: Does the town plan make mention of water recreation resources in town?

Dams & Impoundments: Does the town plan make mention of dams and impoundments?

Inventory: Does the town plan include an inventory of dams and impoundments?

Riparian Zone: Does the town plan include reference to the importance of riparian zones in town?

Groundwater / Aquifers: Does the town plan make mention of groundwater and aquifers in town?

Water Supply Protection: Does the town plan include discussion of water resource protection?

Wastewater Systems: Does the town plan make mention of wastewater systems in town?

Fisheries: Does the town plan make mention of fisheries in town?

Natural Communities: Does the town plan make mention of important natural communities?

Exotic Invasive Species: Does the town plan make mention of exotic invasive species?

Agriculture: Does the town plan make mention of agricultural land use?

Forestry: Does the town plan make mention of forestry practices or protections?

Earth Resource Extraction: Does the town plan make mention water quality protections related to earth resource extraction?

Town zoning and ordinance review

Town zoning and ordinances can also provide protections for water quality and aquatic habitat in a number of ways by encouraging development that protects these resources. In Vermont there are no statewide buffer or shoreline regulations so regulation of land use in these areas in the watershed can only come through local town zoning or ordinances. Most towns in the watershed also participate in the National Flood Insurance Program (NFIP), and have regulations to prevent losses from floods.

Flood Hazard Area Protection: Does the town participation in the NFIP program or other hazard protection?

Fluvial Erosion Hazard Mapping: Does the town zoning include fluvial erosion hazard mapping and overlay districts in accordance with the Vermont River management Program?

Wetlands Protection: Are there protections for wetlands in town zoning?

Fisheries Protection: Are there protections for fisheries in town zoning?

Public Access Protection: Are there protections for public access areas in town zoning/conservation?

Setbacks from water: Does the zoning require building setbacks from surface waters?

Buffers Required: Are there requirements for vegetated buffer strips in zoning regulations?

Stormwater Ordinances: Does the town zoning include a stormwater ordinance?

Erosion & Sediment Control: Does the town zoning cover erosion and sediment control?

Steep Slope / Ridgeline Development: Does the town zoning place limitations on development of ridgelines or steep slopes to protect water quality?

Subdivision Regulations: Does the town have subdivision regulations?

PRD / PUD: Does the town zoning provide for PRD/PUD?

Site Plan Review: Does the town have Site Plan Review?

Road Standards: Does the Town have Road Standards?

Bridge and Culvert Assessments: Has the town completed an ANR Bridge and Culvert survey?

TOWN GOVERNMENT

Does the town have any of the following:

Planning Commission:

Zoning Board of Adjustment:

Development Review Board:

Conservation Commission:

Town Plan					
TOWN	Barnet	Bradford	Chelsea*	Corinth	Danville*
Date in effect	4-Apr-00	2/18/2003	5/1/2007	26-Jun-07	1/9/2007
WQ Areas Covered in Plan					
Water Quality	Y	Y	Y	Y	Y
Classification	N	N			
Rivers & Streams	Y	Y	Y	Y	Y
Inventory	Y	N	N	N	
Lakes and Ponds	Y	Y	N	N	Y
Inventory	undeveloped shorelines	N	N	N	
Wetlands	Y	Y	Y	Y	
Inventory	N	completed but not in plan	N	NWI and inventory in progress	Y
Buffers	Y	Y	Y	Y	Y
Floodplains	N		Y	Y	N
Flood Hazard Areas	N	Y	Y	Y	N
Shorelands	Y				Y
Swimming Areas	Y	Y	Y	some mention	Y Joe's pond
Water Recreation	Y	Y	Y	some mention	Y Joe's pond
Dams & Impoundments	N	N	Y	N	N
Inventory	N	N	N	N	N
Riparian Zone	Y	Y	Y	Y	Y
Groundwater / Aquifers	N	Y	Y	Y	N
Water Supply Protection	Y	Y	Y	Y	N
Wastewater Systems	N	Y		Y, Town ordinance	Y
Fisheries	Y	some mention	Y	some mention	some mention
Natural Communities	N	Y		Y	Y
Exotic Invasive Species	N	N	N		
Agriculture	Y	Y	Y	Y	some mention
Forestry	Y	Y	Y	Y	Y
Earth Resource Extraction	In Zoning	N	N	Y	

ZONING					
TOWN	Barnet	Bradford	Chelsea not reviewed	Corinth not reviewed	Danville
Date in effect	9-Oct-97	10/27/2005			11/3/2005
Areas Covered in Ordinances					
Flood Hazard Area Protection	Y	Y	Y	Y	Y
Fluvial Erosion Hazard Maps	N	N	N	N (being discussed)	N
Wetlands Protection	N	Y			N
Fisheries Protection	N				N
Public Access Protection	N	In town plan			N
Setbacks from water	Y	50' from Conn. & Waits Rivers and 35' others			N
Buffers Required	N	on immediate shoreline			N
Stormwater Ordinances	N				N
Erosion & Sediment Control	N				N
Steep Slope / Ridgeline Development	N	yes 25%		In Town Plan	N
Subdivision Regulations	Y	N			N
PRD / PUD	Y	Y (cud??)			N
Site Plan Review	N	Y			N
Road Standards or assessments					N
Road Standards	N	N			N
Bridge and Culvert Assessments	Completed	in progress		in progress	N
TOWN GOVERNMENT					
Planning Commission	Y	Y		Y	Y
Zoning Board of Adjustment	Y				N
Development Review Board	N				Y
Conservation Commission	N	Y		Y	Y

* indicates town with small amount of land in Basin 14
 NWI - National Wetlands Inventory
 NFIP - National Flood Insurance Program
 PUD - Planned Unit Development
 PRD - Planned Residential Development

Town Plan					
TOWN	Fairlee	Groton	Newbury	Norwich	Orange
Date in effect	6/18/2001	4/18/1995	9/26/2005	11/27/2006	7/11/2005
WQ Areas Covered in Plan					
Water Quality	Y	Y		Y	Y
Classification	Some mention	N	N	N	Y
Rivers & Streams	Y	Y	Y	Y	Y
Inventory			Y	Y	N
Lakes and Ponds	Y	Y	Y	Y	Y
Inventory	Y		N	Y	N
Wetlands	Y	Y	Y	Y	Y
Inventory	N		N	Y	N
Buffers	Y		Y		N
Floodplains	Y	Y	Y	Some mention	Y
Flood Hazard Areas	Y	Y	N	N	Y
Shorelands	Y	Y	Y	Y	N
Swimming Areas	Y	Y	Y	Y	N
Water Recreation	Y	Y	Y	Y	N
Dams & Impoundments	N	Y	n	(only Wilder)	N
Inventory	N	N	N	N	N
Riparian Zone	Y	N	Y	N	N
Groundwater / Aquifers	Y	Y	Y (in zoning)	Y	Y
Water Supply Protection	Y	Y	Y (in zoning)	Y	Y
Wastewater Systems	Y - 75 ft setback	Y	Y	100 ft setback	Y
Fisheries	Y	Some mention	N	Some mention	N
Natural Communities	Y	Y	Y	Y	Y
Exotic Invasive Species	some mention	Y	N	N	N
Agriculture	Y	Y	Y	Y	Y
Forestry	Y	Y	Y	Y	Y
Earth Resource Extraction	Y	N	Y	Y	Y

ZONING					
TOWN	Fairlee	Groton	Newbury	Norwich	Orange Not reviewed
Date in effect	11/10/1998	3/2/2004	6/11/2007	10/28/2005	
Areas Covered in Ordinances					
Flood Hazard Area Protection	Y	N	Y	Y	
Fluvial Erosion Hazard Maps	N	N	In development	In development	
Wetlands Protection	N	N		N	
Fisheries Protection	N	N		N	
Public Access Protection	N	N		N	
Setbacks from water	50 Feet	40 feet (ponds)	50 ft or 250 ft for ponds	60 ft (buildings) 30 ft other Conn. & Ompomp.	
Buffers Required	N	N	N	N	
Stormwater Ordinances	N	N	Y	N	
Erosion & Sediment Control	N	N	Y	(on steep streambanks)	
Steep Slope / Ridgeline Development	N	N	Y	N	
Subdivision Regulations	N	N	Y	Y	
PRD / PUD	N	Y	Y	Y	
Site Plan Review	N		Y	Y	
Road Standards		driveway access	Y	Y	
Bridge and Culvert Assessments		completed	N	Y	
TOWN GOVERNMENT					
Planning Commission	Y	Y	Y	Y	
Zoning Board of Adjustment	Y	Y	Y	Y	
Development Review Board	Y	Y		Y	
Conservation Commission	N	N	Y	Y	

Town Plan					
TOWN	Peacham	Ryegate	Sharon*	Strafford	Thetford
Date in effect	9/9/1999	9/10/2001	3/15/2005	1/13/2003	3/19/2007
WQ Areas Covered in Plan					
Water Quality	N	Y	Y	Y	Y
Classification	N	Y	N	Y	N
Rivers & Streams	Y	Y	Y	N	Y
Inventory	N	Y	N	N	Y
Lakes and Ponds	Y	Y	N	Y	Y
Inventory	Y	Y	N	N	Y
Wetlands	Y	Y	Y	Y	Y
Inventory	N	N (but recommended)	N	N	Y
Buffers	N	Y	Y	N	Y
Floodplains	N	N	Y	Y	Y
Flood Hazard Areas	N	N	Y	Y	Y
Shorelands	Y	Y	N	Y	
Swimming Areas	Some mention	Y	Y	N	Y
Water Recreation	Y	Y	Y	Some	Y
Dams & Impoundments	N	N	N	N	Y
Inventory	N	N	N	N	Y
Riparian Zone	N	Y	Y	Y	Y
Groundwater / Aquifers	N	Y	Y	N	Y
Water Supply Protection	N	N	N	N	Y
Wastewater Systems	Y	Y	Y	Y	Y
Fisheries	Y	Y	Y	Y	Y
Natural Communities	Y	Y	Y	Y	Y
Exotic Invasive Species	N	Y (fish)	N	N	Y
Agriculture	Y	Y	Y	Y	Y
Forestry	Y	Y	Y	Y	Y
Earth Resource Extraction	N	Y	Y	Zoning	N

ZONING					
TOWN	Peacham	Ryegate	Sharon Not Reviewed	Strafford 6/22/2005	Thetford Not Reviewed
Date in effect	12/7/2005	3/6/1996			
Areas Covered in Ordinances					
Flood Hazard Area Protection	N	Y			
Fluvial Erosion Hazard Maps	N	Y		developed but not adopted	
Wetlands Protection	N	Y			
Fisheries Protection	N	N			
Public Access Protection	In plan	N		N	
Setbacks from water	100 ft (in shoreland dist.	100 ft (in shoreland dist.		200-400 ft for Miller Pond only	
Buffers Required	50 foot, shoreland dist.	50 ft		N	
Stormwater Ordinances	N	Y (for subdivisions)		N	
Erosion & Sediment Control	N	N		N	
Steep Slope / Ridgeline Development	N	N		N	
Subdivision Regulations	Y			Y	Y
PRD / PUD	Y			Y	
Site Plan Review	Y	Y		Y	Y
Road Standards	Y	N			
Bridge and Culvert Assessments	Y	Y (some of town)			
TOWN GOVERNMENT					
Planning Commission	Y	Y		Y	Y
Zoning Board of Adjustment	?	Y		Y	Y
Development Review Board	?			Y	Y
Conservation Commission	Y	N		Y	Y

Town Plan					
TOWN	Topsham	Vershire	West Fairlee		
Date in effect	6/24/2005	11/7/2006	8/15/2005		
WQ Areas Covered in Plan					
Water Quality	Y	Y	Y		
Classification	N	N	N		
Rivers & Streams	Y	Y	Y		
Inventory	N	N	Y		
Lakes and Ponds	N	N	Y		
Inventory	N	N	N		
Wetlands	Y	Y	Y		
Inventory	N	N	Y		
Buffers	Y	Y	Y		
Floodplains	Y	Y	Y		
Flood Hazard Areas	Y	Y	Y		
Shorelands	N	Y	Y		
Swimming Areas	N	N	Some mention		
Water Recreation	Y	Y	Y		
Dams & Impoundments	N	N	N		
Inventory	N	N	N		
Riparian Zone	Y	N	Y		
Groundwater / Aquifers	Y	Y	Y		
Water Supply Protection	N	N	Y		
Wastewater Systems	Y	Y	Y		
Fisheries	Y	Y	Y		
Natural Communities	N	N	Y		
Exotic Invasive Species	N	N	Y		
Agriculture	Y	Y	Y		
Forestry	Y	Y	Y		
Earth Resource Extraction	Y	Y	Y		

ZONING					
TOWN	Topsham No Zoning	Vershire 3/6/2001	West Fairlee No zoning		
Date in effect					
Areas Covered in Ordinances					
Flood Hazard Area Protection		N			
Fluvial Erosion Hazard Maps		N			
Wetlands Protection		Y			
Fisheries Protection		Y			
Public Access Protection		N			
Setbacks from water		35 ft			
Buffers Required		N			
Stormwater Ordinances		N			
Erosion & Sediment Control		N			
Steep Slope / Ridgeline Development		slopes of less than 25%			
Subdivision Regulations PRD / PUD		Y			
Site Plan Review		Y			
Road Standards	N	Y			
Bridge and Culvert Assessments	Y	Y			
TOWN GOVERNMENT					
Planning Commission	Y	Y	Y		
Zoning Board of Adjustment		Y			
Development Review Board					
Conservation Commission	N	Y	Y		

APPENDIX A.8 - Relevant Grant and Funding Sources Covering Basin 14

Included in this appendix are funding sources which have been listed for funding strategies in the Basin 14 Plan. There are also a number of funding and grant programs managed by the NRCS and Vermont Agency of Agriculture Farms and Markets related to agriculture and wildlife habitat which are listed in separately in Appendix B1.

Grant sources with acronyms or abbreviations used in the basin 14 basin plan

- 319 – Federal section 319 program to address NPS pollution
- 604b – Federal Section 604b pass-through funding for RPC's
- ANC – Vermont Aquatic Nuisance Species Control Grant
- BBR – Better Back Roads Grants
- BMP – Vermont Best Management Practices Cost Share Program (see Appendix B1)
- C&C – Clean and Clear Watershed planning funds
- CREP – Conservation Reserve Enhancement Program (see Appendix B1)
- CRJC PG – Connecticut River Joint Commissions Partnership Grant
- EPA Loan– EPA Equipment Loan Program for Volunteer Water Monitoring
- EQIP – Environmental Quality Incentives Program (see Appendix B1)
- LaRosa – LaRosa Laboratory Analytical Partnership Program
- Municipal Stormwater Mitigation Grants
- Partners for Fish and Wildlife (see Appendix B1)
- RCG – Clean and Clear River Management Program River Corridor Grant
- Tillotson – The Neil and Louise Tillotson Fund
- UCM&E – Upper Connecticut River Mitigation and Enhancement Fund
- VACB – Vermont Agronomic Practices Program (see Appendix B1)
- Watershed Grant – Vermont Watershed (Conservation License Plate) Grants
- WEF – Wellborn Ecology Fund
- WHIP – Wildlife Habitat Incentives Program (see Appendix B1)

Federal section 319 program to address NPS pollution

Federal NPS implementation funds through Section 319 has been available to Vermont since federal fiscal year 1990, the first year funding was appropriated. Over twelve years of annual funding (FFY1990-2001), Vermont has been awarded about \$11 million, which has assisted over 100 NPS projects. Projects have been completed or are underway by a variety of interests including several towns, watershed associations and state departments, the University of Vermont and many Natural Resources Conservation Districts. Funds support activities to restore water quality or implement nonpoint source pollution controls in priority watersheds that are impaired or threatened by nonpoint source pollution.

Contact: Rick Hopkins (802) 241-3769

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

The DEC is required to pass through to "regional comprehensive planning organizations" 40% of its annual federal Clean Water Act Section 604b allocation to conduct a variety of water-related

planning activities. These funds go directly to the 13 regional planning commissions across Vermont for a wide variety of water related planning activities.

Contact: Rick Hopkins (802) 241-3769

Vermont Aquatic Nuisance Species Control Grant

The Grant-in-Aid Program provides financial assistance to municipalities and agencies of the state for aquatic nuisance species management programs. The Grant-in-Aid Program, established under 10 V.S.A. § 922, is administered by the Vermont Aquatic Nuisance Species Management Program within the Department of Environmental Conservation's Water Quality Division. Funding for Grant-in-Aid grants comes from a portion of annual revenues from motorboat registration fees; federal funds may also be available. In addition, proceeds from the voluntary [Aquatic Invasive Species Sticker Program](#) directly support the Grant-in-Aid Program.

Who May Apply

Municipalities are eligible to receive Grant-in-Aid Grants for work controlling or preventing the spread of aquatic nuisance species. Local interest groups such as lake associations must apply through the municipality in which the waterbody is located. If the waterbody is located in more than one municipality, affected municipalities may apply jointly.

What Types of Projects are Eligible

All types of aquatic nuisance control projects, for both native and non-native species management, are eligible for funds under this Program. Projects supported to date by Grant-in-Aid grants include the control of Eurasian watermilfoil, purple loosestrife and nuisance native aquatic plants, and aquatic nuisance species spread prevention programs. Supported Eurasian watermilfoil management methods have included the use of mechanical harvesters, hydrorakes, diver-operated suction harvesters, benthic barriers, and chemicals (herbicides); physical removal by hand; surveys; and education and outreach initiatives. Mechanical harvesting of native aquatic plants has been supported by the Program as has aquatic nuisance species spread prevention programs that have included public access area "greeter" programs, boat wash stations, searches for non-native aquatic nuisance species in a waterbody, and education and outreach initiatives.

Project Selection

Municipalities may be awarded a grant for 75 percent or less of the total estimated project cost. Recipients must contribute at least 25 percent of the final eligible project cost through in-kind labor (unpaid personnel), in-kind services and/or actual cash expenditures (all from non-state sources).

Better Back Roads Grant

The Better Backroads Program has been offering grants and technical assistance since 1997. New additional funding made available through Clean and Clear will significantly increase the funds available for grants and technical assistance. During the first years of the Clean and Clear, efforts will be made especially to involve towns in the Missisquoi Bay and St Albans Bay watersheds, although grants and assistance will still be available elsewhere in the Champlain basin and statewide.

A. Road Inventory and Capital Budget Planning

Reduction of road erosion requires planning and budgeting to realize cost savings and road improvements. Eligible projects under this category must include: (1) an inventory of road related erosion problems affecting water quality in a particular watershed or the whole town; (2) the sites identified must then be prioritized by problem area and; (3) this must be followed up by the development of a capital budget plan to correct these problems over a certain period of time.

B. Correction of a Road Related Erosion Problem

The Better Backroads Selection Committee will base its evaluation on the following criteria: water quality benefits, longevity and effectiveness of solution, specific support available to meet match obligation, use of aesthetic vegetative solutions where applicable and partnering efforts. Projects can be enhancements of a scheduled project that provide additional erosion control benefits such as ditch stabilization in conjunction with a culvert replacement, or it can be a stand alone erosion control solution.

Example projects:

- Rock lined ditch
- Add turnouts
- Diversion berm
- Stabilize bank
- Add "daylighted" culvert
- Energy dissipaters
- Culvert header
- Velocity reducers
- Streambank stabilization

The maximum grant is \$7000, and a 25% local match is required. Grant availability notices are sent to towns in early spring of each year. The state-wide grant program is administered by the Northern Vermont Resource Conservation and Development Council, who can be contacted about the grant program, technical assistance and for a copy of the Vt Better Backroads Manual.

Northern Vermont Resource Conservation and Development Council

Jarrod Becker, Business Manager
Phone: 802-828-4583

Linda Boudette, Backroads Technician
Phone: 802-793-7816

Email: rdbizmanager@yahoo.com

You can also contact the Vermont Department of Environmental Conservation for information:
Susan Warren

VT Department of Environmental Conservation,
Water Quality Division

103 South Main St., Building 10 North

Waterbury, VT 05671-0408

phone: 802-241-3794

susan.warren@state.vt.us

Clean and Clear Watershed planning funds

During 2006, 2007, and 2008 funding has been available to each DEC watershed coordinator who is responsible for identifying, selecting and awarding assistance funds to eligible and qualified organizations for priority water quality oriented projects or activities. Funding has come from state funds through the Clean and Clear program. Eligible activities include implementation efforts such as aquatic habitat clean up, riparian/shoreline protection and/or plantings; design for likely and near-term future implementation; information/education efforts; field equipment (eg waders, tools). Organizations receiving watershed planning assistance funds

need to be able to demonstrate linkage with the Clean and Clear Action Plan, to a particular EPA-approved TMDL or to a basin or watershed plan. Ineligible activities include: monitoring or assessment; inventory; mapping; in-lake treatment; organizational administrative support. Contact Ben Copans at (802) 751-2610 or Rick Hopkins at (802) 241-3769

Connecticut River Joint Commissions Partnership Grant

The Connecticut River Joint Commissions annual Partnership Program (not funded in 2007 and 2008) has enabled Valley residents and organizations to act on their vision of creating a prosperous region that respects its environment, culture, and history. Grants of \$500-5,000 support innovative, community-generated projects that address economic and conservation challenges in ways that are compatible with the river valley's historic, scenic, and natural resources.

Eligible projects are those that help implement the goals of the [Connecticut River Corridor Management Plan](#) and further the goals of the [Connecticut River Byway](#), in these areas:

- water quality
- fisheries & wildlife habitat
- recreation
- agriculture & forestry
- land use guidance
- river-related education
- preservation of scenic & historic features
- visitor education for the Connecticut River Byway.

Eligible applicants include town boards, committees, or commissions, non-profit tax-exempt organizations, schools (public or private), and regional organizations located in the upper Connecticut River watershed of New Hampshire and Vermont. Informal citizen groups, state and federal agencies, and private businesses may also apply, but must do so through one of the above organizations. More information is available on the web at: <http://www.crjc.org/partnership.htm> . This grant was not available in 2008 but may be restored in future years.

EPA Loan– EPA Equipment Loan Program for Volunteer Water Monitoring

The U.S. Environmental Protection Agency (EPA) has identified improved water quality monitoring as one of its highest priorities, in recognition of the value of monitoring data in guiding EPA's and the states' and tribes' efforts to improve the health of the Nation's waters. There are waters, however, that states, tribes and EPA are not able to monitor at all or only on at a very limited frequency. Here in New England, volunteer groups have played a valuable role in supplementing the available monitoring data. With this equipment loan program, EPA New England expects to support and enhance the work of existing monitoring groups and assist the start up of new groups who seek to monitor waters for which there is no current data.

For more information contact: Diane Switzer
Phone: 617-918-8377
switzer.diane@epa.gov

LaRosa Laboratory Analytical Partnership Program

LaRosa Laboratory Analytical Services Partnership Program provides analytical services for water quality monitoring performed by local volunteer groups. No funds are awarded. Grants are in the form of free analytical services to support water quality monitoring programs addressing joint local and DEC needs. Number of analyses available will depend on laboratory capacity for the requested test parameters. Volunteer organizations participating in the program need collect samples and deliver them to the lab in Waterbury where samples are processed. Contact: Neil Kamman Vermont Department of Environmental Conservation (802) 241-3795.

Municipal Stormwater Mitigation Grants

Vermont Municipal Stormwater Mitigation Grants were established for the purpose of providing financial assistance grants to towns, cities and villages in Vermont for projects to reduce water pollution generated by, or directly associated with existing public roads and road maintenance activities. Municipalities must supply not less than 20% of total project costs, not to include other federal funds.

The Vermont Local Roads Program and the Northern Vermont Resource Conservation and Development Council (RC & D) will be available for assistance to municipalities both on-site and by telephone. VTrans district offices and regional planning commissions will also be involved.

Funds must be used to reduce water pollution generated by, or directly associated with existing public roads and road maintenance activities in Vermont. The following represent possible projects.

- Stabilize ditches, culverts & other drainage facilities against erosion and flooding
- Stabilize critical roadside slopes having a negative impact on public waterways
- Related planning and engineering
- Purchase land or easements required to complete a project under this program.
- Construct or reconstruct salt/sand storage facilities and other road related facilities to reduce impact on public waterways.
- Purchase high efficiency street sweeping equipment
- Develop local regulations to improve water quality
- Construction of stormwater best management practices, such as detention basins, oil-grit separators, swales, etc.

Applicants should demonstrate that they are using sound stormwater treatment practices such as those described in the Agency of Natural Resources' Stormwater Management Manual and the Vermont Better Backroads Manual. Applicants must document the impact of the project on reducing water pollution generated by, or directly associated with existing public roads and road maintenance activities.

Send completed application to: William McManis; Vermont Agency of Transportation - Operations Division; One National Life Drive; Montpelier, VT 05633-5001.

The Neil and Louise Tillotson Fund

Nonprofit organizations and community groups working in the areas of economic development, conservation and sustainable forestry, education, basic needs and community safety net are encouraged to apply. The fund will accept proposals from organizations providing services in Colebrook, Pittsburg, Claksville, Stewartstown, Columbia, Stratford, Errol, Millsfield, Dixville and other towns in Coos County, NH as well as bordering communities in Vermont and Quebec, Canada. The grant is managed by the New Hampshire Charitable foundation. To learn more, contact [Martha Dickey](#) at (603) 225-6641 ext. 238 or log on to <http://www.nhcf.org/page16898.cfm>.

Clean and Clear River Management Program River Corridor Grant

This grant source can be used for implementing river channel or riparian area improvement efforts. Municipalities, other governmental agencies and non-profit organizations are eligible for these grant funds. Funding has been provided through the Vermont Clean and Clear program. Application dates are variable. Contact Mike Kline at 802-241-3774 for more information.

Upper Connecticut River Mitigation and Enhancement Fund

The Mitigation and Enhancement Fund provides financial assistance to projects, activities, and endeavors that will restore, protect, and/or enhance the river ecosystem affected by the 15-mile Falls hydroelectric project, or that will serve as mitigation for some of the impacts of the project. This grant covers the Upper Connecticut River north of the White River. The grant is managed by the New Hampshire Charitable foundation. To learn more, contact [Kevin Peterson](#) at (603) 653-0387 ext. 102 or log on to <http://www.nhcf.org/page16898.cfm>.

Vermont Watershed (Conservation License Plate) Grants

Vermonters have an exciting new opportunity to protect and restore watersheds through the Vermont Watershed Grants program. Half of the proceeds from Vermont Conservation License Plate sales fund the new Vermont Watershed Grants program which distributes grants for local and regional water-related projects in Vermont.

Funds are available for water-related projects that:

- Protect or restore fish and wildlife habitats;
- Protect or restore water quality, and shorelines;
- Enhance recreational use and enjoyment;
- Identify and protect historic and cultural resources;
- Educate people about watershed resources; or
- Monitor fish and wildlife populations and/or water quality.

Who May Apply

Municipalities, local or regional governmental agencies, nonprofit organizations, and citizen groups are eligible to receive Watershed Grants for work on public or private lands. Individuals and state and federal agencies are not eligible to receive funds directly, but may be partners of a project.

Funding Categories

Watershed Mini-Grant: \$200 to \$1,000 awards. Mini-grants are intended for small projects, or for discreet, identifiable portions of larger projects.

Watershed Grant: Awards larger than \$1,000. Grants are intended for complete projects or for discreet, identifiable portions of larger projects.

Application Information

Grant awards are made on an annual cycle, with applications due in October of the year and funding decisions made the following mid-winter.

Wellborn Ecology Fund

The Wellborn Ecology Fund's mission is to support experientially-oriented ecology education programs that focus on the communities of the Upper Valley. These programs should provide Upper Valley residents with the knowledge, experience, skills, and understanding necessary to make informed decisions and take useful actions aimed at protecting and sustaining the natural systems of the region. For more information, please contact [Kevin Peterson](#) at (603) 653-0387 ext. 102 or log on to <http://www.nhcf.org/page16898.cfm>.

APPENDIX A.9 – Fisheries in Basin 14

A description of fisheries in the Stevens River and Wells River watersheds
Compiled by Jud Kratzer (VTDFW) for Ben Copans (VTDEC)

Note: species listed as present in lakes and ponds are mostly game species, but I included some non-game species.

Stevens River Watershed

Lakes:

- 1) Ewell Pond
 - a. Managed as a put-and-take rainbow trout fishery (coldwater)
 - b. Species known to be present: rainbow trout, yellow perch
 - c. F&W owns and maintains a trailer boat access
- 2) Fosters Pond
 - a. Managed as a warmwater fishery
 - b. Species known to be present: brown bullhead, yellow perch, chain pickerel
 - c. F&W owns and maintains trailer boat access
- 3) Mud Pond
 - a. Managed as a warmwater fishery
 - b. Species known to be present: most likely brown bullhead, yellow perch, and chain pickerel (no data available)
 - c. No developed public access
- 4) Martins Pond
 - a. Managed as a put-grow-and-take brook trout fishery with some natural reproduction of brook trout, use of fish as bait (live or dead) is prohibited (coldwater)
 - b. Species known to be present: brook trout, brown bullhead, golden shiner
 - c. F &W owns and maintains trailer boat access
- 5) Harvey's Lake
 - a. Managed as a put-grow-and-take lake trout and rainbow trout fishery (coldwater). Currently there appears to be no natural reproduction, though historically lake trout were believed to reproduce. Harvey's Lake is known for producing the occasional trophy lake trout.
 - b. Species known to be present: lake trout, rainbow trout, yellow perch, chain pickerel, rock bass, brown bullhead, rainbow smelt
 - c. F&W owns and maintains a trailer boat access

Streams:

- 1) Stevens River
 - a. Stocked with brook and brown trout basically from South Peacham Brook to the confluence with the Connecticut River. Brown trout will be replaced with rainbow trout starting in 2010. The brook trout we collect typically are wild.

- b. Harvey's Lake tends to warm the Stevens River, but other tributaries help to cool it.
 - c. The Stevens River is stocked with Atlantic salmon fry as part of an effort to restore salmon to the Connecticut River basin. The Stevens mainstem contains an estimated 829 100-meter² units of salmon rearing habitat. Over the past 5 years an average of 25,000 fry have been stocked annually, at an average density of 31/unit. Typically it takes salmon fry two years to attain *smolt* (migratory) size. Growth rates of salmon have been consistently higher in the Stevens River than in any other Northeast Kingdom salmon nursery stream, to the extent that in some years young salmon are reaching smolt size and leaving after only a single year. Over the past 5 years, the Stevens has contributed an average of 3000 smolts annually to the Connecticut River basin outmigration, roughly 3.6/unit. A large falls in Barnet Village probably prevented Atlantic salmon from accessing the Stevens River in the past, but we are using it as a nursery stream now, as compensation for the vast amounts of mainstem spawning and nursery habitat that have been destroyed. The idea of the nursery stream is that we are stocking salmon fry, hoping that they will survive and grow into smolts and migrate out to the ocean. Returning adult salmon currently can ascend as far up the Connecticut River as the dam at Dodge Falls in East Ryegate, about 4 miles upstream of the mouths of the Wells and Ammonusoc Rivers. Upstream fish passage may be required at the Dodge Falls and McIndoes dams in the future, allowing salmon access to the lower Stevens. Salmon will not be able to ascend into the upper Stevens and Wells Rivers because of the dams or falls close to their confluence with the Connecticut River. However, it is the intention that these nursery streams will boost the total numbers of salmon returning to the Connecticut River and ascending the accessible tributaries. They are stocked as unfed fry in the spring, and they generally spend two years in the stream before becoming smolts and migrating downstream to the ocean.
 - d. Fish species collected in the Stevens River during our annual salmon sampling include: Atlantic salmon, brook trout, longnose dace, longnose sucker, pumpkinseed, blacknose dace, white sucker, common shiner, slimy sculpin, creek chub, brown trout
- 2) South Peacham Brook
- a. Managed as a wild brook trout fishery (coldwater)
 - b. Other species present include: longnose dace, blacknose dace, white sucker, slimy sculpin. Atlantic salmon that stray from the Stevens may also be found here.
 - c. Juvenile rainbow trout were collected here in the early 1980's and were suspected to have come from a spawning run out of Harvey's Lake. South Peacham Brook joins the Harveys Lake outlet upstream of the Harveys Lake dam. Although trout and salmon typically migrate upstream to spawn, adult rainbow trout from Harveys Lake have been documented to drop down into the outlet channel and then ascend South Peacham Brook .
- 3) Peacham Hollow Brook, aka East Peacham Brook
- a. Managed as a wild brook trout fishery (coldwater)
 - b. Other species present include: longnose dace, blacknose dace, white sucker, slimy sculpin. Atlantic salmon that stray from the Stevens may also be found here.

- 4) Other tributaries
 - a. All other tributaries are managed as wild brook trout fisheries, although they may be too warm for brook trout near pond outlets

Wells River Watershed

Lakes:

- 1) Osmore Pond
 - a. Managed as a put-and-take brook trout fishery
 - b. Species known to be present: brook trout, brown bullhead, northern redbelly dace
 - c. Entire pond is within the Groton State Forest
 - d. Car-top boat access owned and maintained by DFP&R
- 2) Kettle Pond
 - a. Managed as a put-and-take rainbow trout fishery and as a smallmouth bass fishery
 - b. Species known to be present: rainbow trout, smallmouth bass, yellow perch, and brown bullhead. A 5.5 lb smallmouth bass was caught from Kettle Pond in 1987 (biggest smallmouth bass reported caught in Vermont that year).
 - c. Entire pond within Groton State Forest. Carry-in boat access owned and maintained by DFP&R
- 3) Lake Groton
 - a. Managed as a warmwater fishery
 - b. Species known to be present: smallmouth bass, chain pickerel, yellow perch, brown bullhead, redear sunfish (this species has only been collected in Lake Groton and in Ticklenaked Pond, it is exotic but probably does not pose a threat to native species)
 - c. Much of the lake falls within the Groton State Forest. Boats can be launched at the State campground by waterfront property owners and the public camping at the campground. Car-top boat access is available to those who pay to access the Boulder Beach area. Additional boating access for the general public is proposed in the recently completed Draft Groton Management Unit Long Range Management Plan.
- 4) Ricker Pond
 - a. Managed as a warmwater fishery
 - b. Species known to be present: smallmouth bass, largemouth bass, chain pickerel, yellow perch, brown bullhead
 - c. Most of the lake falls within the Groton State Forest. Car-top boat access available
- 5) Noyes Pond
 - a. Managed as a wild brook trout fishery – no stocking, fly-fishing only.
 - b. Species known to be present: brook trout and northern redbelly dace
 - c. Entire pond falls within the Groton State Forest. Access available if you rent a boat from Seyon Ranch.
- 6) Levi Pond
 - a. Managed as a put-grow-and-take brook trout fishery. This pond is remote, hard to get to, and has a reputation for producing some big brook trout.
 - b. Species known to be present: brook trout (probably also northern redbelly dace)

- c. Entire pond falls within the Levi Pond Wildlife Management Area. Carry-in boat access.
- 7) Ticklenaked Pond
- a. Managed as a warmwater fishery. It is fairly deep, but oxygen levels are too low in the depths to support fish life. Excessive nutrient input from surrounding farms is a suspected cause of this low dissolved oxygen.
 - b. Species known to be present: smallmouth bass, yellow perch, chain pickerel, brown bullhead, redear sunfish

Streams:

- 1) Wells River
- a. The Wells River is stocked with brown trout from the outlet of Ricker Pond to the confluence with the South Branch Wells River and again from South Ryegate Village almost to the confluence with the Connecticut River. Brown trout will be replaced with rainbow trout starting in 2009. Brook trout are stocked from the confluence of the South Branch Wells River to South Ryegate Village. We find very few wild trout in the Wells River.
 - b. The Wells River starts out warm because it flows from Ricker Pond, but tributaries like the South Branch Wells River help to cool it. The majority of the Wells River is too warm for trout during the summer months, but trout can survive in cold water refugia in the Wells River and its tributaries.
 - c. We stock the Wells River with Atlantic salmon fry. The Wells actually may have been a historic nursery stream for Atlantic salmon, but we are using it as a nursery stream now, as compensation for the vast amounts of mainstem spawning and nursery habitat that have been destroyed. The idea of the nursery stream is that we are stocking salmon fry, hoping that they will survive and grow into smolts and migrate out to the ocean. Returning adult salmon currently can ascend as far up the Connecticut River as the dam at Dodge Falls in East Ryegate, about 4 miles upstream of the mouths of the Wells and Ammonusooc Rivers. Salmon will not be able to ascend into to the upper Wells River because of the dams close to its confluence with the Connecticut River. However, it is the intention that this nursery stream will boost the total numbers of salmon returning to the Connecticut River and ascending the accessible tributaries. The salmon are stocked as unfed fry in the spring, and they generally spend two years in the stream before becoming smolts and migrating downstream to the ocean.
 - d. Fish species collected in our annual fall sampling include: Atlantic salmon, brook trout, brown trout, largemouth bass, smallmouth bass, yellow perch, slimy sculpin, common shiner, longnose dace, blacknose dace, lake chub, white sucker, blacknose shiner, longnose sucker, creek chub, pumpkinseed, fallfish, bluntnose minnow
- 2) Beaver Brook
- a. Managed as a wild brook trout fishery
 - b. Other species known to be present: longnose dace, blacknose dace
- 3) Coldwater Brook
- a. Managed as a wild brook trout fishery

- b. Other species known to be present: white sucker, yellow perch, slimy sculpin
- 4) Depot Brook
 - a. Managed as a wild brook trout fishery
 - b. Other species known to be present: none (probably at least blacknose dace)
- 5) East Brook
 - a. Managed as a wild brook trout fishery
 - b. Other species known to be present: lake chub, blacknose dace, slimy sculpin
- 6) Hosmer Brook
 - a. Managed as a wild brook trout fishery
 - b. Other species known to be present: northern redbelly dace, white sucker, brown bullhead, blacknose dace, pumpkinseed
- 7) Keenan Brook
 - a. Managed as a wild brook trout fishery
 - b. Other species known to be present: none (probably at least blacknose dace)
- 8) Stillwater Brook
 - a. Too warm for brook trout because it flows out of Kettle Pond
 - b. Species known to be present: white sucker, creek chub, blacknose dace, northern redbelly dace
- 9) Tannery Brook
 - a. Managed as a wild brook trout fishery
 - b. Other species known to be present: brook trout, slimy sculpin
- 10) South Branch Wells River
 - a. Managed as a wild brook trout fishery
 - b. Other species known to be present: none (probably at least northern redbelly dace, blacknose dace, white sucker, slimy sculpin, and longnose dace)
- 11) Other tributaries
 - a. All other tributaries are managed as wild brook trout fisheries, although they may be too warm for brook trout near pond outlets

Fisheries Background Waits and Ompompanoosuc Rivers

By Michael Humling – Vermont Department of Fish and Wildlife

Maintaining healthy fisheries is fundamentally linked with supporting and maintaining a healthy ecosystem. Primary concerns in many watersheds include habitat loss and degradation, excessive summertime water temperatures, aquatic organism passage maintaining and enhancing self-sustaining wild fish populations, re-establishing native anadromous salmon populations and managing sustainable recreational fisheries.

Vermont Fish and Wildlife Department Fisheries Management

The Vermont Fish and Wildlife Department (VFWD) conducts fish population investigations to monitor population status and trends and evaluate management strategies. Based on the results of these evaluations, specific waters may be managed as wild, self-sustaining populations, or hatchery-reared trout may be stocked to create or supplement a recreational fishery. This information also helps to shape harvest regulations, another important management tool used by VFWD to ensure sustainable use of fishery resources.

Habitat Protection

Preservation of quality habitat is integral to promoting healthy populations of aquatic organisms. Without necessary habitat, fisheries management activities may be ineffective. VFWD and the Vermont Department of Environmental Conservation (DEC) are active participants in regulatory proceedings for projects that may have an adverse impact on fisheries and aquatic habitats. The state's land use law, Act 250, provides an important tool for Agency personnel to address issues concerning impacts from development on stream habitats by recommending appropriate riparian buffers, erosion controls and stream crossing guidelines. The stream alteration permit process also provides a mechanism to minimize impacts of bridge and culvert projects and other instream activities on fish habitat and fish population requirements.

Law Enforcement

The Vermont Department of Fish and Wildlife Law Enforcement Division supports management programs by maintaining compliance with laws and regulations. Wardens' duties focus on preventing illegal harvest and transport of fish, wildlife and plant resources, and also serve as an important source of information for the public, contributing to the Agency's overall objectives.

Land Acquisition

Departments within the Agency of Natural Resources and a number of other partners have purchased, and/or maintain several ponds, formal access areas, State Forests, and Wildlife Management Areas (WMA) in the Ompompanoosuc Watershed. These include West Fairlee WMA, Kibling Hill WMA, Podunk WMA, Clover Hill WMA, Downer State Forest, CCC Pond, Lake Fairlee F&W Access, Miller Pond F&W Access and the Ompompanoosuc F&W Access at the river mouth. These conserved areas provide a variety of benefits including protection of water quality and habitat as well as public access.

Dams

Dams may have significant effects on the water quality, aquatic habitat, recreational use, and aesthetics of the waterways they impact. Intact or partially breached dams or dams without fish

ladders may impede the movement of fish and other aquatic organisms, restrict the flow of nutrients, sediment and debris (resulting in siltation, channel scour and habitat loss), eliminate riverine habitat by impounding a free-flowing stream, and raise water temperatures or reduce dissolved oxygen levels.

In the fall of 2000, representatives from several state and federal agencies, conservation groups, and others interested in the issue of improving fish habitat formed the Vermont Dam Task Force. The purpose of the meetings was to provide a forum to discuss dam removal as a management tool, the regulatory framework related to removal, and provide feedback on specific projects undertaken by participants.

The Agency of Natural Resources and Division of Historic Preservation maintain the Vermont Dam Inventory, a central database for location, ownership, impoundment, construction, registration, safety inspection, etc.

There are 26 inventoried dams in the Ompompanoosuc Watershed. Of these, 14 are in service, one is considered 'not in use', and three have been breached. The status of eight is unknown. Most (19) of these create impoundments. Most of the dams in the Ompompanoosuc were constructed for recreational purposes. The Union Village Dam in Thetford was built for flood control purposes. The Geer Dam in West Fairlee was built for generation of hydroelectric power. The Lake Fairlee Dam in Thetford was built to stabilize the lake level.

There are 16 inventoried dams in the Waits Watershed. Of these, seven are in service, one is abandoned, and three have been breached. The status of five is unknown. Most (12) of these create impoundments. Most of the dams in the Waits Watershed were constructed for recreational purposes. The Bradford Dam in Bradford generates hydroelectricity.

Aquatic Organism Passage

Improper design or installation of culverts may present migration barriers to fish and other aquatic organisms. Insufficient flows within culverts, excessive jump heights at culvert outlets, or excessive water velocities within culverts can each create migration barriers year-round or just during specific conditions. Careful management of road crossing structures and science-based prioritization of restoration efforts are critical to maintenance and recovery of wild fish populations. Vermont Agency of Transportation (VTrans), DEC, VFWD, towns and other partners are cooperating to assess the current state of the hundreds of road crossing structures within all of Vermont's watersheds, develop improved guidelines for design and installation of future structures, and prioritize restoration and enhancement projects to maximize ecological and infrastructure benefits.

Connecticut River Atlantic Salmon Restoration Program

Since 1967 a cooperative program comprised by several State and federal agencies and private organizations has focused on the restoration of Atlantic salmon. Current restoration efforts include the rearing and stocking of Atlantic salmon in Connecticut River tributaries, and the protection and enhancement of aquatic habitats. The construction of fish passage facilities, which allow adult salmon to access upstream spawning habitats, as well as allow juvenile salmon to safely migrate downstream to the ocean, is a key component of this program. State and

federal agencies currently rear and stock hundreds of thousands of Atlantic salmon fry annually into upper Connecticut tributaries as part of this cooperative restoration effort. The juvenile salmon inhabit the tributaries until they are ready for their seaward migration.

Fish Habitat and Fisheries in the Waits River

Fisheries investigations conducted since the 1950's have shown that the Waits River supports dense populations of brook trout in the upper watershed with fewer brook and brown trout progressing downstream. Survey results indicate a general increasing trend in the brook trout population in the upper watershed over the last 50 years. Naturally reproducing rainbow trout, common in many other Vermont rivers, have not been detected by surveys in recent years.

Creel surveys are an important tool used by fisheries managers to gather specific information from recreational fisheries. In creel surveys, anglers are interviewed about their fishing day. Information collected is used to estimate species caught, total angler participation, catch rate, and harvest. A creel survey conducted in 2000 indicated that angling pressure is low in the upper watershed and moderate throughout the remainder of the watershed. This information, related to fish inventory survey information, is used to support and guide management decisions.

Current fisheries management of the Waits River aims at protecting wild trout populations while providing recreational fisheries through the stocking of hatchery-raised trout where wild populations are insufficient to support them. No stocking of the upper watershed, where healthy populations of wild brook trout occur, has taken place since 2000, in accordance with *The Vermont Management Plan for Brook, Brown, and Rainbow Trout* (1993). Catchable sized rainbow trout are stocked each spring in the lower reaches to provide angling opportunities.

Temperature and habitat loss are thought to be limiting factors to coldwater fish populations in the Waits River below West Topsham. Temperatures above trout species preferred range are regularly reached during the summer in the mainstem. Much of the Waits River mainstem is characterized by a wide, shallow stream channel with minimal riparian trees and vegetation. Loss of streamside trees and vegetation leads to channel instability, erosion, sedimentation of spawning gravels, loss of instream cover, loss of shading and heightened water temperatures. Habitat fragmentation associated with improperly designed and installed stream-crossing structures may also be a limiting factor in trout populations.

Additional management focuses on protecting existing habitat through public outreach and participation in the regulatory process, and assessing aquatic organism passage through stream crossing structures.

There are no public lakes or ponds managed by VFWD in the Waits River Watershed.

Waits River Atlantic Salmon Restoration

The Waits River Watershed is identified as providing important habitat in the *Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin* (1998). The Waits Watershed supports approximately 5.1% of the available anadromous salmon nursery habitat within Vermont and approximately 2.4% of the available salmon nursery habitat within the entire

Connecticut River Basin. Atlantic salmon fry are stocked annually and evaluated throughout the lower Waits River Watershed.

The Bradford Dam, a hydroelectric facility, is located approximately one river-mile upstream of the confluence with the Connecticut River. It is not designed to provide upstream or downstream fish passage. Fish passage requirements are currently deferred; state and federal agencies reserve the right to require it in the future, in the event that sufficient numbers of migratory fish require it. Currently, upstream nursery habitat is incorporated into the stocking effort.

Fish Habitat and Fisheries in the Ompompanoosuc River

Fisheries investigations conducted since 1980 have shown that the high elevation reaches of the East and West branches of the Ompompanoosuc River support moderate to high densities of wild brook trout. Moving downstream within the branches, the numbers of wild trout decrease. Wild brown trout are present in limited numbers in the lower East Branch while poor/absent populations of wild trout in parts of the West Branch, particularly below Copperas Brook, are likely attributed to well-documented copper pollution associated with several area mines. Wild rainbow trout are likely present in low densities. The lowest reaches of the mainstem Ompompanoosuc River are backwatered by the Connecticut River at Wilder Dam. This area supports a warmwater fish community, consisting of bass, pike, and perch and a number of other warm water species present in the upper Connecticut River.

Current management focuses on protecting existing habitat through public outreach and participation in the regulatory process, assessing aquatic organism passage through stream crossing structures, protecting wild brook trout populations in the upper river, and supplementing the lower river with catchable-sized rainbow and brook trout to provide additional recreational fishing opportunities. Stocked areas include the middle and lower reaches of the East and West branches. No trout are stocked in the mainstem below Union Dam.

VFWD manages several public lakes and ponds in the Ompompanoosuc Watershed. These include Lake Fairlee, Miller Pond and CCC Pond (Downer Pond). Miller Pond supports a small warmwater fishery and is also stocked annually with rainbow and brook trout. CCC Pond is the site of a youth summer camp and supports a small warmwater fishery. Lake Fairlee supports regionally important fisheries for both warmwater and coldwater fish species. It is stocked annually with catchable size rainbow and brown trout and supports popular fisheries for largemouth bass, smallmouth bass, and a variety of panfish. A popular ice fishery for yellow perch, rainbow smelt, bass, and trout takes place each winter on Lake Fairlee as well. Fish species present in Ompompanoosuc Watershed lakes and ponds with public access are presented in Table 1.

Table 1. Fish species present in Ompompanoosuc Watershed lakes and ponds.

Common Name	Fish species present in waterbody			
	Miller Pond	Lake Fairlee	CCC Pond	Abenaki Lake
Brook trout	X ¹			
Brown trout		X ¹		
Rainbow trout	X ¹	X ¹		
Rainbow smelt		X		
Largemouth bass	X	X	X	X
Smallmouth bass		X		
Yellow perch		X	X	X
Rock bass		X		
Bluegill	X	X	X	
Pumpkinseed	X	X	X	
Redbreast sunfish	X ²	X ²	X ²	
Brown bullhead	X	X	X	
Chain pickerel		X		
Blacknose dace			X	
Bluntnose minnow	X			
Golden shiner	X	X	X	X
Fallfish		X		
Longnose sucker		X		
White sucker		X	X	

¹Currently stocked

²Needs verification

Ompompanoosuc River Atlantic Salmon Restoration

The Ompompanoosuc Watershed is identified as providing important habitat in the *Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin* (1998). The Ompompanoosuc Watershed contains approximately 1.5% of the available salmon nursery habitat within Vermont and approximately 0.7% of the available salmon rearing habitat within the entire Connecticut River Basin. Atlantic salmon fry are stocked annually and evaluated in the lower reaches of the East branch and the mainstem, below Union Village Dam.

The Union Village Dam, located about four river-miles upstream of the confluence with the Connecticut River, is not designed to provide upstream or downstream fish passage. Fish passage requirements are currently deferred; state and federal agencies reserve the right to require it in the future, in the event that sufficient numbers of migratory fish require it. Currently, upstream nursery habitat is incorporated into the stocking effort.

**APPENDIX A.10 - Bridge and Culvert Survey Ompompanoosuc
River & Major Tributaries**

Bridge and Culvert Survey

Ompompanoosuc River

& Major Tributaries

**Fairlee, Norwich, Thetford, Vershire,
and West Fairlee, Vermont**

April 2007

**Prepared by
The Two Rivers-Ottawquechee
Regional Commission
Woodstock, Vermont**

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BRIDGE AND CULVERT ASSESSMENT

A. Methods

In sum, 31 bridges, 36 culverts, and 2 arches were included in the bridge and culvert assessment in five towns in the Two Rivers-Ottawaquechee Region (see Appendix A). The geomorphic data from the bridge and culvert assessment were used to identify structures that have the potential to fail because of erosion, scour, or alignment problems, or structures that may have an impact on the stream. Sixty-three of the 69 structures surveyed were flagged on ANR's Failure Modes Report for geomorphic incompatibility. One structure at the mouth of the Ompompanoosuc River at Vermont Route 5 was not assessed because of its size.

The habitat data from the ANR bridge and culvert assessment were used to identify potential barriers to movement and migration of organism through culverts. The Wildlife Passage Report and the Culvert Aquatic Organism Passage Report from the assessment are provided in Appendix A. Nine of the 36 culverts assessed were identified as blocking aquatic organism passage, including adult salmonids, under flow conditions that existed at the time of the survey (fall, 2006).



Figure 1– Perched Outlet on Vershire Center Road

Culverts that are not properly installed, meaning those that are at or slightly below the stream's grade, block aquatic organism passage. Organisms cannot pass through these culverts because of they cannot access the outlet and then

they may not be able to travel up the bare culvert bottom. Erosion or scour can also occur if the structure was installed above grade because the water backs up at the inlet and cascades out at the outlet. Last, aggradation or sedimentation can occur upstream of the culvert, resulting in debris jams.

Culverts that are properly installed at grade allow sediment and debris to pass through more readily than culverts installed above grade, resulting in less erosion and debris jams. Organisms can negotiate these culverts because of the gravel and cobble deposits that create a more natural bed inside the structure.



Figure 2 – Natural bed, at grade, Barker Brook in Thetford

In order to assist our five member towns with priorities for replacement of these structures, TRORC developed two priority lists using the information and photographs taken during the assessment. The bridge span and the culvert diameter as a percentage of the channel width were used as a first cut in prioritizing the structures for replacement. As shown in the Tables below, a total of 26 structures have a bankfull width of less than 50%.



Figure 3 – Beaver Meadow Brook, approaching undersized culvert



Figure 4 – Inlet to culvert with 25% bankfull width on Beaver Meadow Brook

Bridges and culverts with channel widths of less than 40 percent of the bankfull width, which significantly impede natural sediment transport, or which block AOP, were placed in Category 1. Category 1 contains structures that have highest priority for replacement, primarily due to geomorphic incompatibility, erosion, scour, or alignment problems. The two photos above illustrate the nature of this problem.

Structures with channel widths of between 40 and 49 percent of the bankfull width, which impede natural sediment transport or which block AOP, were placed in Category 2. Category 2 is of lower priority for replacement, but still contains structures that may be incompatible in terms of sediment transport.

Results

The Bridge and Culvert Assessment indicates that 27 of the public and private culverts within the survey area are undersized and represent some degree of risk for impeding sediment transport. Of these, 15 culverts were less than 40% of the bankfull width and 12 culverts had bankfull widths of 40 to 49 percent.

The railroad trestle at the mouth of the Ompompanoosuc River at Vermont Route 5 was not assessed because of its size. It does not appear to be a barrier to organism passage nor sediment transport.

1. Category One Structures

The Category 1 structures are summarized below in Table 1. All structures in this category are culverts and are top priorities for replacement because of their size.

Table 1 – Category 1 Structures

Town	Road	Stream Name	Structure	Type	Bankfull Width Percent
Fairlee	Route 244	Blood Brook	vtrans- 700028037909013	Culvert	23%
Thetford	Barker Rd	Barker Brook	vtrans- 990021000909111	Culvert	35% H
Vershire	Route 113	Eagle Hollow Brook	dms- 200113000109052	Culvert	37% A
Vershire	Fairbrothers Rd	Beaver Meadow Brook	vtrans- 700011021009143	Culvert	35%
Vershire	Vershire Ctr Rd	Upper Schoolhouse Brook	vtrans- 700003006709143	Culvert	38% A
Vershire	Mero Rd	Schoolhouse Brook Trib (Mero)	vtrans- 990036001009141	Culvert	32%
Vershire	Mero Rd	Mero Brook	vtrans- 700036033209143	Culvert	30%
Vershire	Ayers Rd	Lower Schoolhouse Brook	vtrans- 990035000709141	Culvert	35% A
West Fairlee	Beaver Meadow Rd	Beaver Meadow Brook	dms- 100020000509161	Culvert	16% A, H
West Fairlee	Beaver Meadow Rd	Beaver Meadow Brook	dms- 100020000609161	Culvert	25%
West Fairlee	Middlebrook Rd	Middle Brook	vtrans- 990002000409161	Culvert	37%
West Fairlee	Middlebrook Rd	Middle Brook	vtrans- 990002000509161	Culvert	29% H
West Fairlee	Marsh Hill Rd	Blood Brook	vtrans- 990024000709161	Culvert	33% A
West Fairlee	Beaver Meadow Rd	Beaver Meadow Brook	vtrans- 990020001009161	Culvert	30% H
West Fairlee	Beaver Meadow Rd	Beaver Meadow Brook	vtrans- 990020000609161	Culvert	33%

A Culvert blocks aquatic organism passage of all fish and stream salamanders including adult salmonids.

H Culvert is near houses and other infrastructure, lower in the watershed.



Figure 5 – Double culvert on Barker Brook, Thetford, with midchannel bar

This culvert on Barker Brook in Thetford is 35% of the bankfull width. This culvert is impeding the natural movement of sediment. The mid-channel bar immediately upstream of the inlet illustrates that deposition is occurring.

A. Blocked Aquatic Organism Passage

Five of the culverts that have been included as Category 1 structures were identified as blocking aquatic organism passage under flow conditions found at the time of the assessment. The following conditions must be met at the time of the assessment for a culvert to be considered to block AOP of all fish (including adult salmonids) and stream salamanders:

- The culvert outlet configuration is free fall and the invert to the water surface distance is greater than or equal to 1.0 foot; or
- The water depth in the culvert at the outlet is less than 0.3 feet.

B. Proximity to Houses in Middle and Lower Watershed

Four of the culverts that have been included as Category 1 structures were identified as high priorities for replacement because of their proximity to homes and road infrastructure. These culverts are located in the middle and lower sections of the watershed, and because they are undersized, pose the highest

risk for becoming blocked and damaging or washing out homes and the roads that serve them.

2. Category Two Structures

The Category 2 structures are summarized below in Table 2. As in Category 1, all structures in this category are culverts. Category 2 structures do not necessarily need replacement, but they should be monitored for significant upstream sediment deposition, upstream and downstream scour and erosion. Debris should be removed after the spring runoff and before the winter as well as after major storm events since these structures have smaller capacity to handle runoff with lower percentage of bankfull widths. They should be prioritized for replacement based on their condition and the amount of erosion, sedimentation, and debris jams they typically experience as well as their position on the reach and in the watershed.

Table 2 – Category Two Structures

Town	Road	Stream Name	Structure	Type	Bankfull Width Percent
Thetford	Sawnee Bean Rd	Barker Brook	dms-100021000209111	Culvert	43%
Thetford	Phelps Rd	Barker Brook	dms-100000000309111	Culvert	45%
Vershire	Vershire Ctr Rd	Main Stem Ompompanoosuc	vtrans-990003000209141	Culvert	47% *
Vershire	Mud Ln	Mud Brook	dms-70002200400914	Culvert	42%
Vershire	Vershire Ctr Rd	Vershire Center Brook	vtrans-990003000409141	Culvert	42%
Vershire	Vershire Ctr Rd	Lower Schoolhouse Brook	vtrans-700003006209143	Culvert	45%
Vershire	Eagle Hollow Rd	Eagle Hollow Brook	vtrans-700003011209143	Culvert	42%
Vershire	Mud Ln	Mud Brook trib to Vershire Ctr Bk	vtrans-700022027509143	Culvert	42%
Vershire	S Vershire Rd	Schoolhouse Brook	vtrans-990038001109141	Culvert	40%
West Fairlee	Godfrey Rd	Blood Brook	vtrans-990025001309161	Culvert	43%
West Fairlee	Scrutton Hill Rd	Middle Brook	vtrans-990005001209161	Culvert	48%
West Fairlee	Middlebrook Rd	Bear Notch Brook	vtrans-990002000309161	Culvert	49%

* Culvert blocks aquatic organism passage of all fish and stream salamanders including adult salmonids.

C. Recommendations

The Two Rivers-Ottauquechee Regional Commission is working with several towns on an infrastructure capital planning process. There are two parameters, percentage of bankfull width and if the structure has a perched outlet, allowing the structure to be flagged as geomorphically sensitive and included in a town's replacement prioritization process.

The Vermont Fish and Wildlife Department and the Agency of Natural Resources are in the process of preparing a publication for the design and construction of stream crossings that will be available for public review when complete. The Two Rivers-Ottauquechee Regional Commission recommends that the towns in this survey area acquire this design publication when available and work with the Agency of Natural Resources to provide stream crossings that offer geomorphic compatibility and passage for aquatic organisms and wildlife.

APPENDIX A.11 - VERMONT ANTI-DEGRADATION IMPLEMENTATION (6/2/08 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 on/in flowing waters and additional public drinking water supplies may be identified during the Agency's consideration of a permit application.

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."

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 of Natural Resources fully supports and actively promotes fishing in Vermont's waters. While fishing may occur in most waters of the State, in many places this use may be occurring on merely an incidental level. As part of the river basin water quality management planning process, the Agency recognizes that fishing occurs in all lakes and ponds and in certain reaches of flowing waters (i.e. streams and rivers).

The existing uses for fishing were identified by staff using an Agency procedure developed specifically for use only during the preparation of basin plans. This procedure focuses solely on the identification of well recognized and documented existing uses with public access and therefore is not meant to be an exhaustive list of existing uses for fishing within any particular river basin. It is expected that additional existing uses for fishing will be identified in the future, both as a result of additional information gathered by staff during basin plan updates and as part of Agency reviews of permitting applications for projects that affect the basin. The Agency plans to develop an additional procedure to guide staff in further identifying existing uses in the context of permit application reviews.

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 the following condition:

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.

APPENDIX A.12 - RESPONSIVENESS SUMMARY TO PUBLIC COMMENTS REGARDING:

Basin 14 “Little Rivers” Water Quality Management Plan Covering the Stevens, Wells, Waits, and Ompompanoosuc River Watersheds.

On April 4, 2008 the Vermont Department of Environmental Conservation (DEC) of the Agency of Natural Resources (ANR) released a final draft of the Basin 14 “Little Rivers” Water Quality Management Plan for a public comment period. The public comment period, which ended on May 30th, included four public meetings. The meetings were held in Groton on April 29, in Barnet on May 5, in Bradford on May 8 and in Thetford on May 13, 2008.

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. 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.

Chapter 1 – Introduction and Common Concerns

Comment: Since this Plan only covers a period of five years, when the Plan states that the time-frame for a project is "ongoing," does that mean for the life of the Plan, or indefinitely?

Response: When the time-frame for a strategy is listed as ongoing, the meaning is that the strategy will be an ongoing effort for the five year life of the plan.

Comment: Section 1-2 states that it is DEC's responsibility to monitor and assess water quality and support designated uses for surface waters in the state. Yet in several of the river-specific Chapters, the onus to monitor and assess water quality is left with volunteer groups. Additionally, the Plan notes that monitoring data was collected in 2007, but it seems this data is not yet analyzed. Overall, this Basin Plan can be made more robust by integrating existing data regarding known problems with active corrective measures in order to fully meet the Vermont water quality policy, "to protect and enhance the quality, character and usefulness of (Vermont's) surface waters and to assure the public health."

Response: DEC continues a biological monitoring program on wadeable streams, and completes targeted *E. coli* or chemical monitoring on streams and rivers as needed. However, DEC also encourages work with volunteers in many cases as the Department simply does not have the resources to sample all waters in the state on an ongoing basis. Working with volunteers allows a greater number of waters to be sampled. Volunteer monitoring efforts also benefit from the local knowledge that volunteers can provide about local waters and watersheds. Volunteer monitoring programs also often increase the understanding of volunteers and communities about water quality issues.

Comment: Section 1-3 and related sections for each river talk about non-point source (NPS) pollution as a large problem, even the largest in some areas, but always talks about

it in the abstract, except in cases of past projects. NPS pollution can often be narrowed down to particular reaches and particular parcels of land, including the form of pollution (field runoff, bank sediment, road washouts, etc.). Very little effort was made to identify specific areas where NPS problems are occurring or drafting means to address them. This is one of the main purposes of a basin plan, and to not meaningfully address this issue in ways likely to achieve results is regrettable.

Response: DEC disagrees with this comment and believes that the Basin 14 water quality management plan has identified many specific water quality threats and actions to address these threats were they exist. The basin plan was based upon the Basin 14 water quality assessment report (April, 1999) which included a review of causes and sources of impairments to water bodies in the basin. Additionally there has been an extensive process where public concerns related to specific or general water quality threats have been sought and these have been included in the plan. A select list of the specific water quality impairments or threats that are identified in the basin plan include but are not limited to: elevated levels of phosphorus in Ticklenaked Pond, acid mine runoff associated with the Elizabeth, Ely, and Pike Hill Mines, elevated *E. coli* levels on the Ompompanoosuc River, and streambank erosion on the West Branch of the Ompompanoosuc River and on the Stevens River near the Barnet School. For each of these impairments or threats, specific strategies have been laid out to address the issue. Finally road assessments, bridge and culvert surveys, and geomorphic assessments completed during the planning process have located a number of specific concerns that will be addressed through strategies in the plan.

Comment: TRORC continues to disagree with DEC's "plan to write a plan" approach used in this document. Identification of problems and specific recommendations to address them are the core purpose of basin planning. For instance, page 16 includes this recommendation: "Identify existing dams which are no longer used in the watershed and are candidates for removal. Remove one dam in Basin 14 and restore the natural flows and riverine habitat." DEC has long had the responsibility to monitor and assess water quality in the state, so problematic dams should not be a mystery at this point. This Plan puts off until later real action to improve water quality related to dams in this watershed and the obligation for the State to write basin plans is not a new one.

Response: The Basin 14 assessment report includes a list of all 69 known dams in the basin. There are several dams that have been identified by DEC with potential water quality concerns due to the potential for water level fluctuations on lakes (Harveys Lake Dam and Lake Fairlee Dam) or due to poor bypass flows (the Bradford and Boltonville Dams) and these have been identified in the plan along with strategies to address these issues. The Union Village Dam has also been identified in the plan as a concern for surface waters due to the creation of a winter pool, and a strategy is included to study the elimination of the winter pool at the Union Village Dam and doing so if feasible. There is one known dam in the basin which is no longer in service and is a candidate for removal for the purposes of restoring aquatic passage and riverine habitat. The removal of this dam would require the cooperation of the dam owner as well as significant study and funding to complete such a complex project. There may be other similar abandoned dams in the basin and DEC encourages persons having such knowledge in assisting in the identification of such structures.

Comment: Page 4 cites information relating to phosphorus runoff in the Lake Champlain watershed. It would be useful to have similar data in other regions of the state or to be able to draw more comparisons between Lake Champlain and this region.

Response: It would be helpful to have such similar information in regards to land use and phosphorus pollution for the Connecticut River watershed as is available for the Lake Champlain watershed. However, this information was collected, at great expense, for the purpose of addressing the continued impairment of Lake Champlain due to elevated phosphorus levels and for the purposes of implementing the Lake Champlain TMDL. Fortunately, the Connecticut River does not suffer from a similar phosphorus impairment.

Comment: Page 10 states that Vermont has more than 14,000 miles of paved and gravel roads. Please include data on the miles of road in this watershed if possible. Also, Figure 1-4 is blurry and should be made clearer for the final Plan.

Response: The length of road in Basin 14 was added (850 miles) to the plan and Figure 1-4 was enlarged.

Comment: Strategy 11 “Compile guidance on winter sanding and salt application and distribute to towns in Basin 14 to encourage the development of policies that will reduce salt and sand application in the watershed.” should be rewritten to include outreach to the general public on impacts of salt and sand, as it is the general public as much as the road commissioners that drive the greater application of sand and salt in the watershed (which by rough calculation has gone up in both Peacham and Barnet by 2- 3 times over the last 20 or so years.)

Response: The Agency of Natural Resources agrees that public outreach on this issue would be useful and the strategy to address this issue in cooperation with the Agency of Transportation and Vermont Local Roads Program will be expanded to include: “Provide outreach to the general public on the impacts of salt and sand application to reduce the pressure for their expanded use.”

Comment 1: When will the bridge and culvert survey data be presented to local towns and how is this addressed in the watershed plan?

Comment 2: Fish passage should be more thoroughly addressed in the watershed plan.

Comment 3: Specifically, page 61 of the Plan states that "while strategies to improve fisheries are not broken out in a separate section of this Plan, a number of strategies to improve riparian habitat and remove barriers to fish passage will benefit fisheries in this watershed." As we stated in our comments on this Plan last year (see our letter of June 19, 2007), because salmon are stocked in the watershed, specific recommendations should be made to reduce or mitigate barriers to fish passage.

Response: The Agency agrees that fish passage is an issue that should be addressed and two strategies have been added to the plan with a goal of improving fish passage in the basin. These issues were discussed and similar draft strategies were included for some of the individual watersheds in earlier discussions. The strategies will be restored as follows:

14. Compile available bridge and culvert survey data in the basin and present this information to watershed towns and develop a list of priority culverts for replacement

based on likelihood of culvert failure, geomorphic impacts and aquatic species passage concerns.

Potential key players: Road crews and commissions, conservation commissions, and selectboard members in the basin, VTrans, TRORC, NVDA, RMP, DFW

Potential funding sources: Better Backroads grant, UCM&E

Time-frame: 2009

15. Work with town road commissioners and selectboard members to replace top priority culverts in each town.

Potential key players: Road crews and commissions, conservation commissions, and selectboard members in the basin, VTrans, TRORC, NVDA, RMP, DFW

Potential funding sources: Better Backroads grant, UCM&E

Time-frame: 2010

Comment: Page 13 discusses the Eurasian watermilfoil invasion of various parts of the watershed. We would encourage DEC to be very specific about the scope of this problem. It is our understanding that it has invaded 55 acres out of 511 acres total in Lake Morey alone, and that the problem is out of control. If that is the case, the language on this page should be changed to reflect better information.

Response: Lake Morey is not in Basin 14. However, Lake Fairlee, which is in Basin 14, has Eurasian watermilfoil, and the extent of this issue was described in the plan. The presence of Eurasian watermilfoil in Lake Morey is noted in the plan due to the potential of spread from this lake to waters in Basin 14.

Comment: Lack of adequate data on wetlands in the State of Vermont is a longstanding problem. This Plan should include recommendations (in Sections 1-5, 2-5, 3-5, 4-5, and 5-5) that ANR will conduct more detailed wetland mapping in this watershed.

Response: The DEC is working with the Natural Resources Board to develop a new procedure for adding wetlands to state wetland maps to greatly increase their accuracy. In addition, as stated in strategy 18 of the basin plan, DEC will work with conservation commissions to map existing wetlands and wetland functions and values in the watershed and will use this information to prioritize the protection or restoration of wetlands in the watershed.

Chapter 2 – The Stevens River Watershed

Comment: Tree planting suggested in the plan for the area near Karme Choling are not worth completing due to the extreme instability on this section of the river.

Response: The Agency agrees that a broader approach than just planting trees is needed to address the erosion along this stretch of the Stevens River. In addressing this concern, the strategy currently starting “Restore reaches of the Stevens River where it is out of equilibrium and where needed restore riparian vegetation” was changed to “Recognize reaches of the Stevens River where it is out of equilibrium and where needed restore riparian vegetation” with a goal of corridor protection along this reach of river due to the high level of instability.

Comment: Junk cars in the Stevens River watershed (not just along the river) should be addressed in the watershed plan due to the possibility of leaking fluids impacting water quality.

Response: Strategy 24 was changed to include working with communities and landowners to remove junk cars as follows “Work with local communities to reduce the number of abandoned cars found along the Stevens River and in the Stevens River watershed.”

Comment: There is strong community support for the rebuilding of the dam to repower the Ben Threshers Mill. The wording of strategy 37 in the draft plan should be changed to read “Develop a solution to repowering the historical Ben Threshers Mill millworks without significantly negatively impacting the Stevens River”, by adding in the word “significantly”. The wording at the end of this strategy “in the event the mill is restored” should be deleted because the mill has already been restored.

Response: The Agency of Natural Resources is a participant along with other applicable state and federal agencies in the permitting of dams in Vermont. The building of a dam on the Stevens River at Ben’s mill would require appropriate state and federal permits and this permitting process (not the basin plan) is where such issues are appropriately addressed.

However, to make this strategy clear it was changed in the final plan to say “Continue ongoing discussions between the Ben’s Mill Trust and state and federal regulators on alternatives for repowering the historical Ben Threshers Mill.” In addition to the above change, the strong community support for Ben’s Mill was added to the background text on this subject and the fact that the mill itself has already been restored will be acknowledged by removing the wording in the draft plan suggesting otherwise.

Chapter 3 – The Wells River Watershed

Comment: Is there an opportunity for increased sampling by area youth and or citizens or participation in the Enviro-thon?

Response: This is addressed in strategy 41 of the basin plan and is supported by the Agency through the LaRosa Analytical partnership program. Information on the Enviro-thon has been passed along to area teachers.

Comment: What is electro-fishing? If you use this term it should be included in the glossary

Response: Electro-fishing involves shocking fish in waters to establish population estimates in a waterbody. This term was removed and replaced with “fish surveys” to avoid confusion.

Chapter 4 – The Waits River Watershed

Comment: There are a number of conserved lands that are not on the map of the Waits River watershed. Can these conserved lands be added to the map and if not they should be excluded? Two areas in particular that should be added are public lands surrounding Wrights Mountain and as part of the Orange County Headwaters Project.

Response: The conserved lands for Wrights Mountain will be added but, due to uncertainties related to access on conserved lands in the area known as Orange County Headwaters Project these will not be added

Comment: The plan “sugar coated” the issue of temperature in the Waits River and did not include the Tabor and South Branch when describing the issue of the elevated water temperatures in the watershed. The plan could better delineate the upper watershed where temperature is not as much of an issue and trout populations are doing well.

Response: Temperature monitoring conducted on the main stem of the lower Waits River identified temperature as likely limiting trout populations in this section of the watershed. No similar monitoring has been done on the lower South and Tabor Branches but their similar physical and riparian conditions to those on the main stem suggests that temperature could be an issue on these tributaries as well. In response to this comment, the lower South Branch and Tabor Branch of the Waits River will be added as locations where elevated temperature is a concern in waters in the Waits River watershed.

Comment: Is the Department of Environmental Conservation going to follow up on the water sampling done by local schools which has identified potential issues with *E. coli* as stated in the draft plan?

Response: The Department supports local residents in doing volunteer sampling through the LaRosa partnership program which processes water quality samples for volunteers. Applying for this grant to support this sampling is a strategy in the plan at the Waits River Valley School, although this will be expanded in response to this comment to include sampling at other locations of the watershed where swimming takes place as well.

Comment: Make clear how to dispose of Japanese knotweed if people are cutting this invasive plant to prevent causing additional spread.

Response: Care must be taken with the disposal of Japanese Knotweed stem by either disposal on site by drying thoroughly or burning or land filling. In response to this comment, strategy #85 will be changed to address this issue as follows:

85. Complete a demonstration project along the Waits River on control methods for Japanese knotweed including the proper disposal of Japanese knotweed to prevent its spread. Encourage landowners to mow or cut areas of knotweed on private property.

Comment: The section on the restoration of the Pike Hill Mines Superfund site sounds too optimistic.

Response: The restoration of Pike Hill mines through the Superfund process will likely take many years to complete. The draft plan did not intend to make it appear that this would be a short or simple clean up process.

Chapter 5 – The Ompompanoosuc River Watershed

Comment 1: *E. coli* is a well-documented and long-standing problem in parts of the watershed, resulting in impaired waters, waters likely to be impaired, and numerous water quality violations. This iteration of the Plan improves upon its predecessor, but it should clearly cite actions that the State will take to address these violations and enforce its own regulations. Many *E coli* sources are likely point sources and the Agency has a good idea where they occur. This is not a responsibility that can be delegated to conservation commissions or local schools. Also, further testing is not an action to restore water quality. Further testing and enforcement is, on the other hand.

Comment 2: Resources spent to identify *E. coli* sources in the Ompompanoosuc River watershed should be limited unless it can be shown that the *E. coli* comes from a human source.

Response: DEC has tried to take a balanced approach to locate and address elevated levels of *E. coli* on the Ompompanoosuc River. DEC has not been able to determine the source of *E. coli* as human, domesticated or wild animal and unless DEC can determine the *E. coli* was of an entirely natural source, DEC is charged with restoring this water to meet the Vermont Water Quality standards for *E. coli* as required by the Clean Water Act. Upon learning about elevated *E. coli* levels in the Ompompanoosuc River, DEC conducted *E. coli* sampling and was unable to locate any specific source. Due to the persistent levels of *E. coli*, sections of the Ompompanoosuc River were added to the list of impaired waters. This plan has encouraged the participation of local residents to complete follow up sampling to locate the source or sources of *E. coli* with the hope that the local knowledge of the watershed residents would help in source identification, which then could lead to either enforcement or landowner outreach to address any identified sources. Unfortunately, volunteer sampling and follow up watershed surveys were not able to locate any particular source of *E. coli*, so no action could be taken.

Comment: This Plan should make specific recommendations for actions and resources that ANR will commit to address identified fluvial erosion hazards in this watershed. Page 72 cites only resources from other organizations. It is our position that because this is an ANR-recommended program that the Agency is inviting municipalities to participate in, ANR should be willing to provide resources to implement it locally and should do so through basin plans.

Response: The Agency of Natural Resources has committed considerable resources to addressing fluvial erosion hazards taking a lead role in addressing this issue. The Agency of Natural Resources through the River Management Program is listed as a key player in a number of strategies to address fluvial erosion hazards (FEH). In addition, the state has put forward funding to support this process through river corridor grants to complete the geomorphic assessments and river corridor planning required for the implementation of a FEH overlay districts. The development of FEH overlay districts has been discussed and is a strategy in this plan. The river basin planning process is able to assist towns who are interested in understanding what is involved and completing necessary assessments for the development of FEH overlay districts. Due to the required town involvement in adopting FEH overlay districts, ANR works with towns interested in this tool on a town by town basis. The Agency is also working to develop incentives for towns to address fluvial erosion hazards in town zoning.

Chapter 6 Management Goals and Plan Implementation

Comment: The Plan should discuss population growth in the watershed and its effect on water quality. As population increases, drinking water supply needs will increase. The Plan should designate likely areas for drinking water supplies, or it should state that this will be addressed in a future Plan.

Response: The issue of groundwater did not come up until the end of the planning process in the Ompompanoosuc River watershed. This issue is mentioned in Chapter 5 on the Ompompanoosuc River watershed as follows: “Protection of groundwater

resources may become increasingly important as the regions population grows. This was not initially identified as one of the top issues in the watershed but emerged as a concern at the end of the planning process so should be addressed in future plans.” In the meantime protection of groundwater can be accomplished with programs administered through the DEC Water Supply Division. Recent legislation has also made groundwater a public trust which should allow for the further protection of groundwater resources.

Comment: The Plan does not propose any B Water Management Types. This is temporarily allowed, as noted on page 82, however, there is no strategy proposed in the Plan to create these within the following two years. ANR should provide its best available fisheries and biota data in this draft, at a minimum.

Response: The plan does include maps of biological monitoring data in the watershed (Figures 4-2 and 5-2) and description of fisheries in Appendix A9. The process for water management typing or a similar process to protect waters that may be different from water management typing has not yet been determined in discussions before the Water Resources Panel. Without knowing what form this process of protecting waters will take, the Agency is not able to set forth a strategy to do so in the current plan. When this process has been worked out DEC will be able to set out proposed classification or “typing” recommendations for Basin 14 waters.

Comment: Chapter 6 has minimal data on existing uses. We applaud the Agency's approach to considering that all lakes and ponds have fishing, boating and recreation. We are not sure why the Agency does not extend this presumption for fishing to at least all third order and higher streams. There are obviously more locations of swimming and boating in the basin than those noted on page 83. Though the draft notes this shortcoming by saying, "it is not intended to represent an exhaustive list of all existing uses," that is exactly what the Plan should be doing so as to make these uses obvious in any permitting. The Plan should clearly identify all existing uses and any areas where waters need to be improved to allow these uses, and should include actions and resources for achieving set goals.

Response: The identification of existing uses was completed following a draft set of criteria included in the final plan in Appendix A 11. The draft criteria were not available at the time of the publication of the draft Basin 14 Water Quality Management Plan. Nineteen reaches of rivers and streams in the basin were added as having an existing use for fishing, using the criteria in Appendix A11, and are included in the final plan in Table 6-3. As stated in the Vermont Water Quality Standards, the Agency has the discretion to identify existing uses in basin plans to the “extent appropriate”. The Agency has put forward the procedure in Appendix A11 as a way to identify well know existing uses with public access with the understanding that additional existing uses will be identified on a case-by-case basis during consideration of a permit application, and can be added in future iterations of the Basin 14 Water Quality Management Plan.

APPENDIX B - Regulatory and Non-regulatory Programs that Contain BMPs Applicable to Protecting and Restoring Waters within the Basin

APPENDIX B.1 - Agricultural Runoff Control Programs

Programs To Address Issues

Vermont Agency of Agriculture, Food & Markets Programs

Accepted Agricultural Practices (AAP) are statewide regulatory guidelines for agricultural land use practices created to reduce the amount of agricultural pollutants entering waters of the state from farm land. The AAPs were designed to reduce non-point pollutant discharges through implementation of improved farming techniques rather than investments in structures and equipment. The law requires that these practices must be technically feasible as well as cost effective for farmers to implement without governmental financial assistance.

Accepted Agricultural Practices (AAP's) are intended to reduce, not eliminate, pollutants associated with non-point sources such as sediments, nutrients and agricultural chemicals that can enter surface water and groundwater that would degrade water quality. Accepted Agricultural Practices are a group of farmland management activities, which will conserve and protect natural resources. These practices will maintain the health and long-term productivity of the soils, water, and related plant and animal resources and reduce the potential for water pollution from agricultural non-point sources. Accepted Agricultural Practices include these practices among others: erosion and sediment control, animal waste management, fertilizer management, and pesticide management. Accepted Agricultural Practices are basic practices that all farm operators must follow as a part of their normal operations. Implementation of Accepted Agricultural Practices by Vermont agricultural operators creates a reputable presumption of compliance with Vermont Water Quality Standards. The presumption that the use of Accepted Agricultural Practices complies with Vermont Water Quality Standards may be overcome by water quality data or results from a water quality study deemed conclusive by the Secretary. These rules, however, do not exempt farmers from the obligation to comply fully with the Vermont Water Quality Standards and the provisions of the Clean Water Act.

<http://www.vermontagriculture.com/AgriculturalWaterQuality/AAP/AAP10.htm>

Best Management Practices (BMP) are voluntary practices that are specific practices installed to correct a current waste management problem on a specific farm. All Vermont farmers are eligible to receive available state financial assistance following the installation of on-farm improvements designed to control agricultural non-point source waste discharges. Best Management Practices (BMP's) typically require installation of

structures, such as manure storage systems, milkhouse waste treatment, stream fencing to reduce agricultural nonpoint source pollution, and a variety of other practices that improve water quality. While farmers may realize an economic benefit from Best Management Practices, it is unlikely that they will be affordable without governmental cost sharing.

Best Management Practices Cost-Share Program: The BMP program was created to provide state financial assistance to Vermont farmers in support of their voluntary construction of on-farm improvements designed to abate non-point agricultural waste discharges. The program makes maximum use of federal financial assistance and seeks to use the least costly methods available to accomplish the abatement required. The Vermont Agency of Agriculture, Food, and Markets (VAAFM) grants are limited to a cap of 35 percent of the total actual costs of the system in cases where either the federal government or other entities cost share the system, or up 80 percent on projects with no other source of cost share assistance. Combined federal, state and other cost share participation may not exceed 85 percent of the eligible costs; ensuring grant recipients pay at least 15 percent of the total cost of each BMP. Once funding for BMP implementation has been awarded, the farm is required to operate and maintain the practice under contract or agreement for the design life of the practice, but not to exceed 10 years. Any farm in Vermont is eligible to apply for state BMPs cost-share dollars, and the program accepts applications on a rolling basis. All water quality related BMPs listed on the Vermont NRCS practice code list are available for state funding. Both VAAFM and NRCS engineers are available to help farmers assess what BMPs would be most beneficial on the farm.

<http://www.vermontagriculture.com/ARMES/awq/bmp..html>

Large Farm Operations: The Large Farm Operations (LFO) program requires farms with more than 700 mature dairy cows (whether milking or dry), 1,000 beef cattle or cow/calf pairs, 1,000 young-stock or heifers, 500 horses, 55,000 turkeys, or 82,000 laying hens (without a liquid manure handling system) to be managed in accordance with the states LFO permit rules. A LFO permit prohibits the discharge of wastes from a farm's production area to waters of the state and requires the farm to land apply manure, compost, and other wastes according to a nutrient management plan. This program is the most stringent regulatory program coordinated by the Agency. The Agency provides LFOs with a Vermont-based regulatory program that applies the same technical standards as the federal CAFO permit. If an LFO does not comply with the state issued individual farm permit, the farm may have to obtain a National Pollution Discharge Elimination Systems permit. There are currently no farms in Basin 14 which require an LFO permit.

<http://www.vermontagriculture.com/ARMES/awq/LFO.html>

The **Medium Farm Operations (MFO)** General Permit requires farms with between 200 and 699 mature dairy cows or 300 beef cattle to prohibit a direct discharge of waste to waters of the state from any area of the barnyard or land associated with the farms production area. The MFO program provides a common-sense, Vermont-based,

regulatory alternative to a potentially burdensome federal permitting program by allowing medium sized farms to seek coverage under a single Vermont state General Permit. The General Permit prohibits discharges of wastes from a farm's production area to waters of the state and requires manure, compost, and other wastes to be land applied according to a nutrient management plan. If farms do not comply with the state MFO General Permit they may be required to obtain a National Pollution Discharge Elimination Systems permit.

<http://www.vermontagriculture.com/ARMES/awq/MFO.html>

<http://www.vermontagriculture.com/ARMES/awq/ResoucesforNutrientManagement.html>

Nutrient Management Incentive Grant Program: The NMPIG program provides financial assistance for the development of NMPs and three additional years of plan update and maintenance. NMPs may be developed by a certified nutrient management planner or by farmers themselves. The incentive grant provides NMP development reimbursement at rates of \$9 per acre, plus the cost of soil (\$15 per test), manure, and other waste testing (\$35 per test). Once the NMP is developed and meets the state requirements for reimbursement, the farmer is eligible for 3 years of continued update payments that provide needed dollars for implementation and maintenance of the NMP. Total NMPIG payment is limited to \$13,000 for plan development and maintenance/update per farm.

<http://www.vermontagriculture.com/ARMES/awq/NMPIG.html>

<http://www.vermontagriculture.com/ARMES/awq/ResoucesforNutrientManagement.html>

Farm Agronomic Practices Program (FAPP) provides Vermont farms with state financial assistance for implementation of soil-based practices that improve soil quality, increase crop production, and reduce erosion and agricultural waste discharges. FAPP also will provide funding incentive for NMP updates, implementation, and maintenance with the aim of improving outreach education on agricultural water quality impacts and regulations. Practices eligible for assistance are: Nutrient Management Plan Update Payments (\$2 per acre); Cover Cropping (\$20 per acre); Strip Cropping (\$24 per acre); Conservation Crop Rotation (\$25 per acre); and Cross-Slope Tillage (\$10 per acre).

<http://www.vermontagriculture.com/ARMES/awq/FAP.html>

The **Conservation Reserve Enhancement Program (CREP)** is a State-federal conservation partnership program targeted to address specific State and nationally significant water quality, and soil erosion issues related to agricultural use. The program uses financial incentives to encourage farmers and ranchers to voluntarily enroll in contracts of 15 or 30 years in duration to remove crop and marginal pasture lands from agricultural production. This community-based conservation program provides a flexible design of conservation practices and financial incentives to address environmental issues.

<http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=cep>
<http://www.vermontagriculture.com/CREPwebsite/Home/Home.htm>

Vermont Agricultural Buffer Program (VABP) Of the land currently enrolled in CREP, only 20 % is annual cropland (mainly corn silage). This cropland has a greater potential to contribute phosphorus and sediment through surface runoff and erosion, to waters of Vermont, and hence the VABP has been designed to allow farmers to plant harvestable grass buffer along streams. Eligible land enrolled in the program must be planted to a perennial sod-forming crop. Buffers developed under this program can only be tilled to establish the buffer, can have no manure applied on the contracted land at anytime during the contract, must maintain minimum a 25 ft width, and harvesting of the buffer is only allowed from June 1st to September 1st. A set rate of \$123 per acre is provided to the participant to cover cost of establishing grassed buffer when a suitable grass is not currently planted. An additional per acre incentive payment will be paid annually at the end of growing season for each of the 5 years participant is enrolled in VABP. The annual payment will be 40% of an estimated total 15 year per acre CREP payments, and the VABP program allows farmers to opt out of the contract at anytime over the five year contract period.

<http://www.vermontagriculture.com/documents/VABP.pdf>

Local Government Programs

Conservation District Technical Assistance Programs: Free technical assistance and information is provided through the conservation districts. Landowners seeking assistance in Orange County should contact the White River Conservation District 802.828.4493 ext. 110 Landowners from Caledonia County should contact the Caledonia County Conservation District at 802.748.3885 ext. 110 <http://www.vacd.org/> Technical Assistance from the Conservation District includes:

Accepted Agricultural Practices Assistance to help farmers meet the requirements of Vermont's AAP regulations. Technical assistance for manure and nutrient management, runoff potential, floodway determinations, streambank stabilization, vegetative buffer strips and soil erosion potential are all addressed by the program. Agricultural Resource Specialists (ARS) work with landowners on strategies specific to their farms and provide information and referrals for State and Federal cost-share programs.

<http://www.vacd.org/onrcd/ars.html>

Farm*A*Syst is a free drinking water protection program for farms based on voluntary assessments to determine how current practices and structures may pose a risk to drinking water. Voluntary Farm Assessments provide information that help ARS staff offer farm-specific suggestions for protecting the farm's drinking water.

<http://www.vacd.org/onrcd/farmasyst.html>

Land Treatment Planners are available to assist farmers in developing land treatment plans which provide detailed information on farm soil and water resources, recommendations for continued stewardship, and recommendations for compliance with State and Federal regulations.

<http://www.vermontagriculture.com/ARMES/awq/LTP.html>

Federal Programs

The **Agricultural Management Assistance** (AMA) program provides cost share assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation into their farming operations. Producers may construct or improve water management structures or irrigation structures; plant trees for windbreaks or to improve water quality; and mitigate risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming. Vermont's AMA program priorities are waste storage facility construction and streambank stabilization.

<http://www.vt.nrcs.usda.gov/programs/AMA/>

The **Conservation Reserve Program** (CRP) is a voluntary program that offers long-term rental payments and cost-share assistance to establish long-term, resource-conserving cover on environmentally sensitive cropland or, in some cases, marginal pastureland. Converting highly erodible and/or environmentally sensitive cropland to permanent vegetative cover reduces soil erosion, improves water quality, and enhances or establishes wildlife habitat. CRP contracts are for a term of 10 to 15 years. However, for land devoted to certain practices such as hardwood trees, wildlife corridors, or restoration of cropped wetlands or rare and declining habitat, participants may choose contracts of up to 15 years. Incentives include annual rental payments of up to \$50,000 per year, cost-share payments of up to 50% of the cost for establishing cover, plus special incentive payments for wetland restoration.

<http://www.vt.nrcs.usda.gov/programs/CRP/>

The **Conservation Security Program** (CSP) is a voluntary program to assist agricultural producers implementing and maintaining new or maintaining existing conservation practices on working lands. The program addresses targeted watersheds on a rotating basis and different watersheds are eligible each year. All producers and all private agricultural lands including cropland, improved pasture land, rangeland, and forested land that are an incidental part of an agricultural operation are eligible for enrollment. The purpose of the CSP is to provide incentive payments to producers who adopt and/or maintain conservation practices on private working lands. Producers may choose from one of three tiers of conservation practices and systems, with the more complex and comprehensive tiers receiving higher incentive payments. CSP contracts are from five to 10 years. Contract payments are based on five, 10 and 15 percent of a national land

rental rate per acre for Tiers I, II and III, respectively. In addition to incentive payments, producers will receive cost-share assistance to install practices, annual practice maintenance fees and potentially a bonus to encourage participation in the program. Maximum annual payments are \$20,000, \$35,000 and \$45,000.

http://www.vt.nrcs.usda.gov/programs/CSP/CSP_2006/Index_2006.html

The **Environmental Quality Incentives Program** (EQIP) provides technical, educational, and financial assistance to eligible farmers and nonindustrial private forestland owners working to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The program provides assistance to landowners in complying with Federal and State laws, and encourages environmental enhancement. Protection of surface and groundwater resources is the major focus of EQIP. The program offers cost-share payments of up to 75% of costs up to \$450,000, to implement one or more eligible practices. Five- to ten-year contracts are made with producers to use and maintain cost-shared practices and require a conservation plan be created and carried out for the length of the contract. Priority is given to livestock operations and targeted locations within the State.

http://www.vt.nrcs.usda.gov/programs/EQIP/EQIP_2007/Index.html

The **Farm and Ranch Land Protection Program** (FRPP) provides matching funds to help purchase development rights to keep productive farm and rangeland in agricultural uses. Working through existing programs, USDA partners with State, tribal, or local governments and non-governmental organizations to acquire conservation easements or other interests in land from landowners. USDA provides up to 50 percent of the fair market easement value. To qualify, farmland must be part of a pending offer from a State, tribe, or local farmland protection program; be privately owned; have a conservation plan for highly erodible land; be large enough to sustain agricultural production; be accessible to markets for what the land produces; have adequate infrastructure and agricultural support services; and have surrounding parcels of land that can support long-term agricultural production.

<http://www.vt.nrcs.usda.gov/programs/FRPP/Index.html>

The **Grassland Reserve Program** (GRP) establishes a grassland reserve program for the purpose of restoring and conserving two million acres of grassland, rangeland, and pastureland. GRP uses up to 30-year rental agreements and 30-year or permanent easements. GRP lands may be used for haying and grazing under a conservation plan. Rental and easement payments are based on a percentage of the fair market value of the land less the grazing value of the land for the period during the contract or easement period. Restoration costs are cost shared at up to 75 percent. Unless reauthorized by the 2007 Farm Bill, this program is no longer available.

<http://www.vt.nrcs.usda.gov/programs/GRP/Index.html>

The **Partners for Fish and Wildlife Habitat Restoration Program** provides technical and financial assistance to private landowners interested in voluntarily restoring or

otherwise improving native habitats for fish and wildlife on their lands. This program focuses on restoring former and degraded wetlands, native grasslands, stream and riparian areas, and other habitats to conditions as natural as feasible. The program emphasizes the reestablishment of native vegetation and ecological communities for the benefit of fish and wildlife in concert with the needs and desires of private landowners. The assistance that the USFWS offers to private landowners may take the form of informal advice on the design and location of potential restoration projects, or it may consist of designing and funding restoration projects under a voluntary cooperative agreement with the landowner. Under the cooperative agreements, the landowner agrees to maintain the restoration project as specified in the agreement for a minimum of 10 years. While not a program requirement, a dollar-for-dollar cost share is usually sought on a project-by-project basis.

<http://ecos.fws.gov/partners/viewContent.do?viewPage=home>

Watershed and River Basin Planning and Installation - Public Law 83-566 (PL566)

Technical and financial assistance is provided in cooperation with local sponsoring organizations, state, and other public agencies to voluntarily plan and install watershed-based projects on private lands. The purposes of watershed projects include watershed protection, flood prevention, water quality improvements, soil erosion reduction, rural, municipal and industrial water supply, irrigation management, sedimentation control, fish and wildlife habitat enhancement and create/restore wetlands and wetland functions. Watershed plans involving Federal contribution in excess of \$5,000,000 for construction, or construction of any single structure having a capacity in excess of 2,500 acre feet, require Congressional committee approval. Other plans are approved administratively. After approval, technical and financial assistance can be provided for installation of works of improvement specified in the plans. Project sponsors get assistance in installing land treatment measures when plans are approved. Technical assistance is furnished to landowners and operators to accelerated planning and application of needed conservation on their individual units. There are presently over 1600 projects in operation.

<http://www.nrcs.usda.gov/programs/watershed/>

The **Wetlands Reserve Program (WRP)** is a voluntary program offering landowners a chance to receive payments for restoring and protecting wetlands. Marginal agricultural land that is too wet to produce, previously drained wetlands or land damaged by flooding are typical sites for WRP funding. Landowners retain control over access to their property and compatible uses such as haying, grazing, timber harvest, fee hunting, and trapping may be permitted upon request. Land can be resold. Easements and restoration cost-share agreements establish wetland protection and restoration as the primary land use for the duration of the easement or agreement. Re-stored wetlands improve water quality, filter sediment, reduce soil erosion, provide habitat for wildlife and endangered species, reduce flooding and provide outdoor recreation and education opportunities.

<http://www.vt.nrcs.usda.gov/programs/WRP/Index.html>

The **Wildlife Habitat Incentives Program** (WHIP) is a voluntary program that provides financial incentives to develop habitat for fish and wildlife on private lands. It provides both technical assistance and cost sharing help to participants who agree to implement a wildlife habitat development plan. Participants work with USDA's Natural Resources Conservation Service to prepare a wildlife habitat development plan in consultation with a local conservation district. The plan describes the landowner's goals for improving wildlife habitat, includes a list of practices, a schedule for installing them, and details the steps necessary to maintain the habitat for the life of the agreement. USDA pays up to 75% (usually no more than \$10,000) of the cost of installing wildlife practices. USDA and program participants enter into a cost-share agreement that generally lasts 5 to 10 years from the date the contract is signed.

<http://www.vt.nrcs.usda.gov/programs/WHIP/Index.html>

Additional Programs

The **Current Use Program** (CUP) Vermont's Agricultural and Managed Forest Land Use Value Program -- known as the Current Use Program -- was created in the 1970's as a companion to legislation that required towns to list property at 100% of fair market value. Because of escalating land values, these property taxes were placing a heavy burden on owners of productive farm and forest lands. The CUP offers landowners use value property taxation based on productive value of land rather than traditional "highest and best" use of the land. The CUP includes a Land Use Change Tax as a disincentive to develop land. The tax is 20% of fair market value of a property, or, in case of the sale of part of a property, a pro rata share of the fair market value of the entire property. The program is administered by the [Vermont Department of Taxes](#).

<http://www.state.vt.us/tax/pdf.word.excel/pvr/currentuse-geninfo.pdf>

The **Farmland Access Program** (FAP) goal is to provide qualified diversified farmers with access to good agricultural land and to assist with the start up or expansion of commercial agricultural businesses. In this way, **Vermont Land Trust** hopes to facilitate the creation of new farm enterprises and greater diversification within Vermont agriculture. VLT can work with Land Link Vermont to enroll farmers in a farmland database; assist farm seekers in securing business planning services through the Farm Viability Program; assist in farm purchases when seekers locate farms; and search for, purchase, conserve or sell farms in Vermont that are suitable for diversified farm operations. Minimum qualifications require candidates to have 3 to 5 years of commercial farming experience, strong agricultural references, plans to develop an agricultural enterprise that would gross \$100,000 per year within 5 years of start up, and sufficient financial resources (or ability to be financed) for start-up expenses. Our primary focus is on farms producing food and fiber that would use at least 25 acres of productive land.

<http://www.vlt.org/FarmlandAccessBrochure.pdf>

The **Upper Valley Land Trust** uses voluntary, legally binding agreements known as conservation easements to permanently protect specific parcels of land by restricting development and other activities that may degrade natural resources. Individuals who choose to donate or sell a conservation easement to UVLT work with our staff to ensure that the restrictions meet their goals and are appropriate to unique characteristics of their property. The land remains in private ownership, and the restrictions remain in force as it is transferred from one owner to another. With each parcel conserved, UVLT accepts a stewardship obligation to defend the terms of the easement in perpetuity.

<http://www.uvlt.org/html>

The **Farmland Preservation Program** (FPP) is focused on retaining the state's quality agricultural land base in strong farming regions of the state. The purchase of conservation easements on farmland preserves Vermont's working landscape--the open farm fields, woodlands and farmsteads that comprise the third largest sector in the state's economy and draw the visitors that make tourism the largest sector. Because of the Vermont Housing & Conservation Board's investment in conservation easements, Vermont's most productive farmland will remain undeveloped and the best soils will remain available for farming in the future. Selling conservation easements enables a landowner to keep land in agricultural use and also be compensated for the potential development value of the land, recognizing the asset value of the land. The landowner retains title to the land and agrees to the terms of a conservation easement limiting future ability to subdivide and develop the land.

<http://www.vhcb.org/Conspage.html#Anchor-Farmlan-65515>

Land Link Vermont (LLV) is a farm linking program at University of Vermont Center for Sustainable Agriculture. Land Link Vermont connects farm seekers with farmland and farming opportunities, and provides information and support on farm start-ups and succession by offering a matching service, education, referrals, and outreach. The matching service provides linkages among farm seekers and farmland owners. Interested parties share information on goals, acreage, location, enterprises, and tenure options considered. Participants are interested in a variety of tenure options including buy/sell, lease, joint farming and other arrangements. Farm seekers are interested in a number of different farming enterprises including dairy, vegetables, small ruminants and CSA's. Through publications and on-going workshops, Land Link Vermont provides farmers, land owners and agriculture professionals with links to education on topics like estate and planning, effective leases, farm financing, business planning, and direct marketing. Land Link Vermont also helps link farmers and landowners to professionals and Vermont agricultural organizations through consultation and referrals.

<http://www.uvm.edu/landlinkvt/>

The **National Fish and Wildlife Foundation** conserves healthy populations of fish, wildlife and plants, on land and in the sea, through partnerships, sustainable solutions, and better education. The Foundation meets these goals by awarding challenge grants to projects benefiting conservation education, habitat protection and restoration, and

natural resource management. Federal and private funds contributed to the Foundation are awarded as challenge grants to on-the-ground conservation projects. Challenge grants require that the funds awarded are matched with non-federal contributions, maximizing the total investment delivered to conservation projects. For every dollar that Congress provides, an average of \$3 in on-the-ground conservation takes place. The Foundation has made more than 4,400 grants, committing over \$165 million in federal funds, matched with non-federal dollars, delivering more than \$500 million for conservation.

<http://www.nfwf.org/programs.cfm>

The Nature Conservancy Conservation Easements: Land ownership carries with it a bundle of rights—the right to occupy, lease, sell, develop, construct buildings, farm, restrict access or harvest timber, among others. A landowner can give up one or more right for a purpose such as conservation while retaining ownership of the remainder. Private property subject to a conservation easement remains in private ownership. Many types of private land use, such as farming, can continue under the terms of a conservation easement, and owners can continue to live on the property. The agreement may require the landowner to take certain actions to protect land and water resources, such as fencing a stream to keep livestock out or harvesting trees in certain way; or to refrain from certain actions, such as developing or subdividing the land. Conservation easements do not mean properties are automatically opened up to public access unless so specified in an easement. The terms of a conservation easement are set jointly by landowner and the entity that will hold easement.

<http://www.nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeasements/>

Technical Assistance Programs through Northeast Organic Farming Association are free to farmers - made possible by grants from the Vermont Housing Conservation Board's Farm Viability Enhancement Program and Agency of Agriculture Food & Markets. *Vegetable and Fruit Technical Assistance* provides technical assistance to organic farmers in Vermont seeking production and financial assistance on small fruit and vegetable operations. *Dairy and Livestock Technical Assistance* provides Information, Services and Support for Vermont's Organic Dairy & Livestock Community.

<http://www.nofavt.org/nofa-programs.php>

Vermont Farm Viability Enhancement Program (FVP) provides farmers with business planning and technical assistance. Developed by the Vermont Housing & Conservation Board in collaboration with the Vermont Agency of Agriculture, Food and Markets, the FVP is designed to strengthen the economic position of Vermont agriculture and to complement existing programs in farmland conservation. The Program uses consultants to provide technical assistance tailored to a farmer's needs to fulfill specific business goals. Examples include consultations on keeping better production or financial records, financial analysis, meetings with crop or animal health specialist, new farm enterprise analysis, estate and farm transfer planning, labor management, and value-

added processing. The business planning process involves the farmer in assessment of farm operation's strengths and weaknesses and in exploration of possible management changes that could increase profitability. On-farm consultations result in preparation of written business plan.

<http://www.vhcb.org/viability.html>

APPENDIX B.2 - Effluent Limitations and Point Source Control Programs

1) Design/Engineering Program

Vermont municipalities need various wastewater treatment facility and conveyance system construction and improvement projects including: original treatment facility and collection line construction; enlargement and/or refurbishment of existing facilities; implementation of nutrient removal or sludge and septage treatment improvements at existing facilities; combined sewer overflow abatement; or collection line extensions. These projects enable the municipalities to meet the effluent limits in their NPDES permit in order to meet Vermont Water Quality Standards and comply with statute; provide for centralized treatment to replace problem individual on-site systems; and provide desired wastewater treatment capacity to enable municipal growth and development.

The municipalities desire to take advantage of the state and federal capital funds appropriated for municipal pollution control projects, administered by the DEC Wastewater Management Division. The WWMD assists grant and loan recipients in developing capital planning and financing plans; assists in defining project scopes to meet the technical, regulatory, and funding requirements; assures the design of appropriate facilities; oversees facility construction; and monitors the first year's operation.

Statutory Reference

State: Title 10 VSA Chapter 55 Aid to Municipalities for Water Supply, Pollution Abatement and Sewer Separation. Title 24 VSA Chapter 120 Special Environmental Revolving Fund. Federal: Clean Water Act Title VI - State Water Pollution Control Revolving Funds.

Contacts

Nopadon Sundarabhaya, P.E. - Design Section Supervisor, 241-3750.
Thomas Joslin, P.E. - Design Section, 241-3740
Eric Blatt, P.E. - Financial Management Section Supervisor, 241-3734.

2) Discharge Program (Discharging Facilities and Stormwater Management)

2.A. Permits:

A discharge permit is required whenever an individual, municipality or company wants to discharge waste directly to waters of the state. Some industries are also required to treat waste before sending it to a municipal wastewater treatment facility. This section issues discharge permits and pretreatment permits. The permitting process involves a system evaluation and design being prepared by a consultant.

2.B. Operations and Management (O&M):

This group performs oversight functions of municipally owned wastewater treatment facilities, and of privately owned treatment and pretreatment facilities, in addition to

providing certification and training programs, periodic discharge sampling for permit compliance checks, and laboratory evaluations. Assistance is also provided to operators and municipal officials in the proper operation, maintenance and budgeting of their wastewater facilities.

Statutory Reference
10 VSA Chapter 47

Waste Water Treatment Facilities

There are no wastewater treatment facilities that discharge into Basin 14 waters.

Combined Sewer Overflow (CSO) Elimination

During wet weather events, the combined volume of wastewater and stormwater runoff entering combined sewer systems often exceeds conveyance capacity. Most combined sewer systems are designed to discharge flows that exceed conveyance capacity directly to surface waters. Because CSOs contain untreated wastewater and stormwater, they can contribute microbial pathogens and other pollutants to waterways.

APPENDIX B.3 - Land Disposal (of Wastes) Program

1) Indirect Discharge Permits

DEC's Indirect Discharge Permit Section issues permits for land-based sewage treatment and disposal systems greater than 6,499 gallons per day, including septic tanks and leachfields and also treatment plants and spray disposal systems, all of which use soil as part of the waste treatment process. Following primary and/or secondary treatment, the soil provides final effluent renovation and polishing before it reaches groundwater and, eventually, surface water. This is in contrast to direct discharge systems, which may discharge through a pipe directly to surface waters.

Statutory Reference: 10 VSA, Chapter 47

2) Regional Office Permits

This section issues water supply and subsurface wastewater disposal permits required for all buildings other than single family homes and all permits for subdivisions, sewer line extensions, mobile home parks and campgrounds which have flows less than 6,500 gallons per day. If the subdivision involves 10 or more lots, Act 250 may take jurisdiction. Engineers in five regional offices examine applications and approve permits. The regional offices that cover the basin include the Springfield and Rutland.

Statutory Reference:

10 VSA Chapter 61

18 VSA Section 1218

APPENDIX B.4 - Construction Runoff Control Program

Sediment discharges to waterbodies is a critical stormwater issue. The Department, through the Vermont Geological Survey, developed a guidance document for erosion and sediment control related to construction activities (Vermont Handbook for Soil Erosion and Sediment Control on Construction Sites, Vermont Geological Survey, 1982, rev. 1987). This document is frequently used by developers and their consultants for project planning and responses to Criterion 4 of the Act 250.

General Permit for Stormwater Runoff from Construction Sites

The development of an erosion control plan helps to protect water quality by preventing the discharge of sediment from construction sites, minimizing the extent and duration of soil disturbance, maintaining existing drainage ways and vegetation, and protecting riparian buffer areas from disturbance.

Any construction project that disturbs one or more acres of soil, including any disturbance of less than one acre which is part of a larger common plan that will result in a total of one or more acres of disturbance.

A General Permit to permit discharge of stormwater from construction sites; requires the development and submittal of an erosion and sediment control plan.

At least 30 days prior to the commencement of construction activity.

Where:

An application can be obtained from:
Vermont Agency of Natural Resources
Department of Environmental Conservation
Division of Water Quality, Stormwater Section
103 South Main Street, Building 10 North
Waterbury, VT 05671-0408
Stormwater Hotline 241-4320

http://www.anr.state.vt.us/dec/waterq/stormwater/htm/sw_cgp.htm

APPENDIX B.5 - Solid Waste Management Program

The Solid Waste Management Program regulates the treatment, storage and disposal of solid waste, with the exception of the land management (diffuse disposal) of biosolids and septage, which is regulated by the Wastewater Management Division. In order to receive a certification, a facility must demonstrate that it complies with applicable siting, design, operation, closure and post closure requirements and standards included in the Vermont Solid Waste Management Rules. The Solid Waste Management Program also assists the Enforcement Division in illegal dumping/disposal cases.

The protection of water related resources are specifically addressed in the Vermont Solid Waste Management Rules (“SWMR”), Vermont Groundwater Protection Rule and Strategy, and Agency Procedures applicable to solid waste management facilities (with the exception of biosolids or septage diffuse disposal). These requirements are to be addressed in a solid waste facility application for certification and may be specifically addressed in the requirements of a certification issued by the Agency.

Solid Waste Disposal Facilities must be in compliance with the Vermont Ground Water Protection Rule and Strategy and the Vermont Water Quality Standards to receive certification -§6-303(d) of the SWMR, Vermont Groundwater Protection Rule and Strategy, 2/8/99 Procedure Addressing Requirements For Municipal Solid Waste Landfills To Demonstrate Compliance Of The Landfill Design With Water Quality Standards, and 2/8/99 Procedure For A Combined Solid Waste Certification and Indirect Discharge Permit.

- The SWMR identifies various types of water related resources as prohibited areas for the siting of solid waste management facilities - §6-309(c)(6), §6-502(a) and §6-1104(b)3(b)(3) of the SWMR.
- Facilities must meet performance standards in order to assure that siting of the facility will have the least possible reasonable impact on the environment, including groundwater, surface water or waters of the state. §6-503 of the SWMR and 9/12/95 Procedure Addressing the Numerical Criteria For The Distance To Drinking Water Sources From Discrete Disposal Facilities.
- Site characterization on which a facility is to be located must address groundwater and surface water - §6-603 of the SWMR.
- Facilities must be designed and operated to protect the environment, including ground water and surface water - §6-604(a)(4), §6-606(a)(3), §6-701, §6-1104(c)(2)(E) and §6-1203&1204 of the SWMR. Most landfills must be lined with leachate collection and off-site treatment and must control run-on and run-off - §6-606(b)(2) of the SWMR and 6/9/94 Procedure Addressing Requirements For Run On/Run Off Control System for Municipal Solid Waste Landfills.

- Facilities are to be monitored as deemed appropriate to detect the discharge of contaminants to groundwater and surface water. For landfills, monitoring continues through the operational life of the landfill and the post closure period (20 years for unlined landfills that closed since 1989, 30 years for lined landfills which operated since 1994) - §6-604(a)(4) and §6-606(a)(3) of the SWMR. 2/8/99 Procedure Addressing Ground Water Quality Monitoring and Ground Water. 2/8/99 Remedial Action at Municipal Solid Waste Landfills. Procedure Addressing Post-Closure Care and Post Closure Certification At Solid Waste Landfills.
- A response involving corrective action for ground water impacts by a solid waste landfill can be required - VT Groundwater Protection Rule and Strategy and 2/8/99 Procedure Addressing Corrective Action & Financial Responsibility For Corrective Action At Solid Waste Landfills.
- Any discharge that poses a threat to the environment must be reported within 24 hours to the DEC - §6-703(c) of the SWMR.
- Facilities must be closed in a manner that prevents discharges to surface water during and after closure -§6-1001 of the SWMR.

Statutory Reference

10 VSA Chapter 159 (Waste Management)

10 VSA Chapter 48 (Groundwater Protection).

APPENDIX B.6 - Residual Wastes Program

This program in the Wastewater Management Division oversees the management of the state's residuals, such as septage and wastewater sludge. Permits are required for treatment, storage, or disposal of these residuals and for the operation or construction of such facilities.

Statutory Reference: 10 VSA Chapter 159

There are several regulatory requirements for the land application of sludge (biosolids) and septage that assist in protecting surface waters and groundwater, such as required set backs and separation distances, maximum allowed slope of site, nutrient management for site, among others. In 1998, the Solid Waste Management Rules were revised to include, along with other items, the prohibition of land application of solid waste in the area of the 100-year floodway as another measure to assist in protecting surface water quality.

APPENDIX B.7 - Mine Runoff Control Program

Sand & Gravel Pits

Non-point source pollution is a concern associated with the operation, maintenance, and closure of sand and gravel pits in Vermont. Surface runoff and erosion contribute to the sedimentation of waterbodies adjacent to sand and gravel pits. Vegetative cover can reduce erosion and sedimentation problems, enhancing aesthetic values, and improve nesting and cover areas for wildlife. Practices for the control of erosion can be found in: USDA Natural Resources Conservation Service Technical References:

A. Vegetating Vermont Sand and Gravel Pits- VT Technical Guide, Conservation Planning Application Technical Reference #10

B. Critical Area Planting-Conservation Practice Standards code 342: Technical Guide Chapter IV (www.vt.nrcs.usda.gov/standards/342vt.html)

Also refer to Hazardous Waste Management Program.

APPENDIX B.8 - Hazardous Waste Management Program

1) Hazardous Waste

The Hazardous Waste Management Program within DEC establishes the regulatory framework for all hazardous waste generated in Vermont and provides a "cradle-to-grave" tracking system for these wastes. The program establishes the standards for proper management of hazardous waste while also addressing the environmental and human health problems that arise from the mismanagement of hazardous waste.

Improper management of hazardous waste can pollute vast areas of land, rivers, streams and lakes, and can lead to unacceptable human exposure to these materials. The program is a prevention program -- when it is successful, these impacts occur less frequently and with less severity.

Statutory Reference

Title 10 VSA Chapter 159, the Waste Management Act.

Specific sections include 10 VSA 6601, 6602, 6604, 6605f, 6606, 6606a, 6606b, 6607, 6607a, 6608, 6608a, 6608b, 6609, 6610a, 6612, 6615, 6616, 6617, 6618.

2) Underground Storage Tanks

All Vermonters depend on clean water. Leaking underground storage tanks (USTs) pose a substantial threat to both human health and the environment, because substances leaked from these tanks are one of the most significant contaminants polluting ground and surface water supplies. In densely developed areas, releases from underground tanks pose an additional risk, since gasoline vapors can accumulate in basements and crawl spaces, posing health hazards as well as fire dangers.

The goal of the UST Program within DEC is to protect human health and the environment by eliminating releases of hazardous materials from underground storage tanks, and fostering proper management of underground tanks in Vermont. By regulating the installation, operation, and closure of USTs, the Underground Storage Program protects the state's water resources and prevents vapor impacts to buildings.

Statutory Reference

10 VSA Chapters 59 and 159

APPENDIX B.9 - Flow Regulations and Dams

1) Dam Safety Program

The Dam Safety Section administers the State Dam Safety program, and periodically inspects the 85 state-owned dams found throughout Vermont for their repair/improvement needs. The section operates a permit program for construction and alteration of non-hydroelectric dams (the Public Service Board regulates hydroelectric dams) to serve the public good and provide adequately for the public safety. A permit is required to alter any dam, pond or impoundment not related to generation of electric energy for public use or part of a public utility system which is or will be capable of impounding more than 500,000 cubic feet of water or other liquid, as measured to the top of the dam. Submittal of a completed application form, fee, plans and specifications and design data is required. A public information meeting may be required. The section inspects privately owned dams on a resources-available basis, maintains an inventory of dams, and provides technical assistance to dam owners.

Statutory Reference

Permit program: 10 VSA Chapter 43 (Dams).

2) Hydrology Program

This program within DEC reviews all projects that may alter the natural flow of rivers and streams, such as hydroelectric projects and all manner of water withdrawals. These reviews may take place under a number of regulatory programs, including Act 250, Agency dam orders and stream alteration permits, and projects subject to federal licenses or permits (under Section 401 of the Clean Water Act). In addition, the Hydrology program evaluates projects subject to Act 250 for riparian protection provisions, erosion control measures, and general consistency with Vermont Water Quality Standards.

Statutory References

10 V.S.A. Chapter 41 (Regulation of Stream Flow)

10 V.S.A. Chapter 43 (Dams)

10 V.S.A. Chapter 151 (Act 250)

Section 401 of the Federal Clean Water Act (33 U.S.C. §1341)

APPENDIX B.10 - Wetlands, Dredge, and Fill Material Control Programs

1) Vermont Wetlands Protection

The overall goal of the program is to achieve no net loss of wetland functions and values. The program consists of three components: a regulatory component, a scientific component, and an education/outreach component. The regulatory aspects of the program include administering the Vermont Wetland Rules, making determinations of Water Quality Certification under the Clean Water Act and the Vermont Water Quality Standards, providing project review in Act 250 land use permitting, and assisting in compliance and enforcement. Inventories and scientific investigations are carried out as special grant projects and include both the Division biomonitoring section and biologists in the Fish and Wildlife Department, Nongame and Natural Heritage program. Education and outreach is provided through technical assistance and presentations to towns, stakeholder groups, conservation commissions, schools, and other Agency programs.

Statutory references:

Sections 404 and 401 of the Clean Water Act
Section 104(b) 3 of the Clean Water Act
Act 250
Title 10 VSA Chapter 37, Sec. 905 (7-9).

2) Federal Wetlands Protection

A U.S. Army Corps of Engineers permit is required for all work beyond ordinary highwater in or above navigable waters of the United States under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403). In New England, for the purpose of Section 10, navigable waters of the United States are those subject to the ebb and flow of the tide and a few major waterways used to transport interstate or foreign commerce. Permits are required under Section 404 of the Clean Water Act for those activities involving the discharge of dredged or fill material in all waters of the United States, including not only navigable waters of the United States but also inland rivers, lakes, streams and wetlands. In inland waters, Corps jurisdiction extends landward to the ordinary high water mark or the landward limit of any wetlands. The term "discharge" in this context may include the re-depositing of wetlands soils such as occurs during mechanized land clearing activities, including grubbing, grading and excavation.

The term "wetlands," used above, is defined by Federal regulations to mean "...those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions..." (33 C.F.R. Part 328.3 (b), as published in the November 13, 1986 Federal Register). Wetlands generally include swamps, marshes, bogs and similar areas. The term "fill material," used above, is defined by Federal regulations to mean "...any material used for the primary purpose of replacing an aquatic area with dry land or of changing the bottom elevation of a waterbody. The term does not include any pollutant discharged into the

water primarily to dispose of waste..." (33 C.F.R. Part 323.2 (b), as published in the November 13, 1986 Federal Register).

APPENDIX B.11 - Groundwater Pollution Control Programs

1) Groundwater Protection

The Groundwater Protection Rule and Strategy is the groundwater management and protection strategy for the State of Vermont. The Rule outlines the principles, directives and goals relating to groundwater protection. The Rule also contains groundwater quality enforcement standards and outlines the four classes of groundwater. The Groundwater Coordinating Committee, an interagency committee, oversees the groundwater reclassification efforts and provides a forum for interagency coordination on groundwater issues. The DEC Water Supply Division provides administrative and technical support to the Committee. The program reviews weekly Act 250 applications for potential water supply and groundwater impacts. The Water Supply Division also serves as a clearinghouse on groundwater protection information. Through their regulatory and outreach programs, other divisions also protect groundwater and provide information on groundwater protection issues.

Statutory Reference

10 VSA Chapter 48

2) Underground Injection Control

This program within DEC regulates all non-sanitary sewage discharges to the groundwater. It is a federally delegated program. If the discharge receives a permit from another DEC program, the UIC permit is not required.

Statutory Reference

10 VSA Chapter 47

Section 1422 of the Federal Safe Drinking Water Act.

3) Public Water Supply (program also influences surface water)

The DEC Water Supply Division is responsible for the regulation of all public water systems in the state of Vermont. A public water system has fifteen connections or serves an average of twenty-five people at least sixty days a year. Examples of public water systems include municipalities, mobile home parks, schools, restaurants, motels. The major program functions involve permitting construction and operation, approving new sources of drinking water, review of monitoring data, technical and financial assistance, enforcement, source water protection, operator certification, enforcement, and inspections.

Statutory Reference

Federal Safe Drinking Water Act Amendments of 1996

10 VSA Chapter 56 Public Water Supply

10 VSA Chapter 55 Aid to Municipalities for Water Supply, Pollution Abatement, and Sewer Separation

24 VSA Chapter 120 Special Environmental Revolving Fund.

4) Well Driller Program

Any person who intends to engage in the business of drilling wells must obtain a license to do so. This includes both water well drillers and monitoring well drillers. Licensing is intended to protect public health and prevent degradation of groundwater quality through competent drillers appropriately applying industry standard well construction and abandonment procedures in their work. A license may be renewed if appropriate continuing education is demonstrated on a three-year basis.

Statutory Reference

10 VSA Chapter 48

APPENDIX B.12 - Fisheries Protection Regulations

Statutory references

Title 10 and Chapters 101 through 123

This is where all the laws relating directly to fish and wildlife conservation are found. It also gives the authority to the Fish and Wildlife Board to set seasons, creel limits and size limits. Most of the laws pertaining to fish are found in Chapter 111 and primarily deal with the "taking of fish." One of these laws, section 4605 (placing fish in waters) allows for the control of introductions of exotic or competing fish species as well as diseases. Section 4607 (obstructing streams) prohibits the installation of a structure that prevents fish movement, such as a rack, weir or other obstruction, unless an approval has been granted by the Commissioner of Fish and Wildlife. This statute generally is applied to small streams with a drainage area less than 10 square miles; on larger streams Title 10, Chapters 41 or 43 is applied.

Title 10, Chapter 43 Dams

A certificate of public good is required before constructing any dam impounding more than 500,000 cu. ft. This law is administered by the Department of Environmental Conservation excepting projects involving the generation of hydroelectric energy. The Public Service Board assumes jurisdiction in those cases. Regarding public hydroelectric and flood control projects, the final authority lies with the Federal Energy Regulatory Commission.

Section 1084 requires the Fish and Wildlife Department to investigate the effect of any proposed project on fish and wildlife resources and to certify its findings to the Department of Environmental Conservation or the Public Service Board, prior to any hearing.

Section 1086 enumerates the several issue areas that must be explored before a determination of public good is made. Specifically included are recreational values; fish and wildlife; existing uses such as fishing; and the need for minimum stream flows.

Title 10, Chapter 47 Vermont Water Pollution Control Act

This law administered by the Agency of Natural Resources under auspices of the Federal Water Pollution Control Act (PL 92-500). Within the Water Pollution Control Act are sections 1252 and 1258 which, respectively, set up a classification system for state waters and authorize the Agency to manage waters to attain or maintain their classification, including the regulation of discharges to state waters. Under Section 1252, Water Quality Standards are promulgated by the Water Resources Board to establish numeric and narrative standards for the management of waters. The Standards also designate all waters as to their fish habitat type - either cold water or warm water. The Standards have the force of law and set up an important framework for management of physical water

quality, such as dissolved oxygen, temperature, turbidity, and toxics and for protection of other important habitat and life-stage considerations, such as nutrient control, substrate integrity, and propagation. The authority to regulate stormwater discharges is included in Section 1264. Section 1263(a) regulates activities pertaining to control of aquatic nuisances (Aquatic Nuisance Control).

Title 10, Chapter 41 Regulation of Stream Flow; Subchapter 1, Section 1003

This section of the statute dealing with the regulation of stream flow empowers the Department of Environmental Conservation to call to conference any dam owner that regulates natural stream flow and to require the passage of adequate flows to support the stream fishery.

Title 10, Chapter 41 Regulation of Stream Flow; Subchapter 1, Section 1004

Section 1004 makes the Secretary the state agent with respect to the Federal Energy Regulatory Commission (FERC) dam licensing process and with respect to the Federal Clean Water Act Section 401 administration. Under Section 401, federal agencies cannot issue licenses or permits for activities that may affect water quality until such activities have been certified as meeting state water quality standards. This Section 401 process has proved to be a powerful tool in the review of projects subject to FERC and Corps of Engineers jurisdiction.

Title 10, Chapter 41 Regulation of Stream Flow; Subchapter 2 Alteration of Streams

A person may not change the cross-section of a stream or modify or alter it in any way by moving more than 10 cu. yd. of material without a permit from the Department of Environmental Conservation. This subchapter does not apply to dams subject to Chapter 43 or highways and bridges subject to section 5 of Title 19. Exemptions include personal use of 50 cu. yd. of gravel/year by riparian landowners (this gravel exemption also includes streams having drainage area of less than 10 mi²) and accepted agricultural and silvicultural practices. A permit will be granted if, among other criteria, it appears the project will not significantly damage fish life. There are also special provisions for protecting outstanding resource waters.

Title 10, Chapter 151 Vermont's Land Use and Development Law (Act 250)

This law provides for broad protection of streams, shorelines, and water quality through criteria related to erosion control, effect on public investments, necessary wildlife habitat, and retention of the natural condition of streams and shorelines. Protection of fisheries resources has been primarily protecting stream habitat by imposing buffer strips, minimum stream flows, and stream crossings which provide unrestricted fish passage. The development must meet all the criteria of the Act (6086(a)1-10), but District Commissions have considerable latitude in the decision since the criteria are loosely worded (e.g. "undue water pollution").

Title 29, Chapter 11 Management of Lakes and Ponds

This statute addresses encroachment onto lands lying under public waters such as from docks, marinas, boathouses, etc. Exceptions include water pipes <2 inches (inside diameter), buoys and duck blinds, docks of certain size, rafts, etc. Criteria for granting or denying a project include determination of public good (Section 405), which addresses impacts on fish habitat and recreation. In 1989, interim procedures for issuance or denial of encroachment included whether or not the project meets the requirements of the public trust doctrine. In a recent case the Vermont Superior Court ruled that the Department of Environmental Conservation overstepped its authority by including the public trust doctrine criteria in its interim procedures for permit denial. The interim procedures also addressed the potential cumulative effect of encroachment. In 1984, the Water Resources Board overturned the Department's denial of a permit by concluding "... the consideration of the potential cumulative effect of possible future encroachments is neither contemplated nor authorized by 29 V.S.A. 405(6)." (LaFleur Appeal).

Although there are a number of other state laws that indirectly protect fisheries resources, such as T24 Floodplain Development and T10 Chapter 159 Solid Waste Disposal, the above are most applicable.

In addition to fisheries considerations addressed in the Federal Energy Regulatory Commission's rules, there are several other Federal regulations that can afford resource protection. Two of the most notable are:

1. Section 404 of the Federal Water Pollution Control Act amendments of 1972 give the U.S. Army Corps of Engineers the authority to regulate discharges of dredged or fill material into all waters of the U.S. including wetlands.
2. Section 10 of the Rivers and Harbors Act requires a Corps of Engineers permit for construction of any structure in or over any navigable water of the U.S. This includes dredging or disposal of dredged material, excavation, channelization or other modification. Projects can range in size from small docks to large breakwaters.

APPENDIX B.13 - Other Important Programs

(Monitoring & Assessment, Geologic Surveys, Pollution Prevention, etc)

1) Surface Water Monitoring & Assessment

The overall goal of the environmental monitoring and assessment program is to ensure that good science is used to develop an understanding of the attributes of, and the forces which affect, the physical, chemical, and biological characteristics of Vermont's aquatic ecosystems, and ensure that this information is available to be used as the basis for making, and evaluating the consequences of, environmental management decisions made or influenced by DEC. The specific objectives of this program include the following:

- Determine the present and future health of aquatic ecosystems in Vermont;
- Establish empirical limits of natural variation in aquatic ecosystems in Vermont;
- Diagnose abnormal conditions to identify issues in time to develop effective mitigation;
- Identify potential agents of abnormal change;
- Assess ecological changes resulting from the implementation of environmental management activities; and
- Identify risks to human health associated with the use of aquatic resources.

In order to accomplish these objectives, this program conducts activities to monitor and assess the chemical, physical, and biological components of aquatic ecosystems. Findings relate to both ecological and human health. Activities are conducted both in response to identified issues, activities, and potential problems; and in the framework of long-term environmental status and trends monitoring.

Statutory Reference

10 V.S.A. Chapter 47
Federal Clean Water Act

2) Geologic Surveys & Information

The Geology program conducts surveys and research related to Vermont geology, topography, and mineral resources; provides information to the public, government, industry, and other institutions which request assistance; and maintains and publishes Vermont geological information. Geologic research can illuminate the nature of ground water and the interaction of ground and surface waters that maintains stream discharge and temperature during low flow periods. Erosion studies that focus on slope stability and the sources of sediment released to rivers have direct bearing on water quality.

Statutory references

3 VSA, Chapter 53, Section 2879
10 VSA, Chapter 7, Sections 101-105

HAZUS-MH (stands for FEMA's Mitigation Division powerful risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes)

will be used to not only to predict the potential damage from earthquake events but from flood events and the effects of riverine erosion.

3) Pollution Prevention Program

The focus of this program within DEC is to help businesses research and identify opportunities to reduce the amount of waste generated and the amount and toxicity of chemicals used in their operations. Technical assistance may be provided on-site at the facility's request. The program is also responsible for administering Vermont's Pollution Prevention Planning Requirement affecting over 100 businesses that generate hazardous waste and/or use certain listed toxic chemicals. The Program is located in the Environmental Assistance Division and shares a toll-free number with the Small Business Compliance Assistance Program that businesses and others can use to get answers to their environmental questions.

Statutory reference:

10 V.S.A. Chapter 159 Subchapter 2. Sections 6623-6632.

4) Section 319 Nonpoint Source Management

Water pollution control in Vermont, as well as in other states across the nation, has tended to focus on the larger, more obvious discharges referred to as point sources of pollution. Recently, much greater attention has been directed at the more diffuse, harder to quantify, more difficult to control pollution sources known as nonpoint sources of pollution. Pollution from nonpoint sources (NPS) is the major source of water use impairment to Vermont surface and ground water resources. NPS pollution is apparent in each of Vermont's seventeen river basins. The types and extent of water quality problems associated with these sources of pollution, however, exhibit a considerable degree of variation between and within basins. To a large extent, NPS pollution control and NPS pollution prevention centers about the watershed approach, land use and land management.

NPS implementation through Section 319 has been available to Vermont since federal fiscal year 1990, the first year funding was appropriated. Over twelve years of annual funding (FFY1990-2001), Vermont has been awarded about \$11 million, which has assisted over 100 NPS projects. Projects have been completed or are underway by a variety of interests including several towns, watershed associations and state departments, the University of Vermont and many Natural Resources Conservation Districts. The Vermont NPS Program is involved in the following areas of concentration:

- coordination, oversight and administration of Section 319;
- influence the direction and level of NPS planning and implementation arising from other programs or funding sources (e.g. US Department of Agriculture, Lake Champlain Basin Program, Connecticut River Joint Commissions);
- assist Vermont Agency of Agriculture, Food & Markets with new agricultural NPS responsibilities (as per Act 261 of 1992);
- distribution of Clean Water Act Section 604(b) pass-through planning funds to the 12 Vermont regional planning commissions; and,

- advocate the widespread adoption of certain land management practices (especially erosion/sediment control, phosphorus management and vegetated buffer strips).

Statutory reference:

Title 10 VSA, Chapter 47, the Vermont Water Pollution Control Law
Section 319, 1987 Amendments, Federal Water Pollution Control Act (also known as Clean Water Act)

5) River Corridor Management Program

The River Corridor Management Program provides regulatory review and technical assistance to landowners, municipalities, non-governmental organizations and other agencies to help determine the appropriate stream channel and flood plain management practices necessary to resolve and avoid conflicts with river systems. The practices selected will be designed to recognize and accommodate, to the extent feasible, the stream's natural stable tendencies. The recommended conflict resolution will recognize the stream's long-term physical response to past and proposed management practices. The resulting work will provide increased property and infrastructure protection and will maintain or enhance the ecological functions and economic values of the river system. A number of geomorphic assessments of rivers in basin 14 are underway.

Statutory Reference

10 VSA Chapter 41
10 V.S.A., Chapter 32
Section 401 of the Clean Water Act

Contact

For stream alteration regulatory and technical assistance and flood damage issues:
Fred Nicholson at 802-786-5906.

For flood plain technical assistance:

Floodplains Management Engineer
Water Quality Division
10 North, 103 South Main St.
Waterbury, VT 05676
802-241-3759

For stream stability assessment technical assistance:

Mike Kline, River Restoration Ecologist
Water Quality Division
10 North, 103 South Main St.
Waterbury, VT 05676
802-241-3774
mike.kline@anr.state.vt.us

6) Act 250

Act 250 provides a public, quasi-judicial process for reviewing and managing the environmental, social and fiscal consequences of major subdivisions and development in Vermont through the issuance of land use permits. Activities include review of land use permit applications for conformance with the Act's ten environmental criteria, issuance of opinions concerning the applicability of Act 250 to developments and subdivisions, monitoring for compliance with the Act and with land use permit conditions, and public education.

In an Act 250 application, applicants need to supply sufficient information for the District Commission to make findings on the ten environmental criteria. In so doing, certifications and/or approvals from other agencies and departments, utilities, regional planning commissions and local government may be necessary.

With regard to water pollution, Criterion 1 states that the project will not result in undue water or air pollution. This criterion deals with water and air pollution potential generally and such specific matters relating to water pollution as: (A) Headwaters; (B) Waste disposal; (C) Water Conservation; (D) Floodways; (E) Streams; (F) Shorelines; and (G) Wetlands.

7) Total Maximum Daily Load Program- (Vermont's Wasteload Allocation Process and Federal Requirements for TMDLs)

The primary goal of the Total Maximum Daily Load (TMDL) program is to develop solutions to restore those waters which do not meet Vermont Water Quality Standards and will not meet those standards even after all minimum required Best Practicable Treatment (BPT) alternatives are applied. In order to fulfill the requirements of the Clean Water Act, the program works in three phases and is dependent on several other programs within the Agency of Natural Resources to fulfill its goal. First, water quality monitoring data is gathered and analyzed to identify the condition of the State's waters. Those waterbodies that show a clear and documented violation of the Water Quality Standards substantiated by data collected through chemical, biological or physical monitoring are placed on the State's List of Impaired Surface Waters. The second phase is to develop TMDL plans for those waters that are Water Quality Limited Segments, defined as waters that will not achieve water quality standards even after BPTs are applied to all discharges. These plans essentially are a budget for the pollutant causing the impairment. Following investigations, all pollutant sources are identified that contribute to the impairment and each receives an allocation as to how much it can contribute to the total pollutant load. This is usually accomplished by determining from what sources reductions are necessary. The TMDL plans are structured in accordance with Clean Water Act regulations and EPA guidance. These plans involve public participation and ultimately need approval from EPA to verify their satisfaction of Clean Water Act requirements. The third phase is to implement the TMDL plan and conduct water quality monitoring in order to evaluate the effectiveness of implementation and document achievement of Water Quality Standards.

Statutory reference

Section 303(d) of the Clean Water Act
40 CFR §130.7

8) Current Use Program

Vermont's Agricultural and Managed Forest Land Use Value Program -- better known as the Current Use Program -- was created in the late 1970's as a companion to legislation that required towns to list property at 100 percent of fair market value. Because of escalating land values, it was clear that property taxes based on fair market value were placing a heavy property tax burden on owners of productive farm and forest lands.

The Current Use Program offers landowners use value property taxation based on the productive value of land rather than based on the traditional "highest and best" use of the land. In 2000, the current use value of the land in the program averaged about 20 percent of the full fair market value ([Vermont Department of Taxes](#), 2001).

The Current Use Program includes a Land Use Change Tax as a disincentive to develop land. The tax is 20 percent of the fair market value of a property, or, in the case of the sale of part of a property, a pro rata share of the fair market value of the entire property. The program is administered by the Vermont Department of Taxes.

Statutory reference

32 VSA §3757(a)
Land Use Change Tax Rate

9) Acceptable Management Practices

Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont (AMP's), were developed and adopted as rules to Vermont's water quality statutes and became effective August 15, 1987. The AMP's are intended and designed to prevent any mud, petroleum products and woody debris (logging slash) from entering the waters of the state. They are scientifically proven methods for loggers and landowners to follow for maintaining water quality and minimizing erosion.

Since adoption of the AMP's, the Department of Forests, Parks & Recreation has provided training, demonstrations and one-on-one consultation with logging contractors, landowners and foresters in an effort to reduce the number and severity of discharges resulting from logging operations. The Agency of Natural Resources' Enforcement Division conducts any necessary enforcement actions.

Since 1989 a reporting system has been in place to document the circumstances and outcomes of field inspections, and these activities are summarized in an annual report.

Statutory reference

Title 10 V.S.A. Chapter 47
Water Pollution Control