Otter Creek Basin Plan Appendices

Contents

Appendix A. Acronym List

Acronyms

319	Federal section 319 grants for NPS pollution abatement
604b	Federal section 604b pass through funds for regional planning commissions
AAFM	Vermont Agency of Agriculture Food and Markets
AAP	Acceptable Agricultural Practices
ACRWC	Addison County River Watch Collaborative
ALS	Aquatic Life Support
AMP	Acceptable Management Practices
ANR	Vermont Agency of Natural Resources
ANS	Aquatic Nuisance Species Program
BASS	Biological Assessment Studies Section
BMP	Best Management Practices
CC	Conservation Commission
C&C	Clean and Clean watershed planning funds
CLG	Certified Local Government Grants
CREP	Conservation Reserve Enhancement Program
DEC	Vermont Department of Environmental Conservation
DEC-AIS	Department of Environmental Conservation
AIS	Aquatic Invasive Species Program
DFPR	Vermont Department of Forest Parks and Recreation
DFW	Vermont Department of Fish and Wildlife
DHCA	Vermont Department of Housing and Community Affairs
DOH	Vermont Department of Health
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FEH	Fluvial Erosion Hazard
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
HMGP	Hazard Mitigation Grant Program
LaRosa	LaRosa Analytical Partnership Program
LEAP	Logger Education to Advance Professionalism
LID	Low Impact Development
LMP	Lay Monitoring Program
MALT	Middlebury Area Land Trust
MEG	Municipal Education Grants
MPG	Municipal Planning Grants
NFIP	National Flood Insurance Program
NHRAA	New Haven River Anglers Association
NMPIG	Nutrient Management Incentive Grant Program
NPS	Nonpoint Source Pollution
NRCS	Natural Resource Conservation Service
ONRCD	Otter Creek Natural Resource Conservation District
ORW	Outstanding Resource Water
PFW	Partners for Fish and Wildlife Program
RCG	River Corridor Grant

RM	River Mileage
RMP	River Management Program (Agency of Natural Resources)
RNRCD	Rutland Natural Resource Conservation District
RPC	Regional Planning Commission
SARE	Sustainable Agriculture Research & Education grant program
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
UOCWC	Upper Otter Creek Watershed Council
USGS	United States Geological Survey
US F&W	United States Fish and Wildlife Service
UVM Ext	University of Vermont Extension
VFF	Vermont Family Forests
VHCB	Vermont Housing and Conservation Board
VHCB	Vermont Housing and Conservation Board
VIP	Vermont Invasive Patrollers
VLCT	Vermont League of Cities and Towns
VTrans	Vermont Agency of Transportation
VRC	Vermont River Conservancy
VWQS	Vermont Water Quality Standards
VYCC	Vermont Youth Conservation Corps
WHIP	Wildlife Habitat Enhancement Program
WMA	Wildlife Management Area

Appendix B. Wastewater Treatment Facilities in the Otter Creek Basin

Discharges from wastewater treatment facilities (WWTF) compose the majority of Vermont's "steady-state" point source pollution[1]. In 1970's nearly half of the total load of phosphorus to Lake Champlain came from wastewater discharges; however, since 1990, significant funding for facility upgrades has yielded dramatic reductions in phosphorus and other pollutant loads. However, flows from WWTF in the Otter Creek basin are still significant: the 10 WWTF are designed and permitted to discharge no more than 12.79 million gallons per day (MGD) to the river, which would represent 12.1% of total flow at the lowest river flows (7Q10) as discharged to Lake Champlain. This is rarely realized, however, as these facilities operate well below design capacity, and by definition, flows only attain 7Q10 one week in ten years. Further, as a result of facility upgrades in the Otter Creek basin, wastewater discharges now contributed only 2.7% of the total load from Vermont during the most recent time interval of 2007-2008[2]. The goal of current permitting requirements and ongoing data collection is to ensure that the pollutant loads from discharges continue to be managed such that receiving waters remain high-quality, and meet Vermont water quality standards.

Regulation

The Agency of Natural Resources administers the National Discharge Pollutant Elimination System (NPDES) permit program for discharges from WWTF to state waters. In addition, the agency implements the Vermont Toxic Discharge Control Strategy (TDCS) to quantify all NPDES discharges in Vermont and to establish water quality criteria and discharge permit limits that can be used to regulate discharges in a manner that will assure that Vermont water quality standards and receiving water classification criteria are maintained.

Data collection

To establish permit criteria that will meet Vermont water quality standards (WQS), the agency conducts monitoring and assessment of all the facilities' discharging to wadeable streams, as well as all major Lake Champlain tributaries. In addition, all permittees are required to monitor regularly several core chemical constituents under their permits. Current data indicates that the facilities achieve a high quality of effluent that complies with WQS. Where data indicates problems exist, the Agency assist towns in identifying WWTF needs and obtaining loans or grants from the Clean Water State Revolving Funds to upgrade municipal wastewater systems to reduce pollutant loads.

The 2002 Lake Champlain Phosphorus TMDL

A Lake Champlain Phosphorus Total Maximum Daily Load (TMDL) for phosphorus was approved in 2002, which established phosphorus wasteload limits for each WWTF in the Basin. Current permit criteria for effluent limitations are based on the TMDL; however, in 2011, EPA remanded the TMDL as a result of legal challenge. New wasteload capacities may be prescribed when EPA issues a new TMDL. At the time the TMDL was remanded, all facilities were operating well below their wasteload allocations.

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[1] Point-source discharges of stormwater are considered by the Department to be "precipitation-driven," and subject to different management considerations. See the Vermont Surface Water Management Strategy for more information.

[2] LCBP Technical report 57: Lake Champlain Phosphorus Concentrations and Loading Rates, 1990-2008. Fall 2009. Eric Smeltzer, VDEC; Fred Dunlap, NYDEC; Marc Simoneau, Ministère du Développement durable, de l'Environnement et des Parcs
For Lake Champlain Basin Program

Table B-1. Otter Creek Basin Wastewater Treatment Facilities

WWTF location	Type of Treatment	Design Flow MGD	Current Flow (2010) MGD	Permit expiration date	Remaining CSO outfalls which do not comply with the Vermont CSO Control Policy	Receiving Water
Brandon	Activated sludge, extended aeration	0.70	0.40	12/31/11	0	Neshobe River
Middlebury	SBR w/chem. precipitation	2.2	0.997	9/30/13	4	Otter Creek
Otter Valley High School	Aerated lagoons/ clarifier	0.025	0.015	6/30/12	0	Unnamed trib to Otter Creek
Pittsford	Activated sludge	0.085	0.065	3/31/11	0	Furnace Brook
Proctor	Aerated lagoon	0.325	0.232	12/31/11	0	Otter Creek
Rutland City	Activated sludge, extended aeration	8.1	4.94	6/30/08	3	Otter Creek
Shoreham	Recirc. sandfilter	0.035	0.009	12/31/09	0	Cedar Swamp
Vergennes	Aerated lagoon	0.750	0.363	12/31/09	2	Otter Creek
Wallingford	Extended aeration	0.120	0.063	9/30/11	0	Otter Creek
West Rutland	SBR	0.45	0.187	12/31/11	0	Clarendon River

Facility-specific information

Middlebury – The discharge permit requires that the Town submit a CSO effectiveness study due September 30, 2011 on the remaining CSOs.

Rutland – The City submitted an effectiveness study in late 2010. The remaining CSOs do not comply with the Agency's CSO Control Strategy thus additional work is needed. The Agency will be drafting a 1272 Order.

Vergennes – The City submitted an effectiveness study in Summer 2010 and is in the process of completing additional work to eliminate the overflows such that they will comply with the Agency's Strategy.

Appendix C. Town Plan and Zoning Regulations Overview (towns in the Otter Creek Basin)

Town	Regional Planning Commission	Lake protection goals in the town plan	Stream protection goals in the town plan	Wetland protection goals in the town plan	Year of the town plant that was reviewed	Lake protection standards in the regulations	Stream protection standards in the zoning regulations	Wetland protection standards in the zoning regulations	Year of the zoning regulations reviewed	Protectiveness of Zor
ADDISON	ADD	YES	NO	NO	1996	YES	YES-	YES	2010	Full Protection
BENSON	RUT	YES	YES	YES	2004	YES-	NO+	NO	2010	Some Protection
BRANDON	RUT	YES	YES	YES	2002	NO	YES-	YES-	2006	Some Protection
BRIDPORT	ADD	YES	YES	YES	1999	NO+	NO+	NO	2006	Additional Protection N
BRISTOL	ADD	NO	NO	NO	1994	NO+	NO+	NO	2006	Additional Protection N
CASTLETON	RUT	YES	YES	YES	2007	NO	NO+	NO	2008	Additional Protection N
CHITTENDEN	RUT	NO	NO	NO	2003	-	-	-	0	No Zoning
CLARENDON	RUT	NA	YES	YES	2000	NA	NO	NO	2003	Additional Protection N
CORNWALL	ADD	NA	YES	YES	2005	NA	NO	NO+	1999	Additional Protection N
DANBY	RUT	YES	YES	YES	2007	-	-	-	0	No Zoning
FAIR HAVEN	RUT	YES-	YES-	NO	1998	NO+	NO	NO	1998	Additional Protection N
FERRISBURG	ADD	NO	NO	NO	2000	YES-	NO	NO	2001	Some Protection
GOSHEN	ADD	NA	YES-	YES	2000	NO	NO	NO	1986	Additional Protection N
HUBBARDTON	RUT	YES	YES	YES-	2001	YES-	YES-	NO+	2003	Some Protection
IRA	RUT	NA	YES	YES	2003	-	-	-	0	No Zoning
KILLINGTON	RUT	YES-	YES-	YES-	2005	YES	NO	NO	2006	Some Protection
LEICESTER	ADD	NO	NO	NO	2003	YES-	NO	NO	2005	Some Protection
LINCOLN	ADD	NA	YES	YES-	2002	NA	YES-	NO	2006	Some Protection
MENDON	RUT	NA	NO+	YES-	2005	NA	YES	YES-	2000	Full Protection
MIDDLEBURY	ADD	NO	YES	YES	1999	NO	YES-	NO	1995	Some Protection
MIDDLETOWN SPRINGS	RUT	NA	YES	YES	2002	-	-	-	0	No Zoning
MONKTON	ADD	NO	NO	NO	1983	NO	NO	YES	1986	Additional Protection N
MOUNT HOLLY	RUT	YES-	YES-	YES-	2005	NO	NO+	NO	2005	Additional Protection N

Town	Regional Planning Commission	Lake protection goals in the town plan	Stream protection goals in the town plan	Wetland protection goals in the town plan	Year of the town plant that was reviewed	Lake protection standards in the regulations	Stream protection standards in the zoning regulations	Wetland protection standards in the zoning regulations	Year of the zoning regulations reviewed	Protectiveness of Zor
MOUNT TABOR	RUT	-	-	-	0	-	-	-	0	No Zoning
NEW HAVEN	ADD	NA	YES	YES	2006	NA	NO	NO	2006	Additional Protection N
ORWELL	ADD	YES-	YES-	YES-	2001	YES-	NO+	NO+	2007	Some Protection
PANTON	ADD	YES	YES-	NO+	2005	NO	NO	NO	2001	Additional Protection N
PAWLET	RUT	NA	NO	NO	2005	NA	NO+	NO	2002	Additional Protection N
PITTSFORD	RUT	NO	YES-	YES-	2000	NO	NO	YES-	2005	Additional Protection N
POULTNEY	RUT	YES	YES	YES	2005	YES-	YES-	NO+	2007	Some Protection
PROCTOR	RUT	YES	YES	NO+	2002	NO	NO	NO	2004	Additional Protection N
RIPTON	ADD	NO	YES-	YES-	1998	NO	NO	NO	2005	Additional Protection N
RUTLAND CITY	RUT	NA	YES-	YES-	2002	NA	NO+	NO	2004	Additional Protection N
RUTLAND TOWN	RUT	YES	YES	YES	1999	-	-	-	0	No Zoning
SALISBURY	ADD	NO	NO	NO	1999	NO+	YES-	YES-	2009	Some Protection
SHOREHAM	ADD	YES-	YES-	NO+	2003	NO	NO+	NO	1999	Additional Protection N
SHREWSBURY	RUT	YES	YES	YES	1998	YES-	YES-	YES-	2009	Full Protection
STARKSBORO	ADD	YES	YES	YES	1994	YES	YES	YES	1993	Full Protection
SUDBURY	RUT	YES	YES	YES	2003	YES	YES	YES	1997	Full Protection
TINMOUTH	RUT	YES	YES	YES	2004	NO+	NO+	NO	2005	Additional Protection N
VERGENNES	ADD	NA	YES	YES	2007	NA	NO+	NO+	2007	Additional Protection N
WALLINGFORD	RUT	YES	YES	YES	2004	NO	NO	NO	1972	Additional Protection N
WALTHAM	ADD	NO	YES	YES	1994	NO	NO	NO	1991	Additional Protection N
WELLS	RUT	NO+	NO	NO+	2002	-	-	-	0	No Zoning
WEST HAVEN	RUT	YES	YES	YES	2003	YES-	YES-	YES-	2005	Some Protection
WEST RUTLAND	RUT	NA	YES	YES	2000	NA	YES-	NO	2005	Some Protection
WEYBRIDGE	ADD	NO	YES	YES	1996	NO	NO+	NO+	2006	Additional Protection N
WHITING	ADD	NO	NO+	NO+	2001	NO	NO	NO	2005	Additional Protection N

Appendix D. Existing Use Tables

Table D-1. Determination of existing uses of waters for swimming in Otter Creek (Basin 03)*

Surface Water	Location of Use	Watershed	Town	Basis for Determining the Presence of an Existing Use
Emerald Lake	Emerald Lake State Park	Otter mainstem	Dorset	Public (State) beach and attractive recreation site
Elfin Lake	Elfin Lake Municipal Swimming Beach	Unnamed tributary	Wallingford	Public (municipal) beach and attractive recreation site
Giffith Lake	USFS – Green Mountain National Forest	Big Branch	Peru, Mount Tabor	USFS Public waterbody and attractive recreation site (hikers/ campers only)
Little Rock Pond	USFS – Green Mountain National Forest	Homer Stone Brook	Wallingford	USFS Public waterbody and attractive recreation site (hikers/ campers only)
Mill River (1)	Swinging Bridge	Mill River	Clarendon	Locally used swimming hole at public recreation area (Long Trail/ Appalachian Trail)
Clarendon Gorge (1)	Clarendon Gorge – multiple swimming areas	Mill River	Clarendon	Popular Swimming hole
Spring Lake	Spring Lake local access area	Mill River	Shrewsbury	Private (local) access and attractive recreation site with public swimming usage permitted upon request
Chittenden Reservoir/ Lefferts Pond	USFS – Green Mountain National Forest	East Creek	Chittenden	Green Mountain National Forest – CVPS Public access area. USFS designated access to Sugar Hill Reservoir, Silver Lake, and Falls of Lana.
Lake Dunmore/ Fern Lake/ Falls of Lana/ Silver Lake/ Sugar Hill Reservoir	USFS – Green Mountain National Forest, Branbury State Park	Sucker Brook, tributary to the Leicester River	Salisbury/ Leicester	Green Mountain National Forest, Branbury State Park. USFS designated access to Sugar Hill Reservoir, Silver Lake, and Falls of Lana (1).
High Pond	TNC protected land	Willow Brook	Sudbury	Protected access and attractive recreation site
Middlebury Gorge (1)	Middlebury River – Route 125 pull-off access points	Middlebury River	East Middlebury	Public (local) access and attractive recreation site. Popular and well-known swimming location with easy access from State Route 125.

New Haven Gorge – Bartlett Falls (1)	New Haven River – Lincoln Mountain Road – multiple pull-off access points.	New Haven River	Bristol	Public (local) access and attractive recreation site. Popular and well-known swimming location with easy access from the Bristol-Lincoln Road.
New Haven River – Sycamore Park	New Haven River – municipal park off State Route 116	New Haven River	Bristol	Public (municipal) access and attractive recreation site. Popular and well-known swimming location with easy access from State Route 125.
Monkton Pond	Cedar Lake	Lewis Creek	Monkton	

*** The Agency will presume that all lakes and ponds that exist within a river basin have existing uses of fishing, contact recreation and boating.**

Table D-2. Determination of existing uses of waters for fishing in Otter Creek (Basin 03)*

Surface Water	Watershed	Town	Basis for Determining the Presence of an Existing Use
Otter Creek WMA	Otter Creek	Danby/ Mount Tabor	Otter Creek WMA F&W access, special use regulations and stocking
Danby Pond	Mill Brook	Danby	State designated "carry-in" access to Pond, warm-water fishery.
Emerald Lake	Emerald Lake State Park	Dorset	Public (State) beach and attractive recreation site, State designated "carry-in" access to Lake, warm-water fishery.
Tinmouth Pond	Clarendon River	Tinmouth	State designated "car-top" access to Pond, warm-water fishery.
Star Lake	Mill River	Mount Holly	State designated "trailer" access to Lake, mixed water fishery.
Little Rock Pond	Homer Stone Brook	Wallingford	USFS Public waterbody and attractive recreation site (hikers/ campers only), cold water fishery.
Wallingford Pond	Mill River	Wallingford	USFS Public waterbody and attractive recreation site (hikers/ campers only), designated "carry-in" access to Pond, warm-water fishery.
Spring Lake	Mill River	Shrewsbury	Public (local) beach and attractive recreation site, cold-water fishery.
Chittenden Reservoir/ Lefferts Pond	East Creek	Chittenden	Green Mountain National Forest – CVPS Public access area. State designated "trailer" access to Lake, mixed water fishery, special use regulations and stocking.
Sutherland Falls	Otter Creek	Proctor	Public (municipal) access and attractive recreation site below falls.

Otter Creek	Otter Creek	Proctor/ Pittsford	Gorham Covered Bridge, State designated “car-top” access to Creek, mixed-water fishery. State designated special use regulations and stocking.
Furnace Brook	Furnace Brook	Chittenden Pittsford	State designated special use regulations and stocking.
Neshobe River	Neshobe River	Goshen Brandon	State designated special use regulations and stocking.
Otter Creek	Otter Creek	Brandon	State designated “trailer” access to Creek, mixed water fishery, special use regulations and stocking.
Otter Creek	Otter Creek	Salisbury	State designated “car-top” access to Creek, mixed-water fishery.
Lower Otter Creek WMA	Otter Creek	New Haven	Lower Otter Creek WMA F&W access, special use regulations and stocking
Richville Pond – Richville WMA	Lemon Fair River	Shoreham, Orwell	Richville WMA F&W access, special use regulations and stocking. State designated “car-top” access to Pond, warm-water fishery.
Lake Dunmore/ Fern Lake/ Falls of Lana/ Silver Lake/ Sugar Hill Reservoir	Leicester River	Salisbury/ Leicester	Green Mountain National Forest – and State DFW Public access areas. USFS designated access to Sugar Hill Reservoir, Silver Lake, and Falls of Lana.
Middlebury River	Middlebury River	East Middlebury	State designated special use regulations and stocking. Access from Route 125
New Haven River	New Haven River	Lincoln, Bristol, New Haven	State designated special use regulations and stocking.
New Haven River	New Haven River	New Haven - Brooksville	Public (local) access and attractive recreation site. Popular and well-known fishing location at the site of the former Dog Team Tavern.
Dead Creek WMA	Dead Creek	Addison, Panton	State designated “car-top” access to Creek, warm-water fishery, special use regulations and stocking.
Bristol Pond	Pond Brook – Lewis Creek	Bristol	State designated “trailer” access to Pond, warm-water fishery, special use regulations and stocking.

Monkton Pond	Lewis Creek	Monkton	State designated "trailer" access to Pond, warm-water fishery, special use regulations and stocking.
Lewis Creek WMA	Lewis Creek	Ferrisburgh	State designated "trailer" access to Creek, mixed water fishery, special use regulations and stocking.
Otter Creek	Otter Creek	Weybridge	State designated "trailer" access to Creek, mixed water fishery, special use regulations and stocking.
Otter Creek	Otter Creek	Ferrisburgh	Fort Cassin - State designated "trailer" access to Creek, warm-water fishery, special use regulations and stocking.
Little Otter Creek WMA	Little Otter Creek	Ferrisburgh	State designated "trailer" access to Creek, mixed water fishery, special use regulations and stocking.

*** The Agency will presume that all lakes and ponds that exist within a river basin have existing uses of fishing, contact recreation and boating.**

Table D-3. Determination of existing uses of waters for pubic water supplies in Otter Creek (Basin 03)

Surface Water	Watershed	Town	Basis for Determining the Presence of an Existing Use
Unnamed Pond	Middlebury River	Ripton	The Middlebury College Breadloaf Campus water system in Ripton: An unnamed pond as an Inactive, Emergency source
Furnace Brook Kiln Brook	Furnace Brook	Chittenden	The Proctor Water Department in Proctor: Furnace Brook as an Active, Permanent source Kiln Brook as an Active, Permanent source
Mendon Brook East Creek	Mendon Brook East Creek	Mendon Chittenden	The Rutland City Water Department in Rutland: Mendon Brook in Mendon as an Active, Permanent source East Creek in Chittenden as an Inactive, Emergency source
Roaring Brook	Roaring Brook	Wallingford	The Wallingford Fire District #1 water system in Wallingford: Roaring Brook as an Inactive, Emergency source

Unnamed tributary (A2)	Cold River	Killington	City of Rutland water supply. Unnamed tributary to Cold River and all waters within its watershed upstream of its diversion into the Mendon Brook watershed in the town of Killington.
Mendon Brook (A2) *Previously mentioned*	Mendon Brook	Killington Mendon	City of Rutland water supply. Mendon Brook and all waters within its watershed upstream of the water intake just south of Meadow Lake Drive in the Town of Mendon.
Tenney Brook (A2)	Tenney Brook	Mendon Rutland Town	Rutland-Mendon Town water supply. Tenney Brook and all waters with its watershed upstream of and including a small intake impoundment.
Rutland City Reservoir (A2)	East Creek	Rutland Town	City of Rutland water supply. Rutland City Reservoir in Rutland Town and all waters within its watershed in Rutland Town and Mendon.
Moon Brook (A2)	Moon Brook	Mendon	Rutland-Mendon F.D. #2 water system. (Gleason Road System - now abandoned.) Moon Brook and all waters within its watershed in Mendon upstream of and including a small intake impoundment.
Unnamed Tributary to Tenney Brook (A2)	Tenney Brook	Mendon	Rutland F.D. #2 (Gleason Road) water system. Unnamed tributary to Tenney Brook and all waters within its watershed in Mendon upstream of the water intake.
Young's Brook (A2)	Clarendon River	West Rutland Ira	Village of West Rutland water supply. (No longer used). Young's Brook and reservoir and all waters within its watershed in West Rutland and Ira upstream of the water intake.
Furnace Brook and Kiln Brook (A2) *Previously mentioned*	Furnace Brook	Chittenden	Village of Proctor water supply. (Kiln Brook in the main source, with Furnace Brook used as a backup). Furnace Brook and Kiln Brook and all waters within their watersheds in Chittenden upstream of their confluence.
Sugar Hollow Brook (A2)	Sugar Hollow Brook	Goshen Chittenden	Town of Brandon water supply. (No longer used). Sugar Hollow Brook and all waters within its watershed in Goshen and Chittenden upstream of the water intake.
Leicester Hollow Brook (A2)	Neshobe River	Leicester	Town of Brandon Water Supply. (No longer used). Leicester Hollow Brook and all waters within its watershed in Leicester upstream of the water intake.

Brandy Brook (A2) *Previously mentioned*	Middlebury River	Ripton	Now or former water supply for Breadloaf School. Brandy Brook and all waters within its watershed.
Unnamed tributary to Beaver Meadow Brook (A2)	New Haven River	Lincoln	Village of Bristol water supply. Unnamed tributary to Beaver Meadow Brook and all waters within its watershed upstream of the water intake in Lincoln.
Unnamed tributary to Lewis Creek (A2)	Lewis Creek	Starksboro	Village of Starksboro water supply. (No longer used). Unnamed tributary to Lewis Creek and all waters within its watershed in Starksboro upstream of the water intake.
Two unnamed tributaries to Little Otter Creek (A2)	Little Otter Creek	Monkton Bristol	City of Vergennes water supply. (Not used since 1973). Two unnamed tributaries to Little Otter Creek and all waters within their watersheds in Monkton and Bristol upstream of two water intakes.
Notch Brook (A2)	New Haven River	Bristol	Village of Middlebury water supply. (Reserved for emergency use). Notch Brook and all waters within its watershed upstream of the water intake in Bristol.
Roaring Brook *Previously mentioned*	Roaring Brook	Wallingford	Wallingford F.D. #1 water supply. Roaring Brook and all waters within its watershed upstream of the water intake.

Table D-4. Determination of existing uses of waters for recreational boating in Otter Creek (Basin 03) – Flat water*

Surface Water	Location of Use	Watershed	Town	Basis for Determining the Presence of an Existing Use
Emerald Lake	Emerald Lake State Park	Otter mainstem	Dorset	Public (State) beach and attractive recreation site
Elfin Lake	Elfin Lake Municipal Swimming Beach	Unnamed tributary	Wallingford	Public (municipal) beach and attractive recreation site
Otter Creek mainstem	Otter Creek	Otter Creek	Dorset to Ferrisburgh	Multiple Otter Creek F&W and other access areas
Danby Pond	Danby Pond	Mill Brook	Danby	State designated “carry-in” access to Pond
Tinmouth Pond		Baker Brook	Danby/ Tinmouth	

Spring Lake	Spring Lake local access area	Mill River	Shrewsbury	Private (local) access and attractive recreation site
Chittenden Reservoir/ Lefferts Pond	USFS – Green Mountain National Forest	East Creek	Chittenden	Green Mountain National Forest – CVPS Public access area. USFS designated access to Sugar Hill Reservoir, Silver Lake, and Falls of Lana.
Lake Dunmore/ Fern Lake/ Falls of Lana/ Silver Lake/ Sugar Hill Reservoir	USFS – Green Mountain National Forest, Branbury State Park	Sucker Brook, tributary to the Leicester River	Salisbury/ Leicester	Green Mountain National Forest, Branbury State Park. USFS designated access to Sugar Hill Reservoir, Silver Lake, and Falls of Lana (1).
Lake Winona	F&W access area	Pond Brook	Bristol	State F&W access area
Monkton Pond	Cedar Lake F&W access area	Lewis Creek	Monkton	Swimming listed as a present use in
Star Lake	Belmont – Star Lake	Mill River	Mount Holly	State designated "trailer" access to Lake
Little Otter Creek	Little Otter Creek WMA	Little Otter Creek	Ferrisburgh	State designated "trailer" access to Creek

*** The Agency will presume that all lakes and ponds that exist within a river basin have existing uses of fishing, contact recreation and boating.**

Table D-5. Determination of existing uses of waters for recreational boating in Otter Creek (Basin 03) – White water

Surface Water	Watershed	Town	Basis for Determining the Presence of an Existing Use
Clarendon Gorge to Route 7	Mill River	Clarendon	Multiple access locations
New Haven River	New Haven River	Lincoln, Bristol	Bristol - Lincoln Mountain Road – multiple pull-off access points.
Middlebury Gorge	Middlebury River	Middlebury, Ripton	East Middlebury - Multiple access locations - Route 125 pull-off access points
Furnace Brook	Furnace Brook	Chittenden Pittsford	Multiple access locations
Neshobe River	Neshobe River	Goshen	Multiple access locations

		Brandon	
Otter Creek Gorge and Falls	Otter Creek	Middlebury, Weybridge	Multiple access locations
Cold River	Cold River	Shrewsbury	Multiple access locations
Roaring Brook	Roaring Brook	Wallingford	Multiple access locations
Big Branch	Big Branch	Mount Tabor	Multiple access locations
Danby Slides	Mill Brook	Danby	Multiple access locations

(1) Jenkins and Zitka, The Waterfalls, Cascades, and Gorges of Vermont, VTANR, 1988.

Table D-6. Determination of waterbodies not considered as Existing Use – Fishing in Otter Creek (Basin 03)

Surface Water	Watershed	Town	Basis for Existing Use exclusion
Moon Brook	Moon Brook	Rutland – Rutland City	No stocking, use regulations, or access areas
Willow Brook	Otter Creek	Sudbury	No stocking, use regulations, or access areas
Muddy Branch	New Haven River	Middlebury	No stocking, use regulations, or access areas
Pond Brook	Lewis Creek	Monkton	No stocking, use regulations, or access areas
Beaver Pond	Mendon Brook	Mendon	Future milfoil management uncertain, ownership and contracted use in jeopardy

Appendix E. Highest Priority Corridor Plan Recommendations

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Description	Tributary	If applicable	1-Assessment and Project Identification, 2-Project Design and Development, 3-Project Implementation, or 4-Education, Outreach, and Awareness			Identify strategy/page of relevant plan	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protect river corridor/ channel/ contiguous wetlands	Lewis Creek	**Reach (priority):** M18 (high), M17-C (very high), M17-B (high), M17-A (moderate), M16 (very high), M15-B (very high), M15-A (high), M14 (low)	2-Project Design and Development, 3-Project Implementation	ERP, VLT conservation easements, VHCB	LCA, VLT, VRC, VT DEC-RMP	River Corridor Plan Lewis Creek: Reaches M14 – M18 - Towns of Hinesburg, Monkton, and Starksboro - Chittenden & Addison Counties, Vermont - February 2008 (Revised March 2008) - South Mountain Research & Consulting	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Plant Stream Buffer	Lewis Creek	High to moderate priority, depending on reach	2-Project Design and Development, 3-Project Implementation	CREP, ERP	VAAFM, USDA-NRCS, Otter Creek NRCD	River Corridor Plan Lewis Creek: Reaches M14 – M18 - February 2008 (Revised March 2008) - SMRC. Lewis Creek Watershed (Addison & Chittenden Counties, VT) River Corridor Conservation & Management Plan, March 2010. South Mountain Research & Consulting	High-priority opportunities to increase buffer widths and continuity are located along the following reaches which are closer to equilibrium condition and have good or reasonable floodplain access: - upper main stem (M21-A; M19-B and –A; M17-B, -A; M15-A); - lower main stem (M08, M04, and M03); - High Knob Brook (T6.06-B and –A, T6.03-A); - Hollow Brook (sections of T4.01-B and T4.01-A; T4.3S6.01); and - Pond Brook (segment T3.01-B).

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Exclude livestock from the Creek	Lewis Creek	High priority, depending on reach	2-Project Design and Development, 3-Project Implementation	AAFM CREP, AAFM Livestock Exclusion Grants, ERP, EPA 319	VAAFM, USDA-NRCS, Otter Creek NRCD	River Corridor Plan Lewis Creek: Reaches M14 – M18 - February 2008 (Revised March 2008) - SMRC. Lewis Creek Watershed (Addison & Chittenden Counties, VT) River Corridor Conservation & Management Plan, March 2010. South Mountain Research & Consulting	Livestock Exclusion Opportunities on assessed reaches of the Lewis Creek main stem and tributaries. Reach / Segment Town M22 (downstream of Meadowlark Lane), M17-A, M16, M02, M01, T6.06-B, T4.3S6.01, T3.01-B

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Stabilize Streambank	Lewis Creek	M15-A	2-Project Design and Development, 3-Project Implementation	ERP, EPA 319	VAAFM, USDA-NRCS, VT DEC-RMP	River Corridor Plan Lewis Creek: Reaches M14 – M18 - February 2008 (Revised March 2008) - SMRC. Lewis Creek Watershed (Addison & Chittenden Counties, VT) River Corridor Conservation & Management Plan, March 2010. South Mountain Research & Consulting	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Remove or Replace Structures: - Bridge & Culverts - Old Bridge Abutments (M17-C) - Berm (M08)	Lewis Creek	High (M08, M17-A, M17-B), Moderate (M14, M15-B), Low (M17-C, M18)	2-Project Design and Development, 3-Project Implementation	ERP, EPA 319, WHIP (NRCS)	USDA-NRCS, VT DEC-RMP	River Corridor Plan Lewis Creek: Reaches M14 – M18 - February 2008 (Revised March 2008) - SMRC. Lewis Creek Watershed (Addison & Chittenden Counties, VT) River Corridor Conservation & Management Plan, March 2010. South Mountain Research & Consulting	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Fluvial erosion hazard planning. Work with **Town of Starksboro** to communicate fluvial erosion hazard risks to landowner(s). Consider adoption of fluvial erosion hazard overlay district in town zoning to prevent future development at this high-hazard location. Incorporate erosion hazards of this location in the Addison County All-Hazards Mitigation Plan (and Starksboro Annex). Develop plans for emergency response to this area in the event of flooding. River Corridor Protection.	Lewis Creek	M17-C	2-Project Design and Development, 3-Project Implementation	ERP	VT DEC-RMP, LCA, Town of Starksboro, ACRPC	River Corridor Plan Lewis Creek: Reaches M14 – M18 - February 2008 (Revised March 2008) - SMRC. Lewis Creek Watershed (Addison & Chittenden Counties, VT) River Corridor Conservation & Management Plan, March 2010. South Mountain Research & Consulting	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protection Upstream of Constrained or Altered Reaches; Channel-contiguous wetlands; Moderate or Major Departure from Equilibrium (M13-A)	Little Otter Creek	M13-A, M13-B	2-Project Design and Development, 3-Project Implementation	ERP, WRP	VT DEC-RMP, VRC, Town of New Haven,	Little Otter Creek Watershed: Phase 2 Stream Geomorphic Assessment (Addison County, Vermont) July 2011. South Mountain Research & Consulting	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protection Downstream of Constrained or Altered Reaches (M12-A); Key Sediment Attenuation Area (M12-A); Alluvial Fan or Point of Marked Valley Slope Reduction (M12-B); Moderate or Major Departure from Equilibrium (M12-B)	Little Otter Creek	M12-A, M12-B	2-Project Design and Development, 3-Project Implementation	ERP	VT DEC-RMP, VRC, Town of New Haven,	Little Otter Creek Watershed: Phase 2 Stream Geomorphic Assessment (Addison County, Vermont) July 2011. South Mountain Research & Consulting	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Key Sediment Attenuation Area; Channel-contiguous wetlands (M11-A)	Little Otter Creek	M11-A, M11-B	2-Project Design and Development, 3-Project Implementation	ERP, WRP	VT DEC-RMP, VRC, Towns of Monkton, New Haven	Little Otter Creek Watershed: Phase 2 Stream Geomorphic Assessment (Addison County, Vermont) July 2011. South Mountain Research & Consulting	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Key Sediment Attenuation Area (M08-A); Channel-contiguous wetlands (M08-A) Protection Downstream of Constrained or Altered Reaches (M08-B); Alluvial Fan or Point of Marked Valley Slope Reduction (M08-B)	Little Otter Creek	M08-A, M08-B	2-Project Design and Development, 3-Project Implementation	ERP, WRP	VT DEC-RMP, VRC, Town of Ferrisburgh	Little Otter Creek Watershed: Phase 2 Stream Geomorphic Assessment (Addison County, Vermont) July 2011. South Mountain Research & Consulting	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Key Sediment Attenuation Area; Channel-contiguous wetlands; Downstream from Major Tributary or Other Large Sediment Source (M04)	Little Otter Creek	M04, M05, T2.01-A, T2.01-B	2-Project Design and Development, 3-Project Implementation	ERP, WRP	VT DEC-RMP, VRC, Town of Ferrisburgh	Little Otter Creek Watershed: Phase 2 Stream Geomorphic Assessment (Addison County, Vermont) July 2011. South Mountain Research & Consulting	
Conduct field measurements of the channel width on reaches to identify undersized structures and assist towns and the State when planning retrofits or replacement for structure replacements.	Lemon Fair		1-Assessment and Project Identification	ERP, Better Backroads Program (for inventory)	Lewis Creek Basin town road crews, VT Local Roads, VT DEC	Lemon Fair River Phase I Geomorphic Assessment Addison County, Vermont Draft Report March, 2006 Prepared by Landslide Consulting Inc.	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Targeted riparian planting program that includes fencing animals out of waterways to improve water quality throughout the watershed.	Lemon Fair		2-Project Design and Development, or 3-Project Implementation	AAFM CREP, AAFM Livestock Exclusion Grants, ERP, EPA 319	VAAFM, USDA-NRCS, Otter Creek NRCD	Lemon Fair River Phase I Geomorphic Assessment Addison County, Vermont Draft Report March, 2006 Prepared by Landslide Consulting Inc.	
Encourage towns in the watershed to adopt development review standards that prevent development in floodplains and along fluvial erosion hazard areas. Encourage non-participating towns in NFIP to participate.	Lemon Fair		2-Project Design and Development, 3-Project Implementation, or 4-Education, Outreach, and Awareness	LCBP E&O grants	ACRPC, VLCT, VT DEC-RMP	Lemon Fair River Phase I Geomorphic Assessment Addison County, Vermont Draft Report March, 2006 Prepared by Landslide Consulting Inc.	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Plant stream buffer	Middlebury River	M04	2-Project Design and Development, or 3-Project Implementation		ACRPC, OCNRCD, USDA-NRCS, DEC-RMP, Town	Middlebury River Watershed River Corridor Conservation Plan Main Stem and Middle Branch October, 2008 Prepared by Landslide Consulting, Inc. River Corridor Conservation Plan Main Stem and Middle Branch October, 2008 Middlebury River Watershed River Corridor Conservation Plan Main Stem and Middle Branch October, 2008	Substantial planform adjustment and erosion due to lack of buffers. Aggrading from in-reach and u/s sources.

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protect river corridor	Middlebury River	M06B	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP	Middlebury River Watershed River Corridor Conservation Plan Main Stem and Middle Branch October, 2008 Prepared by Landslide Consulting, Inc.	This property has already begun to be protected at the d/s, north end. MALT is having an appraisal done on the south side. Other properties to the east on the north side remain un-protected and identifying landownership is the next step.
Protect river corridor, Remove berm, Restore incised reach	Middlebury River	M07	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP	Middlebury River Watershed River Corridor Conservation Plan Main Stem and Middle Branch October, 2008 Prepared by Landslide Consulting, Inc.	The south side is relatively undeveloped could provide a big benefit to the river. Relocating a berm can be cost-prohibitive, while removing a berm can be cost-effective. Remember that the south side could provide opportunities as well.

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protect river corridor, Restore incised reach	Middlebury River	M12C	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP	Middlebury River Watershed River Corridor Conservation Plan Main Stem and Middle Branch October, 2008 Prepared by Landslide Consulting, Inc.	The left bank is entirely undeveloped and a priority for conservation.
Corridor conservation, remove berm; replace structure (Peddler's Bridge Road)	Middlebury River	M13A	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP	Middlebury River Watershed River Corridor Conservation Plan Main Stem and Middle Branch October, 2008 Prepared by Landslide Consulting, Inc.	A critical reach just u/s of the village. There is significant erosion d/s of the Peddler's Bridge Rd. culvert.
Conserve and Protect River Corridor and existing buffer, manage braided channel.	Mill River	M01-A	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR, VRC, CREP, WHIP	Mill River Watershed River Corridor Management Plan, February 2009, Round River Design	Potential to keep agricultural use with BMPs

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protect River Corridor to provide attenuation area upstream of constrained/ altered reach with existing FEH hazards.	Mill River	M06	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR, VRC , NRCS (WHIP)	Mill River Watershed River Corridor Management Plan, February 2009, Round River Design	Flood and sediment attenuation asset
Protect River Corridor, Examine restore incised reach. Restore riparian buffer.	Mill River	M11-B	2-Project Design and Development, or 3-Project Implementation		Landowners, CREP, RNRCD, ANR, VRC	Mill River Watershed River Corridor Management Plan, February 2009, Round River Design	Floodwater and sediment attenuation area upstream of reach with significant floodplain encroachment
Enroll in CREP or WHIP, possible floodplain redevelopment.	Mill River	T2.01-A	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR, CREP, WHIP	Mill River Watershed River Corridor Management Plan, February 2009, Round River Design	Improved sediment and floodwater attenuation above the Village. Conversion of Agricultural land to forest.
Possible berm removal project, land conservation to public land.	Mill River	M07	2-Project Design and Development, or 3-Project Implementation		Landowners, ANR, RNRCD, FEMA, WHIP	Mill River Watershed River Corridor Management Plan, February 2009, Round River Design	Cost of property acquisition and berm removal.

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Replace degraded bridge and pier that is causing sediment transport disruption and relocate berm on right bank	Mill River	M11-A	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR, VTRANS	Mill River Watershed River Corridor Management Plan, February 2009, Round River Design	Increase sediment transport through Village, reduce flood hazard in village, remove split flow in channel, create some floodplain in vital area upstream of bridge.
Protect River Corridor to allow for planform adjustment or consider placing stream back in former channel	Moon Brook	M22-S1.01	2-Project Design and Development, or 3-Project Implementation		CREP, ANR, VRC, RNRCD	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	Hay to forested
Protect River Corridor to provide attenuation area	Moon Brook	M22-S1.02-A	2-Project Design and Development, or 3-Project Implementation		ANR, VRC, RNRCD	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	Land use conversion may be minimal

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protect River Corridor	Moon Brook	M22-S1.03-A to lower end of M22-S1.03-B	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR, VRC	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	No additional structures in corridor
Alternatives Analysis for modifying pond	Moon Brook	M22-S1.06	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	Decrease water temperatures to improve suitability for trout; allow natural migration of aquatic organisms; sediment transport **Project underway (06/01/2011)**

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Conserve and Protect River Corridor and existing buffer	Moon Brook	M22-S1.07	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR, VRC	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	Flood and sediment attenuation asset
Mitigate active degradation (headcuts)	Moon Brook	M22-S1.08-A	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR, YCC	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	Reduce sediment , prevent loss of land

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Replace undersized culverts, bridge with alignment problem and reduce number of stream crossings	Mussey Brook	M22-S1.01-S1.01-B	2-Project Design and Development, or 3-Project Implementation		Property owner, ANR, RNRCD	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	Reduction in number of crossings
Plant stream buffer	Mussey Brook	M22-S1.01-S1.01-B	2-Project Design and Development, or 3-Project Implementation		Property owner, ANR, USFWS, RNRCD	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	Open space to buffer

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Replace undersized culvert at Curtis Ave.	Mussey Brook	M22-S1.01-S1.01-C	2-Project Design and Development, or 3-Project Implementation		City of Rutland, ANR, Rutland NRCD	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	Improved sediment transport and geomorphic stability
Protect River Corridor	Mussey Brook	M22-S1.01-S1.04	2-Project Design and Development, or 3-Project Implementation		Landowners, RNRCD, ANR, VRC	River Corridor Plan Moon Brook Watershed Rutland City, Rutland Town, and Mendon, Vermont March 20, 2008, Bear Creek Environmental	No additional structures in corridor
Protect River Corridor and Wetlands through easements , FEH zoning and/or CREP; no new structures in corridor or	Neshobe River	M01	2-Project Design and Development, or 3-Project Implementation		VANR, RNRCD, Town of Brandon, landowners, CREP, land	Neshobe River Corridor Plan - Brandon, Vermont June, 2011, Bear Creek Environmental	Conserve sediment and flood attenuation of wetlands

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
wetland					trust, WRP		
Conduct an alternatives analysis to consider options for channel and/or floodplain management in vicinity of WWTF. Project could range from a community project to providing additional room for the river to migrate.	Neshobe River	M02	2-Project Design and Development, or 3-Project Implementation		VANR, RNRCD, Town of Brandon,	Neshobe River Corridor Plan - Brandon, Vermont June, 2011, Bear Creek Environmental	Improved water quality and habitat within reach. High profile project since owned by Town and visible from Union Street. Opportunity for community involvement in project.
Remediate mass failure by improving slope and vegetation and/or diverting flow away from the bank	Neshobe River	M03	2-Project Design and Development, or 3-Project Implementation		VANR, Town of Brandon,	Neshobe River Corridor Plan - Brandon, Vermont June, 2011, Bear Creek Environmental	Improved habitat and water quality

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protect river corridor and wetlands through easements, FEH zoning and/or WRP/CREP. Buffer plantings along field in upper parcel possibly through CREP program.	Neshobe River	M03	2-Project Design and Development, or 3-Project Implementation		VANR, RNRCD, Town of Brandon, landowners, USDA-NRCS (CREP/ WRP), land trust	Neshobe River Corridor Plan - Brandon, Vermont June, 2011, Bear Creek Environmental	Conserve sediment and flood attenuation of wetlands; Improved habitat and water quality
Protect river corridor and wetland through easement, FEH zoning and/or CREP. Streamside plantings along farm fields as part of possible CREP project. No new structures in corridor or wetland; Agricultural to forested. Conduct analysis to evaluate solutions for reducing farm runoff from agricultural field adjacent to stream. Consider	Neshobe River	M04 and M05	2-Project Design and Development, or 3-Project Implementation		VANR, RNRCD, Town of Brandon, landowners, CREP, land trust	Neshobe River Corridor Plan - Brandon, Vermont June, 2011, Bear Creek Environmental	Conserve sediment and flood attenuation of wetland; Improved habitat and water quality. Improved habitat and water quality

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
improved buffer strips to reduce sedimentation.							
Conservation to preserve equilibrium and ecological functions of riparian corridor.	New Haven River	T4.03-A	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP, USFWS,	DRAFT River Corridor Plan New Haven River: Town of Lincoln Addison County, Vermont February 2006, Prepared by South Mountain Research & Consulting, Inc.	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protect the corridor from future development/encroachments/berming. Possible corridor easement. Riparian Buffer enhancement. Facilitate sediment attenuation / lateral adjustments at upstream extent near reach break with M21 - could relieve stresses on Lincoln village reach, M19	New Haven River	Upstream end of reach across Lincoln Community School M20	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP, USFWS, Town of Lincoln	DRAFT River Corridor Plan New Haven River: Town of Lincoln Addison County, Vermont February 2006, Prepared by South Mountain Research & Consulting, Inc.	
Protect the corridor from future development/encroachments/berming. Possible corridor easements to facilitate sediment attenuation / lateral adjustments in channel and contiguous wetlands at downstream end of segment - could offset	New Haven River	Downstream end of segment T4.03-B	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP, USFWS, Town of Lincoln	DRAFT River Corridor Plan New Haven River: Town of Lincoln Addison County, Vermont February 2006, Prepared by South Mountain Research & Consulting, Inc.	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
consequences of upstream channel management through Downingsville settlement. Riparian Buffer enhancement.							
Protect the corridor from future development/encroachments/berming. Possible corridor easements to facilitate sediment attenuation / lateral adjustments in channel and contiguous wetlands at downstream end of segment - could offset consequences of upstream sediment contributions from Cow Brook and	New Haven River	Downstream end of reach M25	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP, USFWS, Town of Lincoln	DRAFT River Corridor Plan New Haven River: Town of Lincoln Addison County, Vermont February 2006, Prepared by South Mountain Research & Consulting, Inc.	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
mass failure.							
Conduct alternatives analysis to determine cost/benefit and technical feasibility of stabilizing this landslide to reduce sediment inputs to the New Haven River.	New Haven River	M25	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP, USFWS, Town of Lincoln, VGS	DRAFT River Corridor Plan New Haven River: Town of Lincoln Addison County, Vermont February 2006, Prepared by South Mountain Research & Consulting, Inc.	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
Protect the corridor from future development/encroachments/berming. Possible corridor easements to facilitate sediment attenuation / lateral adjustments in channel. Riparian Buffer enhancement. Geomorphic assessment of Cow Brook tributary to understand flow and sediment dynamics.	New Haven River	M25	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP, USFWS, Town of Lincoln,	DRAFT River Corridor Plan New Haven River: Town of Lincoln Addison County, Vermont February 2006, Prepared by South Mountain Research & Consulting, Inc.	
Protect the corridor from future development/encroachments/ berming. Possible corridor easements to facilitate sediment attenuation / lateral adjustments in channel. Riparian Buffer enhancement. Geomorphic	New Haven River	M21	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP, USFWS, Town of Lincoln,	DRAFT River Corridor Plan New Haven River: Town of Lincoln Addison County, Vermont February 2006, Prepared by South Mountain Research & Consulting, Inc.	

Task	Sub-Basin	Reach ID	Category	Potential Sources of Funding	Partners	Identified in Corridor or other Assessment Plan	Benchmark/ Status
assessment of Cota Brook tributary to understand flow and sediment dynamics.							
Possible corridor easements to facilitate sediment attenuation/ lateral adjustments in channel and contiguous wetlands at downstream end of segment - could offset consequences of upstream channel management and relieve stresses on downstream reach M19 through Lincoln village.	New Haven River	M21	2-Project Design and Development, or 3-Project Implementation		MALT, VLT, VT DEC-RMP, USFWS, Town of Lincoln,	DRAFT River Corridor Plan New Haven River: Town of Lincoln Addison County, Vermont February 2006, Prepared by South Mountain Research & Consulting, Inc.	

Appendix F - Basin 3 Watershed Plan - Agricultural Aspects - Upper Otter Creek

Sylvia D. Harris
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Rutland County Natural Resources Conservation District

Introduction

Agricultural Data

Conservation Practices

Status & Trends

Future Concerns

River Sections in Need of Further Assessment Due to Agricultural Impacts

Recommendations for Agricultural NPS Improvement in the Basin

Cooperating Partners

Programs To Address Agricultural Issues

Purpose:

The purpose of the following report is to provide a resource document that compiles agricultural data, details the current status of agriculture and outlines the concerns and water quality improvement recommendations of the agricultural community within the Upper Otter Creek (UOC) Basin of Rutland County, Vermont.

The data and status information summarized is from the most recently available agricultural data for the UOC. Sources for this data include: USDA Farm Service Agency, USDA National Agricultural Statistics Service, USDA Natural Resources Conservation Service, US Fish & Wildlife Service, US Geological Survey, ANR Department of Environmental Conservation, Vermont Agency of Agriculture Food & Markets, Northeast Organic Farmers Association and the Rutland County Natural Resources Conservation District and several agricultural texts cited throughout. The data reported is by watershed if available, otherwise the data represents county information and is so noted.

The concerns and recommendations for water quality improvement in this report were developed by an Agricultural Focus Group formed of farmers in the basin. This group held at least 16 meetings from January 2003 through May 2008 to discuss agricultural concerns, review relevant information, provide feedback on the overall agricultural section and to formulate the recommendations included in this section. Final AAFM comments on the draft report were received and incorporated on July 2008.

This report is provided by the Vermont Agency of Agriculture Food & Markets (AAFM) to the Vermont Department of Environmental Conservation (DEC) for incorporation into the most recent Basin Plan for this watershed. The AAFM provides funding to the Natural Resource Conservation Districts of Vermont to both develop these reports and organize the Agricultural Focus Groups within each basin.

GOAL:

The goal of the agricultural section is to provide supportive data and a concise list of recommendations to address agricultural water quality issues within the basin. These recommendations outline preferred methods and types of agricultural improvements and, also, point out the changes to infrastructure that will be necessary if agriculture is to remain economically viable. The continuance and improvement of local agriculture as a viable business must be considered a priority in order for the agricultural community to afford both installing practices that will result in improved water quality and contributing to the maintenance of Vermont's valuable pastoral landscape.

Introduction

Land Use: The Upper Otter Creek watershed stretches across approximately half of Rutland County (299,936 of the county's 604,538 total acres[3]). This eastern portion of the county contains broad open valleys rimmed with forested hillsides. Agriculture, the dominant historical land use of the region, created and still largely maintains this pastoral landscape.[4]

While agriculture lends the entire Otter Creek watershed, within Addison and Rutland counties, its rural character, it also gives it an economic base, a cultural identity and an environment that combines field, forest, pasture and village. Of the 705,062 acres that make up the watershed, only 5.5% of the basin has been developed into roads, homes and businesses, with 23% remaining in agriculture. Though agriculture is the second largest land use type in the watershed, it is far below the 60% of land that is forested.[5] Rutland County farms are producing not only milk and meat but also, apples, wool and vegetables. Farm-owned forestland extends farm production into maple syrup and forest products. In 2002, Rutland County farms maintained the greatest acreage of strawberries and one of the greatest acreage of sweet corn in Vermont. Rutland County also boasts one of the highest counts of both horses and beef in the state. [6]

Impacts: Agriculture has a large impact on Rutland's economy. In 2002, agricultural products produced in the county had a market value of nearly $24 million dollars (dairy accounts for 67%). However, these farms are struggling. Farms in Rutland spend nearly $24 million in 2002 much of it locally, on production costs and property taxes.[4] Given the financial status of farming in Rutland County, it is interesting to note that farmers, in the Upper Otter Creek portion of Rutland County alone, have contributed over $171,254 (with an additional $345,041 planned) towards state and federal cost-share programs that address on farm impacts to water quality through implementation of best management practices in the Upper Otter Creek basin since 1996 (Table 6 & 7).

Agriculture, as a working landscape, provides many benefits to the environment. Fields and pastures provide large tracts of open space and are habitat for many species of birds and mammals. As field soils absorb rain water more readily than paved and other impervious surfaces, fewer nutrients are released from an acre of agricultural land than from an acre of developed land.[7] Farms recycle farm-produced wastes, such as manure and spoiled feed, into soil amendments. Farms also work to prevent runoff of soil, nutrients and pathogens through land management practices like cover cropping, grass filter strips, no-till farming and strip farming. Agriculture in the watershed also has the potential to impact the environment. It is estimated that almost 75 miles of rivers and 403 acres of lake water in the entire Otter Creek watershed are adversely affected by agricultural runoff.[3] Though these figures represent only 20.1% of the total impaired river miles and 9.6% of the total impaired lake acreage in the watershed, the effects of agriculture on water quality should not be ignored. Excess nutrients, pathogens and sediments all can leave the farm when erosion control methods fail or heavy rains and floods inundate fields.

Conservation: US Agricultural Policy, from its roots in the 1930's through the 1970's, encouraged farmers to focus on farm improvement practices that enhanced farm productivity, like increasing agricultural land base by clearing vegetation along rivers and draining wetlands.[8] A greater awareness of the potential impacts of farming on water quality and a better understanding of the long-term impacts of stream channel alterations has changed the focus of these government farm programs to environmental management and improvement, beginning with the 1985 farm bill and strengthened in successive farm bills.[6] However, many effects of older practices are still evident. For example, streambank destabilization on agricultural land can often be associated with past cropping practices that removed riparian vegetation and left banks susceptible to erosion leading to sedimentation of rivers. Additionally, though current agricultural recommendations do address environmental concerns, practice recommendations require constant improvement as knowledge of environmental processes is built.

Agriculture has been sustaining society in the valley for over 200 years.[9] While Soil Conservation has been a national effort for over 70 years, it is only within the past 20 years, following the Section 319 amendment to the Clean Water Act, that non-point

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[3] Vermont Center for Geographic Information. 2007. GIS Shapefiles: VT County Boundaries 2006, VT Subbasin Boundaries 2003. http://www.vcgi.org .
[4] Cronon, W. 1983. Changes in the Land: Indians, Colonists and the Ecology of New England. Hill & Wang.
[5] Vermont Agency of Natural Resources. 1998. Basin 3 Otter, Little Otter, Lewis Creek Watersheds Water Quality and Aquatic Habitat Assessment Report #273. Department of Environmental Conservation, Water Quality Division.
[6] USDA. 2002. Census of Agriculture, Vermont State and County Data. http://www.agcensus.usda.gov/Publications/2002/Census_by_State/Vermont .
[7] USGS. 1996. Nutrients in the Nation's Waters: Identifying Problems and Progress. Fact Sheet FS-218-96. http://pubs.usgs.gov/fs/fs218-96/ .
[8] Cox, C. 2006 "US Agricultural Conservation Policy and Programs: History, Trends and Implementations" in *US Agricultural Policy and the 2007 Farm Bill.* Arha, K, T Josling, DA Sumner (editors). Woods Institute for the Environment. Stamford University. http://environment.stanford.edu/ideas/farmbill.html .
[9] Ebeling, W. 1979. The Fruited Plain: The Story of American Agriculture. University of California Press.

source pollution from agricultural lands has begun to be purposefully addressed.[6] It will take a great deal of time, work and investment on the part of Federal, State and local organizations, as well as farmers, to control the cumulative effects of over two centuries of impact.

AGRICULTURAL DATA

Farm Types:

Much of the agricultural information available for this region is collected on a countywide basis by the USDA National Agricultural Statistics Service. While the Upper Otter Creek encompasses only 50% of Rutland County, most of the larger dairy farms are outside of this watershed. Therefore, the county information provided here must be used with that caveat.

The most recent data available from the USDA 2002 Census shows a diversity of farm types ranging from dairy and horse to bees, cut flowers and raspberries (Table 1). The Census defines a farm as 'any place from which $1000 or more of agricultural products were produced or sold, or normally would have been sold, during the census year'. Of the 623 Rutland County farms listed in the 2002 Census, only 312 are the primary occupation of the operators and many are diversified.

Table 1. Rutland County: Types of Farms – 2002

	Number of Farms	Acres	Animals
Hay	320	28334	
Horse	180		1541
Maple Sugar	135	36292 g	
Beef	132		1602
Dairy	121		7563
Poultry-All	94		3248
Grass	92	9549	
Corn Silage	92	5471	
Sheep	53		1663
Vegetable	38	300	
Nursery	32	28	
Christmas Tree	24	168	
Bee	23		*D*
Hog	21		177
Orchard	21	159	
Berry	19	79	
Goat (milk)	14		196
Llama	10		175
Corn Grain	9	598	
Rabbit	5		117

With over 7,500 animals, Dairy Farms and their associated crops are the predominant agricultural use in Rutland County. Vermont Agency of Agriculture, Food & Markets data from 2007 shows 61 operational dairy farms in the Upper Otter Creek (UOC).[10]

There are 11 certified Organic Farms in the UOC. These farms have a total of 491 acres in hay, 254 acres in pasture, 53 acres in various crops, 86 acres in sugarbush and another 10,722 square feet in greenhouses.[11]

There are no Large Farm Operations in the UOC. An LFO is defined as a farm with 700 or more mature cows or a poultry operation with over 82,000 laying hens.[12]

[10] AAFM, 2007 Personal communication from J. Cook, BMP Cost-Share Administrator. Vermont Agency of Agriculture, Food & Markets.
[11] NOFA Vermont. 2006. Personal communication with E. Ramsay, Database Manager. Northeast Organic Farming Association of Vermont

There are only two Medium Farm Operations in the UOC. The MFO is defined as any farm with 200 or more mature cows, 300 or more youngstock or heifers, 150 horses, 300 sheep or 25,000 hens.[13] MFO's must now comply with more stringent regulations regarding water quality (as with LFO's).

Water Uses:

Water is an important resource for agriculture in the entire Otter Creek watershed. Potatoes, vegetables, orchards, berries, and nursery stock are all supported by irrigation. Yet, combined total water withdrawals for animal watering and irrigation account for only 6% of the total water withdrawals by all uses (Table 2 & Figures 1, 2, 3). The vast majority of water withdrawals are for public supply, domestic, industrial and thermoelectric uses.[12]

Between 1985 – 2000* the number of acres under irrigation more than doubled from 230 to 700 (Figure 4). While the irrigation figure is small and covers agriculture, golf courses and cemeteries, the availability of irrigation is crucial to producers. [14]

Table 2. Otter Creek Basin – Water Withdrawals (Mgal/Day)

		1985	1990	1995	2000
Surface	*All Uses*	24.74	19.78	11.27	5.48
	Irrigation	0.10	0.09	0.37	0.36
	Livestock	0.30	0.26	0.30	0.10
Ground	*All Uses*	4.23	5.33	8.32	5.58
	Irrigation	0.00	0.01	0.04	0.04
	Livestock	0.64	0.77	0.90	0.87

Figure 1.

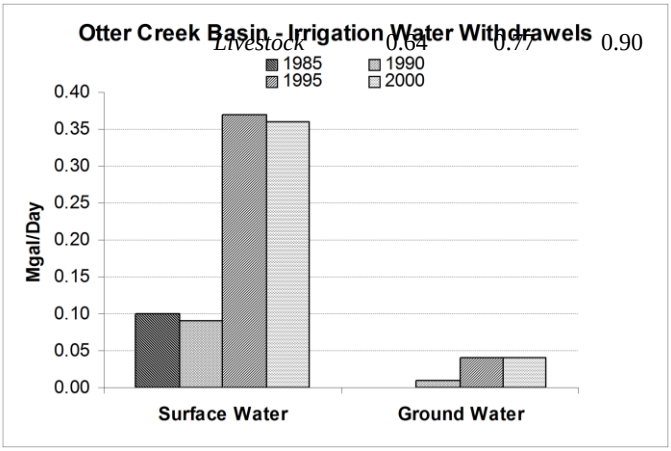


Figure 2.

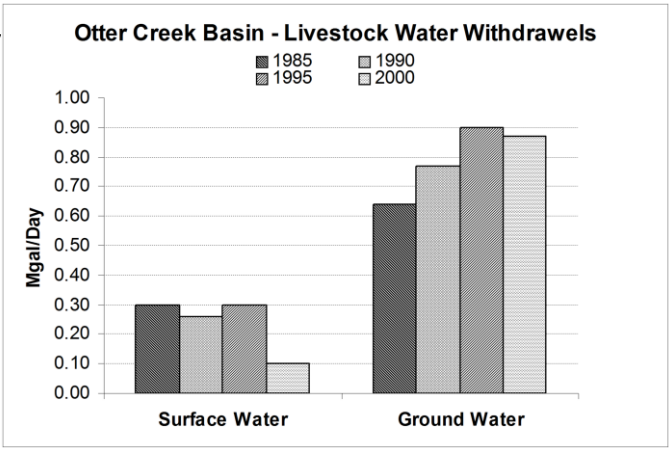


Figure 3.

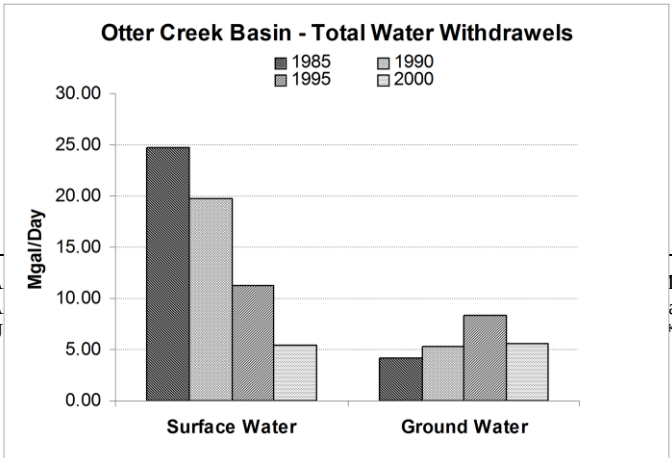
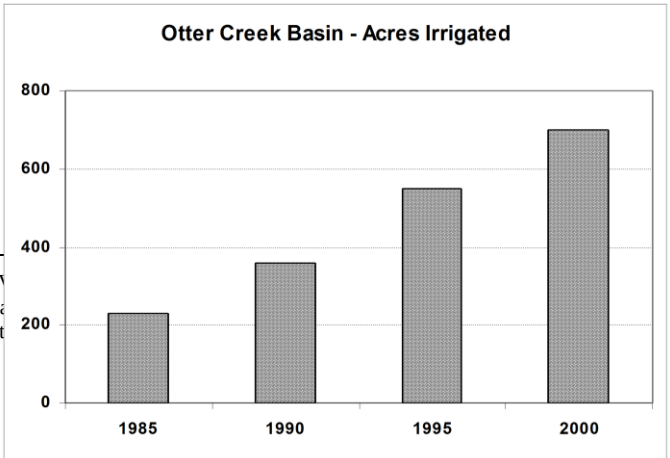


Figure 4.



[12] A
[13] A
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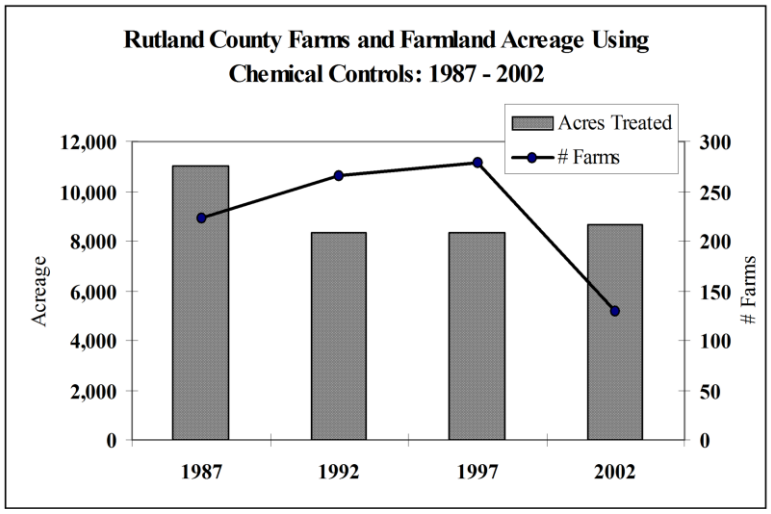
Pesticide Use:

Each farm operation uses a unique and specific combination of tools to combat insect, disease and weed problems. In Rutland County there were 21.2% fewer acres treated and 42.2% fewer farms using agrichemicals in 2002 than 15 years earlier (Table 3, Figure 5). Data interpretation for disease treatment may be problematical, however, due to missing census data for 2002 in Rutland County. [15]

Table 3. Rutland County Farms Using Chemical Controls

	1987	1992	1997	2002
# Farms Using Chemical Control for Insects	49	70	87	25
Acres Treated for Insects	1,627	1,803	1,578	1,947
# Farms Using Chemical Control for Weeds	159	157	158	104
Acres Treated for Weeds	9,215	5,806	6,500	6,738
# Farms Using Chemical Control for Plant Disease	15	39	33	nr
Acres Treated for Plant Disease	175	711	238	nr

Figure 5.



The Agency of Agriculture manages a groundwater monitoring program to determine the quality of groundwater near Vermont farms. The program includes nitrates and corn herbicides. 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 70 samples collected in Rutland County. While pesticides were detected in 9 samples, none were above the drinking water standard (Figure 6). 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 above the drinking water standard (Figure 7). 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.[16]

Figure 6.

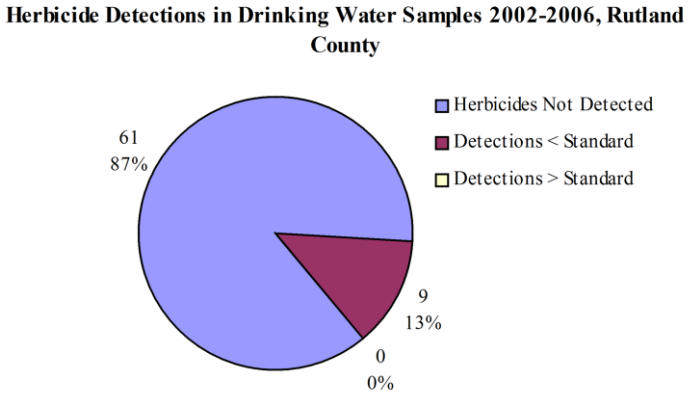
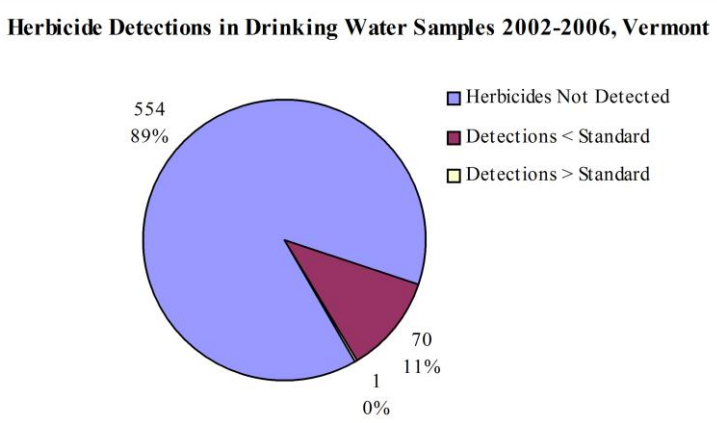


Figure 7.



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

[15] USDA. 2002 & 1992. Census of Agriculture, Vermont State and County Data. http://www.agcensus.usda.gov/Publications/2002/Census_by_State/Vermont .
[16] AAFM. 2007. Personal Communication from J. Comstock, Soil Scientist. Vermont Agency of Agriculture, Food & Markets.

of groundwater quality based on hydrogeologic factors. However, each agrichemical has unique formulations that dictate their fate and transport in the environment. It is, therefore, difficult to screen for each possible compound in groundwater.

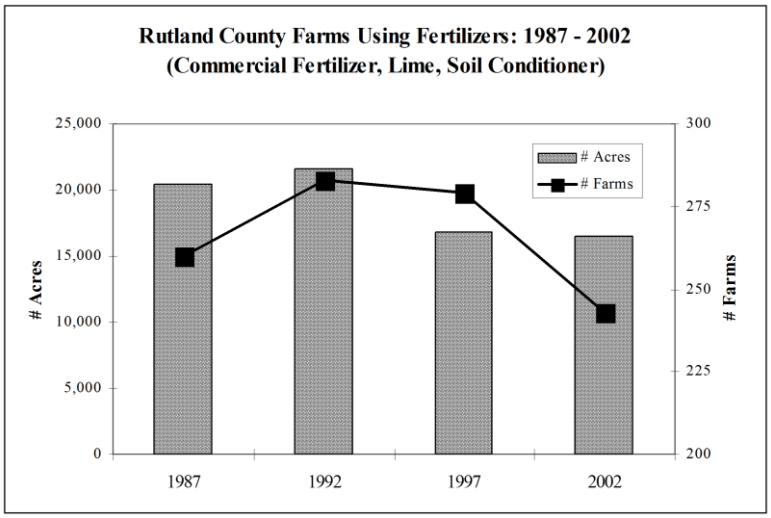
Fertilizer Use:

In Rutland County, the number of acres treated with commercial fertilizers has decreased by 19.2% and the number of farms using commercial fertilizers decreased by 6.5% in the past 15 years (Table 4, Figure 8). [17]

Table 4. Rutland County Farms Using Fertilizers

	1987	1992	1997	2002
# Farms Using Commercial Fertilizer, Lime, Soil Conditioner	260	283	279	243
# Acres Where Fertilizer Spread	20,461	21,634	16,832	16,529
# Farms Using Manure	nr	nr	nr	183
# Acres Where Manure Spread	nr	nr	nr	13,703

Figure 8.



The Agency of Agriculture manages a groundwater monitoring program to determine the quality of groundwater near Vermont farms. The program includes nitrates and corn herbicides. 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.

Between 2002 and 2006 a total of 70 well samples collected in Rutland County were analyzed for nitrates. Of those sampled, 35 had no detections of nitrates. Another 28 had detections between 1 and 10 ppm. Seven samples had detections of nitrates above the drinking water standard of 10 ppm (Figure 9). Statewide, a total of 625 samples were analyzed for nitrates between 2002 and 2006. Of these, 298 (48%) had no detections of nitrates. Another 240 (38%) had detections between 1 and 10ppm and 87 (14%) had detections above the drinking water standard of 10ppm (Figure 10). 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.[18]

Figure 9.

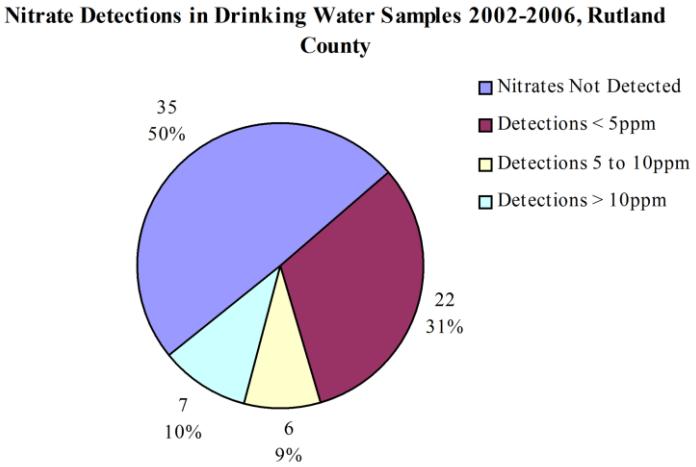
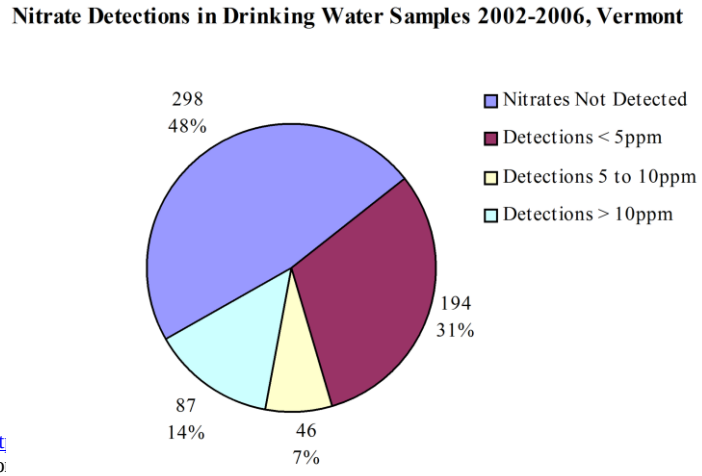


Figure 10.



CONSERVATION PRACTICES

Before 1996, prior to State or Federal cost share funds, many farm improvements were implemented by farmers on their own. Unfortunately, funding for these practices is not documented. Since 1996, over $1,113,482 federal, state and landowner monies have been invested in non-point source pollution control on farms in UOC with an additional $1,801,722 planned (Table 5-7, Figure 11-14). These practices will reduce sediment, pathogen and nutrient loading of waterways and assist farmers in managing nutrients on farm.

Of the farms currently in operation in Upper Otter Creek, 55 have implemented 169 Best Management Practices protecting 957 acres of farmland and resulting in a phosphorous reduction of 781 pounds as per AAFM (Table 6). Each year approximately 4.2 farms are provided with cost-share funds for BMP implementation. Contributions of Federal and State dollars combine to decrease the cost for the farmer/landowner to as little as 15% (for the typical $200,000 manure pit project, 15% is still a high price for one landowner to afford). In addition, 262 BMPs on 27 farms are currently planned or in progress and should be completed in the next few years, protecting 759 acres of farmland and resulting in a phosphorous reduction of 1133 pounds as per AAFM (Table 7). Some of the BMPs installed include: waste storage facilities, improved barnyards, roof runoff management systems, streambank stabilization, fencing animals out of waterways and providing stream crossings and alternative watering systems.

Structural: Cost-share funds for BMP improvements to farm structures have derived primarily from USDA-NRCS and AAFM programs. The *NRCS EQIP* program has installed 1 waste storage facility, 1 roofed loafing area and other BMP's on 5 farms[19]. Over 50 other practices, including waste storage facilities, improved barnyards, walkways and access lanes, and heavy use area protection, have been implemented on 16 farms through *AAFM BMP* funding (Table 5-7).[20]

Table 5. Percent of Animal Units in Dairy Operations Treated Through BMP's

	Farms	Animal Units*	% Treated
Total Farms	61	5,577	
Farms with Improved Barnyards	6	870	9.8%
Farms with Manure Storage	9	1,358	14.8%

Land-Based: Cost-share funds for BMP land based practices have derived primarily from USDA-NRCS, USDA-FSA, USFWS and AAFM programs. *NRCS WHIP* program has worked with 4 farms implementing practices such as wildlife food plots and invasive species removal on 63 acres.[17] The *NRCS WRP* has protected 87 acres[17], the *FSA GRP* 103 acres, and the *FSA CRP*, 74 acres.[21] The *FWS PFW* has protected 22 acres with fencing to prevent livestock from damaging streambanks.[22] The *AAFM CREP* has completed 8 contracts in the watershed protecting 8.5 miles of stream bank.[23] In addition, AAFM and NRCS funding has supported:

Land Treatment Plans are in progress for 1 farm within UOC, through funding from NRCS and AAFM. The requirement for MFO's is that all acreage be managed to the soil loss tolerance specific to each field. For SFO's, the requirement is for soil loss to be managed to twice the tolerance for soil loss for each field.[24]

Nutrient Management Plans have been developed for 14 farms covering 3956 acres within the UOC by farmers, NRCS and NRCD's Southern Vermont Nutrient Management Program (SVNMP).[17, 25] SVNMP often incur no cost to farmers due to funding from AAFM's Nutrient Management Plan Incentive Grants or support of SVNMP; which for

[19] NRCS. 2007. Personal communication from B. Forbes, District Conservationist. USDA Natural Resources Conservation Service - Vermont.
[20] AAFM. 2007 Personal communication from J. Cook, BMP Cost-Share Administrator. Vermont Agency of Agriculture, Food & Markets.
[21] FSA. 2007. Personal communication from P. Torrey, County Executive Director. USDA Farm Service Agency - Vermont.
[22] USFWS. 2007. Personal communication from C. Smith, Partners for Fish & Wildlife Vermont State Coordinator. US Fish & Wildlife Service.
[23] AAFM. 2007 Personal communication from L. DiPietro, CREP Coordinator. Vermont Agency of Agriculture, Food & Markets.
[24] VACD. 2007. Personal communication from J. Fleury, Land Treatment Planner. Vermont Association of Conservation Districts.
[25] SVNMP. 2007. Personal communication from B. Howlett, Nutrient Management Planner. Southern Vermont Nutrient Management Program.

this basin, involved an estimated $20,000 in funding through NMPIG. During winter of 2008, 6 of these farmers completed an NMP workshop hosted by RNRCD, SVNMP and UVM Extension, in which they wrote and will implement their own NMP's.[26] The importance of the NMP's 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.

Farms have also received cost-share funding for other practices such as spring development, fencing, and water diversions. These practices help reduce erosion, phosphorous runoff and pathogen loading of waterways and assist farmers in better managing nutrients on their farms. Cost-share funds have derived from USDA-NRCS, USDA-FSA, AAFM and FWS programs. Only those practices that involve State and Federal money are reported here and that farmers often continue work without benefit of these programs.

Cost Share Data:

Table 6. BMP Projects COMPLETED Upper Otter Creek, 1996 - 2007[27]

Fiscal Year	Farms Funded	Completed Practices	Phosphorus Reduced (lbs)*	Acreage **	Actual Total Cost	Actual Federal Cost	Actual State Cost	Actual Landowner Cost
1996	2	4	0	5	$28,511	$20,715	$2,582	$4,544
1997	1	1	0	1	$1,105	$365	$0	$540
1998	4	8	167	3	$157,436	$112,816	$13,381	$28,944
1999	10	20	259	61	$197,846	$133,151	$29,921	$38,284
2000	5	21	313	7	$144,559	$70,263	$44,248	$27,798
2001	4	7	42	14	$29,750	$19,637	$4,523	$4,690
2002	3	12	0	109	$174,579	$126,382	$46,332	$1,865
2003	2	15	0	259	$93,321	$77,434	$0	$15,887
2004	5	14	0	39	$118,174	$79,281	$20,456	$18,437
2005	7	15	0	93	$43,738	$26,726	$5,596	$11,416
2006	6	25	0	229	$58,078	$38,496	$10,288	$9,294
2007	5	19	0	137	$55,420	$41,306	$5,042	$9,072
2008	1	8	0	0	$10,965	$10,482	$0	$483
Total	**55**	**169**	**781**	**957**	**$1,113,482**	**$757,054**	**$182,369**	**$171,254**

[26] RNRCD. 2008. Personal communication from N. McGuire, District Manager. Rutland Natural Resources Conservation District.
[27] Data summarized represents information from AAFM, USFWS and partial information from NRCS and FSA.

Table 7. BMP Projects IN-PROGRESS Upper Otter Creek, 1996 – 2007[19]

Fiscal Year	Farms Funded	Planned Practices	Phosphorus Reduced (lbs)*	Acreage **	Estimated Total Cost	Estimated Federal Cost	Estimated State Cost	Estimated Landowner Cost
1996	0	0	0	0	$0	$0	$0	$0
1997	0	0	0	0	$0	$0	$0	$0
1998	0	0	0	0	$0	$0	$0	$0
1999	0	0	0	0	$0	$0	$0	$0
2000	0	0	0	0	$0	$0	$0	$0
2001	0	0	0	0	$0	$0	$0	$0
2002	1	5	0	69	$44,183	$44,183	$0	$0
2003	2	22	840	8	$307,736	$205,960	$50,000	$51,776
2004	2	6	0	65	$5,489	$4,117	$0	$1,372
2005	3	51	0	97	$121,859	$91,394	$0	$30,465
2006	5	64	0	237	$263,355	$197,516	$0	$65,839
2007	4	60	0	161	$521,802	$375,926	$23,976	$121,900
2008	10	54	293	122	$537,298	$388,609	$75,000	$73,689
Total	**27**	**262**	**1133**	**759**	**$1,801,722**	**$1,307,705**	**$148,976**	**$345,041**

** Phosphorous reduction estimate where available only for AAFM projects.*
*** Affected acreage was available only for USDA projects.*

Note: Data reported for USDA – NRCS & FSA Farm Bill Program Contracts represents only those contracts that have been entered into the agencies funding database. Estimated funds unaccounted for in these databases amount to total project costs of $116,279, or 24% of total Farm Bill Program contracts in the Upper Otter Creek since 1996 [28].

[28] 2007. Environmental Work Group. Farm Subsidy Database. http://farm.ewg.org/farm/index.php

Figure 11.

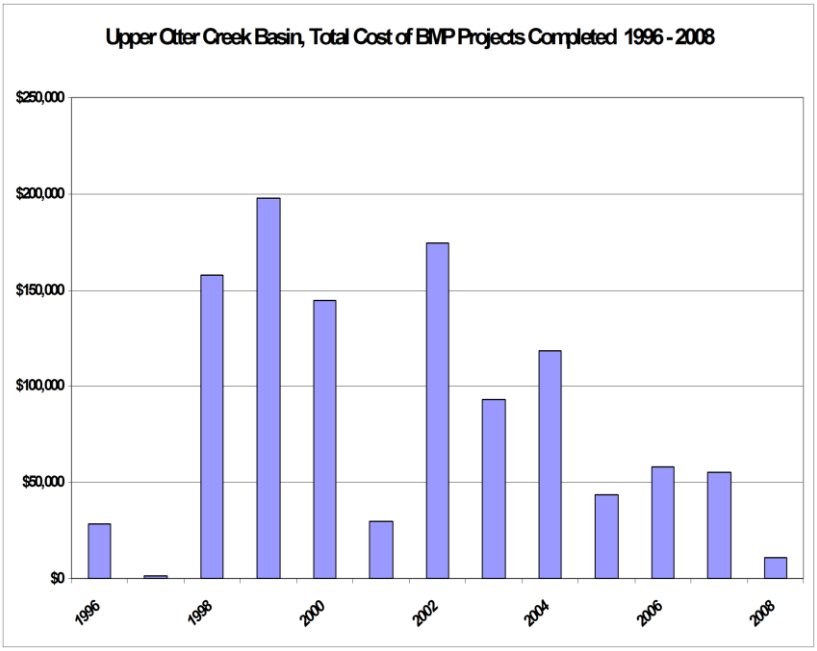


Figure 12.

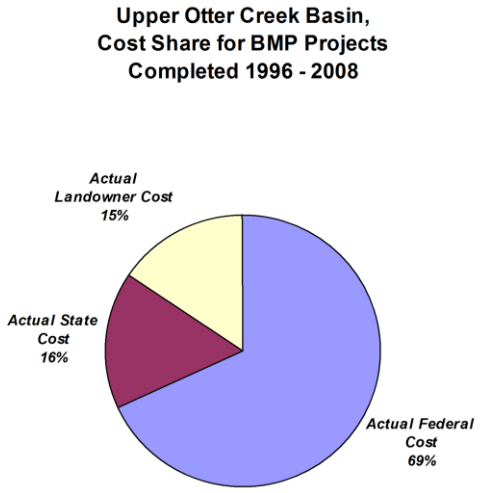


Figure 13.

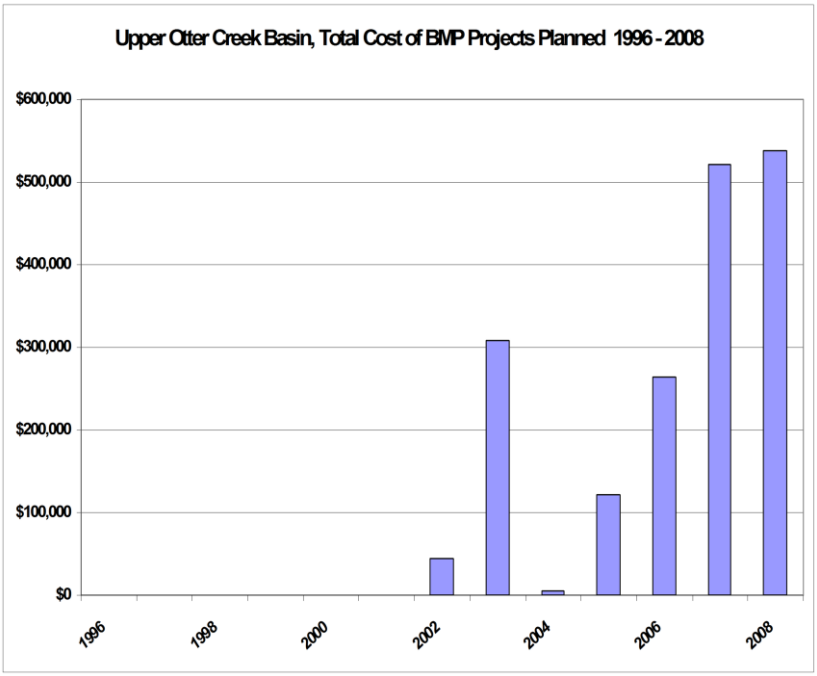
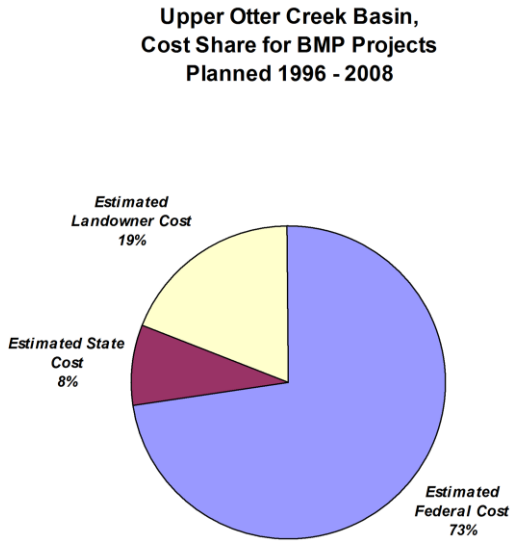


Figure 14.



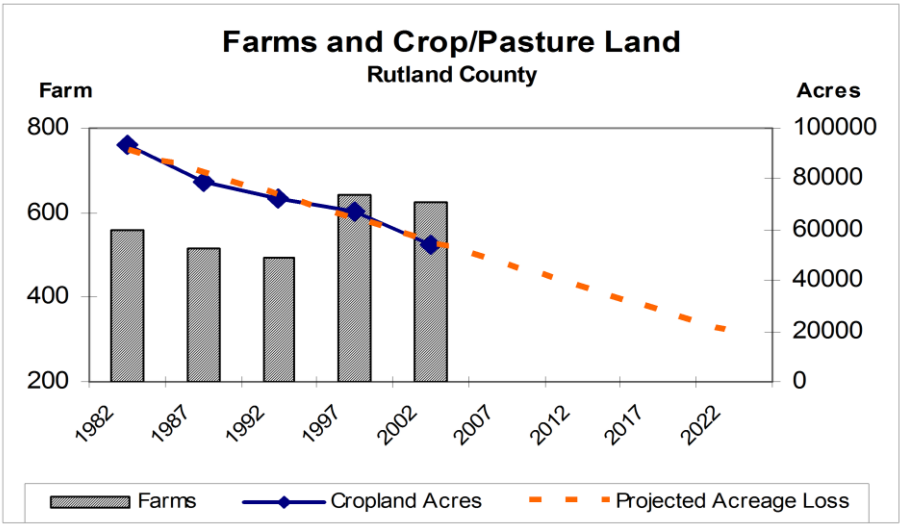
Farm Numbers: The number of farms in Rutland County has increased by 62 (11%) between 1982 and 2002.[29] However, the number of farmed acres in either crops or pasture has decreased by 39,569 acres. This is a 42% decrease in agricultural land in only twenty years (Table 8). Loss of open space to development is evident along many of the major roads in the watershed.

Table 8. Rutland County: Farms and Farmland

	1982	1987	1992	1997	2002	Change (82 to 02)
Total # Farms	561	516	493	643	623	*+11%*
Acres in Farms	166,855	140,177	132,674	128,685	121,203	-27%
Crop + Pasture Acres	93,591	78,702	72382	67,417	54,022	*-42%*

Land Use Trends: Projecting out another 20 years at the present rate of loss, there will be fewer than 25,000 acres in agriculture by the year 2022 in all of Rutland County. Note that this forecast does not necessarily take into account the compounding factors of economics, climate and the future regulatory environment. This predicted decrease is 4.2% of the land base of the county (Figure 15). This loss would dramatically change the cultural and environmental qualities of the area.

Figure 15.



Benefits: The loss of agricultural land has many implications. Per acre, urban land has been shown to have a greater adverse impact on water quality than agricultural land[30]. The increase in pavement and other impervious areas can increase runoff and carry toxic pollutants into waterways. Increased development means greater disturbance to soils, greater impact on natural resources and greater stress on existing farmland to both produce more on less land and to maintain the pastoral nature of the landscape. This becomes increasingly difficult with the concurrent increase in the cost of farming due to higher land costs and higher tax rates. Loss of Vermont's pastoral aesthetic may ultimately affect the State's tourism revenue.

The current economic impact of agriculture in the watershed is telling. Although, the market value for agricultural products sold in Rutland County had hovered around $27 million from 1982 to 1997, the value declined in 2002 by 14% to nearly $24 million. Despite this loss in revenue, agriculture puts a significant amount of money into the local economy; total production expenses in 2002 for Rutland County were $23,951,000 including $2,710,000 in property taxes.

[29] USDA. 1987, 1992, 2002. Census of Agriculture, Vermont State and County Data. http://www.agcensus.usda.gov/Publications/2002/Census_by_State/Vermont .
[30] Hanmer, R. 2006. Food for Thought; Save a Farm, Save the Bay. Bay Journal. V.16, no. 7. http://www.bayjournal.com/article.cfm?article=2921 .

FUTURE CONCERNS

Now, more than ever, farmers are under considerable pressure to sustain economically viable and environmentally sound farming operations. Farmers must face labor issues, foreign competition, competing land use pressures, regulations concerning husbandry, genetics, food safety and stricter water quality regulations under the State's Accepted Agricultural Practices (AAP). In complying with these new AAP's, farmers must address nine key water quality protection concepts:

- No Direct Discharge of wastes to surface waters
- Nutrient and Pesticide Storage and setback requirements
- Nutrient and Pesticide Application, setback and soil testing requirements
- Soil Cultivation designed to minimize erosion
- Waste Management to minimize impacts to water quality
- Buffer Zones maintained on crop land
- Farm Structure design and setbacks
- Streambank Stabilization to federal standards
- Minimize impacts to Groundwater Quality.

Federal, State and private agencies have taken steps to protect farmland and farm water quality through many of the programs listed in the following 'Programs to Address Issues' section. This land protection ensures the availability of agricultural land for future food and fiber production and provides those presently working the farm with some financial assistance to help them succeed. These programs often include assistance for installing conservation practices on the farm that reduce non-point source pollution such as fencing animals out of streams to prevent damage to streambanks and providing them with alternative watering systems. Unfortunately, federal and state cost-share dollars for these practices are limited and competitive.

Using dairy alone, the funding issues can be well illustrated. There are currently 61 operating dairy farms in the Upper Otter Creek, only 9 of which have permanent waste storage facilities designed to federal standards. Of the 52 remaining dairy farms, manure is field stacked in accordance with AAP standards, but some of these farms could benefit from permanent waste management systems (Table 5). To complete implementation of permanent systems for these dairy farms, it will take at least $1,350,080. The figure is based on a treatment cost of $320 per animal unit for waste management systems and a need to treat the remaining 4,219 animal units on dairy farms. Additionally, 55 of these dairy farms have not yet installed improved barnyards. In order to treat the remaining 4,707 animal units on farms that could benefit from this practice, at an average cost of $90 per animal unit, it will cost $423,630 at minimum.

If funding for BMP installation continues at the current level of 4.2 farms per year, it will take over 25 years to treat all the remaining dairy farms in the UOC with appropriate practices. In that time, systems now in use will need upgrading as well. Water quality should gradually improve over time as more farms install these systems. Levels of phosphorus and nitrogen in surface waters should decrease but will not be eliminated. Even greater improvement should come now that nutrient management planning is a requirement of participation in Federal programs. Further improvement could take place if the cost share funding programs are increased for other types of farms and to annual practice implementations such as riparian treatments and buffer installation. An increase in support for these programs would decrease the amount of time it will take to reach maximum nutrient containment.

The Upper Otter Creek remains rural, rich in excellent agricultural land and maintains a diverse agricultural industry. While development pressure is a concern of local towns most are committed to maintaining the rural, agricultural nature of the area. The economics of agriculture, however, will determine the future character.

RIVER SECTIONS IN NEED OF FURTHER ASSESSMENT DUE TO AGRICULTURAL IMPACTS

The 2006 State of Vermont 303(d) Part A list of Impaired Surface Waters in Need of a TMDL lists **NO** agriculturally impaired surface waters within the UOC. This should be celebrated as testimony to the excellent stewardship by the residents of the watershed and encouragement to remain off this list. That said, the Part C list of Priority Surface Waters Outside the Scope of the Clean Water Act Section 303(d) does note two river sections within the UOC that are in need of further assessment due to agricultural impacts.

VT03-03, Otter Creek (Middlebury River Confluence Upstream to Furnace Brook Confluence)

- Current Condition:
    - Possible Pollutants – Sediment, Nutrients, E. coli
    - Possible Problems Needing Assessment – Agricultural Runoff, Bank Erosion

- Agricultural Needs:
    - Irrigation
    - Animal Watering

VT03-15, Clarendon River

- Current Condition:
    - Possible Pollutants – Sediment, Nutrients, E. coli, Storm water
    - Possible Problems Needing Assessment – Agricultural Runoff, Industrial and Urban Runoff

- Agricultural Needs:
    - Irrigation
    - Animal Watering

- Remediation Options:

Both sections of the Upper Otter Creek watershed could be improved with additional practices including:

- waste storage facilities
- fencing along streams to exclude animals with alternative watering systems
- stream crossings for animals, walkways and access lanes
- roof runoff management
- silage leachate management
- improved barnyards and heavy use area protection
- milkhouse waste management
- surface and subsurface water diversions
- buffers along waterways
- streambank stabilization
- stream channel stabilization
- grade stabilization structures along the river channel
- control of invasive species

RECOMMENDATIONS FOR AGRICULTURAL NPS IMPROVEMENT IN THE BASIN

The following were developed from input to the Basin 3 Agricultural Focus Group forums held from January 2003 to March 2008.

STRUCTURAL PRACTICES

1 Increase implementation of water quality Best Management Practices.

Strategy a. Work with farmers, state/federal agencies, private industry and utilities to design and implement barnyard improvement, innovative biosolid and agricultural waste management practices.

Lead Agency FSA, NRCS, AAFM, UVM Ext, NOFA, NRCD, SVNMP, VFB, CVPS, Farm Operators

Funding FSA, NRCS, AAFM, CVPS, UVM Ext

Timeline On-going

2 Increase funding opportunities for water quality Best Management Practices and equitable distribution of funds statewide.

Strategy a. Work with USDA to increase funding for programs such as EQIP, CRP, CREP, WHIP.

b. Work with AAFM to increase funding for programs such as VABP, NMPIG and FAPP.

c. Work with FWS to increase funding for PFW program to install more alternative watering systems, riparian buffers and fencing.

d. Work with state, federal and local organizations on statewide equitability.

Lead Agency FSA, NRCS, RC&D, AAFM, ANR, UVM Ext, NOFA, NRCD, VACD, VFB, Farm Operators

Funding AAFM, ANR

Timeline On-going

3 Increase awareness of the MFO and LFO requirements and how they may affect SFO's in the future.

Strategy a. Work with farmers through outreach and education of MFO and LFO regulations.

Lead Agency AAFM, UVM Ext, NOFA, NRCD, SVNMP, VFB, Farm Operators

Funding AAFM, UVM Ext

Timeline On-going

LANDBASED PRACTICES

1 Develop innovative and emerging technology which will result in improved water quality while maintaining the economic integrity of the agricultural land base in the basin.

Strategy a. Increase awareness/development of manure storage/handling practices and wastewater treatment.

Lead Agency AAFM, ANR, UVM Ext, CVPS, NOFA, NRCD, SVNMP, VFB, Farm Operators

Funding AAFM, ANR, UVM Ext

Timeline On-going

2 Increase awareness of and compliance with the Accepted Agricultural Practices.

Strategy a. Work with farmers through education and outreach on the Accepted Agricultural Practices.

b. Encourage development of peer advisory groups for problem solving agricultural resource concerns.

Lead Agency AAFM, UVM Ext, NOFA, NRCD, SVNMP, VFB, Farm Operators

Funding AAFM

Timeline On-going

3 Increase development and implementation of nutrient management planning.

Strategy a. Increase funding for farmers to create their own nutrient management plans.

b. Increase technical assistance for farms to develop nutrient management plans.

Lead Agency NRCS, AAFM, ANR, UVM Ext, NOFA, NRCD, SVNMP, VFB, Farm Operators

Funding NRCS, AAFM, ANR

Timeline On-going

4 Increase understanding of the effects of development in the watershed.

Strategy
a. Provide education on the affects of development in the watershed.
b. Work with legislators and town select boards to protect agriculturally productive soils.
c. Provide education the value of our working landscape.

Lead Agency EPA, NRCS, AAFM, ANR, UVM Ext, NOFA, NRCD, RPC, SVNMP, VACD, VFB, Farm Operators

Funding EPA, FWS, RC&D, AAFM, UVM Ext, NFWF, TNC

Timeline On-going

5 Increase awareness of NPS Pollution and the AAPs within the equine community.

Strategy
a. Hold equine industry workshops on NPS Pollution and the AAPs.

Lead Agency EPA, NRCS, AAFM, ANR, UVM Ext, NRCD, SVNMP, VFB, Farm Operators

Funding EPA, FWS, AAFM, ANR, NFWF, TNC

Timeline 2014

6 Increase awareness and implementation of farm soil health improvement practices.

Strategy
a. Provide additional technical assistance to farmers on cover cropping, crop rotation, composting, conservation tillage, and soil sampling techniques.
b. Provide increased financial support to farmers adapting such newer technologies to their farms.

Lead Agency FSA, NRCS, AAFM, UVM Ext, NOFA, NRCD, SVNMP, VFB, Farm Operators

Funding NRCS, AAFM, ANR, UVM Ext

Timeline On-going

7 Increase research, technical and financial support for use of grass-based farming practices.

Strategy
a. Work with legislators to provide financial support to farmers adopting grass farming practices.

Lead Agency AAFM, UVM Ext, NOFA, NRCD, SVNMP, VACD, VFB, Farm Operators

Funding AAFM, ANR, UVM Ext, TNC

Timeline On-going

8 Increase voluntary farm buffer establishment, as appropriate, along surface waterways and upland wetlands.

Strategy
a. Increase financial support to farmers willing to install buffers through programs like CREP, VABP.
b. Work with state, federal and local organizations to establish these buffers.
c. Provide education on the need for buffers.

Lead Agency FSA, NRCS, AAFM, ANR, UVM Ext, NOFA, NRCD, VFB, Farm Operators

Funding EPA, FWS, AAFM, ANR, NFWF, TNC

Timeline On-going

9 Exclude livestock from streambank and shoreline areas and establish alternate water sources, particularly in areas that are at high risk for phosphorus loss and soil erosion.

Strategy
a. Increase technical and financial assistance to farms willing to exclude livestock from surface waters.
b. Provide education on the benefits of livestock exclusion from surface waters.
c. Identify and prioritize high risk streambank and shoreline areas.

Lead Agency FSA, FWS, NRCS, AAFM, ANR, UVM Ext, NOFA, NRCD, SVNMP, VFB, Farm Operators

Funding FWS, AAFM, ANR, NFWF, TNC

Timeline On-going

10 Maximize the potential of the next Conservation Security Program allocation for the Upper Otter Creek Basin.

Strategy a. Identify lands in need of protection through such programs as CSP.

b. Provide outreach and education on the CSP program prior to next round of funding for UOC Basin.

Lead Agency FSA, NRCS, AAFM, ANR, UVM Ext, NOFA, NRCD, VFB, Farm Operators

Funding FSA, AAFM, ANR

Timeline 2014

11 Prevent agricultural pesticide loss to surface waters.

Strategy a. Continue technical assistance on pesticide use, safety and alternatives.

Lead Agency FSA, NRCS, AAFM, ANR, UVM Ext, NRCD, VFB, Farm Operators

Funding FWS, AAFM, ANR, NFWF, TNC

Timeline On-going

12 Minimize urban and rural practices that contribute to poor water quality.

Strategy a. Identify and assess river sections along the Upper Otter Creek mainstem and it's tributaries for development of potential stormwater retention areas.

b. Educate homeowners, resorts, developers on affects of fertilizers/pesticides, impervious surfaces, stormwater runoff, etc.

Lead Agency EPA, NRCS, AAFM, ANR, UVM Ext, NRCD, RPC, VACD, Watershed Groups, VFB, Farm Operators

Funding EPA, FWS, AAFM, ANR, NFWF, TNC

Timeline 2014

13 Develop river maintenance technologies specific to the Upper Otter Creek river system, that purposefully consider the needs of agriculture within the basin.

Strategy a. Research innovative bank stabilization strategies such as forms up armoring, where appropriate.

b. Support research and provide outreach specific to unique characteristics of the UOC river system.

Lead Agency NRCS, USACE, AAFM, ANR, UVM Ext, NRCD, RPC, VACD, Watershed Groups, VFB, Farm Operators

Funding USACE, AAFM, ANR

Timeline 2014

INFRASTRUCTURE PRACTICES

1 Prioritize agricultural water quality Best Management Practice programs to areas in need of improvement due to unmet resource concerns.

Strategy a. Research and compile BMP practice locations throughout the watershed and identify areas in need of additional BMP practices.

Lead Agency FSA, NRCS, RD, AAFM, ANR, UVM Ext, NRCD, Watershed Groups, VFB, Farm Operators

Funding NRCS, AAFM, ANR, NFWF, TNC

Time-line On-going

2 Estimate costs of needed agricultural water quality BMP projects and their contribution to required phosphorus reductions.

Strategy a. Research the applicability of similar project cost estimates in other states including information on market value fluctuations.

b. Research accuracy of P reduction estimators for BMP practices.

Lead Agency FSA, NASS, NRCS, AAFM, UVM Ext, NRCD, VFB, Farm Operators

Funding AAFM, ANR

Time-line 2014

3 Inform farmers about additional funding sources available for conservation program practices that will enable farm operators to meet their cost-share obligations in a timely manner.

Strategy
a. Research, compile, regularly update, and distribute farm funding source information.
b. Support farm business management outreach programs.
c. Hold informational workshops on farm funding sources and assistance with funding applications.

Lead Agency FSA, NRCS, AAFM, ANR, UVM Ext, CVPS, NOFA, NRCD, VFB, Farm Operators

Funding AAFM, ANR

Time-line On-going

4 Build conservation planning and funding mechanisms for farm operations not currently participating in USDA and AAFM conservation programs.

Strategy
a. Support increased funding for local programs like SVNMP that provide technical assistance to farms underserved by USDA.
b. Work with legislators to develop financial assistance programs for nontraditional/diversified farms.

Lead Agency RC&D, AAFM, ANR, UVM Ext, NOFA, NRCD, SVNMP, VACD, VFB, Farm Operators

Funding AAFM, ANR

Time-line On-going

5 Support programs that better serve the farming industry in Vermont.

Strategy
a. Work with legislators to address milk pricing issues through regional policies.
b. Work through local organizations to establish infrastructure for transport, storage and processing of diversified farm products.

Lead Agency AAFM, ANR, UVM Ext, NOFA, NRCD, RPC, VACD, VHCB, VFB, Farm Operators

Funding AAFM, VHCB

Time-line On-going

6 Support tax programs that keep land in agriculture.

Strategy
a. Work with legislators to address tax programs affecting farmland.

Lead Agency AAFM, ANR, UVM Ext, NOFA, NRCD, VHCB, VACD, VFB, Farm Operators

Funding AAFM, VHCB

Time-line On-going

7 Compile agricultural statistics by watershed.

Strategy
a. Work with State and federal agencies to compile agricultural statistics in a more flexible format.

Lead Agency EPA, FSA, FWS, NASS, NRCS, AAFM, ANR, UVM Ext, NOFA, NRCD, VACD, VFB, Farm Operators

Funding EPA, AAFM, ANR

Time-line 2014

8 Support outreach programs on farm viability.

Strategy
a. Support the Vermont Housing & Conservation Board's Farm Viability Enhancement Program.
b. Support the Vermont Agricultural Viability Council's work to outline farm viability needs.
c. Support Women's Agricultural Network and groups that provide education on business management.

Lead Agency FSA, RD, AAFM, ANR, UVM Ext, NOFA, NRCD, VACD, VHCB, VFB, Farm Operators

Funding RD, AAFM, UVM Ext, VHCB

Time-line On-going

COOPERATING PARTNERS

- State:
    - University of Vermont, Cooperative Extension Service – UVM Ext.
    - Vermont Agency of Agriculture Food & Markets - AAFM
    - Vermont Agency of Natural Resources - ANR

- Federal:
    - US Army Corps of Engineers - USACE
    - USDA Farm Service Agency - FSA
    - USDA Forest Service - FS
    - USDA National Agricultural Statistics Services - NASS
    - USDA Natural Resource Conservation Service – NRCS
    - USDA Resource Conservation and Development – RC&D
    - USDA Rural Development - RD
    - US Environmental Protection Agency - EPA
    - US Fish & Wildlife Service – FWS

- Local:
    - Central Vermont Power Service – CVPS
    - Natural Resource Conservation Council – NRCC
    - Rutland Natural Resource Conservation District - NRCD
    - Rutland Regional Planning Commission – RPC
    - Southern Vermont Nutrient Management Program - SVNMP
    - Town Governments & Selectboards
    - Vermont Association of Conservation Districts – VACD
    - Vermont Housing and Conservation Board – VHCB

- Other:
    - Lake Champlain Basin Program
    - National Fish & Wildlife Foundation - NFWF
    - Nature Conservancy of Vermont – TNC
    - Northeast Organic Farmers Alliance of Vermont – NOFA
    - Vermont Farm Bureau – VFB
    - Farm Operators
    - Watershed Groups

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 (AAFM) 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 AAFM and NRCS engineers are available to help farmers assess these BMPs.

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

Large Farm Operations (LFO) – The 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 handing 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.

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 $14,000 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 ($25 per acre); Conservation Crop Rotation ($25 per acre); and Cross-Slope Tillage ($10 per acre).

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

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

Free technical assistance and information is provided through the natural resource conservation districts. http://www.vacd.org/

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

Southern Vermont Nutrient Management Program Co-sponsored by Windham County NRCD, the SVNMP provides on-farm consultation, with the primary goal of working on individual nutrient management plan development. Nutrient management plans are required in Vermont on larger farms and on farms participating in Federal and State cost-share programs. A detailed plan involves field and crop histories, soil tests and sampling results, and a detailed plan for use of all on-farm nutrients so as to maximize environmental and financial sustainability.

http://www.vacd.org/wnrcd/documents/SVNMP_Brochure.pdf

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 Enhancement Program** (CREP) is a State-federal conservation partnership program targeted to address specific State and nationally significant water quality, soil erosion and wildlife habitat 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

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. 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 ranchland 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.

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 a minimum of 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 **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 G - Basin 3 Watershed Plan - Agricultural Aspects – Lower Otter Creek *including Lewis Creek and Little Otter Creek*

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Purpose:

The purpose of the following report is to provide a resource document that compiles agricultural data, details the current status of agriculture and outlines the concerns and water quality improvement recommendations of the agricultural community within the Lower Otter Creek (LOC) Basin of Addison County, Vermont.

The data and status information summarized is from the most recently available agricultural data for the LOC. Sources for this data include: USDA Farm Service Agency, USDA National Agricultural Statistics Service, USDA Natural Resources Conservation Service, US Fish & Wildlife Service, US Geological Survey, ANR Department of Environmental Conservation, Vermont Agency of Agriculture Food & Markets, Northeast Organic Farmers Association and the Otter Creek Natural Resources Conservation District and several agricultural texts cited throughout. The data reported is by watershed if available; otherwise, the data represents county information and is so noted.

The concerns and recommendations for water quality improvement in this report were developed by an Agricultural Focus Group formed of farmers in the basin. This group held at least 16 meetings from January 2003 through May 2008 to discuss agricultural concerns, review relevant information, provide feedback on the overall agricultural section and to formulate the recommendations included in this section.

This report is provided by the Vermont Agency of Agriculture Food & Markets (AAFM) to the Vermont Department of Environmental Conservation (DEC) for incorporation into the most recent Basin Plan for this watershed. The AAFM provides funding to the Natural Resource Conservation Districts of Vermont to both develop these reports and organize the Agricultural Focus Groups within each basin.

Goal:

The goal of the agricultural section is to provide supportive data and a concise list of recommendations to address agricultural water quality issues within the basin. These recommendations outline preferred methods and types of agricultural improvements and, also, point out the changes to infrastructure that will be necessary if agriculture is to remain economically viable. The continuance and improvement of local agriculture as a viable business must be considered a priority in order for the agricultural community to afford both installing practices that will result in improved water quality and contributing to the maintenance of Vermont's valuable pastoral landscape.

SUMMARY

The Otter Creek is the longest river that is entirely in Vermont. It drains almost 1,000 square miles along its 100-mile length, less than either the Winooski or the Mississquoi River.[31] With the Winooski, it is one of three Vermont rivers that are getting cleaner, showing decreases in amounts of Phosphorous since 1991.[32]

The Lower Otter Creek (LOC) Basin has 37.4% of total land base in agricultural use. One in ten residents is estimated to work in agriculture. In 1998 alone, agriculture returned $1.6 million to the local economy and resulted in additional secondary output and value added dollars, increasing that amount to $2.5 million.[33]

Since the 1996 Farm bill and the Federal Agriculture Improvement and Reform Act to 2006, LOC farmers have implemented conservation practices at a total estimated farmer cost of over $2.5 million. There is an additional $7.1 million in federal and $1.1 million in state funds committed to practices for an estimated total contract amount nearly $10.8 million in the Lower Otter Creek basin of Addison County.[34,35]

Farmers have implemented numerous conservation practices since the 1930s. Of note, Addison County farmers were installing manure storage and improved barnyards starting 20 years prior to the winter spreading ban; Addison County had a number of successful Small Watershed efforts particularly Lake Champlain Direct and the Lemon Fair; Addison County has the highest CREP and CRP participation in the state to date, having planted 600 acres of riparian buffer.[4,5] Addison County has the most conserved agricultural acres statewide with 25% of agricultural land in Addison County conserved with an easement.[36] Addison County is home to two farm electrical generation systems, including the first methane generation system in the state and host of a test site for P reduction via algal growth systems.

Agriculture has cooperated over the decades with a number of efforts by many partners to implement conservation. The Otter Creek flows through the 15,000-acre northern white cedar swamps in Cornwall and Whiting, where the Vermont Nature Conservancy has protected miles of riverbank and more than 1,034 acres of bottomland.[37]

Economics is always a concern. Increased funding for farm production area Best Management Practices to meet current water quality standards with corresponding increases in technical assistance for design and implementation are a need.

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[31] Vermont Agency of Natural Resources. 1998. Basin 3 Otter, Little Otter, Lewis Creek Watersheds Water Quality and Aquatic Habitat Assessment Report. Department of Environmental Conservation, Water Quality Division.
[32] Medalie, L., and E. Smeltzer. 2004. Status and trends in phosphorus in Lake Champlain and its tributaries, 1990-2000. pp. 191-219 in T. Manley et al. (eds.). Lake Champlain: partnership and research in the new millennium. Kluwer Academic/Plenum Publishers. NY. www.lcbp.org/reports.htm .
[33] American Farmland Trust. 1998. The Economic Importance of Agriculture: A Profile of Addison and Franklin Counties, Vermont. www.farmland.org .
[34] USDA. 2002. Census of Agriculture, Vermont State and County Data. www.agcensus.usda.gov/Publications/2002/Census_by_State/Vermont .
[35] VAAFM. 2007. BMP Program Data.
[36] Vermont Land Trust. 2008. Farmland Program Data. www.vlt.org/agriculture.html .
[37] Nature Conservancy – Vermont Chapter. 2008. Preserve Program Data. www.nature.org/wherewework/northamerica/states/vermont/preserves/ .

Nearly 21 river miles of the LOC including Lewis Creek and the Little Otter Creek are impaired due to agriculture by E. coli in excess of the acceptable levels promulgated by Vermont Water Quality Standards (this is almost 30% of the total LOC river miles that are impaired and in need of a TMDL).[38]

[38] ANR. 2006. State of Vermont 303(d) List of Waters, Part A-F. Vermont Department of Environmental Conservation-Water Quality Division. Waterbury, VT. www.anr.state.vt.us/dec/waterq/planning.htm .

Agriculture – Introduction

The Lower Otter Creek watershed of Addison County is comprised of a large area of former Champlain Sea floor once called The Great Plains of Vermont, now referred to commonly as the clay plain.[39] The cultural landscape of Addison County has over a few hundred years been built on this clay plain.[40] There are sandy outwashes but these are laid upon underlying clay. Clay is a productive agricultural soil that holds moisture and nutrients for plant growth. Success with annual crops depends on the practice of plowing in the fall following manure application. Winter freezing and thawing allow the clay soils to be spring tilled and planted in either an annual crop or a grass/legume rotation. Cover cropping clays is marginally successful for these reasons.[41]

Agriculture gives the Otter Creek watershed, within Addison and Rutland counties, a rural character. Dairy agriculture is still dominant in Addison County even with recent increases, if not explosion, of small and diverse agricultural enterprises. This remains so even though a patchwork of agricultural land has been lost to development over a half century of population increases, evidenced by strip developed roadways, densely developed lakeshores and growing urban areas. Even with these changes, agriculture continues to provide the watershed an economic base, a cultural identity and an environment that combines field, forest, pasture and village.

Approximately 5.5% of the Otter Creek basin has been developed into roads, homes and businesses.[1] Of the 517,120 acres that make up the county, 37.4% or 193,376 acres, is in agricultural uses.[42] This is the second largest land use type in the watershed but is far below the 60% of forested land.[1] The dominant farm commodities are milk and meat but farms in the basin also produce substantial amounts of apples, wool and vegetables. Farm-owned forestland extends farm production into maple syrup and forest products. This county also is home to many horses, kept both in small numbers and larger numbers kept in stables, including the UVM Morgan Horse Farm.[43]

Agriculture is a significant force in the economy of the county and the state. In 2002, agricultural products produced in Addison County had a market value of $106 million. That year, farms in Addison County returned over $90 million to the local economy, in production costs and property taxes.[13] Estimates have added to this figure secondary and value added outputs, which put the total economic farm return to the county at $250,000,000.[3]

An example of the value added agricultural economy is the Agri-Mark-Cabot cheddar cheese factory in Middlebury, which hires about 60 employees and produces award winning cheddar at national competitions. More recently, homestead cheeses have added their efforts to the value added economy. Agri-tourism is also a portion of annual receipts in a county where agri-tourism is a seamless portion of the Champlain Valley's rich historical heritage. Agriculture also pprovides more than ten percent of all the jobs in the region. Note that this is a conservative estimate as this figure does not consider jobs in industries such as tourism and recreation that also rely on agriculture. [3]

Agriculture contributes the most land by far in attainment of society's water quality goals. Agriculture as a working landscape provides many benefits to the environment. Fields, pastures and forestland maintain large tracks of open space. Fewer pollutants are released from an acre of agricultural land than from an acre of developed land.[44] Field and forest soils absorb water allowing it to permeate into the ground rather than quickly running off directly into rivers as the case on paved surfaces. Farms manage and recycle farm-produced wastes as fertilizer and soil amendments, and work to reduce runoff of soil, nutrients and pathogens.

Farmers have been cognizant of long term societal changes and the cumulative impacts of increased development. Their observations of local increases in homebuilding and drive way lengths dovetails with the goals of voluntary storm water management where Limited Impact Development aims at disconnecting impervious sites from the storm water flow. Where farmers observe increased impacts to river miles that they farm, researchers have observed decreases in storm water flows of 107%, a delay in the stormwater surge by an average of 24 minutes and a general decrease in mass pollutant export in a BMP neighborhood compared to a traditional and control neighborhood.[45] Successes in implementation of Limited Impact Development with complement successes achieved in agriculture.

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[39] Meeks, H.A. 1986. Vermont's Land and Resources. New England Press. Shelburne, VT.
[40] Ebeling, W. 1979. The Fruited Plain: The Story of American Agriculture. University of California Press.
[41] USDA. 1971. Soil Survey of Addison County, Vermont. USDA Natural Resource Conservation Service.
[42] UVM Spatial Analysis Lab. 2005. Vermont LULC Mapping Project. www.uvm.edu/~joneildu/LULC/ .
[43] USDA. 2002. Census of Agriculture, Vermont State and County Data. www.agcensus.usda.gov/Publications/2002/Census_by_State/Vermont .
[44] USGS. 1996. Nutrients in the Nation's Waters: Identifying Problems and Progress. Fact Sheet FS-218-96. pubs.usgs.gov/fs/fs218-96/ .
[45] Jordan Cove Urban Watershed Project , Waterford , CT http://www.newecology.org/documents/Forum%202004%20PDFs/Jordan_Cove.pdf

Given the uneven financial status of farming in Addison County, it is important to note that farmers have contributed over $835,000[46] (with and additional $1,711,000 planned) towards federal and state cost-share programs that address on-farm impacts to water quality through the implementation of Best Management Practices in the Lower Otter Creek basin including Lewis Creek and Little Otter Creek. This is in comparison to amounts spent overall by USDA NRCS, AAFM, and ANR (Table 5 & 6).

Agriculture has been sustaining society in the valley for over 200 years.[10] Soil Conservation has been a local and national effort for seventy years. Early conservation efforts provided farmers with a solid understanding of soil health and science provided a local landowner based organization (Conservation Districts) from which landowners could work with USDA NRCS and other partners, and recognized outstanding farm operators. Forty years later, efforts on the land became more focused on impacts to water quality following passage of the Section 319 amendment to the Clean Water Act.[47] It will take time, work and investment on the part of Federal, State and local organizations, as well as farmers, to complete the tasks at hand.

In addition, within the past 30 years, agricultural land has been converted to urban and suburban development. According to an LCBP study, urban and suburban land contributed about 53% of the phosphorus runoff basin-wide to Lake Champlain and agricultural lands contributed about 39%.[48] This study was based on satellite imagery from 2001. Doubtless more agricultural land has been lost since. Agricultural gains in conservation efforts have been increasing for the last twenty years. With participation from the other sectors (transportation, residential and business, i.e.) further gains will be realized.

Agriculture has cooperated over the decades in a number of efforts by many partners to increase riparian habitat. For example, the Otter Creek flows through the 15,000-acre northern white cedar swamps in Cornwall and Whiting, where the Vermont Nature Conservancy has protected miles of riverbank and more than 1,034 acres of bottomland.[7]

AGRICULTURE - FARM NUMBERS AND TYPES

Much of the agricultural information collected by the Agricultural Census is used primarily for an economic purpose and is collected on a countywide basis. While the Lower Otter Creek encompasses 78% of Addison County, a number of dairy farms are outside of this watershed. Therefore, the information provided here must be used with that caveat. USDA NRCS is now collecting data on a watershed level, which will be more useful for basin planning purposes.

The most recent data available from the USDA 2002 Census shows a diversity of farm types ranging from dairy and horse to goats, rabbit, grain corn, wheat and oats (Table 1).[13] The Census defines a farm as 'any place from which $1000 or more of agricultural products were produced or sold, or normally would have been sold, during the census year'. Of the 676 Addison County farms listed in the 2002 Census, 405 (60%) are the primary occupation of the operators; those operating the farm without benefit of external occupations and many are diverse.

Dairy Farms and their associated crops are the predominant animal agricultural use in the Lower Otter Creek (LOC). Year 2007 Vermont Agency of Agriculture, Food & Markets data shows 200 operational dairy farms in the LOC.[49]

Of this number, there are 5 Large Farm Operations in the LOC. An LFO is defined as a farm with 700 or more mature cows, 1000 beef cows, or a poultry operation with over 30,000 birds.[50]

There are 34 Medium Farm Operations in the LOC. The MFO rule applies to farms with 200 or more mature cows (dry or lactating), 300-999 cattle or cow/calf pairs, 300-999 dairy youngstock or heifers, 150-499 horses, 16,500-54,999 turkeys, or 25,000-81,999 laying hens without a liquid manure handling system.[51] 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, milk house liquids, barnyard runoff etc) may leave the production area and enter surface water. Second, the MFO must have completed by March

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[45] USDA NRCS-VT. 2008. Conservation Program Data.

[47] Cox, C. 2006 "US Agricultural Conservation Policy and Programs: History, Trends and Implementations" in *US Agricultural Policy and the 2007 Farm Bill*. Arha, K, T Josling, DA Sumner (editors). Woods Institute for the Environment. Stamford University. environment.stanford.edu/ideas/farmbill.html .
[48] Troy, A., D. Wang and D. Capen. 2007. Updating the Lake Champlain Basin Land Use Data to Improve Prediction of Phosphorus Loading. LCBP Technical Report #54. The Rubenstein School of Environment and Natural Resources University of Vermont. www.lcbp.org/reports.htm .
[49] VAAFM. 2007. Dairy Program Data.
[50] VAAFM. 2007. LFO Program Data.
[51] VAAFM. 2007. MFO Program Data.

2008 a Comprehensive Nutrient Management Plan, that is, follow a nutrient management plan for the land application of wastes and additional nutrients. Land application of wastes may not result in the primary or secondary groundwater standard being exceeded.

There are over 200 Small Farm Operations in the LOC. 158 Small Farm Operations are dairies. Many more are non dairy farms. The SFO is defined as any farm with less than 200 mature cows, less than 300 young stock or heifers, less than 150 horses, 300 sheep or 9000 hens.[52] SFO's may comply with regulations regarding water quality (as with MFO's) by implementing a Comprehensive Nutrient Management Plan.

There are 32 certified Organic Farms in the LOC. These farms have a total of 3,900 acres in hay, 1,776 acres in pasture, 368 acres in various crops, and another 27,477 square feet in greenhouses. In total, 6% of farms in Addison County are certified organic.[53]

Table 1 Addison County: Types of Farms – 2002

	Number of Farms	Acres	Animals
Hay	401	80608	
Dairy	222		32797
Grass	190	55134	
Corn Silage	163	24330	
Horse	154		908
Beef	112		1209
Poultry-All	111		D
Maple Sugar	98	24681 g	
Sheep	56		1737
Vegetable	51	258	
Nursery	42	32	
Orchard	42	1328	
Goat (milk)	31		1056
Christmas Tree	26	212	
Bee	25		2050 hives
Berry	22	43	
Corn Grain	20	1279	
Hog	18		123
Rabbit	14		34
Llama	13		161
Total	**676**		

AGRICULTURE - CONSERVATION EASEMENTS

Addison County was home to the late Senator Arthur Gibb, R.-Weybridge who became the first Addison County resident to sell the development rights to his property to the Vermont Land Trust. In 2007, the Vermont Land Trust acknowledged 30 years of holding easements that limit development on land. Addison County has the most acres of conserved farmland statewide. Of the nearly 55,000 acres of Vermont Land Trust-conserved land in Addison County, 47,686 acres is associated with farm operations, including 37,623 acres in dairy and 4,147 acres of cropland.[54] Land is Addison County is also conserved by other entities

[52] VAAFM. 2007. SFO Program Data.
[53] NOFA Vermont. 2006. Program Data.
[54] Vermont Land Trust. 2008. Program Data.

including the Vermont Agency of Agriculture, Food and Markets and the Middlebury Area Land Trust, among others. This total approximates 25% of Addison County agricultural land that has a conservation easement.

AGRICULTURE – WATER USES

Water use data is collected by USGS by basin. Water from the Lower Otter Creek Basin is an important resource for agriculture in the watershed. Vegetables, orchards, berries, and nursery stock are all being supported by irrigation. Yet, combined total water withdrawals for animal watering and irrigation account for only 6% of the total water withdrawals by all uses (Table 2 & Figures 1, 2, 3). The vast majority of water withdrawals are for public supply, domestic, industrial and thermoelectric uses.

In the period between 1985 – 2000* the number of acres under irrigation more than doubled from 230 to 700 (Figure 4). While the irrigation figure is small and covers agriculture, golf courses and cemeteries, the availability of irrigation is crucial to producers. [55]

Table 2. Otter Creek Basin – Water Withdrawals (Mgal/Day)

		1985	1990	1995	2000
Surface	*All Uses*	24.74	19.78	11.27	5.48
	Irrigation	0.10	0.09	0.37	0.36
	Livestock	0.30	0.26	0.30	0.10
Ground	*All Uses*	4.23	5.33	8.32	5.58
	Irrigation	0.00	0.01	0.04	0.04
	Livestock	0.64	0.77	0.90	0.87

Figure 1.

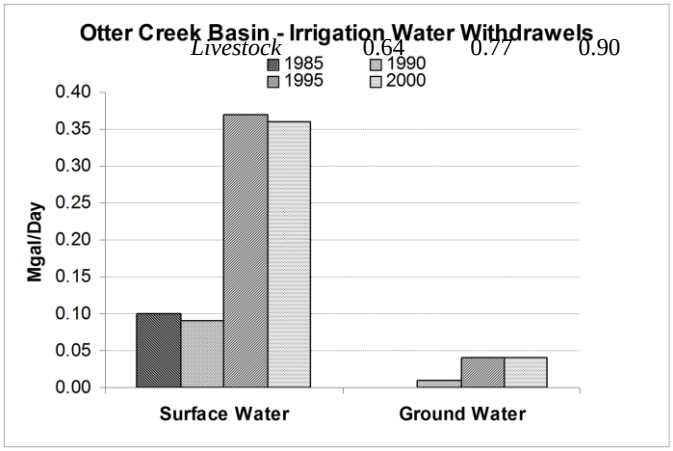


Figure 2.

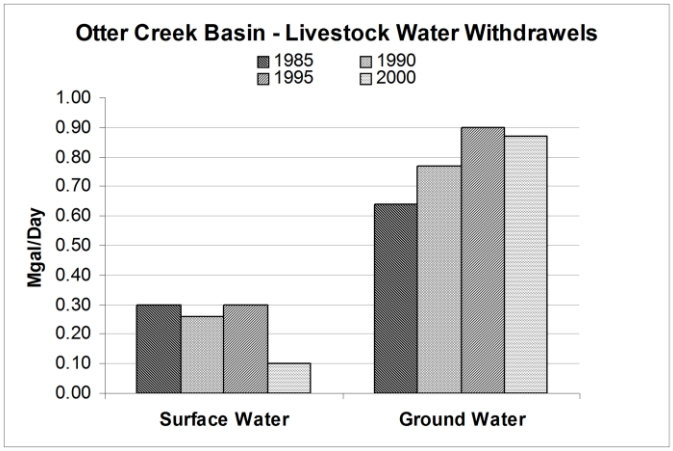


Figure 3.

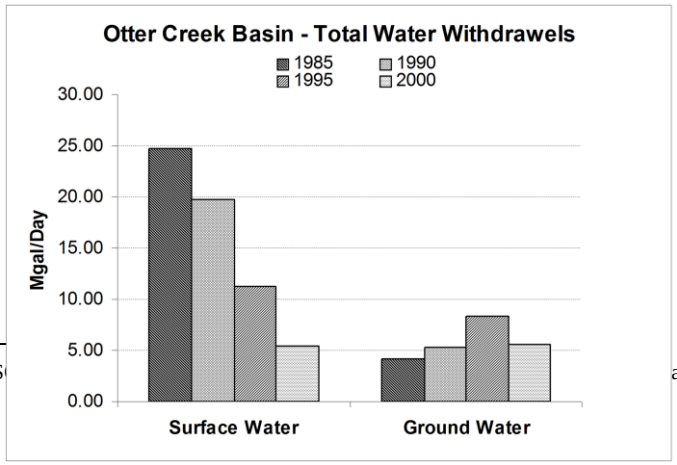
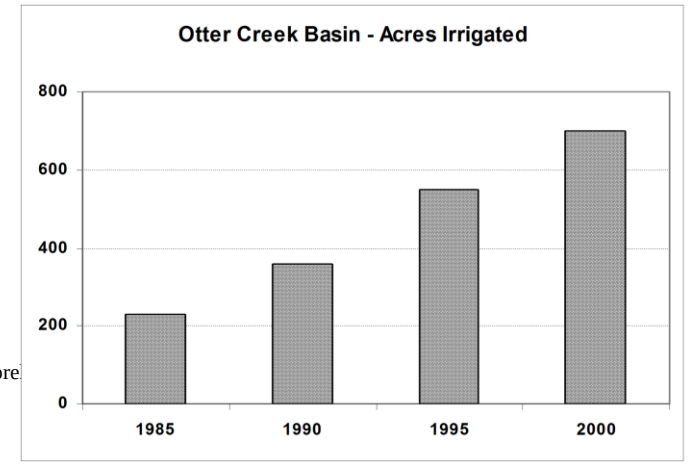


Figure 4.



[55] US ata is pre

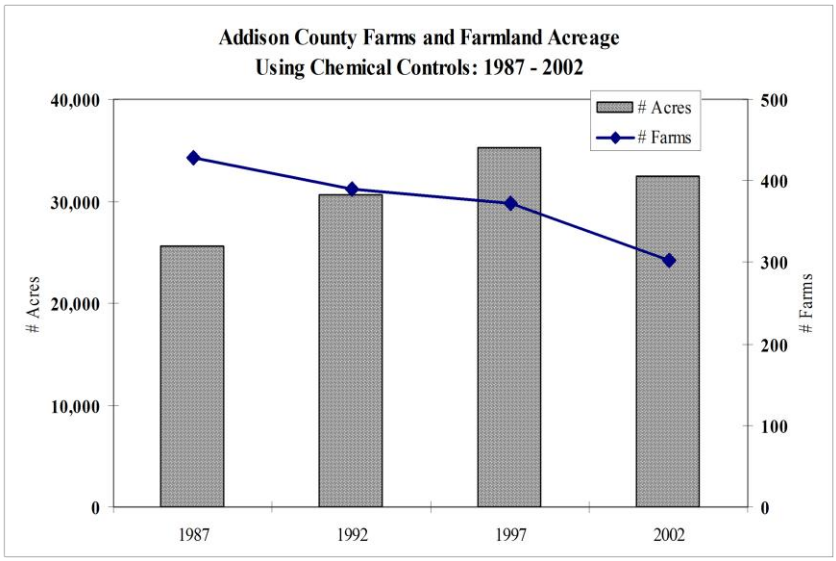
AGRICULTURAL - PESTICIDE USE

Each farm operation uses a unique and specific combination of tools to combat insect, disease and weed problems. In Addison County, there were 27.1% more acres treated but with 29.6% fewer farms using agrichemicals in 2002 than 15 years earlier (Table 3, Figure 5).[56] It is true that a number of farms have converted to organic operations and most of these were smaller farms that may not have used agrichemicals in the past.

Table 3. Chemical Use for Addison County

	1987	1992	1997	2002
# Farms Using Chemical Control for Insects	102	98	104	96
Acres Treated for Insects	5,708	6,767	7,438	7,647
# Farms Using Chemical Control for Weeds	278	249	220	158
Acres Treated for Weeds	17,405	21,151	25,476	22,792
# Farms Using Chemical Control for Plant Disease	49	43	48	48
Acres Treated for Diseases	2,441	2,668	2,311	2,047

Figure 5.



Groundwater Sampling: The Agency of Agriculture manages a groundwater-monitoring program to determine the quality of groundwater near Vermont farms. The program tests for nitrates and corn herbicides from orchards and cropped land including chemicals such as atrazine and metolachlor.

Between 2002 and 2006 a total of 34 wells sampled in Addison County were analyzed for herbicides. No Addison County wells had herbicides. The statewide trend in the VAAFM Groundwater Monitoring Program is for 1 to 2% of wells to have herbicide detections above drinking water standards (Figure 6 & 7). Farms in the Groundwater Monitoring Program include wells tested out of concern and wells tested as a result of participation in the Farm*A*Syst Program.[57]

Figure 6.

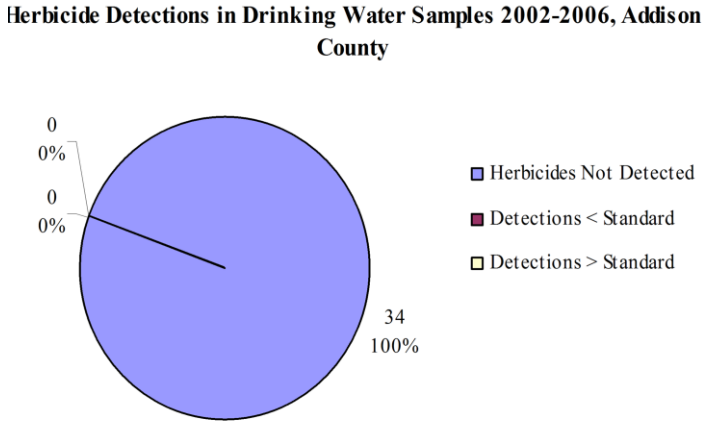
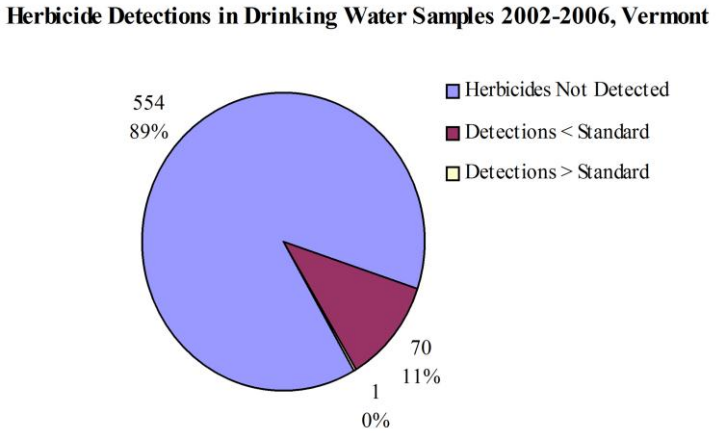


Figure 7.



[56] USDA. 2002 & 1992. Census of Agriculture, Vermont State and County Data, Addison County.
[57] VAAFM. 2007. Groundwater Monitoring Program.

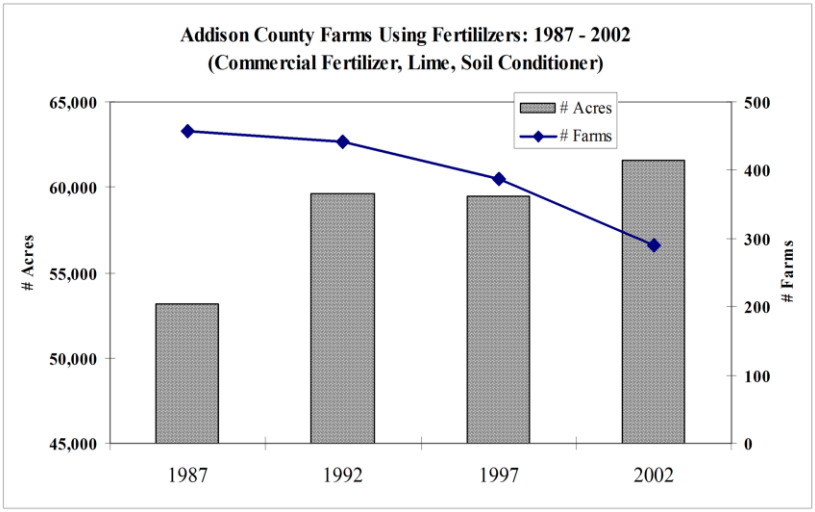
AGRICULTURE – FERTILIZER USE

In Addison County, the number of acres treated with commercial fertilizers has increased by 15.7%, while the number of farms using commercial fertilizers decreased by 36.8% from 1987 to 2002 (Table 4, Figure 8). [26]

Table 4. Fertilizer Use for Addison County

	1987	1992	1997	2002
# Farms Using Commercial Fertilizer, Lime, Soil Conditioner	457	442	388	289
# Acres Treated	53,204	59,635	59,476	61,570
# Farms Using Manure	na	na	na	231
# Acres Where Manure Spread	na	na	na	55,181

Figure 8.



Groundwater Sampling: In the broad clay plain of Addison County, drinking water supply is more of a challenge than drinking water quality. A number of public sources have been developed to meet this challenge. Addison, Bridport, Shoreham are served by the Tri-Town Water District which draws from Lake Champlain. Towns at the base of the Green Mountains have drilled wells for public water sources and schools have deep wells. Sprawl along roadsides leads to closely spaced development where homes distant from services still use drilled wells and use septic systems for waste treatment and disposal. This trend competes with agriculture for raising nitrate risks to drinking water.

The Agency of Agriculture manages a groundwater-monitoring program to determine quality of groundwater near Vermont farms. The program tests for nitrates. Given that nitrates are highly soluble, transported by runoff and leaching in 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 34 wells were sampled in Addison County for nitrates. Of those sampled, 1 water source had nitrate above drinking water standard of 10 ppm (Figure 9 & 10). Sampling continues to monitor those wells that exceed standard and on farms that contract for federal conservation practice cost share dollars to provide baseline data for groundwater quality and determine resource needs.[27]

Figure 9.

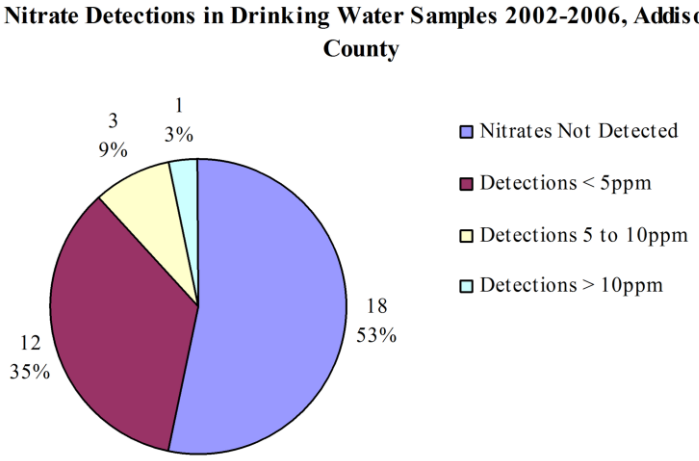
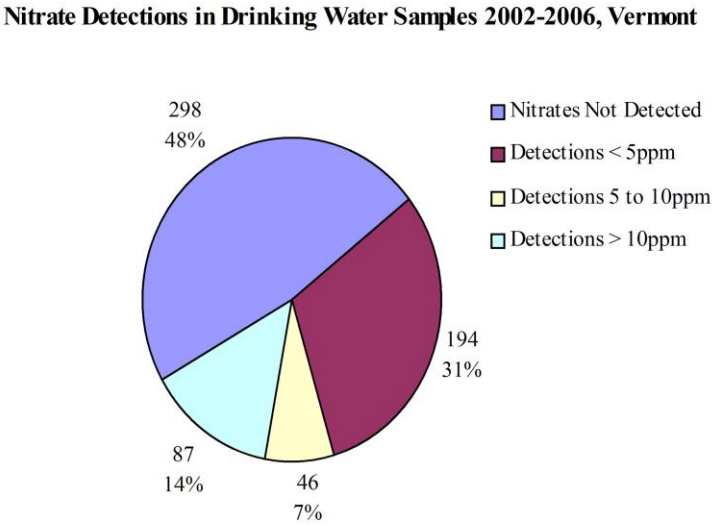


Figure 10.



Active federal involvement with soil conservation began in the 1930s. In 1933, the Soil Erosion Service within the Dept of the Interior started to conduct research. In 1935, the Soil Erosion Service was moved to the USDA. The Conservation Technical Assistance Program (CTA) was established in 1935. It was designed to assist farmers in planning and installing approved conservation measures to protect agricultural land from soil erosion. In 1944-45, the Agricultural Conservation Program began. During the 1970s, the emphasis changed to focus on implementing multiple Best Management Practices (BMPs). The Food Security Act of 1985 mandated a conservation plan to receive payments. These early efforts were followed by three decades of implementation of conservation practices implemented in this basin.[58]

Agricultural Conservation Program (ACP): funds were used in this first phase of implementation alone and later, in Long Term Contracts. In the 1970s, the Otter Creek Natural Resource Conservation District and partners focused on the installation of in-ground liquid manure storages on dairy farms in the county. Farmers may have received $3,500 in cost share against an $11,000 cost for the pit and the same again for a barnyard.[59]

Public Law 566 (**PL-566 Small Watershed Program)**: funding was applied in the 1980s to continue this work. This work focused in the small watersheds including the Lemon Fair. $1,646,000 of PL-566 funding has cost shared and designed barnyards, milkhouse waste water treatment, silage leachate control, and waste storages for 29 completed contracts and 6 in progress.[60]

Environmental Quality Implementation Program (**EQIP):** 2002 Farm Act EQIP consolidates and better targets the functions of the Agricultural Conservation Program (ACP) and Environmental Quality Implementation Program EQIP in the 1990s and to the present. The main focus of this work was liquid manure storage, although some alternative systems were implemented including compost stacking pads, and a methane digester. In the 1990s, there was an effort to include milk house wastewater in the manure storages. The present challenge is to contain concentrated silage leachate from bunker silos and to retrofit that practice into the existing barnyard layout.

Farmland Preservation Program (FPP): Farms conserving land-using funds from this program were encouraged to get a conservation plan written for their farm. 35 conservation plans were written for Addison County farmers conserving land under this program.

Methane Digestion and Composting: Methane Digestion and Power generation has the potential to reduce 1 ton of phosphorous a year from the watershed as modeled on the Blue Spruce Farm operation in Bridport. This methane digestion system installed in 2006 is the second in the county. The first is Foster Brothers of Middlebury, which has been operating since the 1970s. During the energy crisis of the late 1970's, Foster Brothers Farm, Inc. started producing more than milk to keep the family business going strong. They began producing electricity from cow manure (and continue to do so today). This electricity is used to provide power for the farm and the excess is sold to the local utility. To produce the electricity, the Fosters built an anaerobic digester, which uses bacteria to break down the manure into methane gas. The methane gas is used as a clean burning, environmentally safe source of fuel for electrical generation. Not satisfied with simply recovering energy from the manure, the Fosters used their "Yankee ingenuity" to take the process of digestion a step further. The Fosters began composting in 1989. What started out as a way to better utilize nutrients and supply a local market quickly grew into a regional business as word spread about the superior quality of materials that the farm was producing. Vermont Natural Ag Products, Inc. has taken over where the Fosters left off and is now a leader in the production of soils, composts, and growing mixes in the Northeastern United States. Using the digested manure, an organic product line was developed that makes growing more productive and more natural. In addition, VNAG Products encourage the composting of agricultural by-products in the Lake Champlain region through the use of efficient and economical technologies. The results of this process are environmental stewardship and economic benefit to the composter and community. This results in a net export of phosphorous out of the watershed. There is the potential for five more methane systems in the watershed the size of the operation at Blue Spruce Farm, each with the potential for phosphorous reduction.

Conservation Reserve (Enhanced) Program CREP: The Otter Creek Natural Resource Conservation District and partners in 2005 completed the planting of 500 acres of riparian buffers in Addison County. In 2006, that number increased to nearly 600 acres. This is the result of ten years of tree planting, often combined in practices with stream crossings and fencing grazing

[58] Uri, N. D. 1999. Conservation Tillage in U.S. Agriculture: Environmental, Economic, and Policy Issues. The Halwath Press, Binghamton, NY.
[59] NRCS – Vermont. 2007. Conservation Program Data.
[60] VAAFM. 2007. BMP Program Data.

animals from streams and the development of alternative water sources. This acreage has not yet to date been broken out on a watershed basis.[30]

Comprehensive Nutrient Management Plans CNMP: In an effort to assist Vermont farms comply with Federal Concentrated Animal Feeding Operation (CAFO) and State Medium Farm Operation (MFO) regulations, the Agency of Agriculture, Food, and Markets offered financial assistance for the development and maintenance of Nutrient Management Plans**.** Nutrient Management Plan Incentive Grants offer payment of soil and manure/waste testing and assistance for 3 additional years of Nutrient Management Plan updates. $1 million has been spent on CNMPs to date. USDA NRCS always required a conservation plan for program participation. With an increasing focus on water quality, those plans followed a path to whole farm planning. A Comprehensive Nutrient Management Plan (CNMP) currently in use has the following components: Purpose and Conditions, Manure and Wastewater Handling and Storage, Land Treatment Practices, Nutrient Management Plan, and Record Keeping. USDA NRCS creates a CNMP for each farm that participates in program technical assistance and cost share. In addition, the Medium Farm Operation Permit required farms to complete a Comprehensive Nutrient Management Plan by March 28, 2008. The Vermont Agency of Agriculture anticipates that all Medium Farms in the LOC will have a CNMP written by March 28, 2008.

- The 5 large farms are permitted Large Farm Operations with CNMPs in place. New LFO rules became final November 28, 2007. The rules complete a seamless regulatory process for animal farms, which may move from one size operation to another (small to medium to large).

- The 34 Medium Farm Operations are in the process of submitting a developed Comprehensive Nutrient Management Plan to the Vermont Agency of Agriculture by March 2008.

- Small Farm Operations have conservation plans from a variety of sources and timelines including the Farmland Protection Program, EQIP and VAAFM ICM funds.

CNMPS have two major components, written by certified Technical Service Providers, Conservation District staffs and USDA NRCS staffs.

- Land Treatment Plans are being developed for farms within the LOC. The requirement for MFO's is that all acreage be managed to the soil loss tolerance specific to each field. For SFO's, the requirement is for soil loss to be managed to twice the tolerance for soil loss for each field. In Addison County in 2007, the Land Treatment Planner wrote plans for 17 farmers representing 23,419 acres. The number of acres was not compiled for 2005-6.

- Nutrient Management Plans have been developed for many farms within the LOC. 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.

Best Management Practices: Of the 200 dairy farms currently in operation in the Lower Otter Creek, a majority has completed or is presently implementing Best Management Practices. Each year between 5 and 15 farms are provided cost-share funds for BMP implementation. Contributions have varied from 25% (ACP) to 75% (EQIP) to 90%. Contributions of Federal and State dollars combine to decrease the cost for the farmer/landowner to as little as 10% but more generally 15%.

Some of the Best Management Practices installed include: waste storage facilities, improved barnyards, roof runoff management systems, fencing animals out of waterways and providing them with stream crossings and alternative watering systems. Farms have also received cost-share funding for other practices such as spring development, fencing, grazing plans, nutrient management plans and water diversions. These practices help reduce erosion, phosphorous runoff and pathogen loading of waterways and assist farmers in better managing nutrients on their farms. Cost-share funds have derived from USDA-NRCS, USDA-FSA, VAAFM and USFWS programs. It should be noted that only those practices that are covered in part by cost share money through the State and Federal government 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.

From 1996 through 2007 USDA NRCS has obligated $4,577,301 and paid $350,377 to fund on a cost share basis a range of practices on farms upon which implementation of those practices would have a water quality benefit. In addition, USDA

NRCS paid $158,063 to implement the Conservation Security Program on 7 farms with 3,230 acres and used $109,828 of AMA funds for practices associated with transition to organic (BMPs – Table 5&6, Figure 11-14).

Before and since 1970, prior to the State providing additional cost share funds, many improvements were implemented by farmers on their own or with only limited Federal assistance. Since 1996, nearly **$**3.5 million has been invested in non-point source pollution control on farms in the LOC.[29] This investment will reduce agriculture's contribution to phosphorus in the watershed when fully implemented. Additionally, these practices will reduce pathogen loading of waterways from farmland and assist farmers in better managing nutrients on their farms. Pathogen loading from wildlife will not be affected by implementation of farm practices.

BMP Cost Share Data:

Table 5. BMP Projects COMPLETED Lower Otter Creek, 1996 - 2007[61]

Fiscal Year	Farms Funded	Completed Practices	Phosphorus Reduced (lbs)*	Acreage **	Actual Total Cost	Actual Federal Cost	Actual State Cost	Actual Landowner Cost
1996	9	13	227	78	$107,251	$63,105	$25,179	$18,967
1997	15	80	263	1050	$226,715	$148,231	$20,938	$57,547
1998	16	22	501	22	$320,212	$164,652	$82,012	$73,548
1999	27	73	931	2473	$266,700	$172,141	$36,452	$58,107
2000	15	33	1696	2657	$311,567	$157,619	$57,289	$96,659
2001	12	30	919	17	$306,615	$178,298	$74,416	$53,901
2002	18	32	987	4077	$416,535	$252,683	$74,306	$89,546
2003	7	21	211	549	$174,365	$128,482	$17,934	$27,949
2004	6	14	403	2	$309,060	$77,109	$100,703	$131,248
2005	5	18	430	254	$484,675	$342,312	$61,405	$80,958
2006	9	37	366	5	$345,418	$175,328	$103,107	$66,983
2007	3	5	104	0	$181,148	$120,046	$8,306	$60,096
Total	**142**	**378**	**7130**	**11184**	**$3,458,561**	**$1,883,006**	**$740,047**	**$835,508**

Table 6. BMP Projects IN-PROGRESS Lower Otter Creek, 1996 – 2007[61]

Fiscal Year	Farms Funded	Planned Practices	Phosphorus Reduced (lbs)*	Acreage **	Estimated Total Cost	Estimated Federal Cost	Estimated State Cost	Estimated Landowner Cost
1996	0	0	0	0	$0	$0	$0	$0
1997	0	0	0	0	$0	$0	$0	$0
1998	0	0	0	0	$0	$0	$0	$0
1999	3	10	0	374	$9,431	$7,073	$0	$2,358
2000	4	15	30	568	$86,834	$37,934	$24,228	$24,672
2001	6	36	1295	1710	$329,852	$142,658	$96,318	$90,875
2002	17	47	491	1600	$271,971	$167,688	$54,576	$49,727
2003	6	38	492	4380	$264,299	$198,035	$6,281	$59,983
2004	15	45	0	5641	$1,746,417	$1,301,228	$14,535	$430,654
2005	35	77	1017	8224	$1,522,917	$1,142,188	$27,525	$353,203
2006	14	240	577	1000	$698,616	$456,123	$109,148	$133,345
2007	16	35	638	6889	$2,369,447	$1,736,003	$67,114	$566,329
Total	**116**	**543**	**4540**	**30386**	**$7,299,784**	**$5,188,930**	**$399,725**	**$1,711,146**

** Phosphorous reduction estimate where available only for AAFM projects.*
*** Affected acreage was available only for USDA projects.*

[61] Data summarized represents information from AAFM, USFWS and partial information from NRCS, however, no data was available from FSA.

Figure 11.

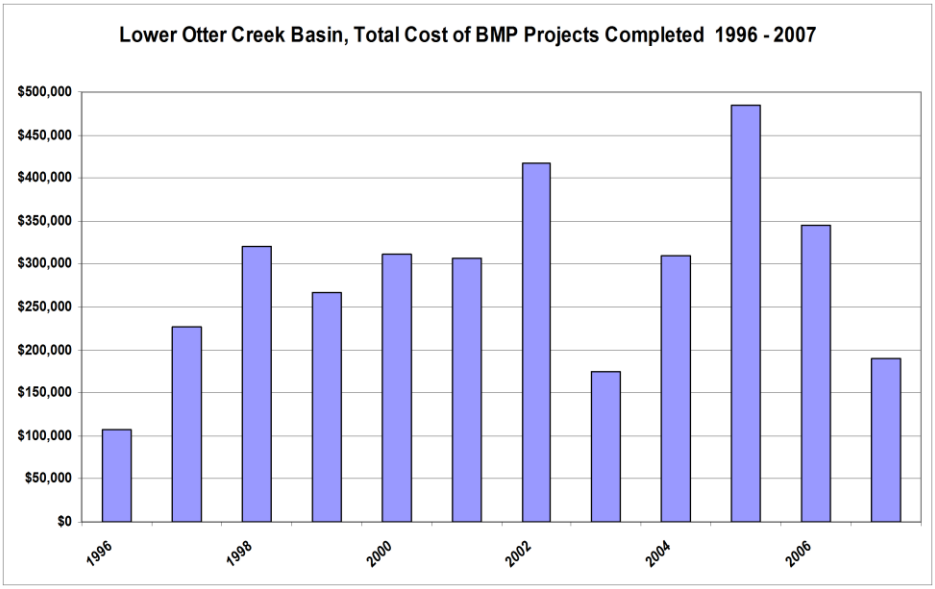


Figure 12.

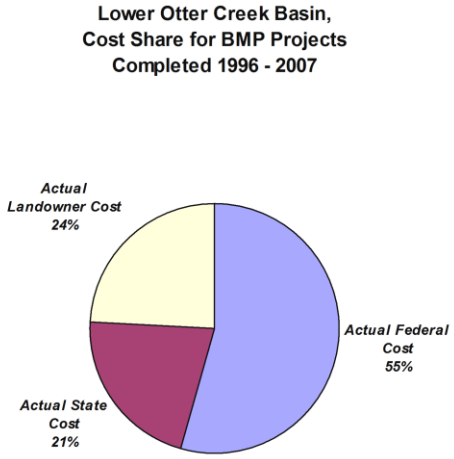


Figure 13.

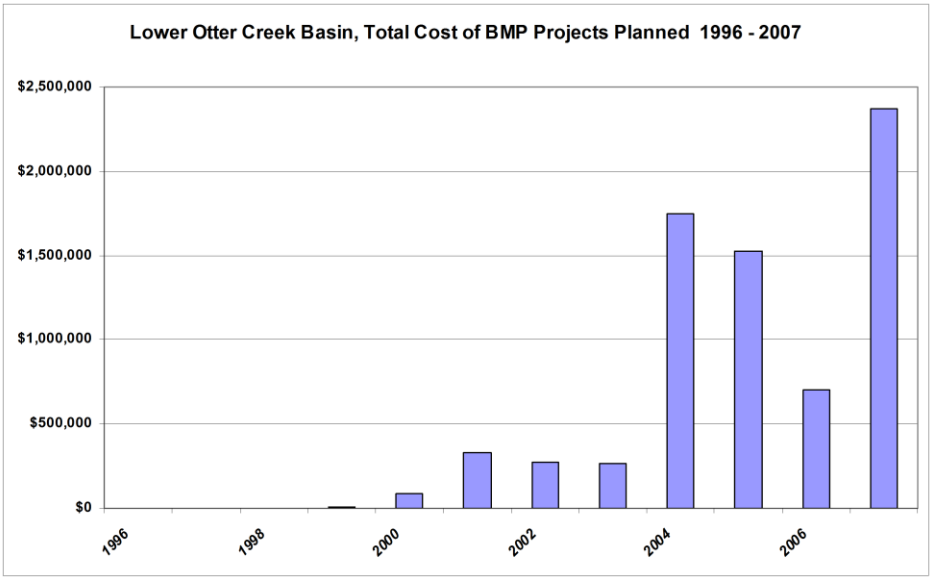
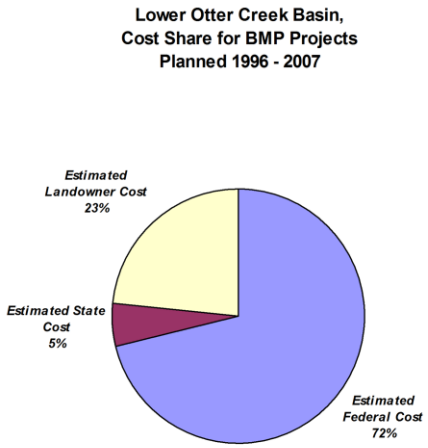


Figure 14.

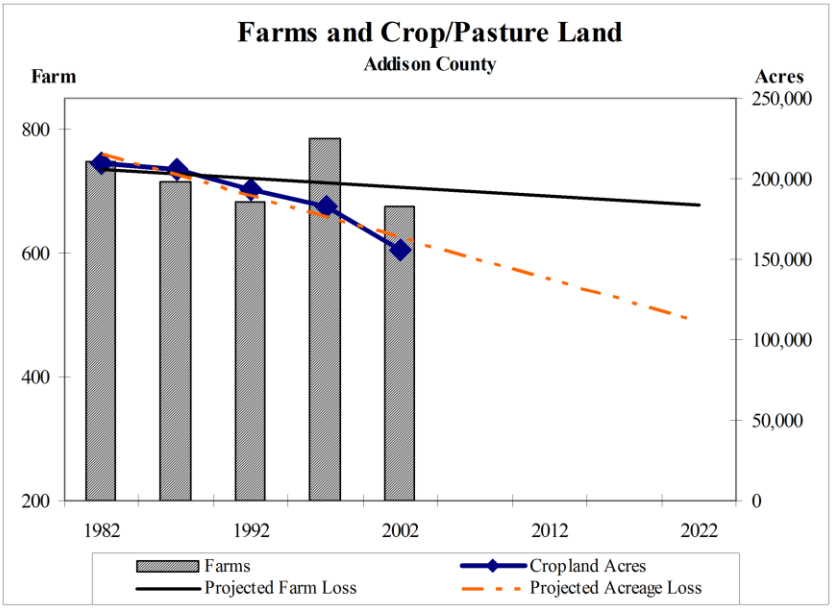


Current Status: The data shows that the number of farms in Addison County decreased by 9.6% between 1982 and 2002.[12] At the same time, the number of farmed acres in either crops or pasture has decreased by 25.7% (Table 7). Addison County, in this time, lost less agricultural land to development than other parts of Vermont.[12] Comparing these numbers to the Vermont Ag Census, it is evident that there is a recent increase in number of farms, especially on small acreages. If this trend continues, there will be fewer than 700, 150-acre farms by the year 2022 (Figure 15). Development spurred by increases in population took place along roads in the watershed in strip fashion. Many of these subdivisions support not only homes but also small farm operations.

Table 7. Addison County: Farms & Farmland.

	1982	1987	1992	1997	2002
Total # Farms	748	714	683	784	676
Acres in Farms	231,616	220,949	209,677	209,469	193,376
Acres in Crop + Pastureland	209,559	205,326	192,960	182,952	155,641

Figure 15.



This loss of agricultural land has many implications. Development has been shown to have a greater adverse impact on surface water quality than does agricultural.[14] The increase in pavement and other impervious areas can increase runoff and carry toxic pollutants into waterways. Increased development means greater disturbance to soils, greater impact on natural resources and greater stress on existing farmland to both produce more on less land and to maintain the pastoral nature of the landscape. This becomes increasingly difficult with the concurrent increase in the cost of farming due to higher land costs and higher tax rates. Loss of Vermont's pastoral aesthetic may ultimately affect the State's tourism revenue.

The current economic impact of agriculture in the watershed is striking. Although, the market value for agricultural products sold in Addison County had increased from 1982 to 1997, the value declined in 2002 by 14% (Table 8).[13] With dairy making up 76% of receipts, the value of products sold will fluctuate with milk prices and other inputs. Estimates have added to this figure secondary and value added outputs, which put the estimated figure at $250,000,000.[3]

Table 8.

Value of Ag Products Sold	1982	1987	1992	1997	2002
millions of dollars	72,217	75,677	93,598	113,580	105,923

Trends for the Future: There are currently 200 operating dairy farms in the Addison County. This number changes frequently, often in the downward direction as farms go out of business, sometimes at the rate of 3 – 5 a year. Of these farms an estimated 50 do not have waste management systems. At the current rate of 5 waste management systems per year, it will take approximately 10 years and $ 5,000,000 to complete implementation. An estimated 75 farms have not yet installed improved barnyards. In order to treat the remaining animal units needing this practice, at an average cost of $90 per animal unit, it will cost $ 675,000. [30]

If funding for BMP installation continues at the current levels, it will take over 10 years to treat all the remaining dairy farms in the LOC with appropriate practices. In that time, systems now in use will need upgrading as well. Water quality should gradually improve over time as more farms have systems. Levels of phosphorus and nitrogen in surface waters should decrease but will not be eliminated. Even greater improvement should come now that nutrient management is a requirement of regulatory programs and participation in Federal programs. Further improvement could take place if the cost share funding programs are refocused on other types of farms and on annual practice implementation such as riparian treatments and buffer installation. An increase in support for these programs would decrease the amount of time it will take to reach full nutrient containment.

Non-dairy animal agriculture will need practices installed to improve water quality and systems will need to be developed, designed and funded to implement practices on these farms. Some of these farm needs will be addressed coincident with dairy farm improvement but many will still need improvements that will be not addressed in the short term.

Despite these constraints, the Lower Otter Creek basin remains rural, rich in excellent agricultural land and maintains a diverse agricultural industry. While development pressure is a concern of local towns, they are committed to maintaining the rural, agricultural nature of the area. The economics of agriculture, however, will determine the future character of the basin.

Successes: Now, more than ever, farmers are under considerable pressure to sustain economically viable and environmentally sound farming operations. Farmers must face labor issues, foreign competition, competing land use pressures, regulations concerning husbandry, genetics, food safety and stricter water quality regulations under the State's Accepted Agricultural Practices (AAP). In complying with these new AAPs, farmers must address five key water quality protection concepts:

- Riparian buffer development and stream bank management criteria
- Livestock impacts on stream banks
- Setbacks from wells and property boundaries
- Soil testing for manure spreading and record keeping
- On-site disposal or composting of animal mortalities

Federal, State and private agencies have taken steps to protect farmland and farm water quality through many of the programs listed in the 'Programs to Address Issues' section. This land protection ensures the availability of agricultural land for future food and fiber production and provides those presently working the farm with some financial assistance to help them succeed. These programs often include assistance for installing conservation practices on the farm that reduce non-point source pollution such as fencing animals out of streams to prevent access to streambanks and providing animals with alternative watering systems.

In Addison County the Conservation Partnership has been working since the 1970s with farmers to install manure storage systems and barnyards. The earliest implementation was assisted by ACP funds. ACP funds were small allocations to both the local offices and the farmers. The 1996 Federal Agricultural Improvement and Reform Act or Farm Bill created EQIP and increased funding over time. The Environmental Quality Incentives Program (EQIP) provides a voluntary conservation program for farmers and ranchers who face serious threats to soil, water, and related natural resources. Nationally, it provides technical, financial, and educational assistance primarily in designated priority areas-half of it targeted to livestock-related natural resource concerns and the remainder to other significant conservation priorities. The 2002 Farm Bill titled The Farm Security and Rural Investment Act increased funding to $1.5 billion annually. Vermont worked to achieve regional equity in the distribution of these funds.

Within the Lower Otter Creek, USDA's EQIP program has installed waste storage facilities, roofed loafing area, streambank exclusion fencing and other BMP's on farms. Many other practices have also been implemented in past years such as walkways and access lanes, streambank stabilization and heavy use area protection on farms. USDA's WHIP program is working with 6 farms implementing practices such as wildlife food plots and invasive species removal on over 1,050 acres of farmland. $50,000 of Wetland Reserve Program funds has restored wetlands.[29] $1.2 million of The Conservation Reserve Program and CREP funding together with the US Fish & Wildlife Service's Partners for Fish & Wildlife Program has planted

600 acres of riparian buffer in many cases with fencing to prevent livestock from accessing streambanks. The Partners for Fish & Wildlife Program has funded 15 farms in the Lower Otter Creek watershed to exclude animals from 176 riparian acres.[62] The NRCD's Land Treatment Planning services, which assist farmers with plans, have developed land treatment plans for 50 farms involving an estimated 50,000 acres.

[62] USFWS. 2007. Program Data.

RIVER SECTIONS IMPAIRED DUE TO AGRICULTURAL IMPACTS

The 2006 State of Vermont 303(d) Part A list of Impaired Surface Waters in Need of a TMDL lists six water bodies as having agriculturally impaired surface waters within the LOC. Excellent stewardship by the residents of these watersheds has been accomplished and E. coli remaining has not been traced to animal agriculture.

VT03-03, Otter Creek - Below Mouth of Middlebury River to Weybridge Dam

- Current Condition:
  - Possible Pollutants – E. coli
  - Surface Water Quality Problems – Agricultural Runoff

- Agricultural Needs:
  - Irrigation
  - Animal Watering
  - Economic return on conservation investments
  - Compensation for land taken from production

- Unmet Needs:
  - Increased funding for farm production area BMPs
  - Increased technical assistance to design BMPS
  - Continued assistance to implement AAPs

VT03-07, Little Otter Creek – Lower from Mouth upstream 9 miles

The Little Otter Creek watershed has served as the focus of two studies within the last ten years. Parson looked at the relative costs of P reduction strategies including manure storage, barnyard improvements and field practices. This study determined the most cost effective way to decrease nonpoint source runoff was by implementing field practices including nutrient management, keeping cropland at T, and strip and cover cropping. In this study, FLIPSim is combined with GISPLM to provide policymakers and dairy farmers estimated farm financial impacts on the implementation of eight Best Management Practices (BMPs) designed to reduce phosphorus loading in Lake Champlain. Financial performance indicators are derived for three dairy farms (60, 150, and 350 cows). Results indicate that feed reformulation and nutrient management are the least cost BMPs but that a combination of four BMPs cannot meet the 8% reduction goal. Additional, less effective, but more costly BMPs will have to be implemented to meet the goal. None of the individual BMPs cause any of the farms to go out of business. However, the initial declining financial position of the small farm is hastened by the implementation of all BMPs except the row crop field buffer and feed reformulation. (This may be why small farmers are implementing field buffers alone) The medium farm is also threatened by several costly BMPs. Achieving the desired goal will have an adverse financial impact on watershed farms. Following this study Parsons also determined that organic dairies are not making money. [63]

A second study involving the Little Otter Creek was accomplished by Donald Meals. Its goal was to develop an approach to identify, analyze and map high-risk areas for P export by integrating spatial, geophysical, land use, and agronomic data with long-term mass balance modeling. The interest in high areas was an effort to focus limited funds to those locations in the watershed which would produce the greatest Phosphorous reduction should practices be applied there. A pixel P balance model was used. PPBalModel simulates P dynamics for land uses and computes the annual P mass balance for each pixel for each year over a defined period. Simulations were carried out over a period of 80 years or more. Among the conclusions of the study: Nutrient Management is the only effective manner for appreciably reducing soil test P; even after P inputs are reduced through nutrient management, there will be a lag-time on the order of decades before excessive soil test P and P export decline to sustainable levels; implementation of erosion control on row crop land yields only a small and transitory reduction in P export; conversion of row crop land to permanent grass land can reduce P export, but will not by itself address soil test P; regardless of land use, runoff contributing areas are critical to P export with a watershed.[64]

[63] Parson, R., et al. 2002. Financial and Environmental Tradeoffs of Phosphorous Management Practices on Vermont Diary Farms, Dept of Community and Applied Economics, University of Vermont.
[64] Meals, D., et al. 2006. Interactive Spatially Dynamic Framework for Sustainable Watershed Phosphorus Management: Draft Final Report, CSREES Project No. VT-AE-037CG.

- Current Condition:
    - Possible Pollutants – E. coli, Undefined
    - Surface Water Quality Problem – Agricultural Runoff

- Agricultural Needs:
    - Irrigation
    - Animal Watering
    - Economic return on conservation investments
    - Compensation for land taken from production

- Unmet Needs:
    - Increased funding for farm production area BMPs
    - Increased technical assistance to design BMPS
    - Continued assistance to implement AAPs

VT03-07, Little Otter Creek Upper From RM 15.4 to RM 16.4

- Current Condition:
    - Possible Pollutants – E. coli Undefined
    - Surface Water Quality Problem – Agricultural Runoff

- Agricultural Needs:
    - Irrigation
    - Animal Watering
    - Economic return on conservation investments
    - Compensation for land taken from production

- Unmet Needs:
    - Increased funding for farm production area BMPs
    - Increased technical assistance to design BMPS
    - Continued assistance to implement AAPs

VT03-08, Pond Brook From Lewis Creek confluence upstream 1.5 miles

- Current Condition:
    - Possible Pollutants – E. coli
    - Surface Water Quality Problem – Agricultural Runoff

- Agricultural Needs:
    - Irrigation
    - Animal Watering
    - Economic return on conservation investment
    - Compensation for land taken from production

- Unmet Needs:
    - Increased funding for farm production area BMPs
    - Increased technical assistance to design BMPS
    - Continued assistance to implement AAPs

VT03-12, Middlebury River from Mouth upstream 2 miles

Addison County River Watch Collaborative (ACRWC) data showed that the river has pathogen levels resulting in repeated levels of violations of water quality standards that restrict fecal coliform.[65] High levels of pathogens were present at some sites throughout the early and mid-1990s. In 1999 the Otter Creek Natural Resources Conservation District (OCNRCD) was awarded a grant from Vermont Department of Environmental Conservation to initiate a water quality improvement effort in the in the North Otter Creek Basin. A Watershed Advisory Group selected the Middlebury River watershed. ACRWC data also point to high levels of Phosphorous in the river. In the early 1990's, a cooperative effort was undertaken to address on farm improvements to improve water quality. Partners included USDA Natural Recourses Conservation Service (NRCS), Farm Services Agency (FSA), Otter Creek Natural Resources Conservation District (OCNRCD), the Vermont Department of Agriculture, Food and Markets(AAG), and the Environmental Protection Agency (EPA). Technical assistance and up to 85% cost share was provided for installing waste management systems, stream crossings, stream bank protection and restoration, fencing of livestock, and cattle watering systems. These efforts were completed in 1996. Additional streambank stabilization work, including rip rap toed in with planting of willows, were completed by USDA NRCS and landowners on two sections of the river from 1997 - 1999. In the meantime, the focus of the Middlebury River Watershed Partnership was to identify strategies to reduce the levels of E.coli in the river. It was agreed that success depended on conducting intensive sampling within the impaired section and conducting seasonal samples over the course of a year. Pathogen source and location were the goals of this effort. In 2003, the Middlebury River Watershed Partnership disbanded after not succeeding to locate the source of the E. coli in the river.

- Current Condition:
    - Possible Pollutants – E. coli
    - Surface Water Quality Problem – Agricultural Runoff

- Agricultural Needs:
    - Irrigation
    - Animal Watering
    - Productive Cropland
    - Economic return on conservation investment
    - Compensation for cropland taken from production

- Unmet Needs:

    - Trace pathogen source
    - Erosion control on untreated bank sections
    - Increased funding for farm production area BMPs
    - Increased technical assistance to design BMPS

VT03-15, Lewis Creek, 12.3 miles

Addison County River Watch Collaborative (ACRWC) data showed that the Lewis Creek has pathogen levels resulting in repeated levels of violations of water quality standards that restrict fecal coliform. In the early 1990's, a cooperative effort was undertaken to address on farm improvements to improve water quality. Partners included USDA Natural Recourses Conservation Service (NRCS), Farm Services Agency (FSA), Otter Creek Natural Resources Conservation District (OCNRCD), the Vermont Department of Agriculture, Food and Markets (AAG). Technical assistance and up to 85% cost share was provided for installing waste management systems, stream crossings, stream bank protection and restoration, fencing of livestock, and cattle watering systems. Lewis Creek farmer, Les Rublee, was the 2006 OCNRCD Conservation Farmer of the Year. At the 2006, Annual Tour participants viewed riparian plantings, and a constructed crossing as well as production area BMPs.

- Current Condition:
    - Possible Pollutants – Sediment, Nutrients, E. coli, Storm water
    - Possible Problems Needing Assessment – Agricultural Runoff, Industrial and Urban Runoff

- Agricultural Needs:
    - Irrigation
    - Animal Watering
    - Economic return on conservation investment

[65] Lescaze, M. 2001. Middlebury River Watershed Water Quality Improvement Plan, Otter Creek Natural Resources Conservation District, Vermont.

- Compensation for land taken from production

- Unmet Needs:

  - Trace pathogen source
  - Erosion control on untreated bank sections
  - Increased funding for farm production area BMPs
  - Increased technical assistance to design BMPS

The Lewis Creek watershed could be improved with additional practices including:

- waste storage facilities
- fencing along streams to exclude animals with alternative watering systems
- stream crossings for animals, walkways and access lanes
- roof runoff management
- silage leachate management
- improved barnyards and heavy use area protection
- milkhouse waste management
- surface and subsurface water diversions
- buffers along waterways
- streambank stabilization
- stream channel stabilization
- grade stabilization structures along the river channel
- control of invasive species

RIVER SECTIONS IN NEED OF FURTHER ASSESSMENT DUE TO AGRICULTURAL IMPACTS

The Part C list of Priority Surface Waters Outside the Scope of the Clean Water Act Section 303(d) does note two river sections within the UOC that are in need of further assessment due to agricultural impacts.

VT03-03, Otter Creek (Middlebury River Confluence Upstream to Furnace Brook Confluence)

- Current Condition:
  - Possible Polutants – Sediment, Nutrients, E. coli
  - Possible Problems Needing Assessment – Agricultural Runoff, Bank Erosion

- Agricultural Needs:
  - Irrigation
  - Animal Watering

- Unmet Needs:
  - Continued financial assistance and funding for technical support to implement practices resulting in meeting water quality goals.
  - Innovative practices i.e. technology scaled for and cost effective for medium and small farms, which help to protect water quality.
  - Technological practices which reduce Phosphorus including methane production systems, composting systems and others, i.e. growth systems like algae production.
  - Conservation plans, practice design and funding for practices on all small farms, including non dairy farms.
  - An estimated 50 farms still need manure storages, barnyard improvements or a combination.

The Otter Creek watershed could be improved with additional practices including:

- waste storage systems
- fencing along streams to exclude animals with alternative watering systems
- stream crossings for animals, walkways and access lanes
- roof runoff management
- silage leachate management
- improved barnyards and heavy use area protection
- milkhouse waste management
- surface and subsurface water diversions
- buffers along waterways
- streambank stabilization
- stream channel stabilization
- grade stabilization structures along the river channel
- control of invasive species

RECOMMENDATIONS/ACTIONS FOR AGRICULTURAL NPS IMPROVEMENT

1] Continue implementation of the revised AAPs on all farms in the watershed including an emphasis on education.
The AAPs have resulted in tons of Phosphorus reduced to the Lake Champlain Basin since 1996 and reach the broadest sector of animal agriculture.

Lead Partners: AAFM, NRCD's, NRCS, UVM Ext, Technical Service Providers, Farm Operators, Private Sector partners.
Potential Funding Sources: BMP funds**,** EQIP**,** AAFM, and farm operators.
Timeline: On-going

2] Complete requirements of the Medium Farm Operations regulations, and the revised Large Farm Operation permit.

Lead Partners: NRCD's, NRCS, AAFM, UVM Extension, Medium Farm Operators, Technical Service Providers.
Potential Funding Sources: AAFM, EQIP, farm operators and local partners.
Timeline: 2009.

3] Support the expanded use of technology to get to P reduction while maintaining and enhancing ag economic viability including methane digestion, nutrient separation and compost.

Lead Partners: NRCD's, NRCS, AAFM, UVM Extension, Farm Operators, LCBP and industry.
Potential Funding Sources: AAFM, EQIP, farm operators and local partners.
Timeline: On-going.

4] Support the efforts of farmer groups, contractors, and industry groups in recognition that all efforts are necessary to achieve ag goals to include contract manure injection, multiple small source P capture, and diverting nutrients to high value non vascular crops.

Lead Partners: NRCD's, NRCS, AAFM, UVM Ext, Farm Operators, Farmers Watershed Alliance**,** LCBP, Contractors.
Potential Funding Sources: AAFM, LCBP, farm operators and local partners.
Timeline: On-going.

5] Eliminate discharges from the production area of farms.
The Medium Farm Operation permit requires no discharges including silage leachate, which often was not included in farm plans in the past.

Lead Partners: NRCD's, NRCS, AAFM, UVM Extension, Technical Service Providers, Farm Operators.
Potential Funding Sources: EQIP**,** AAFM, and farm operators, LCB.
Timeline: On-going.

6] Build conservation and funding mechanism for operations not served by USDA NRCS, i.e. farms which do not sell $2500 in ag products, or produce food and fiber, i.e. owners of horses and stable operators.

Lead Partners: NRCD's, NRCS, AAFM, UVM Extension, Small Farm Operators, Technical Service Providers.
Potential Funding Sources: AAFM, EQIP, farm operators and local partners.
Timeline: 2009

7] Build on past successes with re-establishing buffers along Vermont waterways with state and federal programs and other mechanisms.

Lead Partners: NRCD's, NRCS, AAFM, US Fish and Wildlife, UVM Ext, Farm Operators, Technical Service Providers.
Potential Funding Sources: AAFM, Farm Service Agency, farm operators and local partners.
Timeline: On-going.

8] More purposefully meet the conservation needs of Small Farm Operations with a focus on Farm Viability based on a business plan.

Lead Partners: NRCD's, NRCS, AAFM, UVM Extension, NOFA, Intervale.
Potential Funding Sources: VHCB, Conservation Security Program, EQIP.
Timeline: 2009

9] Educate farmers about funding sources, i.e. a revolving loan fund from public or private sources, specifically to enable farm operators to meet their portion of cost shared and designed conservation practices in a timely manner in those years that the milk prices do not fully support farm operations. Maintain a focus on access to capital.

Lead Partners: NRCD's, AAFM, farmers, individuals.
Potential Funding Sources: AAFM, Foundations, FSA, VAAC.
Timeline: 2007

COOPERATING PARTNERS

- State:
    - University of Vermont, Cooperative Extension Service – UVM Ext.
    - Vermont Agency of Agriculture Food & Markets - AAFM
    - Vermont Agency of Natural Resources - ANR

- Federal:
    - US Army Corps of Engineers - USACE
    - USDA Farm Service Agency - FSA
    - USDA Forest Service - FS
    - USDA National Agricultural Statistics Services - NASS
    - USDA Natural Resource Conservation Service – NRCS
    - USDA Resource Conservation and Development – RC&D
    - USDA Rural Development - RD
    - US Environmental Protection Agency - EPA
    - US Fish & Wildlife Service – FWS

- Local:
    - Central Vermont Power Service – CVPS
    - Natural Resource Conservation Council – NRCC
    - Otter Creek Natural Resource Conservation District - NRCD
    - Addison County Regional Planning Commission – RPC
    - Southern Vermont Nutrient Management Program - SVNMP
    - Town Governments & Selectboards
    - Vermont Association of Conservation Districts – VACD
    - Vermont Housing and Conservation Board – VHCB

- Other:
    - Lake Champlain Basin Program
    - National Fish & Wildlife Foundation - NFWF
    - Nature Conservancy of Vermont – TNC
    - Northeast Organic Farmers Alliance of Vermont – NOFA
    - Vermont Farm Bureau – VFB
    - Farm Operators
    - Watershed Groups

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 (LFO) – The 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 handing 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 water quality 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 11, 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. There are currently 2 farms in Basin 11, which will require an MFO 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 ($5,000 total) of continued update payments that provide needed dollars for implementation and maintenance of the NMP. Total NMPIG payment is limited to $14,000 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

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

University of Vermont Extension System

The mission of University of Vermont Extension is to improve the quality of life of Vermonters by providing research-based educational programs and practical information concerning Vermont communities, families and homes, farms, businesses, and the natural environment. UVM Extension provides links to the University and provides timely, research-based information and education. UVM Extension works with communities and individuals to Support agriculture and the environment by increasing agricultural business profitability, supporting forest and farm stewardship and safety, encouraging expanded markets for locally

produced foods, facilitating farm transfers to maintain a working landscape, and supporting local water-quality improvement programs.

http://www.uvm.edu/~uvmext/

Land Link Vermont (LLV) is a farm linking program at University of Vermont Center for Sustainable Agriculture. LLV 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, LLV 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/

Farm Viability Enhancement (FVE) is designed to strengthen the economic position of Vermont agriculture and complement existing programs in farmland conservation by helping farmers diversify their businesses. The Center for Sustainable Agriculture is leading UVM Extension's effort to engage farmers in a business planning process tailored to meet their individual needs

Local Government Programs

Conservation District Technical Assistance Programs Free technical assistance and information is provided through the conservation districts. *http://www.vacd.org/*

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

Nutrient Management Planners are available to assist farmers in developing nutrient management plans and record-keeping systems in order to maximize benefit from fertilizer and manure applications while minimizing the impact of excess nutrients on water quality.

http://www.vacd.org/wnrcd/documents/SVNMP_Brochure.pdf

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 Enhancement Program** (CREP) is a State-federal conservation partnership program targeted to address specific State and nationally significant water quality, soil erosion and wildlife habitat 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

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. 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 ranchland 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.

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 agencies to voluntarily plan and install watershed-based projects on private lands. The purposes the projects include watershed protection, flood prevention, water quality improvements, soil erosion reduction, rural, municipal and industrial water supply, irrigation water management, sedimentation control, fish and wildlife habitat enhancement and create and restore wetlands and wetland functions. Watershed plans involving an estimated 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 plans. Project sponsors are provided assistance in installing planned land treatment measures when plans are approved. Technical assistance is also 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 a minimum of 10 years from date the contract is signed.

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

Additional Programs

The **Farmers Watershed Alliance** (FWA) The Franklin and Grand Isle Farmer's Watershed Alliance's mission is to insure environmentally positive solutions and enable the dairy industry through education and funding to better the soil, air, and water of the Lake Champlain Watershed while remaining economically viable. Secondly, to promote and defend dairy farming to further it is future as one of the largest contributors to the state's economy. The Farmer's Watershed Alliance has the following goals: Provide farmers with a support network. Help farmers understand environmental regulations. Provide farmers with non-regulatory technical assistance. Provide farmers with whole farm assessments. Help farmers develop nutrient management plans. Provide farmers with whole farm assessments. Stay connected to actions in the legislature. Provide the public with a positive image of agriculture and its influence on the environment.

http://www.farmerswatershedalliance.com/

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 **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

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 benchmark analysis, meetings with crop or animal health specialists, new farm enterprise analysis, estate and farm transfer planning, labor management, and value-added processing. The business planning process involves the farmer in an assessment of the farm operation's strengths and weaknesses and in an exploration of possible management changes that could increase profitability. On-farm consultations result in the preparation of a written business plan.

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

ADDENDUM - Addison Regional Planning Commission Draft Ag Lands Summary

I. AGRICULTURAL LANDS SUMMARY

II. AGRICULTURAL LANDS GOALS AND OBJECTIVES

GOALS

Preserve prime agricultural land and strengthen the agricultural economy.

Encourage the conservation, wise use and management of important agricultural lands to maintain environmental integrity and provide for present and future agricultural use.

Strengthen research into and marketing of agricultural tourism and value-added products.

Encourage and strengthen local markets for agricultural products.

To meet these Goals it is our Objective to:

Recognize the diverse values and benefits provided to the public by agricultural land, (resource base for the farm economy and rural culture, food and fiber production, enhancement of the scenic landscape for residents and visitors, provision of wildlife habitat, and recreational opportunities).

Encourage the protection of the quality and quantity of agricultural lands.

Encourage that land development be placed so as to avoid significant negative impacts on farm land and farm management and encourage clustered development in situations where agricultural land may need to be developed forp urposes other than agriculture.

Promote the equitable taxation of agricultural lands through, but not limited to: local assessments that reflect current use, zoning restrictions, and land capabilities.

Encourage the strengthening and diversification of existing farming enterprises, including agricultural support services.

Encourage municipalities to carefully consider agricultural lands in local planning and decision-making.

Encourage the local processing, manufacturing and marketing of value-added agricultural products.

Encourage implementation of Best Management Practices (BMPs) to protect and enhance environmental quality.

Maintain and enhance diversity, including biodiversity, within the farmland of Addison County.

III. AGRICULTURAL LANDS RECOMMENDED ACTIONS

Inventory and prioritize lands that have the potential to sustain agriculture.

Assist communities in developing overlay districts, transfer of development rights, and agriculture zoning that can be used to implement protection and conservation measures.

Work with local and regional development corporations to assist local farmers by expanding programs related to availability of federal, state, and regional loan programs, business planning, and other business strategies.

Work with the Natural Resource Conservation Service (NRCS) and Otter Creek Natural Resource Conservation District (OCNRCD) to develop and promote programs that help farmers maintain agricultural operations affecting surface waters that protect and sustain agricultural land and rivers and streams.

Work with land trusts in developing programs for landowners, which address conservation easements, bargain sales, and estate planning.

IV. AGRICULTURAL LANDS DOCUMENTATION AND ANALYSIS