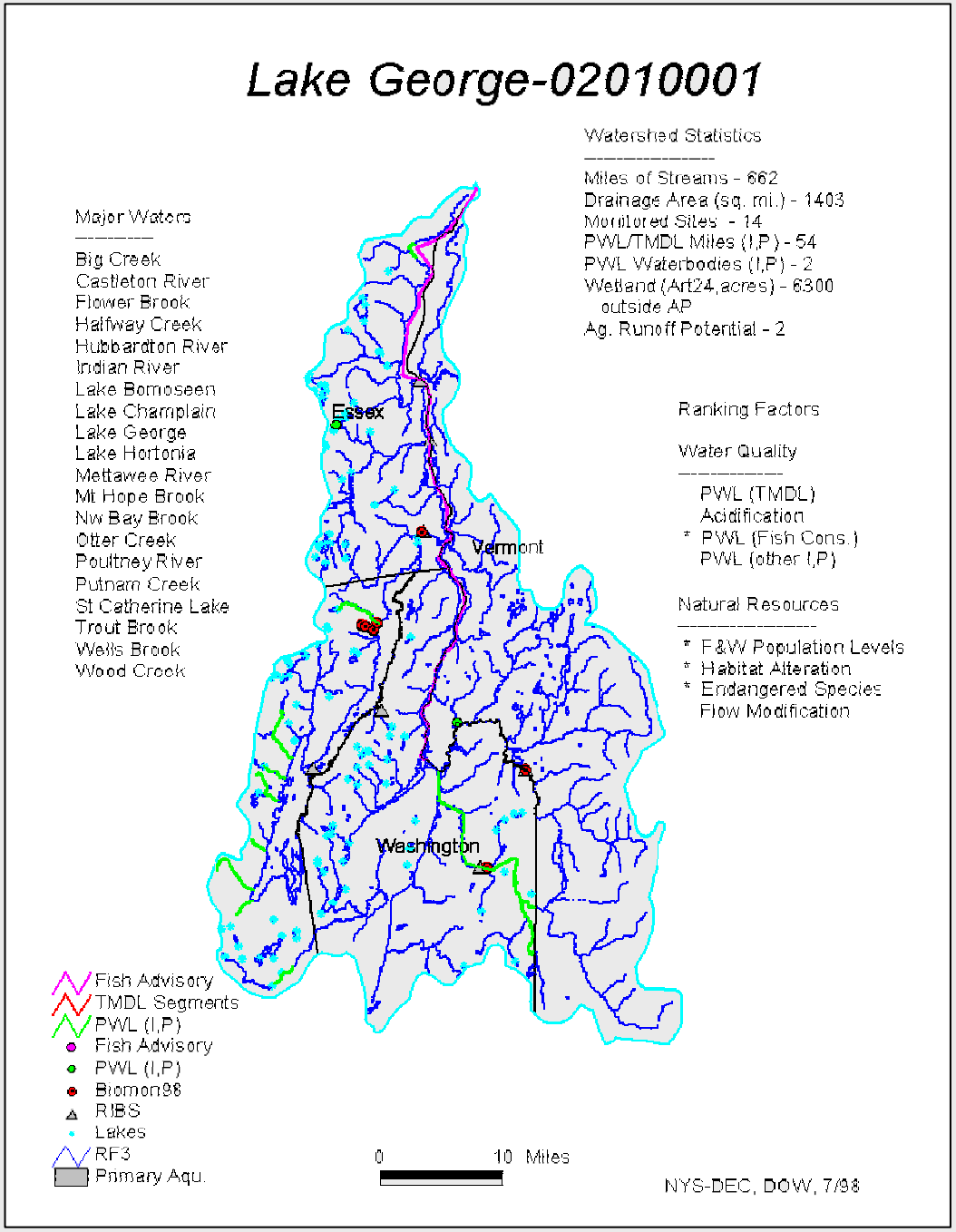
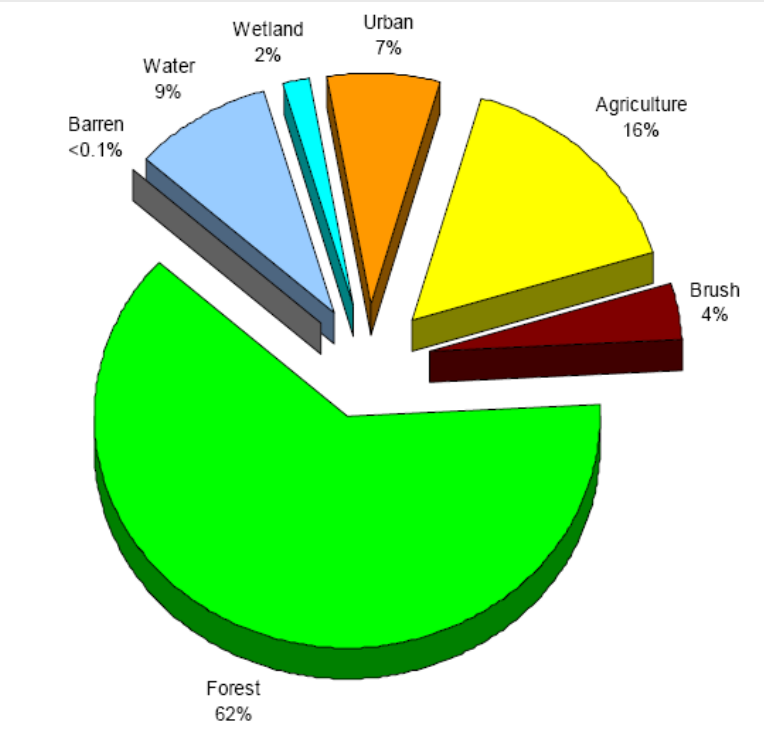
South Lake Basin –

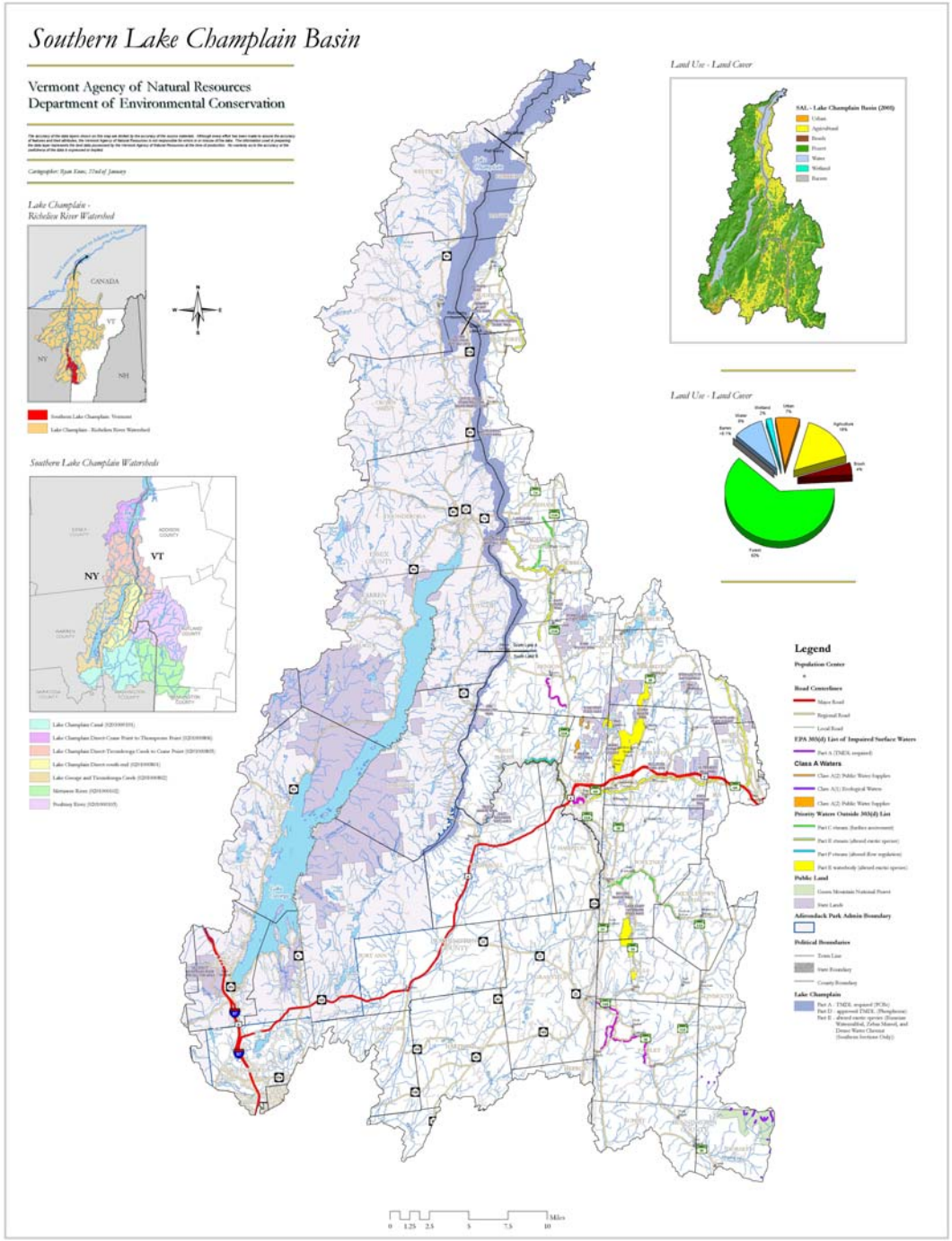
Available Vermont Water Quality Monitoring and Assessment Data and Methods



Southern Lake Champlain Basin

Land use – land cover





Generalized Land Cover/Use for
ANR Planning Basin 2 and 4 (UVM SAL 1992 & 2001)

Watershed Planning Basin	Classification	1992	2001	Change	% Change	% Total
Poultney-Mettawee	Urban	11,000	11,000	0	0%	0.05
	Agriculture	38,000	36,000	(2,000)	-6%	0.15
	Brush	10,000	10,000	0	0%	0.04
	Forest	160,000	160,000	0	0%	0.68
	Water	5,900	5,900	0	0%	0.02
	Wetland	3,900	3,900	0	0%	0.02
	Barren	120	120	0	0%	0.00
	Urban - Open	5,000	6,600	1,600	24%	0.03
	Total		**233,520**			**0.99**

Watershed Planning Basin	Classification	1992	2001	Change	% Change	% Total
Lower Champlain Direct	Urban	3,300	3,200	(100)	-3%	0.04
	Agriculture	34,000	32,000	(2,000)	-6%	0.39
	Brush	3,300	3,300	0	0%	0.04
	Forest	19,000	19,000	0	0%	0.23
	Water	21,000	21,000	0	0%	0.25
	Wetland	1,900	1,700	(200)	-12%	0.02
	Barren	60	60	0	0%	0.00
	Urban - Open	940	1,900	960	51%	0.02
	Total		**82160**			**0.99**

Notes:

Totals between years are different due to rounding.

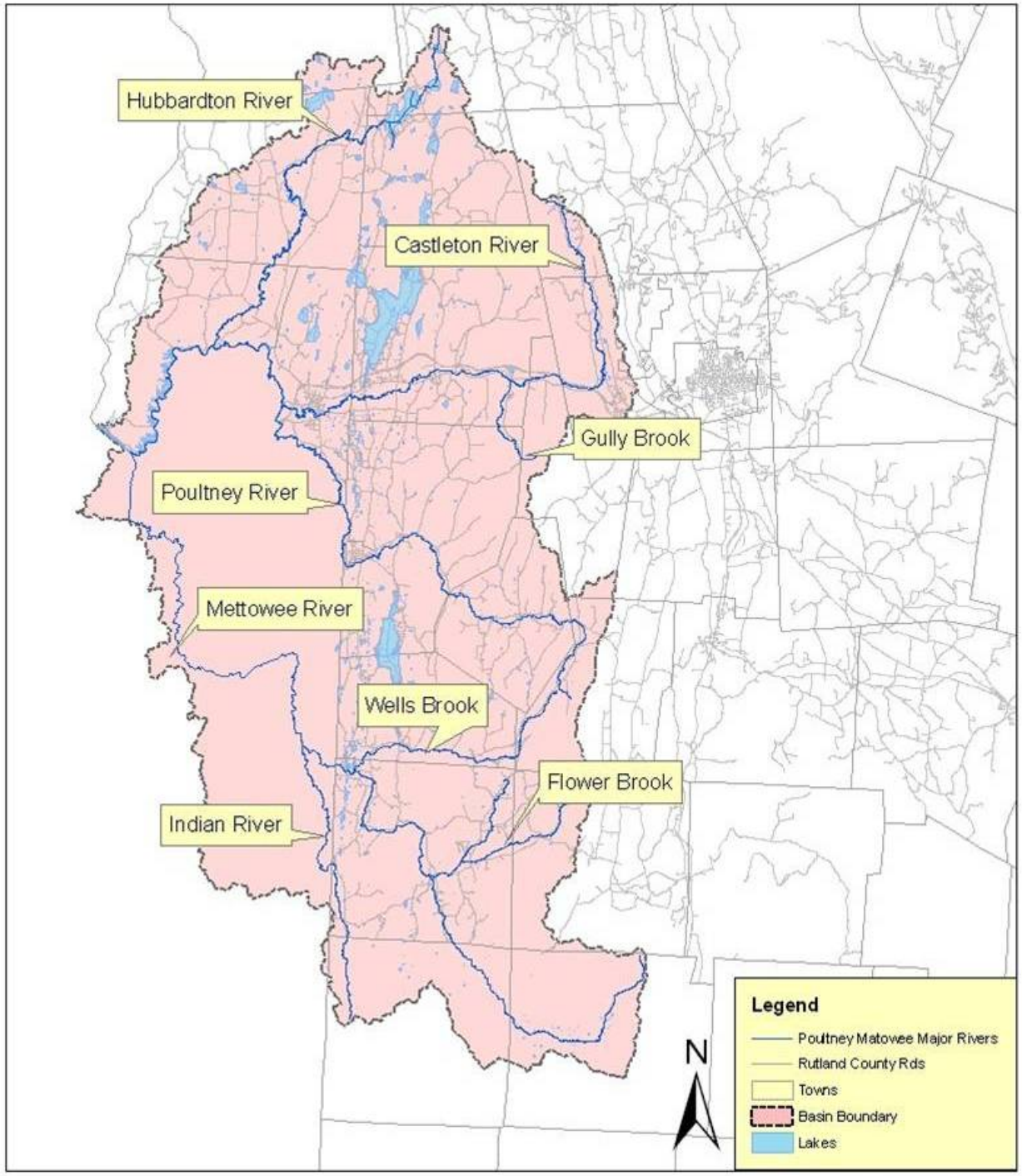
1992 LULC Metadata: http://www.vcgi.org/metadata/LandLandcov_LCLULCB92.txt

2001 LULC Metadata:http://www.vcgi.org/metadata/LandLandcov_LCLULCB01.txt

Basin 2 – Poultney Mettowee

<u>Land use – land cover</u>

Forest – 68%
Agriculture – 15%
Urban/ open – 8%
Brush – 4%
Water/ wetland – 4%



Basin 4 - Lower Champlain Direct

<u>Land use – land cover</u>

Forest – 23%

Agriculture – 40%

Urban/ open – 4%

Brush – 4%

Water/ wetland – 27%*

* Includes Lake Champlain

Water Quality Monitoring (biological)

- **Lake Champlain Long-Term Water Quality and Biological Monitoring**
  - Basin 2 – Poultney Mettowee
    - Poultney River (6 sites)
    - Coggman Creek (1 site)
    - Hubbardton River (1 site)
    - Castleton River (1 site)
    - Gully Brook (1 site)
    - Mettowee River (1 site)
    - Flower brook (1 site)

WBID	SiteID	EventID	Location	Station	Date	IBI_Type	Community
VT02-04	570000000231	2007-46	Poultney River	23.1	10/9/2007	MW	Good
VT02-04	570000000240	2007-45	Poultney River	24	10/6/2007	MW	Good
VT02-04	570000000301	1989-35	Poultney River	30.1	6/21/1989	MW	Very Good
VT02-04	570000000309	2002-02	Poultney River	30.9	7/10/2002	MW	Good
VT02-04	570000000336	1989-34	Poultney River	33.6	6/12/1989	None	
VT02-01	570600000022	1989-56	Coggman Creek	2.2	6/30/1989	MW	Good
VT02-01	570600000029	2007-47	Coggman Creek	2.9	10/10/2007	MW	
VT02-02	570700000018	1993-67	Hubbardton River	1.8	9/23/1993	MW	Very Good
VT02-02	570700000018	1992-24	Hubbardton River	1.8	9/21/1992	MW	Very Good
VT02-02	570700000024	1989-55	Hubbardton River	2.4	6/29/1989	MW	Very Good
VT02-02	570700000058	1989-54	Hubbardton River	5.8	7/7/1989	MW	Good
VT02-02	570700000107	1989-53	Hubbardton River	10.7	7/11/1989	MW	Good
VT02-02	570700000107	1994-40	Hubbardton River	10.7	9/30/1994	MW	Good
VT02-02	570700000107	1995-36	Hubbardton River	10.7	10/5/1995	MW	Good
VT02-02	570700000107	1988-41	Hubbardton River	10.7	10/6/1988	MW	Fair
VT02-02	570700000109	2007-61	Hubbardton River	10.9	10/10/2007	MW	Good
VT02-02	570700000147	1989-52	Hubbardton River	14.7	7/5/1989	MW	Good
VT02-02	570707000022	1997-44	Hubbardton Trib	2.2	10/2/1997	MW	
VT02-01	571000000022	1989-51	Mud Brook	2.2	6/26/1989	MW	
VT02-03	571100000087	1993-78	Castleton River	8.7	10/6/1993	None	
VT02-03	571100000087	1990-03	Castleton River	8.7	7/16/1990	MW	Very Good
VT02-03	571100000100	1989-47	Castleton River	10	6/27/1989	MW	
VT02-03	571100000168	1989-46	Castleton River	16.8	6/16/1989	Both	
VT02-03	571104000003	1989-50	Bomoseen Outlet Brook	0.3	6/23/1989	MW	
VT02-03	571104150004	2003-66	Giddings Brook	0.4	10/8/2003	MW	Good
VT02-03	571112000015	1989-48	North Britton Brook	1.5	6/14/1989	MW	
VT02-03	571114000005	1989-49	Gully Brook	0.5	6/15/1989	CW	
VT02-04	571300000005	1989-45	Lewis Brook	0.5	6/10/1989	MW	
VT02-04	571900000030	1989-43	Finel Hollow Brook	3	6/8/1989	CW	
VT02-15	580000000325	1986-06	Mettawee River	32.5	8/20/1986	MW	Very Good
VT02-15	580100000087	1989-25	Indian River	8.7	10/4/1989	MW	Fair
VT02-05	580300000055	2002-16	Wells Brook	5.5	7/31/2002	CW	Excellent
VT02-05	581700000048	1993-76	Flower Brook	4.8	10/5/1993	CW	Excellent
VT02-05	581700000048	1992-38	Flower Brook	4.8	10/7/1992	CW	Excellent
VT02-05	581700000048	1991-32	Flower Brook	4.8	9/12/1991	CW	Fair
VT02-05	581700000049	1991-33	Flower Brook	4.9	9/12/1991	CW	Excellent

Lake Champlain Long-Term Water Quality and Biological Monitoring - Basin 2 – Poultney Mettowee

	A	Giddings Brook	571104150011			9/25/2003
	A	Belgo Brook	571112050010			9/25/2003
	A	Wells Brook	580300000055			7/31/2002
	A	Flower Brook	581700000048			9/12/1991

	B1	Poultney River	570000000240			10/7/1998
	B1	Poultney River	570000000329			9/25/2002
	B1	Breese Pond Outlet	570710000047			10/7/2004
	B1	Castleton River	571100000062			10/8/2003
	B1	Castleton River	571100000065			10/8/2003
	B1	Castleton River	571100000087			7/11/1990
	B1	Castleton River	571100000087			10/29/1991
	B1	Mettawee River	580000000325			9/25/2002
	B1	Mettawee River	580000000369			9/28/2004
	B1-B2	Breese Pond Outlet	570710000047			10/8/2003
	B1	Hubbardton River	570700000018			10/14/2003

Water Quality Monitoring (biological)

- **Lake Champlain Long-Term Water Quality and Biological Monitoring**
  - Basin 4 – Lower Champlain Direct
    - East Creek (North Fork)
    - Sanford Brook
    - Perch Pond Outlet

Lake Champlain Long-Term Water Quality and Biological Monitoring - Basin 4 – Lower Champlain

Location	Station	SiteID	Date	WBID	DrainageA	Elevation	OrgID	GearID	Town	Community	Latitude	Longitude
East Creek-No. Fork	0.7	560200000007	10/6/1988	VT04-03	39	120	DEC	KN	Orwell	Fair	43.81056	73.33
East Creek-No. Fork	2.2	560200000022	10/22/2004	VT04-03	35	190	DEC	KN	Orwell	Fair	43.82694	73.31833
Sanford Brook	0.2	560402000002	10/7/2003	VT04-03	3.37	315	DEC	SW	Orwell		43.78556	73.30667
Perch Pond Outlet	0.1	560405000001	10/7/2003	VT04-03	4.45	320	DEC	SW	Benson		43.74389	73.3075

Lake Champlain Long-term Monitoring
Tributary Station Summary Statistics

Statistics include data from all sampled years, and both VT and NY laboratories.

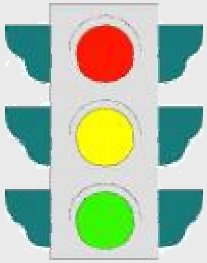
Tributary	Test	Units	N	Mean	Minimum	25th	Median	75th	Maximum
Poultney River	TP	mg/L	324	0.092	0.012	0.031	0.056	0.122	0.499

Tributary	Test	Units	N	Mean	Minimum	25th	Median	75th	Maximum
Mettowee River - Barge Canal	TP	mg/L	343	0.097	0.014	0.043	0.065	0.119	0.750

Lake Champlain Watershed Management Partners

VTANR Clean and Clear Program
Lake Champlain Basin Program
University of Vermont Studies

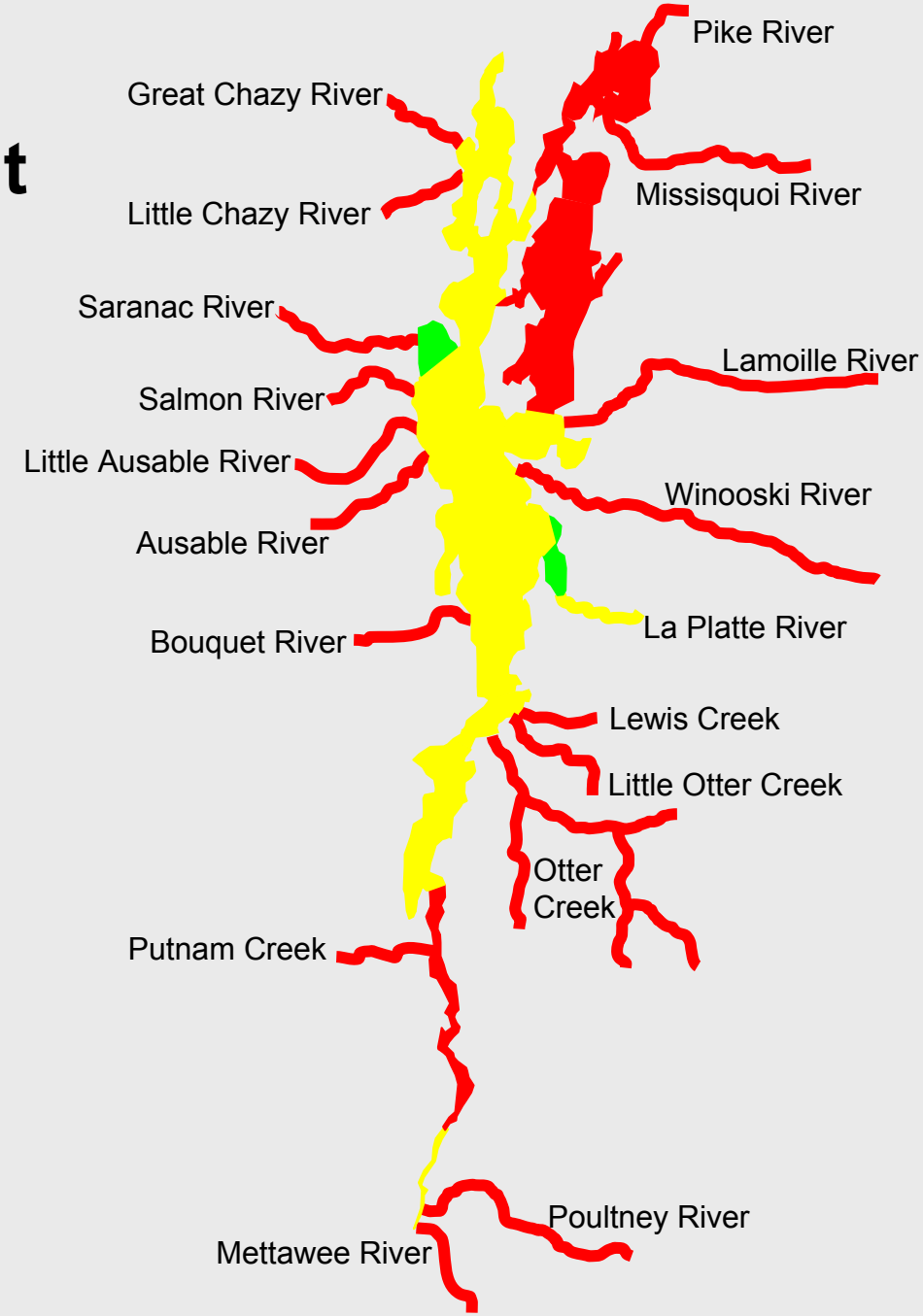
Status of lake phosphorus concentrations and tributary loads



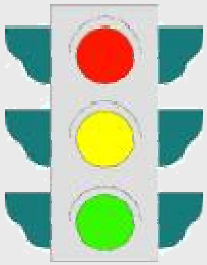
Not meeting criteria or targets

Borderline

Meeting criteria or targets



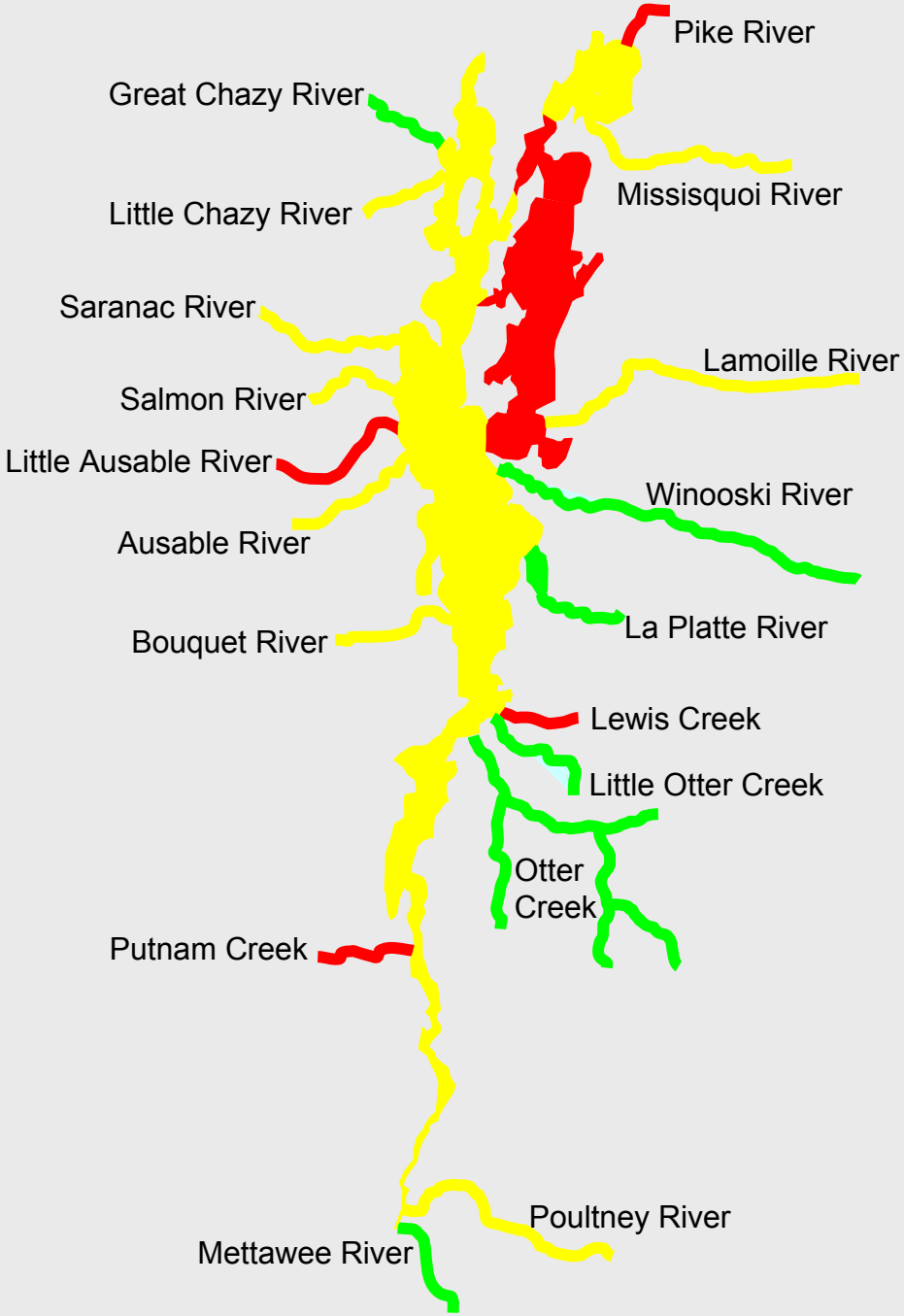
Trends in lake phosphorus concentrations and tributary loads



Increasing

No trend

Decreasing



Water Quality Monitoring (chemical – TP, turbidity, bacteria – *E. coli*)

- **Basin 2 - Poultney Mettowee Watershed Partnership via the LaRosa DEC Laboratory Partnership (since 2002 - *not all sites)**
  - Poultney River (8 sites)
  - Castleton River (5 sites)
  - Mettowee River (4 sites)
  - Flower Brook (1 site)
  - Beaver Brook (1 site)

Poultney Mettowee

water quality monitoring program – *E. coli* (2007)

Expressed in # of colonies per 100 milliliters

Site	6-Jun	20-Jun	5-Jul	9-Jul	18-Jul	1-Aug	8-Aug	14-Aug	29-Aug	10-Sep
PR01	96	114	33	99	78	47	326	64	48	816
PR02	272	285	365		816	517		921	344	
PR03	179	261	613		345	241		231	142	
PR05	172	238	308		160	114		210	32	
PR06	185	501	291		147	365		93	152	
PR07	186	866	435		248	153		387	76	
PR08	1050	613	649	770	261	326	1050	1200	201	1410
Mett01.5	140	276	111	613	192	185	816	114	37	236
Mett02	162	517	156		125	248		118	238	
Mett02.5	308	649	345		488	326		276	199	
Mett03	326	1550	517	1990	517	411	2420	291	285	921
Flower01	206	1120	687		727	1050		517	687	
Beaver01	185	727	980		248	162		291	88	
CA01	214	488	326		866	613		186	193	
CA02	921	461	236		291	238		135	127	
CA03	260	727			435	291			50	
CA05	261	548	365	517			866			308
CA06	461	548	387	649	152	124	579	866	411	461

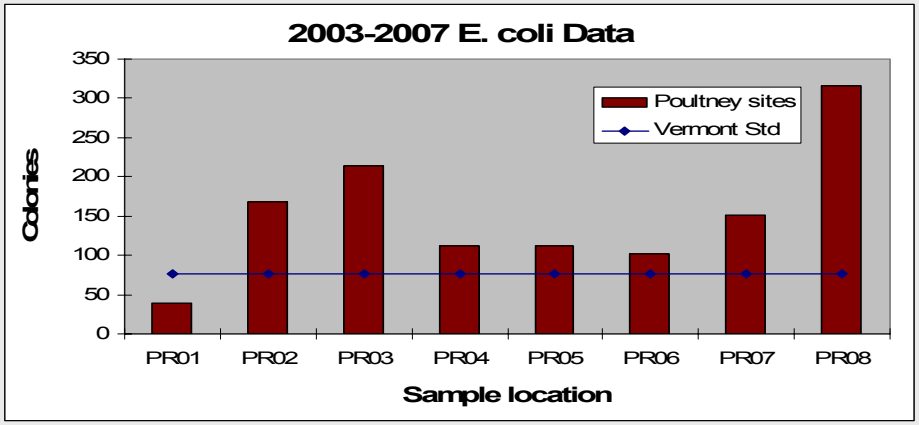
= above Vermont *E. coli* standard

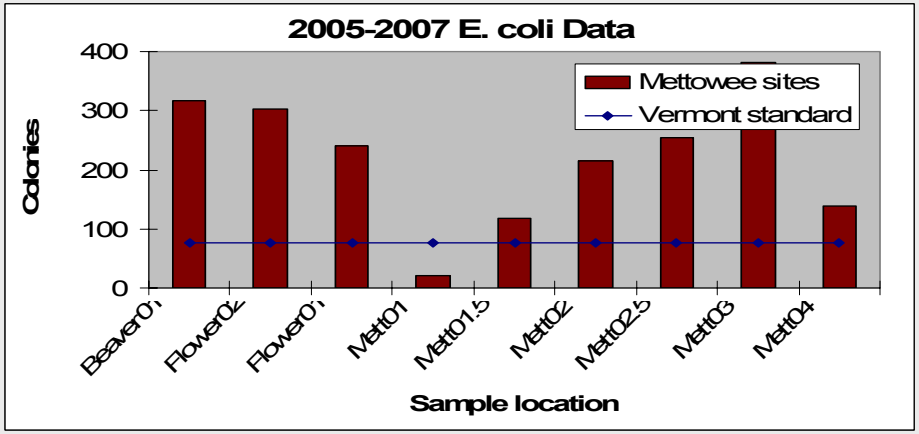
= above Vermont and US EPA *E. coli* standards

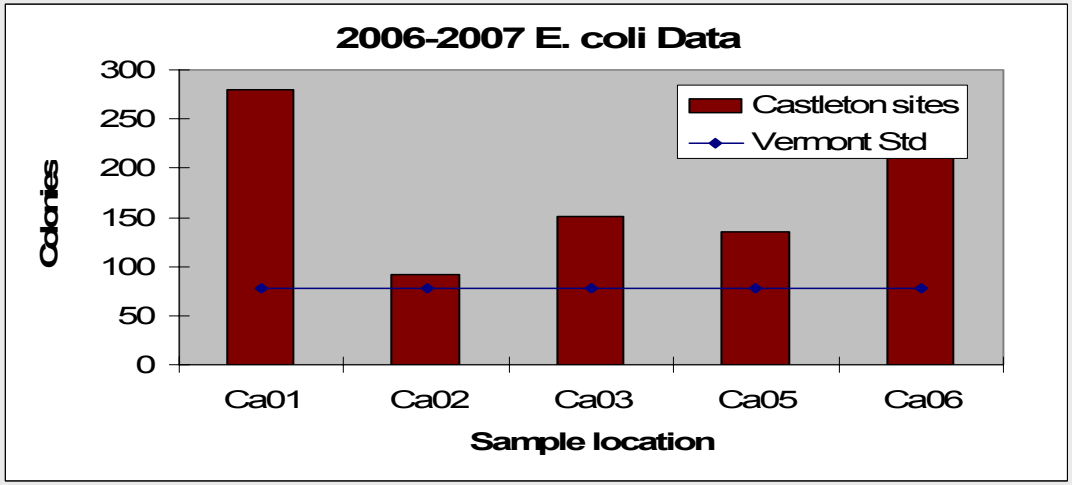
Poultney Mettowee

water quality monitoring program – *E. coli* (2007)

Expressed in # of colonies per 100 milliliters







Poultney Mettowee

water quality monitoring program – phosphorus (2007)

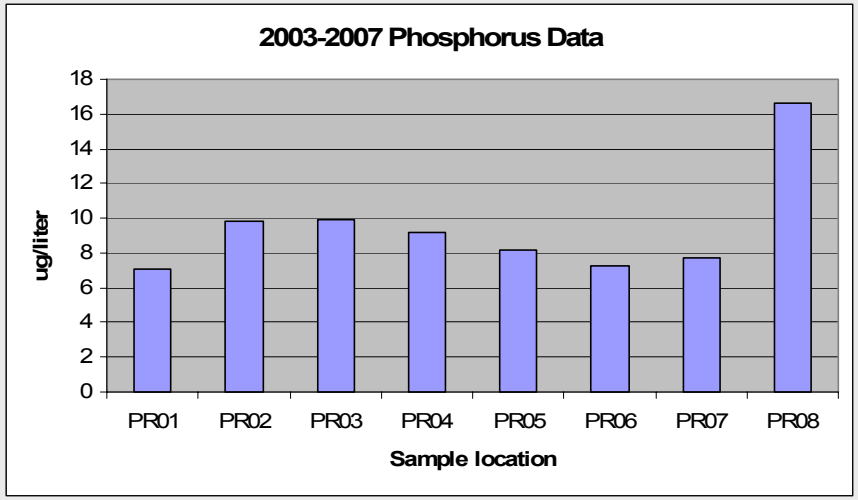
Expressed in micrograms per liter

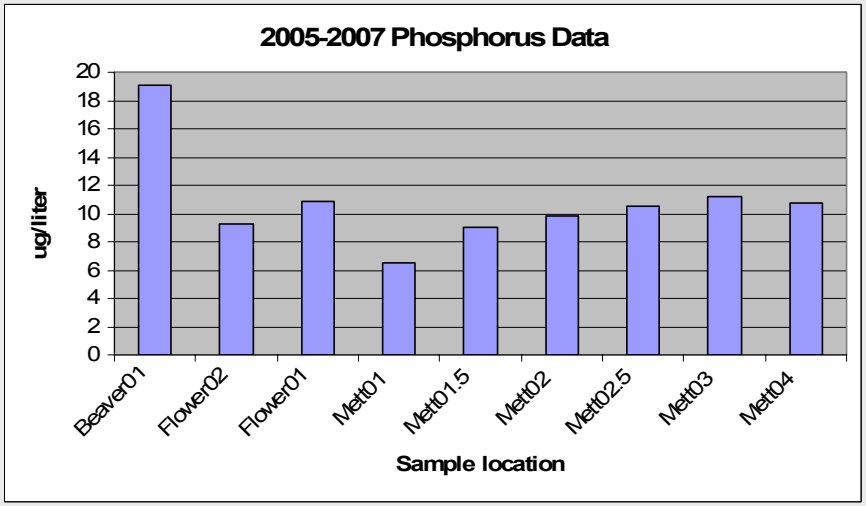
Site	**6-Jun**	**20-Jun**	**5-Jul**	**9-Jul**	**18-Jul**	**1-Aug**	**8-Aug**	**14-Aug**	**29-Aug**	**10-Sep**
PR01	7.62	7.22	8.56	9.72	6.84	5.56	8.54	5.61	<5	<5
PR02	7.97	10.9	10.2		11.8	9.01		9.54	7.2	
PR03	7.86	12.2	8.49		11.6	8.42		9.31	8.34	
PR05	10.5	12.3	5.71		10.1	6.24		7.34	6.23	
PR06	6.3	7.43	6.41		10.5	5.8		6.91	9.31	
PR07	6.09	7.12	6.32		7.68	11.7		6.32	<5	
PR08	24.8	22	18.4	16.6	7.7	11.9	15.7	20	15.9	23.3
Mett01.5	11.1	10.2	6.68	13.1	7.08	5.13	12.2	<5	<5	<5
Mett02	13.6	13.5	7.4		7.21	5.71		5.32	<5	
Mett02.5	15.6	14.6	9.29		9.28	6.42		6.77	5.06	
Mett03	14.9	17.7	8.59	12.2	7.94	6.8	14.6	6.8	5.65	7.49
Flower01	10.8	13.4	8.07		11.3	9.38		10.1	6.92	
Beaver01	14	25	17.1		19.1	31.6		13.8	9.97	
CA01	22.8	28.8	20.8		26	20.8		20.9	16.1	
CA02	36.3	45.4	35.9		41.8	60.6		43.9	24.8	
CA03	19.9	49.2	<5		16	10.7		<5	20.9	
CA05	35.8	53	21.6	23.9	15.3	16	20.1	23.3	16.7	30.2
CA06	26.5	28.5	21.1	27.6	21.6	19.7	21.1	28.1	22.1	23.8

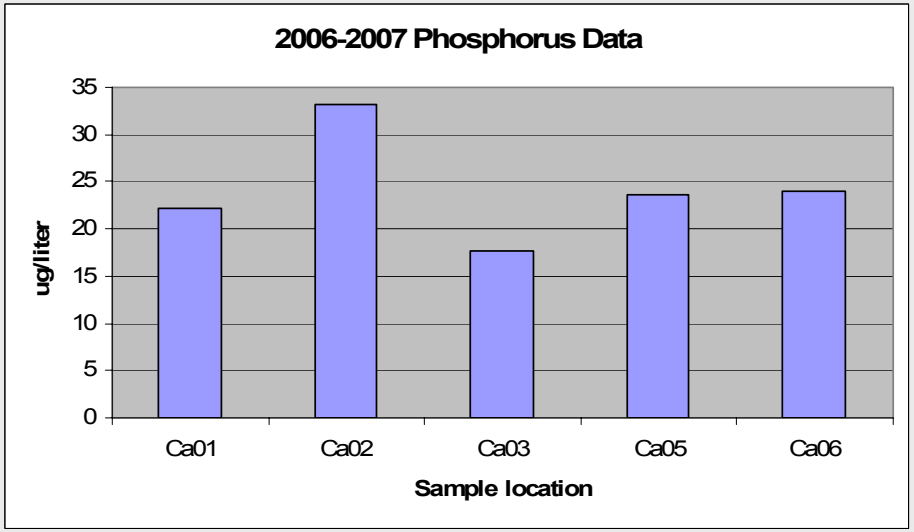
Poultney Mettowee

water quality monitoring program – phosphorus (2007)

Expressed in micrograms per liter







Poultney Mettowee

water quality monitoring program – turbidity (2007)

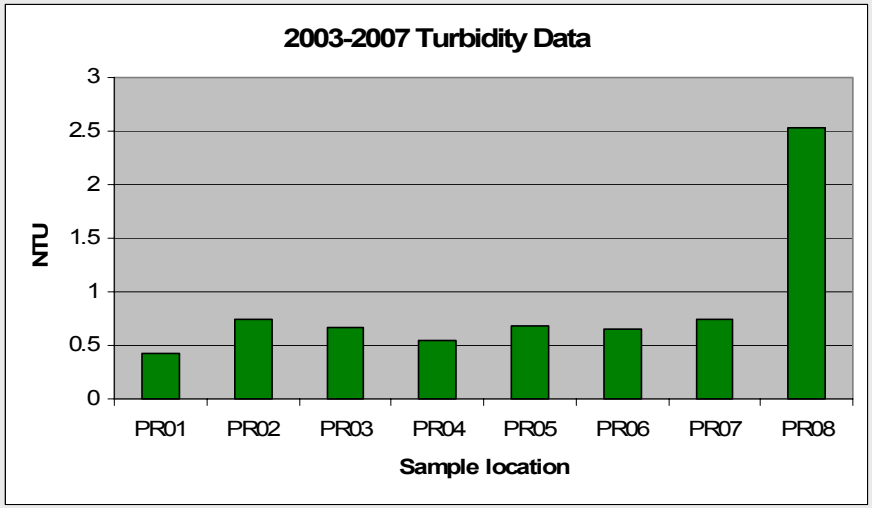
Expressed in Nephelometric Turbidity Units (NTU)

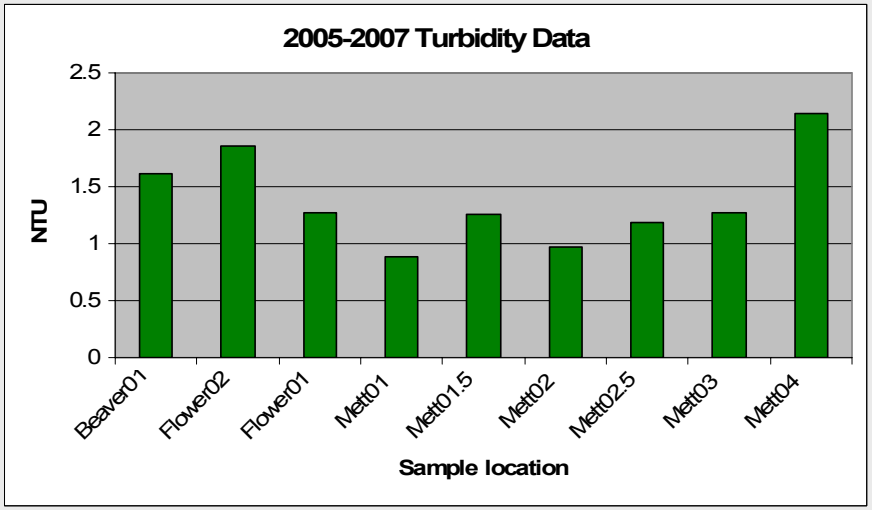
Site	6-Jun	20-Jun	5-Jul	9-Jul	18-Jul	1-Aug	8-Aug	14-Aug	29-Aug	10-Sep
PR01	0.52	0.36	0.52	0.38	<0.2	<0.2	0.32	0.21	<0.2	0.66
PR02	0.76	1	0.72		0.75	0.74		0.71	<0.2	
PR03	2.1	0.64	0.29		0.99	0.25		0.72	0.38	
PR05	0.4	1.04	0.37		0.45	0.33		0.57	0.33	
PR06	0.67	0.63	0.65		0.57	0.77		0.44	0.29	
PR07	0.72	0.65	0.61		0.34	0.36		0.4	0.23	
PR08	3.44	3.02	3.77	3.97	0.41	1.45	1.9	3.65	1.71	
Mett01.5	2.51	1.54	0.49	2.73	0.7	0.35	1.52	0.32	0.24	0.37
Mett02	2.06	1.61	0.46		0.3	0.69		0.27	0.3	
Mett02.5	1.96	2.42	0.38		0.84	0.5		0.57	0.65	
Mett03	1.46	3.27	0.65	1.82	0.54	0.97	0.81	0.64	0.63	0.61
Flower01	1	1.99	0.9		0.96	0.94		1.24	0.65	
Beaver01	0.96	2.22	1.13		1.49	2.5		1.15	0.65	
CA01	2.14	2.67	2.26		2.18	1.9		2	1.27	
CA02	5.72	5.37	5.56		5.07	4.06		3.59	2.09	
CA03	3.34	3.04			1.28	1.53				
CA05	2.03	2.95	2.52	1.9			1.38			1.55
CA06	2.54	3.27	2.49	3.79	3.13	2.17	2	2.41	1.68	2.46

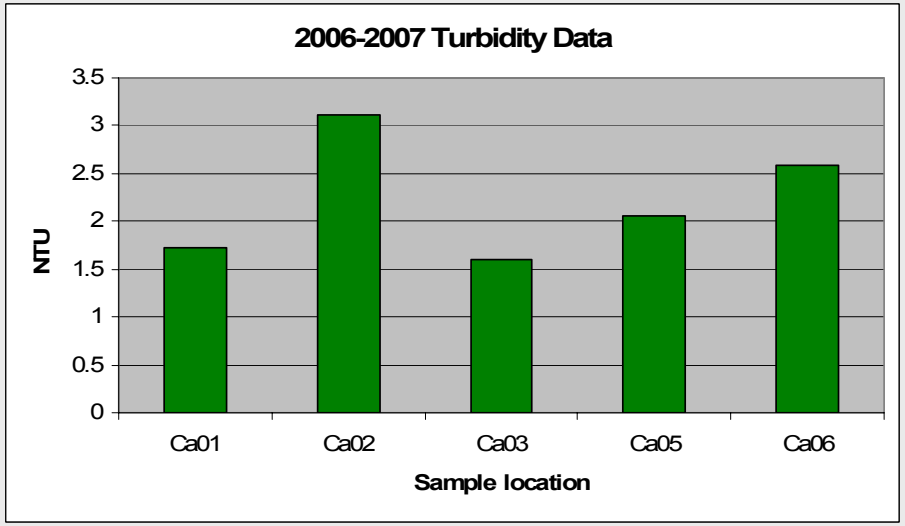
Poultney Mettowee

water quality monitoring program – turbidity (2007)

Expressed in Nephelometric Turbidity Units (NTU)







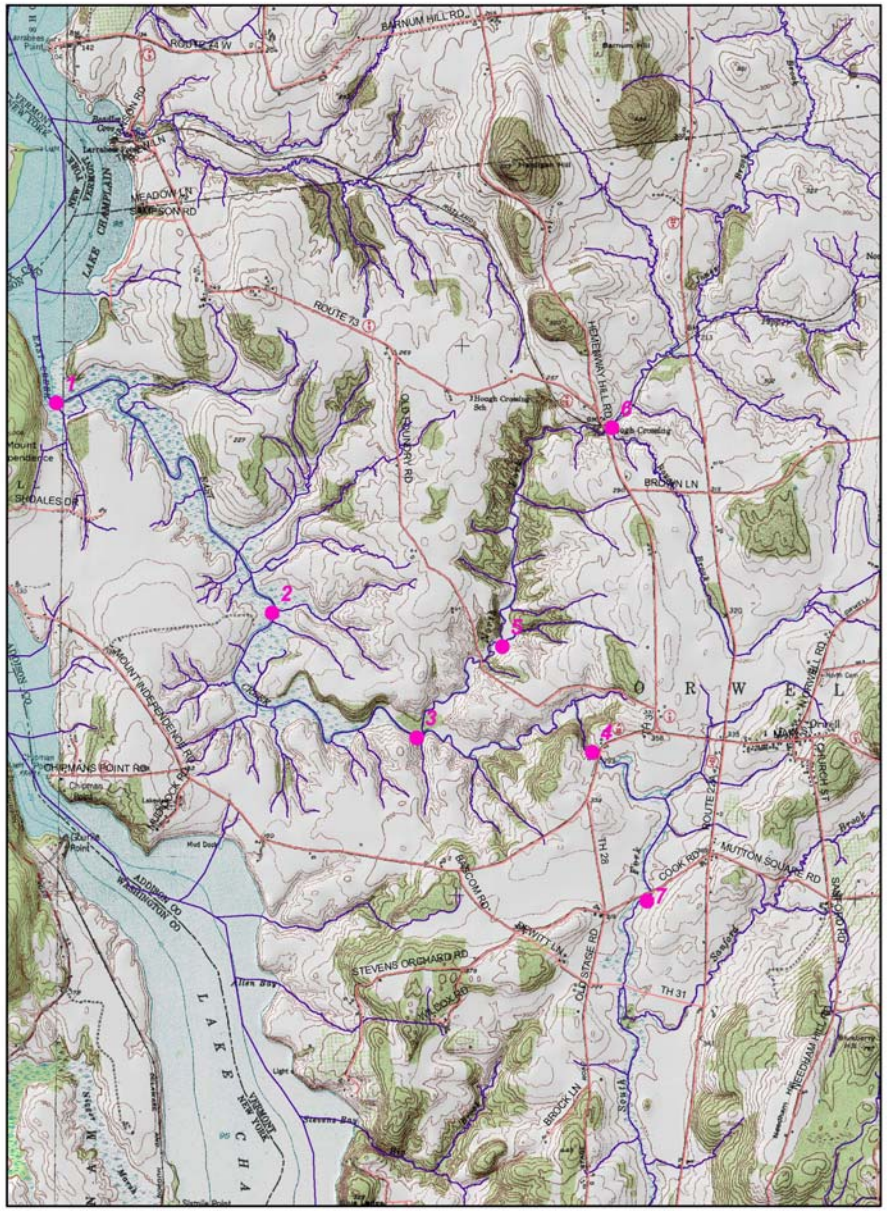
Water Quality Monitoring (chemical – TP, turbidity, bacteria – *E. coli*)

Basin 4 – The Nature Conservancy (1995-1997) - East Creek (7 sites)

- Temperature
- Dissolved Oxygen
- Total Dissolved Solids
- pH
- Conductivity
- Turbidity (NTU)
- Ammonia (mg/L) – NH_4
- NO_3 (nitrate)

- TNC researchers found the primary concern during this time to be excessive levels of ammonia and low dissolved oxygen levels during the summer months.

East Creek - WQ sites (TNC)



River Impairments

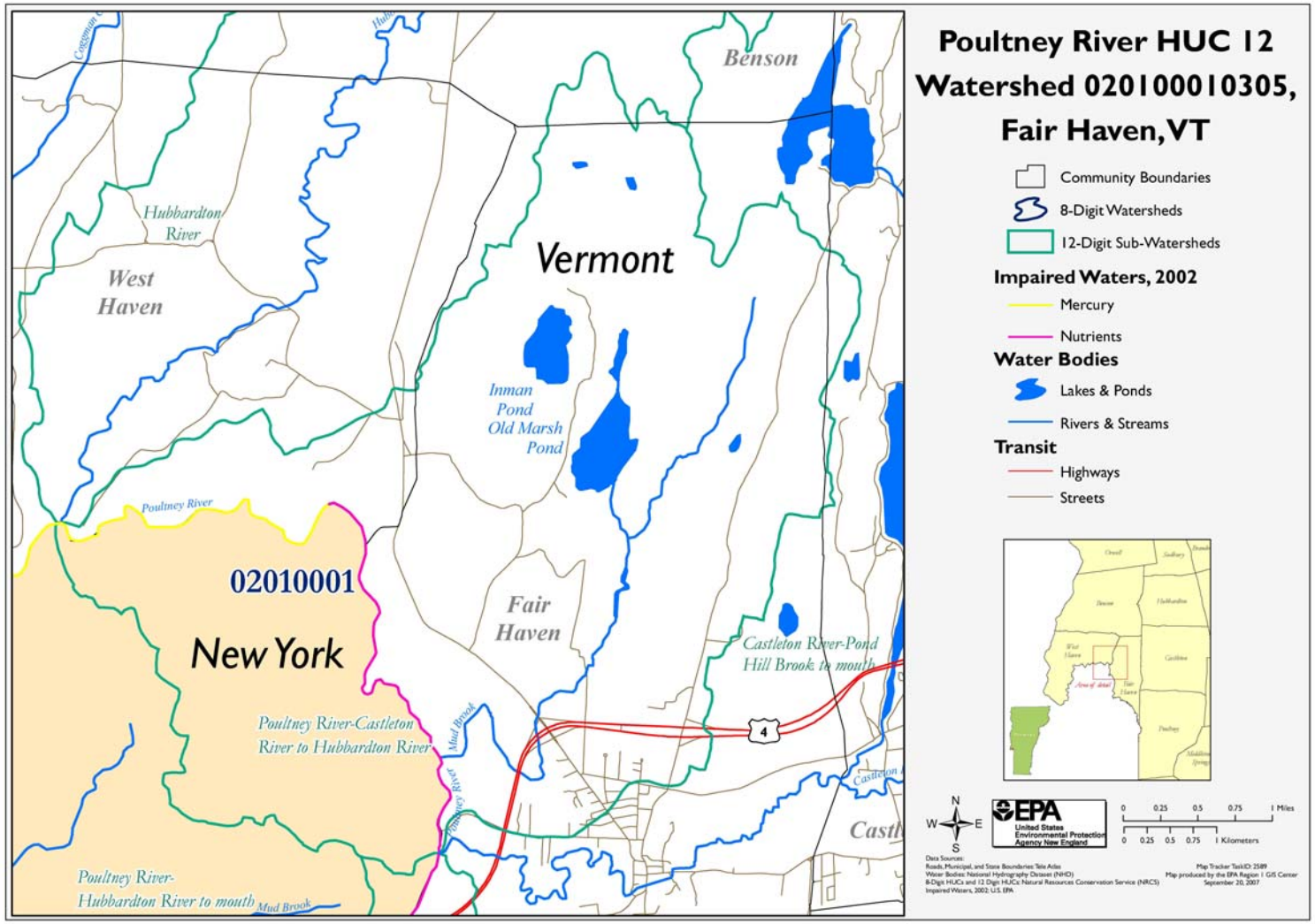
Part A. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards according to the methodology described in the Vermont Surface Water Assessment and Listing Methodology. Required or needed pollution controls have yet to be fully implemented and further pollutant loading determinations (i.e. TMDLs) are necessary - unless remediation will be completed prior to the scheduled TMDL.

Waterbody ID	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Completion Priority
VT02-02	UNNAMED TRIB TO HUBBARDTON RIVER, BELOW WWTF DISCHARGE	E. COLI, NUTRIENTS, TEMPERATURE	ALS, CR, 2CR	BENSON WWTF DISCHARGE POSSIBLE SOURCE; SITUATION NEEDS MORE MONITORING & ASSESSMENT ESP UPSTREAM OF WWTF DISCHARGE (LAND USES & WETLAND)	M
VT02-03	CASTLETON RIVER, FAIR HAVEN	E. COLI	CR	WWTF PUMP STATION OVERFLOWS	L
VT02-05	**FLOWER BROOK, MOUTH TO RM 0.5	E. COLI	CR	ELEVATED E. COLI MONITORING RESULTS	L
	METTAWEE RIVER, UPSTREAM OF NY/VT BORDER (8.2 MILES)	TEMPERATURE	ALS, 2CR	LOSS OF RIPARIAN VEGETATION; CLOSE PROXIMITY OF AGRICULTURAL USES	L
	UNNAMED TRIB TO METTAWEE RIVER	METALS (IRON, ZINC)	ALS	PAWLET LANDFILL LEACHATE	M

Part D. Waters in this section have completed and EPA-approved TMDLs.

WaterbodyID	*Name*	*Pollutant*	*Previously Identified Problem*	*Status*
VT02-01	POULTNEY RIVER, MOUTH UPSTRM TO CARVERS FALLS (10.4 MILES)	MERCURY	ELEVATED LEVELS OF Hg IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007

River Impairments



River Impairments - Flow

Part F. Waters appearing below are altered by flow regulation. These are priority waters for management action.

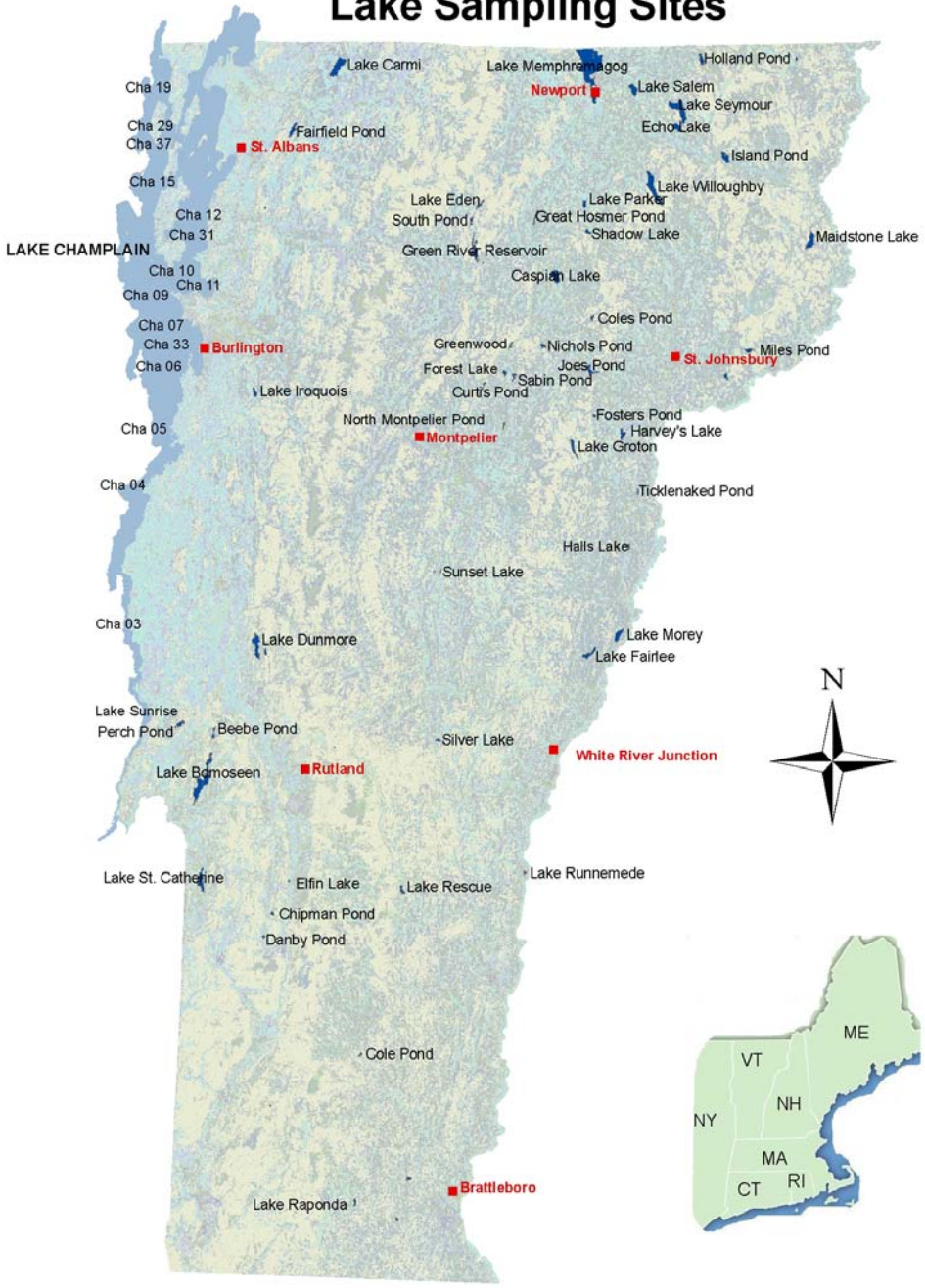
Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity	Projected WQS Compliance Year
VT02-01	POULTNEY RIVER, MOUTH TO CARVERS FALLS (10.4 MILES)	ALL USES	ARTIFICAL FLOW REGULATION & CONDITION BY HYDRO; DEWATERING OF LARGEST/HIGHEST WATERFALL IN VT	PRESENTLY IN FERC LICENSING PROCESS; NY 401 ISSUED (4/95); NEPA PROCESS DONE (3/97); VT 401 FILING (3/98); SECTION 401 WQ CERT APPL'N UNDER REVIEW BY VT DEC	2008

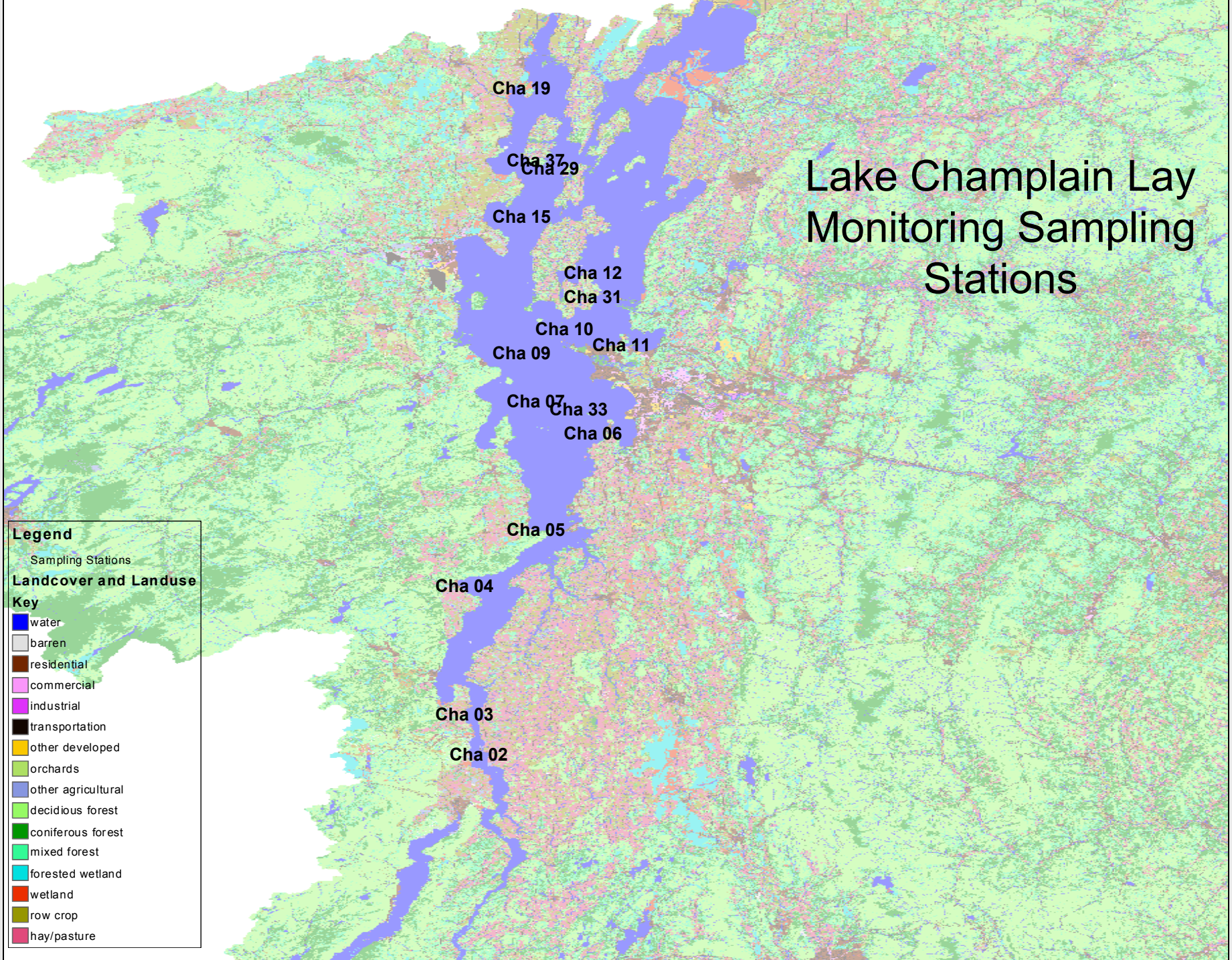
Lay Monitoring Program

Goals of the LMP Program

- To collect water quality data in terms of nutrient enrichment
- To establish a database on each lake
- To educate and involve lake residents in lake protection

2008 Vermont Lay Monitoring Program
Lake Sampling Sites



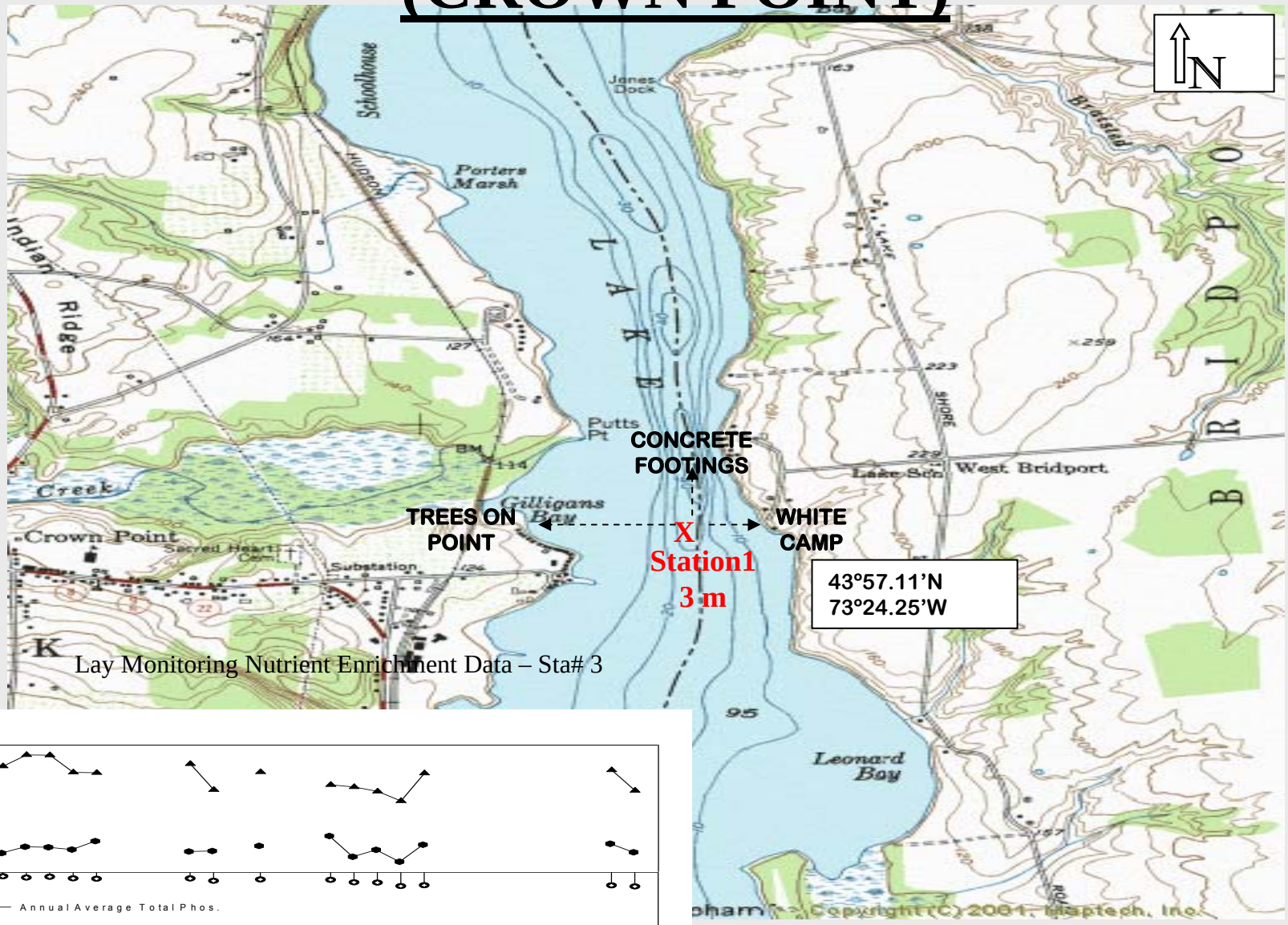

Lake Champlain Lay Monitoring Sampling Stations
Cha 19
Cha 37
Cha 29
Cha 15
Cha 12
Cha 31
Cha 10
Cha 11
Cha 09
Cha 07
Cha 33
Cha 06
Cha 05
Cha 04
Cha 03
Cha 02
Legend
Sampling Stations
Landcover and Landuse Key
water
barren
residential
commercial
industrial
transportation
other developed
orchards
other agricultural
decidious forest
coniferous forest
mixed forest
forested wetland
wetland
row crop
hay/pasture

Vermont Lay Monitoring Program

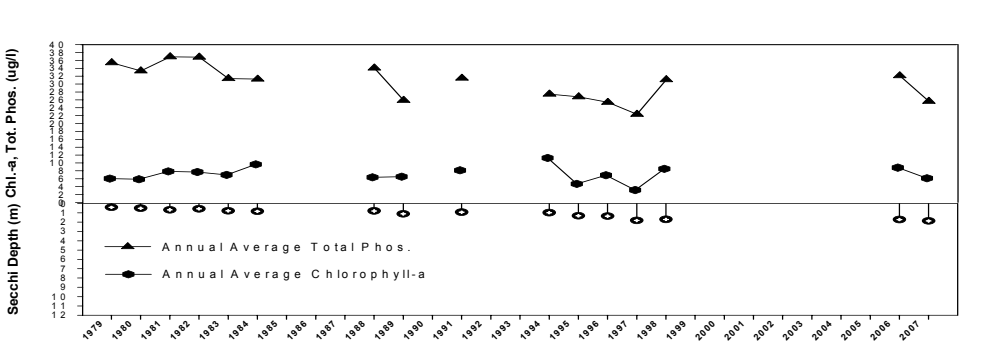
- **Lower Lake Champlain**
  - Station # 36 – Mouth of the Poultney
  - Station # 35 – West Haven
  - Station # 2 – Larrabee's Point
  - Station # 3 – Crown Point ✓

✓ **= only site of these 4 still monitored**

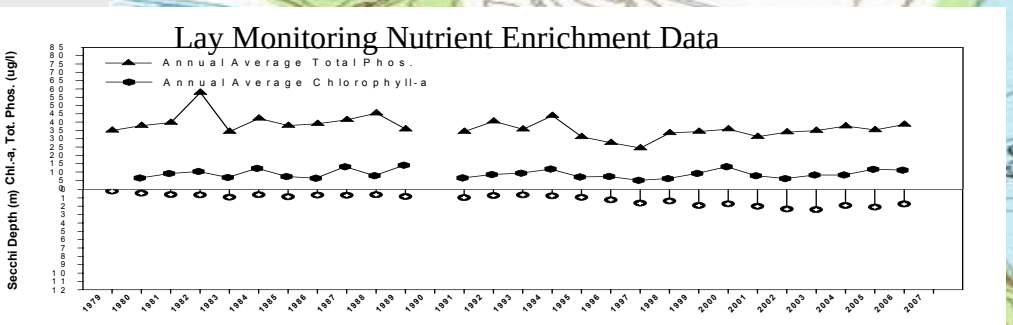
CHAMPLAIN 03 (CROWN POINT)



Lay Monitoring Nutrient Enrichment Data – Sta# 3



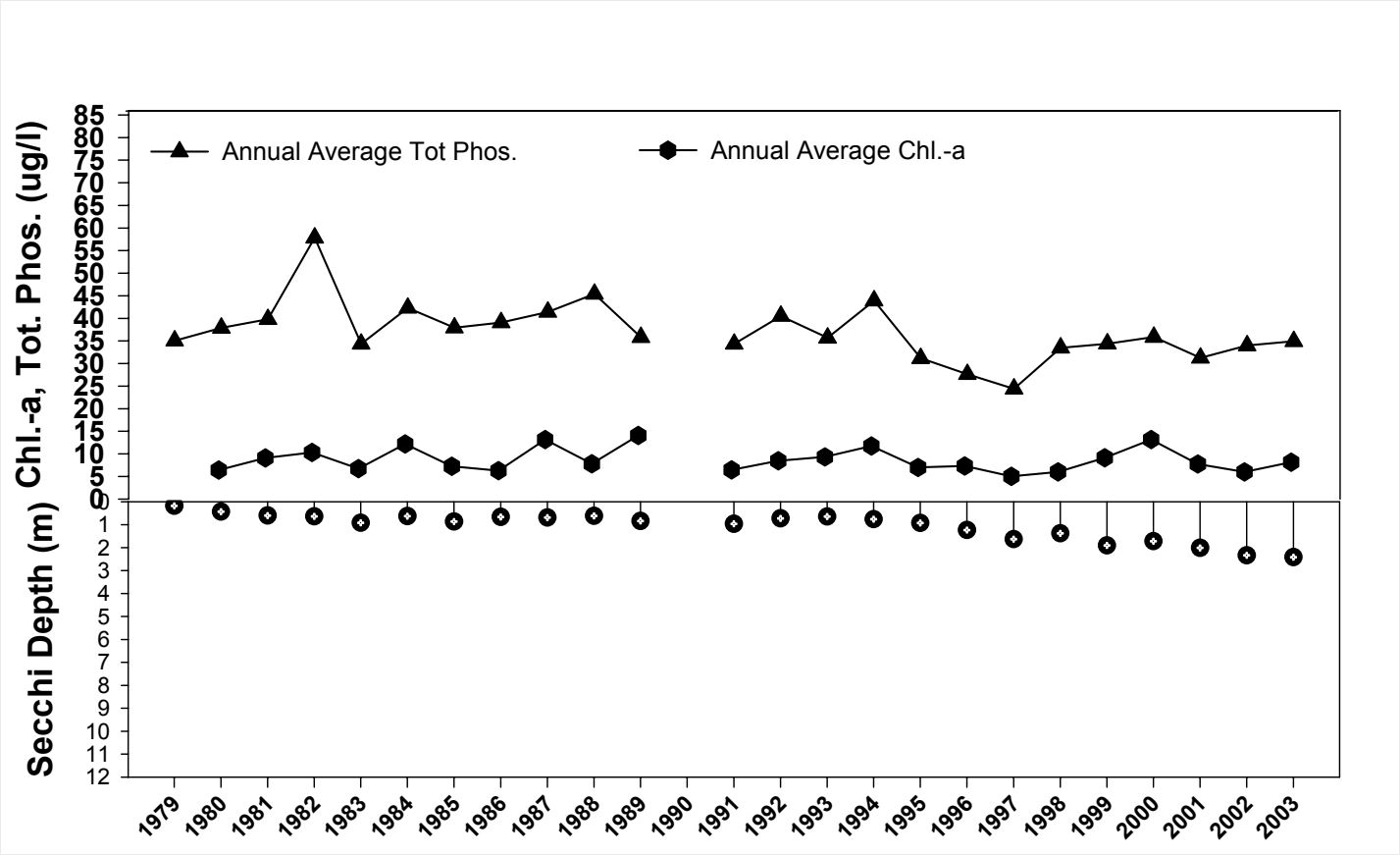
CHAMPLAIN 02
(LARRABEE'S POINT)



Long Term LMP Data

Larrabee's Point on Lake Champlain

shows increase in Secchi water clarity readings at same time that zebra mussels were found in the lake

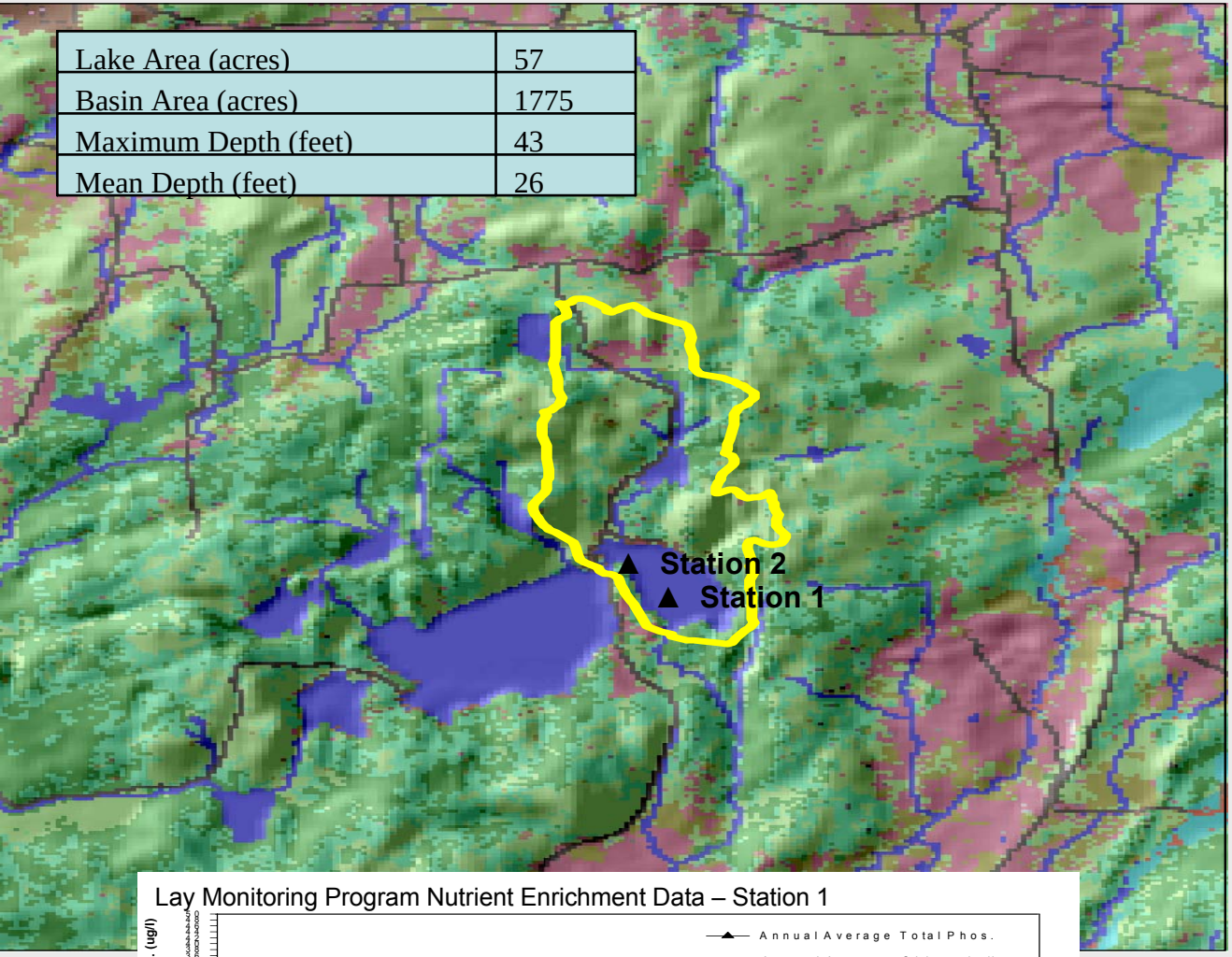


Vermont Lay Monitoring Program

- **Inland Lakes and Ponds (all Basin 2)**
  - Sunrise Lake
  - Perch Pond
  - Beebe Pond
  - Lake Bomoseen
  - Lake Saint Catherine

Sunrise Lake
Benson, VT

Lake Area (acres)	57
Basin Area (acres)	1775
Maximum Depth (feet)	43
Mean Depth (feet)	26



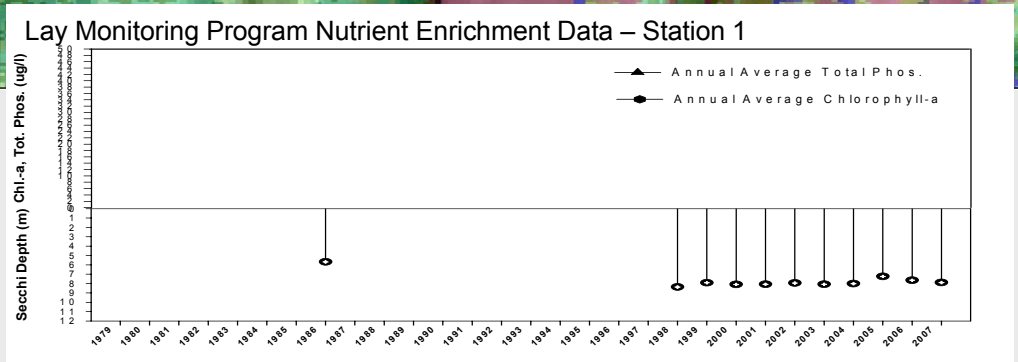
Legend

- Sampling Stations
- Sunrise Watershed

Landcover and Landuse Key

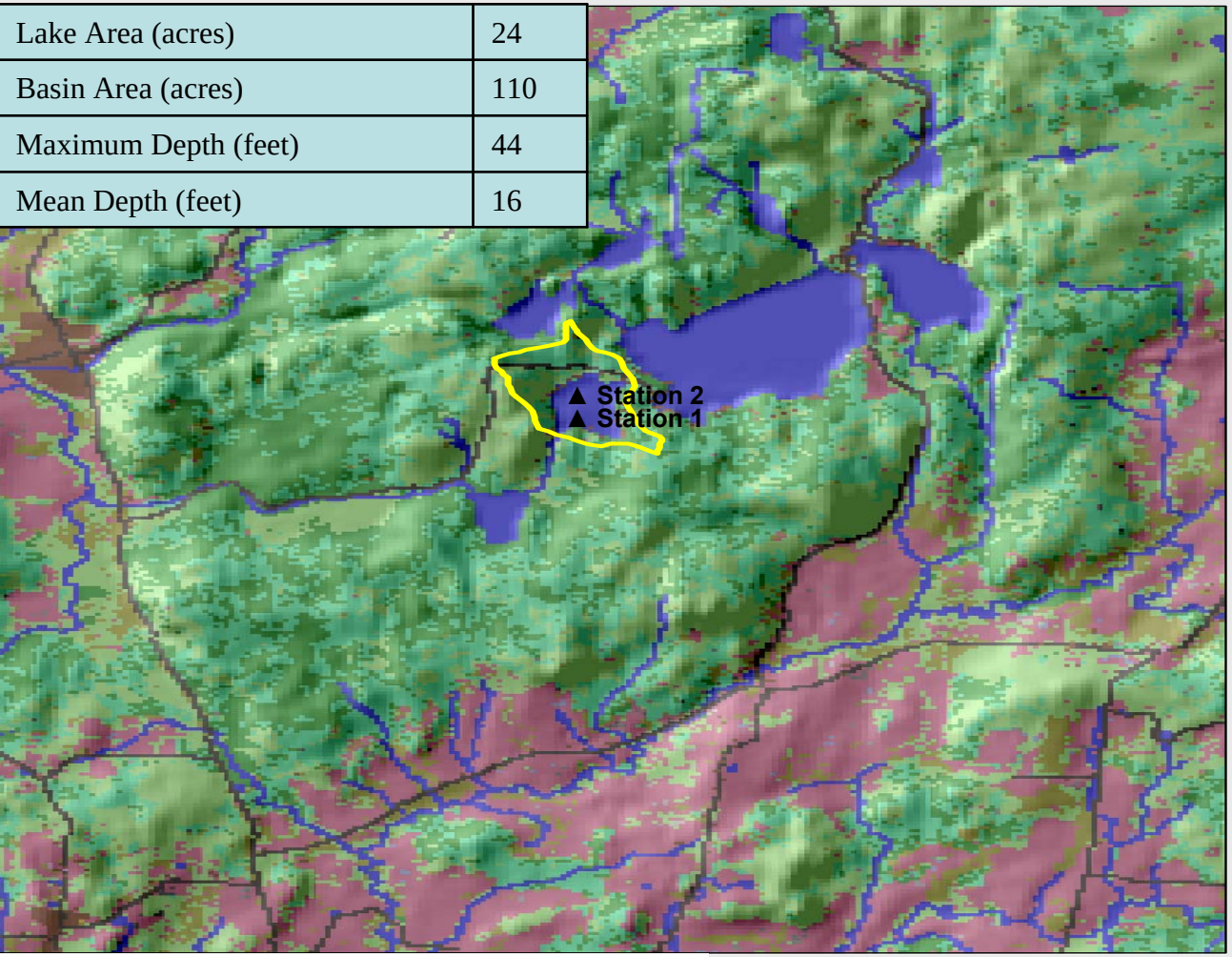
- water
- barren
- residential
- commercial
- industrial
- transportation
- other developed
- orchards
- other agricultural
- decidious forest
- coniferous forest
- mixed forest
- forested wetland
- wetland
- row crop
- hay/pasture

N



Perch Pond
Benson, VT

Lake Area (acres)	24
Basin Area (acres)	110
Maximum Depth (feet)	44
Mean Depth (feet)	16



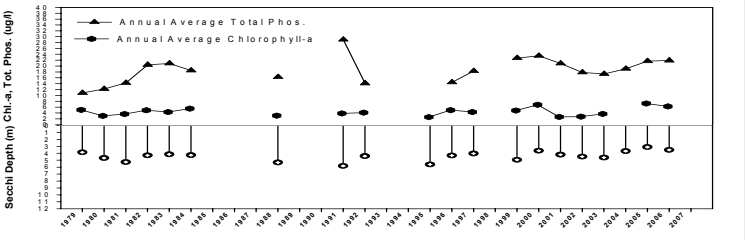
Legend

- Sampling Stations
- Perch Watershed

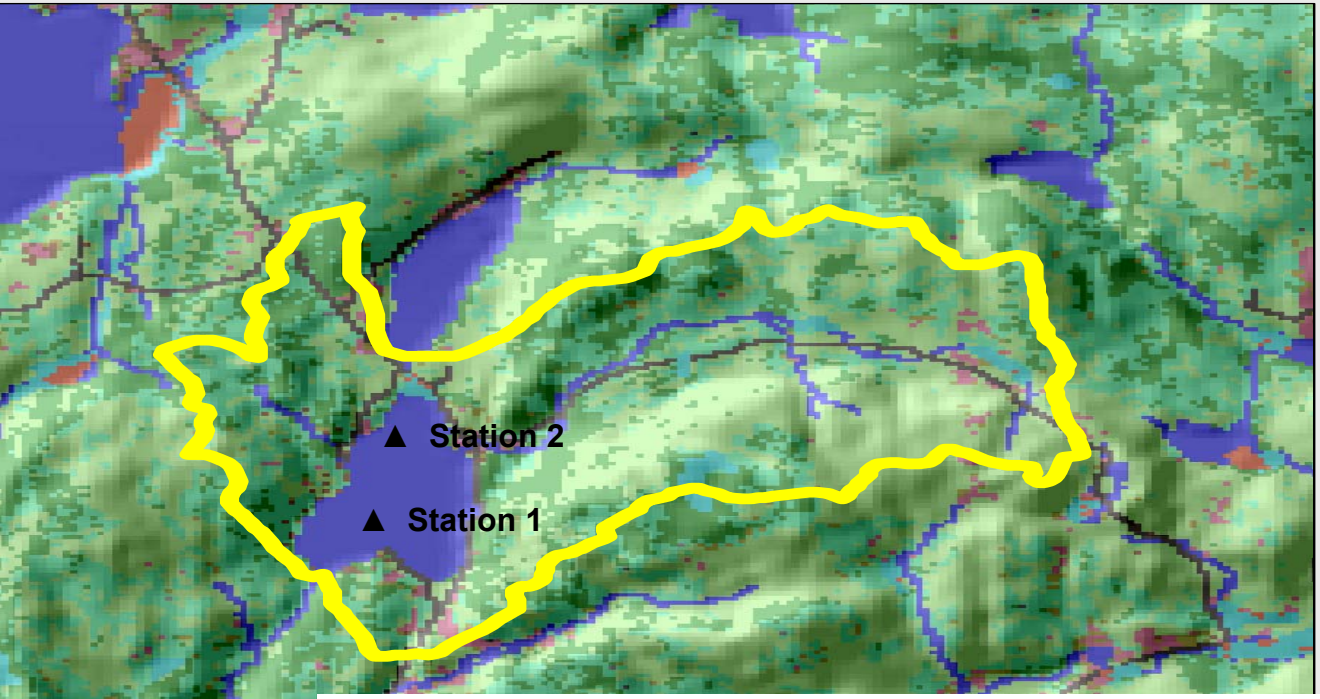
Landcover and Landuse Key

- water
- barren
- residential
- commercial
- industrial
- transportation
- other developed
- orchards
- other agricultural
- decidious forest
- coniferous forest
- mixed forest
- forested wetland
- wetland
- row crop
- hay/pasture

N



Beebe Pond
Hubbarton, VT



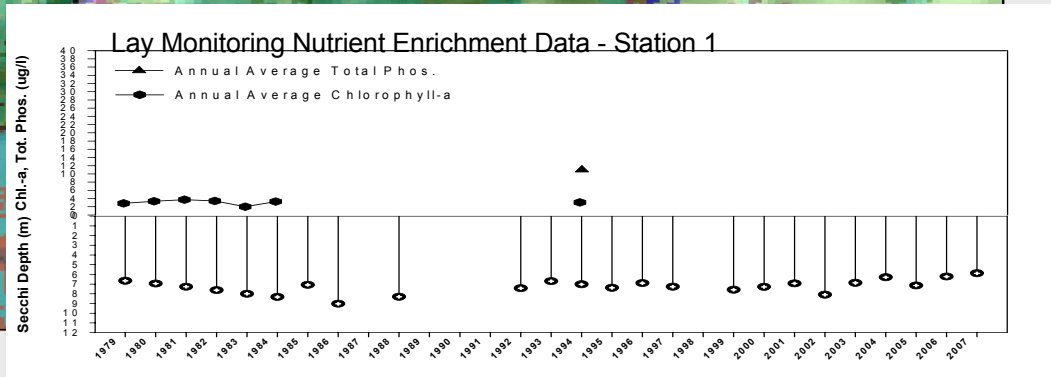
Legend

- Sampling Stations
- Beebe Watershed

Landcover and Landuse Key

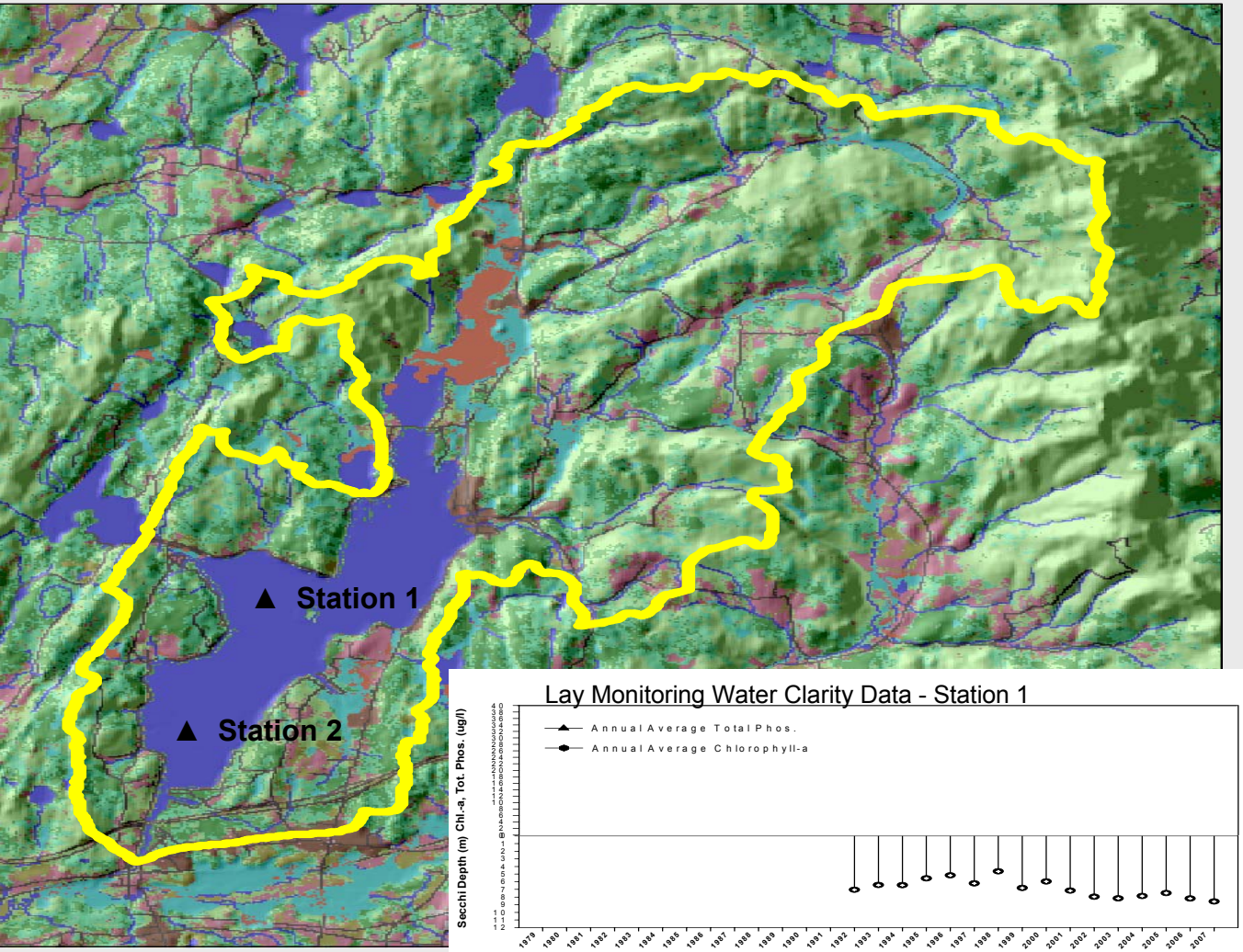
- water
- barren
- residential
- commercial
- industrial
- transportation
- other developed
- orchards
- other agricultural
- decidious forest
- coniferous forest
- mixed forest
- forested wetland
- wetland
- row crop
- hay/pasture

N



Lake Area (acres)	111
Basin Area (acres)	1843
Maximum Depth (feet)	43
Mean Depth (feet)	26

Lake Bomoseen
Castleton, VT



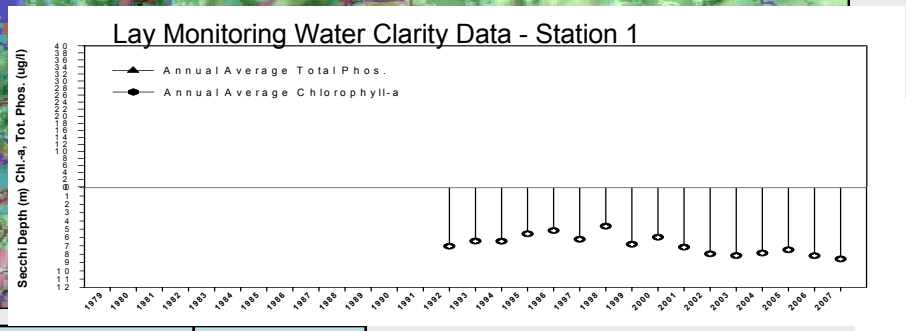
Legend

- Sampling Stations
- Bomoseen Watershed

Landcover and Landuse Key

- water
- barren
- residential
- commercial
- industrial
- transportation
- other developed
- orchards
- other agricultural
- decidious forest
- coniferous forest
- mixed forest
- forested wetland
- wetland
- row crop
- hay/pasture

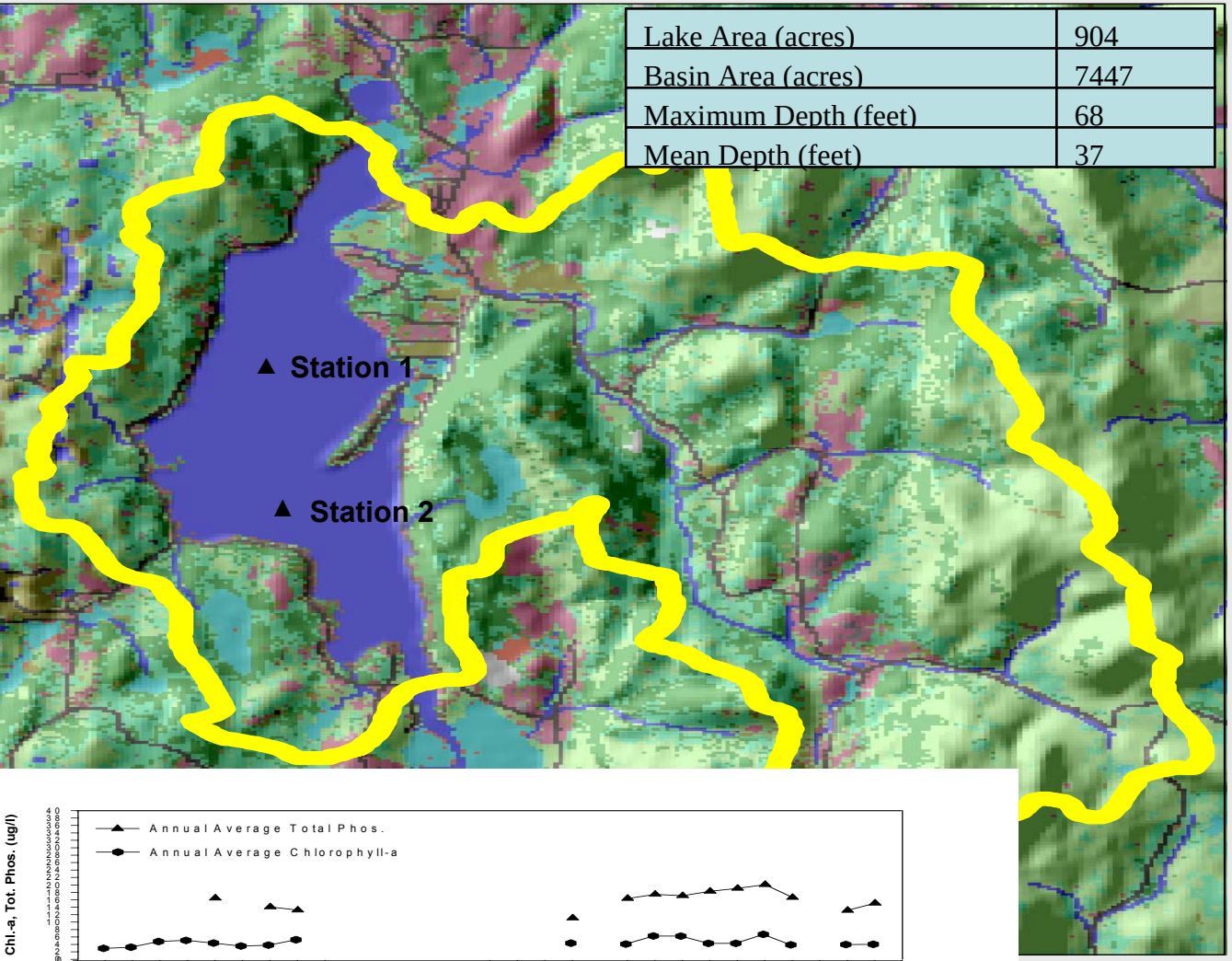
N



Lake Area (acres)	2360
Basin Area (acres)	23630
Maximum Depth (feet)	65
Mean Depth (feet)	27

Lake St. Catherine
Wells, VT

Lake Area (acres)	904
Basin Area (acres)	7447
Maximum Depth (feet)	68
Mean Depth (feet)	37



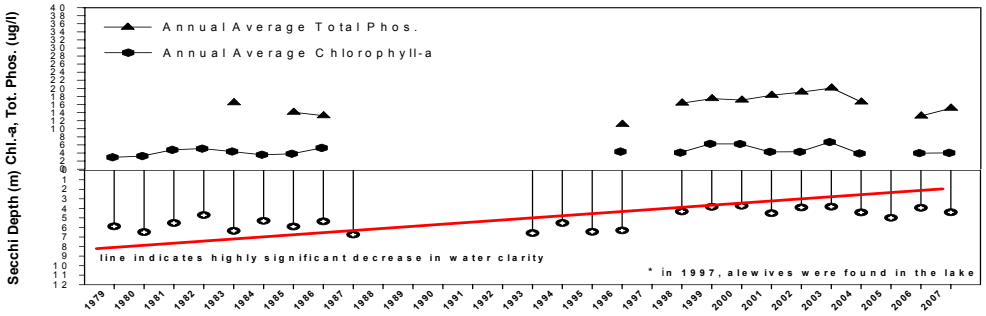
Legend

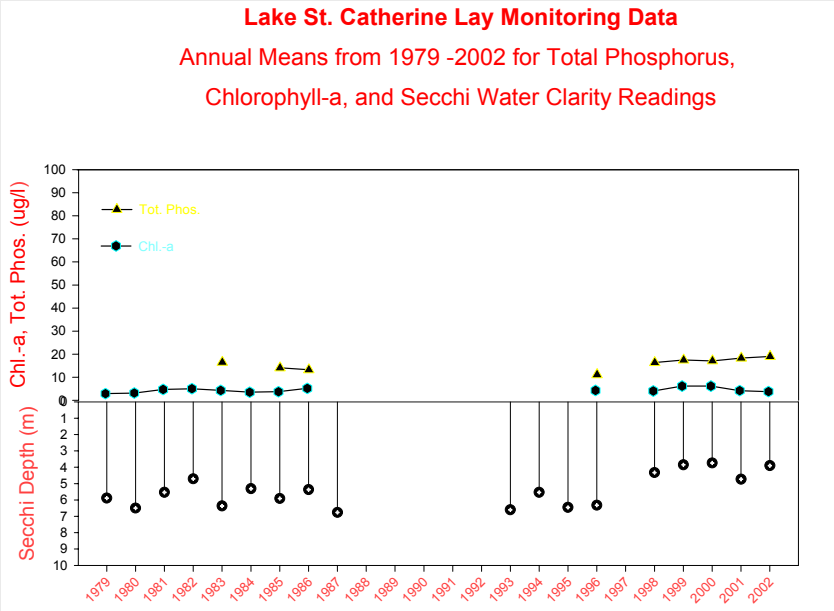
- ▲ Sampling Stations
- St. Catherine Watershed

Landcover and Landuse Key

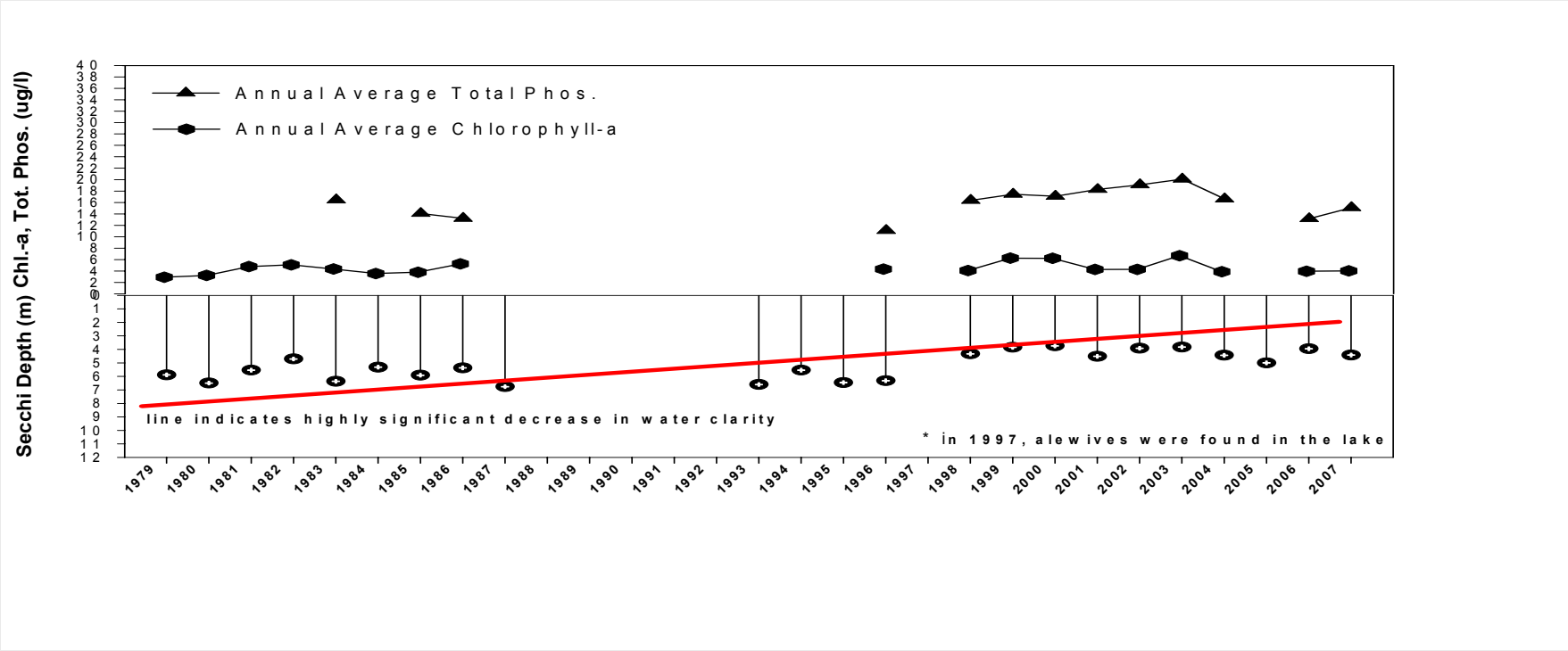
- water
- barren
- residential
- commercial
- industrial
- transportation
- other developed
- orchards
- other agricultural
- decidious forest
- coniferous forest
- mixed forest
- forested wetland
- wetland
- row crop
- hay/pasture

N

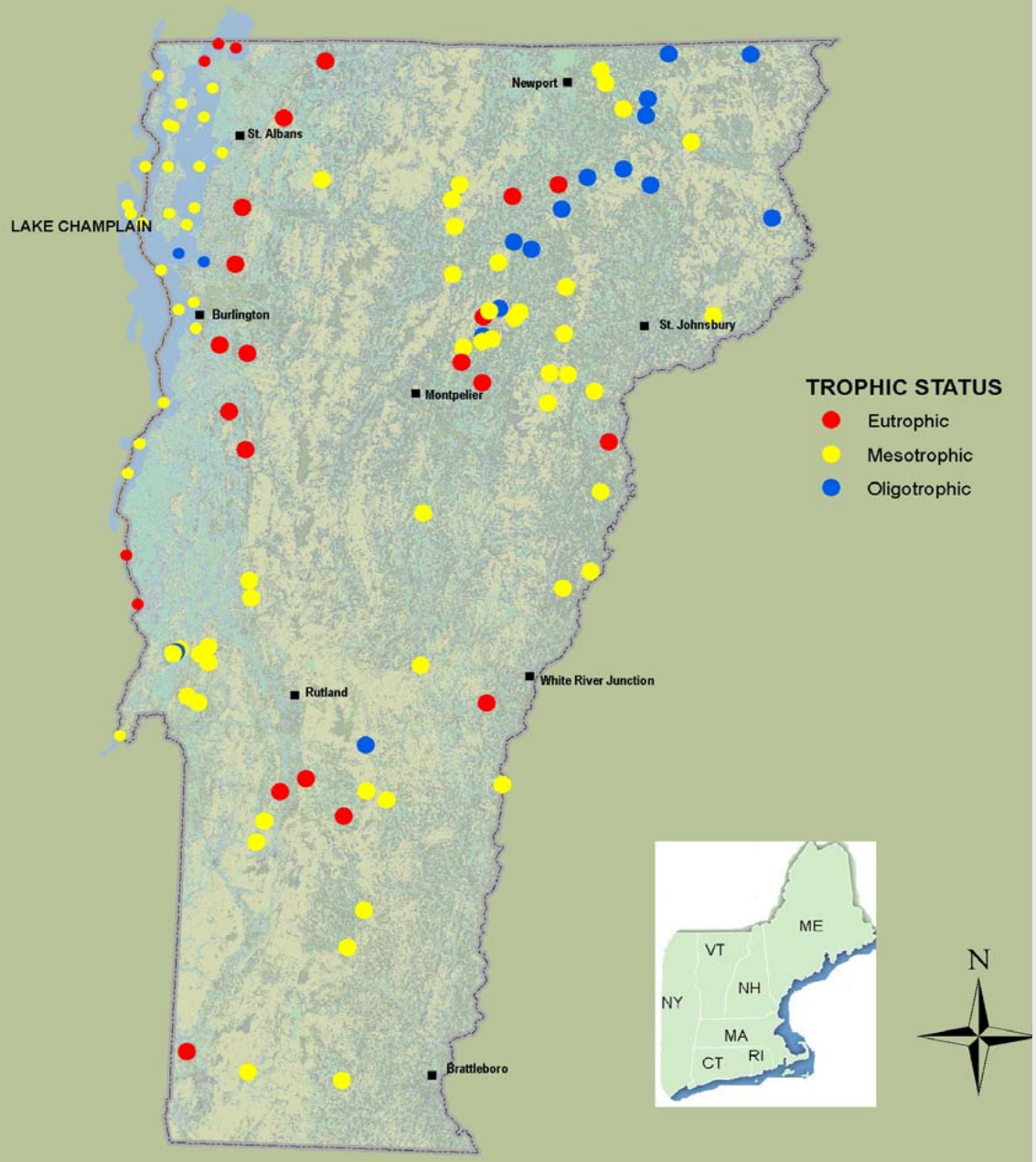




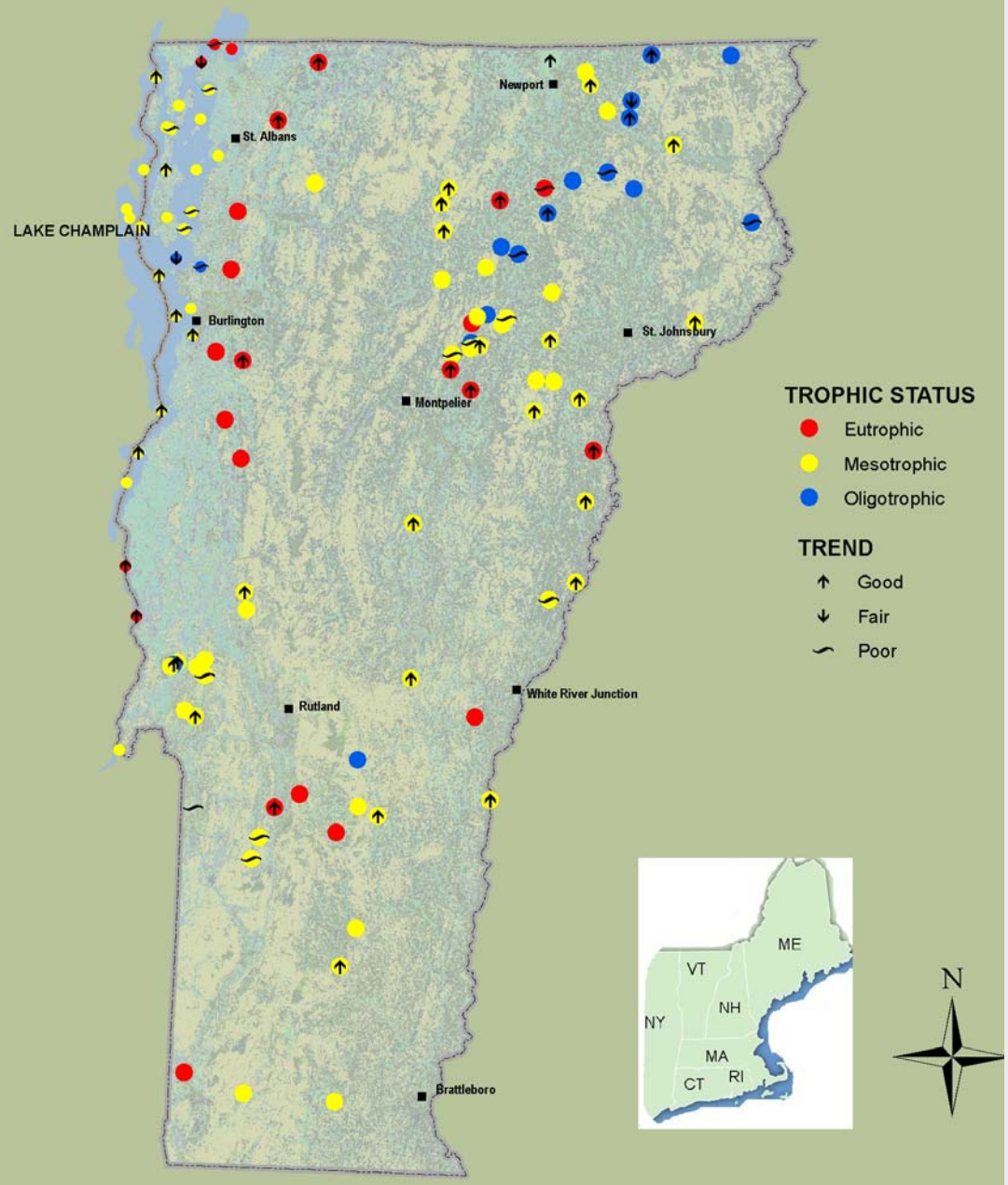
Lake St. Catherine shows a highly significant decrease in water clarity and stable total phosphorus and chlorophyll-a levels, likely attributed to the presence of alewives



Vermont Lay Monitoring Program
Trophic Status



Vermont Lay Monitoring Program
Trophic Status with Nutrient Enrichment Trend

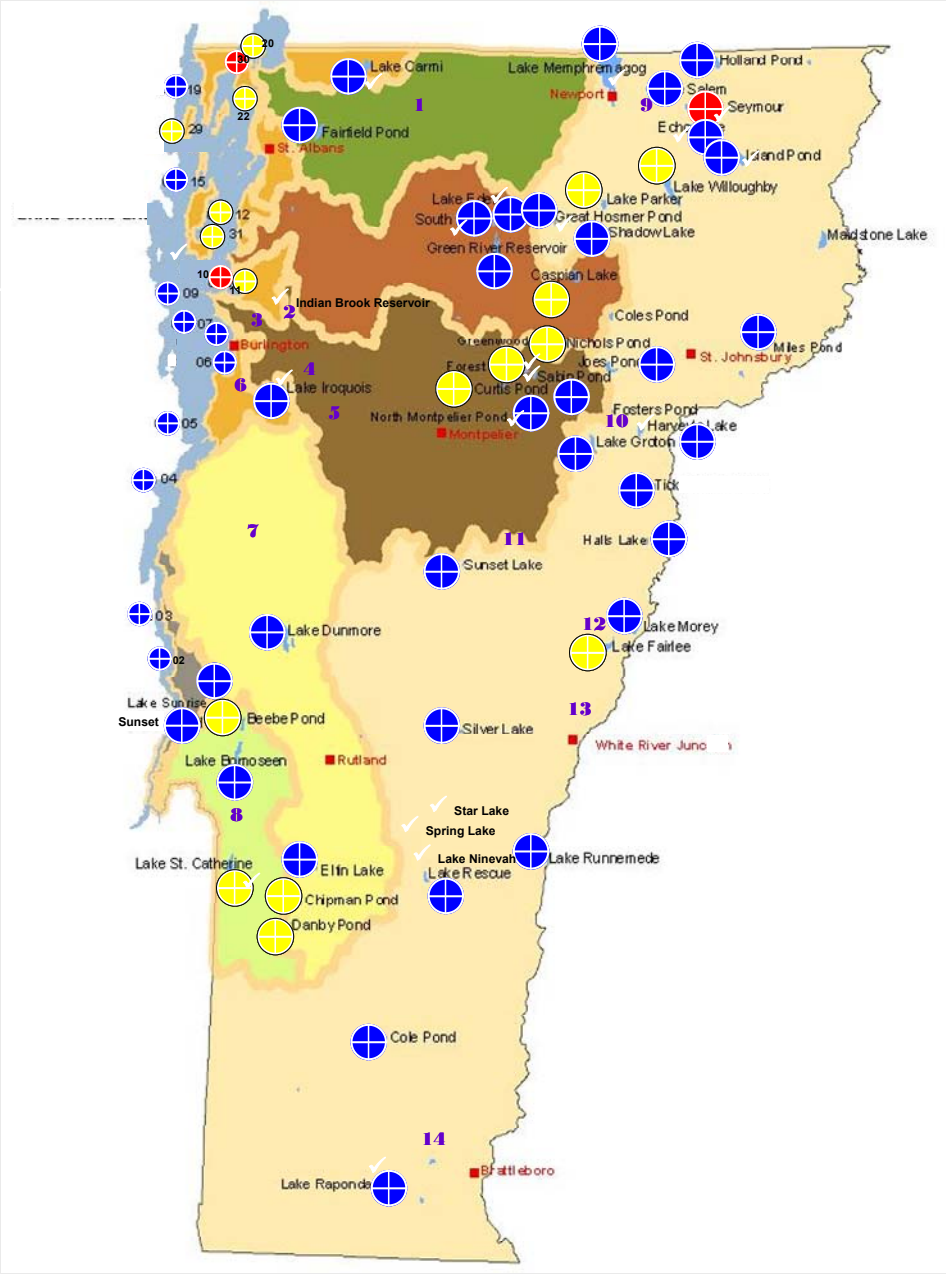


Long-Term Lake Nutrient Enrichment Trends

Good

Fair

Poor



Lake Impairments

Part A. Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards according to the methodology described in the Vermont Surface Water Assessment and Listing Methodology. Required or needed pollution controls have yet to be fully implemented and further pollutant loading determinations (i.e. TMDLs) are necessary - unless remediation will be completed prior to the scheduled TMDL.

Waterbody ID	Segment Name/ Description	Pollutant(s)	Use(s) Impaired	Surface Water Quality Problem(s)	TMDL Completion Priority
VT04-01L01	OTTER CREEK SECTION - LAKE CHAMPLAIN (Ferrisburg)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT04-01L02	PORT HENRY SECTION - LAKE CHAMPLAIN (Ferrisburg)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L
VT04-02L01	SOUTHERN SECTION - LAKE CHAMPLAIN (Bridport)	PCBs	FC	ELEVATED LEVELS OF PCBs IN LAKE TROUT	L

Part D. Waters in this section have completed and EPA-approved TMDLs.

WaterbodyID	*Name*	*Pollutant*	*Previously Identified Problem*	*Status*
VT04-02L01	SOUTHERN SECTION (A) - LAKE CHAMPLAIN (Bridport)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002
VT04-02L01	SOUTHERN SECTION - LAKE CHAMPLAIN (Bridport)	MERCURY	ELEVATED LEVELS OF MERCURY IN WALLEYE	EPA APPROVED REGIONAL MERCURY TMDL ON DECEMBER 20, 2007
VT04-02L01	SOUTHERN SECTION (B) - LAKE CHAMPLAIN (Bridport)	PHOSPHORUS	P ENRICHMENT	EPA APPROVED LAKE CHAMPLAIN PHOSPHORUS TMDL SEPTEMBER 25, 2002

Lake Impairments – Basin 2

Part E. Waters appearing below are altered by exotic species. These are priority waters for management action.

Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity
VT02-01	DISCRETE AREAS OF LOWER POULTNEY RIVER	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	HANDPULLING ONGOING SINCE 1998 BY TNC
VT02-01L01	COGGMAN POND (West Haven)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	VTDEC/TNC HANDPULLING ONGOING SINCE 1999
		AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	CONFIRMED POPULATION IN 1998; VTDEC/TNC HANDPULLING ONGOING
VT02-02L06	BLACK POND (Hubbardton)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	WEEVIL PRESENT; WEEVIL AUGMENTATION (1997-2000)
VT02-02L07	MILL POND (PARSONS MILL POND) (Benson)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT WATER CHESTNUT GROWTH	VTDEC/TNC HANDPULLING ONGOING
VT02-03	CASTLETON RIVER	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL	NO CONTROL
VT02-03L05	LAKE BOMOSEEN (Castleton)	ALS, CR	ZEBRA MUSSEL INFESTATION	ZM POPULATION DISCOVERED IN 1999; FIRST WATER INTAKE LINE CLOGGED IN LATE 2001; ADULTS COMMON THRUOUT MOST OF LAKE IN 2005
		AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	WEEVIL PRESENT; WEEVIL AUGMENTATION (93, 94, 97); 1997 AND 2001 MILFOIL DECLINES OF UNKNOWN CAUSE
VT02-03L06	GLEN LAKE (Castleton)	AES, ALS, CR, 2CR	LOCALLY ABUNDANT EURASIAN WATERMILFOIL GROWTH	WEEVIL PRESENT; NOTED NATURAL MILFOIL DECLINE IN 1992; WQD WEEVIL HARVEST IN 1999-2007; MIDDLEBURY COLLEGE WEEVIL HARVEST IN 2005 AND 2006
VT02-05L03	LAKE ST. CATHERINE (Wells)	AES, ALS	ALEWIVES	ALEWIVES CONFIRMED IN 1997, NOW ABUNDANT THRUOUT LAKE; VT DEPT OF FISH AND WILDLIFE CONTROL ALTERNATIVES REPORT (2004);

Lake Impairments – Basin 4

Part E. Waters appearing below are altered by exotic species. These are priority waters for management action.

Waterbody ID	Segment Name/ Description	Use(s) Impacted	Surface Water Quality Problem	Current Status/Management or Control Activity
VT04-02	WHITNEY CREEK	AES, ALS, CR, 2CR	MODERATE EURASIAN WATERMILFOIL	NO CONTROL
VT04-02L01	SOUTHERN SECTION - LAKE CHAMPLAIN (Bridport)	AES, ALS, CR, 2CR	DENSE WATER CHESTNUT GROWTH	ONGOING HARVESTING; NORTHWARD EXPANSION HALTED IN 1999
		ALS, CR	ZEBRA MUSSEL INFESTATION	NEARLY ALL SUITABLE SUBSTRATE COVERED; EXPANDING ONTO SOFT SUBSTRATE; NATIVE MUSSELS MOSTLY EXTIRPATED
		AES, ALS, CR, 2CR	EURASIAN WATERMILFOIL INFESTATION	WEEVILS PRESENT IN LAKE CHAMPLAIN
VT04-03	EAST CREEK, ORWELL	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	HANDPULLING ONGOING BY TNC
VT04-03	SOUTH FORK OF EAST CREEK, ORWELL	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	HANDPULLING ONGOING BY TNC
VT04-04L04	BROOKSIDE POND	AES, ALS, CR, 2CR	WATER CHESTNUT INFESTATION	HANDPULLING BY VTDEC

Other States Have Lakeshore Protection Laws

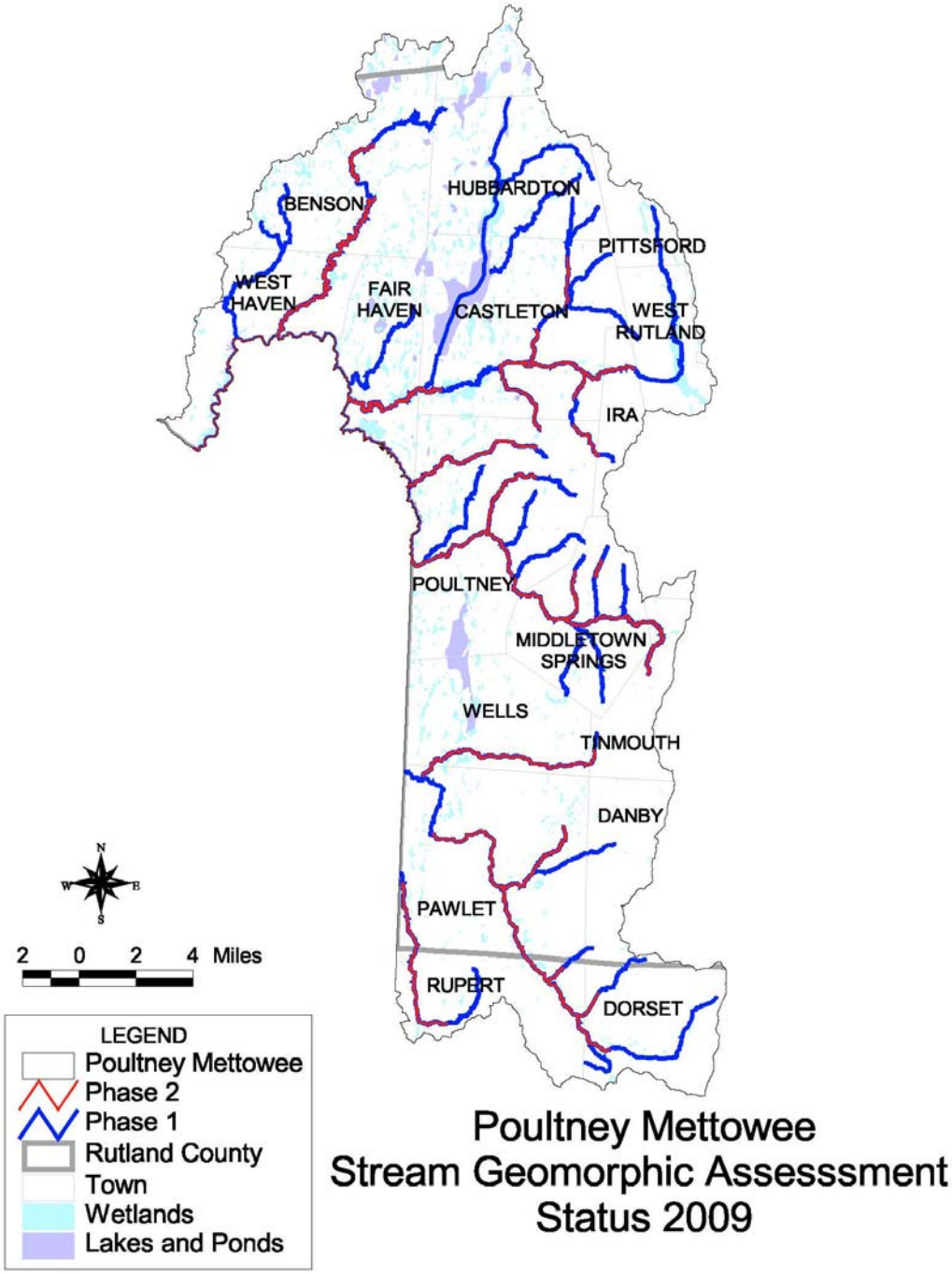
State (Total # of Lakes)	Minimum Setback for Structures on Lakes	Vegetative Requirements on Lakes
Maine (5,785)	100′	Yes
New Hampshire (1,019)	50′	Yes
Wisconsin (15,081)	75′	Yes
Minnesota (11,842)	75′ – 150′	Yes
Vermont (812)	0′	No

River Management and Stream Geomorphic Assessments

Poultney Mettowee Basin (only in South Lake)

- Poultney River (including Hubbardton and Castleton River tributaries)
- Mettowee River (including Indian River and Flower Brook)

Stream geomorphic assessment status map of the Poultney Mettowee Basin - 2009



River Management and Stream Geomorphic Assessments

Poultney River Basin

- Poultney River Phase 1 and 2 SGA (2004-2006)
- Castleton River Phase 1 and 2 SGA (2005-07)
- Town of Castleton Corridor Plan (2007)
- Hubbardton River Debris Project Summary (2006)
- Poultney and Hubbardton Alternatives Analysis (2007)
- Lewis and Finel Hollow Brook Phase 2 SGA (2006)
- Select Poultney Tributaries Phase 1 SGA (2007)
- Vail Brook Phase 2 SGA (2007)

River Management and Stream Geomorphic Assessments

Mettowee River Basin

- Mettowee – Indian River Phase 1 and 2 SGA (2004-2007)

Non-game and Natural Heritage

- Vermont's Natural Heritage, Conserving Biological Diversity in the Green Mountain State.
  A Report from the Vermont Biodiversity Project, 2002
- A Classification of the Aquatic Communities of Vermont. Vermont Agency of Natural Resources, Waterbury, VT. 1998
- Wetland, Woodland, Wildland
  - Thompson and Sorenson, 2000
- The Nature Conservancy
  - Southern Lake Champlain Valley

Fisheries

Known Threats

- Habitat Modification – including ANS infestations (e.g. water chestnut)
- Thermal Modification (e.g. Mettowee River)
- Mercury Methylation (and high levels of PCBs)
- Aquatic Nuisance Fish Species (e.g. Alewife, Round Goby, etc)
- Parasitic Bacteria (e.g. Whirling Disease)
- Viral Hemorrhagic Septicemia (VHS)
- Invasive Algae (e.g. Didymo)

Green Mountain College – Block Class Gap Analysis – 2008 - 2009

Model Component	Comp. Type	Data	Type[1]	Study Type[2]	Date	Geo. Context	Source	Access	Notes
Water quality	Parameter	Footnote[16]	Report	2	1997	Lake Champlain Basin	LCBP	http://www.lcbp.org/publication_detail.aspx?id=26	Footnote[17]
Water quality	Parameter	The Poultney Mettowee Water Quality Monitoring Project	Data	n/a	02/ 2008	Poultney-Mettowee Watershed	PMNRCD	http://www.poultneymettowee.org/projects/district_projects/WaterSamplingProject.php	The website provides current and past data for water quality in the Poultney-Mettowee Watershed.
Water quality	Parameter	Conceptual Framework for Evaluation of Pollution Control Strategies and Water Quality Standards for Lake Champlain, LCBP Technical Report #4D	Report	2	1993	Lake Champlain Basin	LCBP	http://www.lcbp.org/publication_detail.aspx?id=51	This report outlines the analytical techniques, data requirements, and decision criteria involved in developing and evaluating alternative water pollution control programs and water quality standards. It provides an analytical framework to guide the LCBP's research activities and policy formations.

[16] Long-Term Water Quality and Biological Monitoring project for Lake Champlain - Cumulative Report for Project Years 1992- 1996, LCBP Technical Report #26

[17] This report documents the database of information compiled by the Long-Term Water Quality and Biological Monitoring Project for Lake Champlain between 1992 and 1997. The report also provides a cumulative statistical summary of the sampling results from that period. Also, some specific aspects of the results relating to data quality and phosphorus loading trends were chosen for special analysis and interpretation.

Other Plans and Assessment Reports:

- **Lower Poultney River ORW Management Report (DEC, 1992)**
- **Poultney Mettowee Water Quality and Aquatic Habitat Assessment Report (DEC, 1999)**
- **Lake Champlain Phosphorus Loading Report**
- **Lake Champlain Basin Wetland Restoration Plan (ANR, 2007)**
    - The Lake Champlain Direct sub-basin had a large number of sites
- **1990 PL-566 Management Plan for the Lower Champlain Direct**
- **Agricultural BMP/ NMP Implementation Database and Small Farm Needs Survey developed for SFO's in Rutland and Addison Counties**
- **Geomorphic Studies at the Harrison Site (Lower Poultney River) and Hubbardton River Tributaries, NY and VT (GMC, 2001)**
- **A Wetland and Riparian Habitat Assessment of the Poultney River Watershed in NY and VT (GMC and TNC, 2001)**
- **Clayplain and Floodplain Forest Restoration Plan – Hubbardton River and Lower Poultney River Watershed in VT and NY (TNC, 2004)**
- **Poultney Mettowee Basin Plan (DEC, 2005)**