Lake Champlain
Total Maximum Daily Load (TMDL)

Public Outreach Meetings

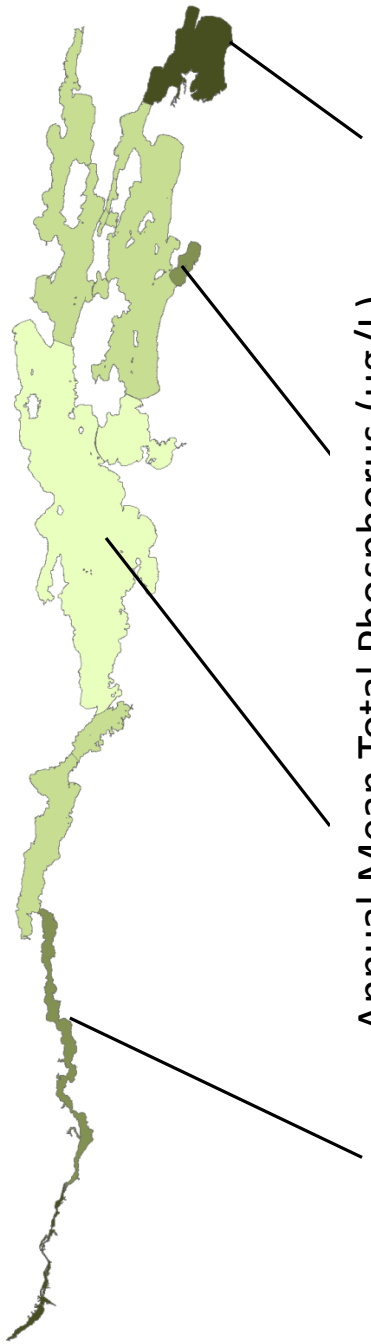
U.S. EPA, New England Region
State of Vermont
November, 2014

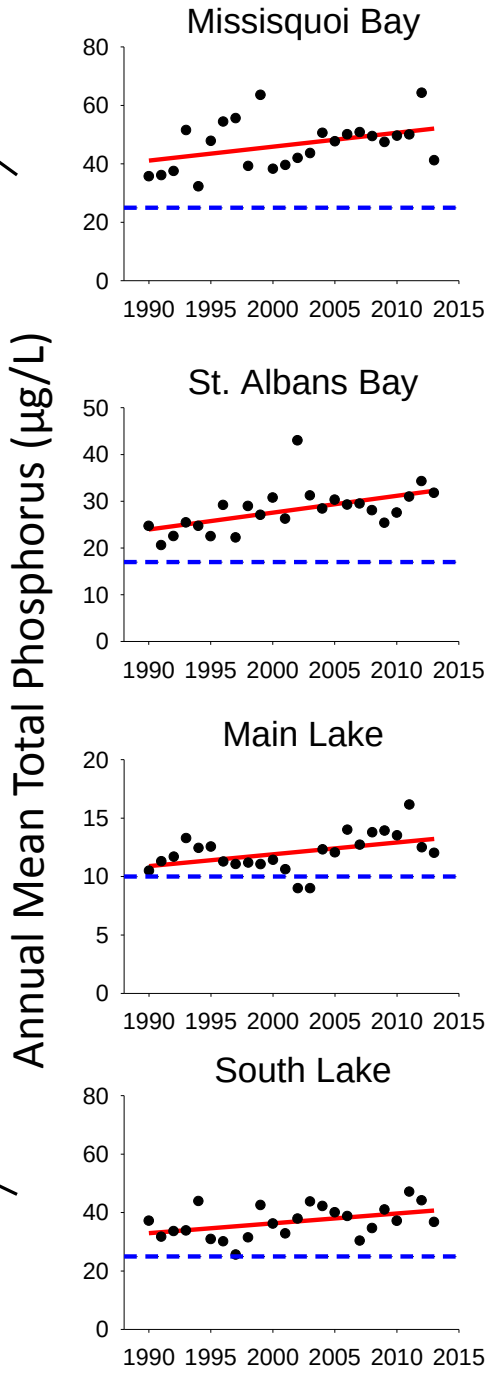
Desired Outcomes

- Understanding of main elements of the upcoming revision of the Lake Champlain TMDL
- Public input on the requirements needed to meet the TMDL targets.

Meeting Agenda

- Introduction & Background
- TMDL components
- Accountability Framework
- Summary of requirements
- Q & A / Feedback





Trend line

Water quality standard

Lessons learned from the past 20 years

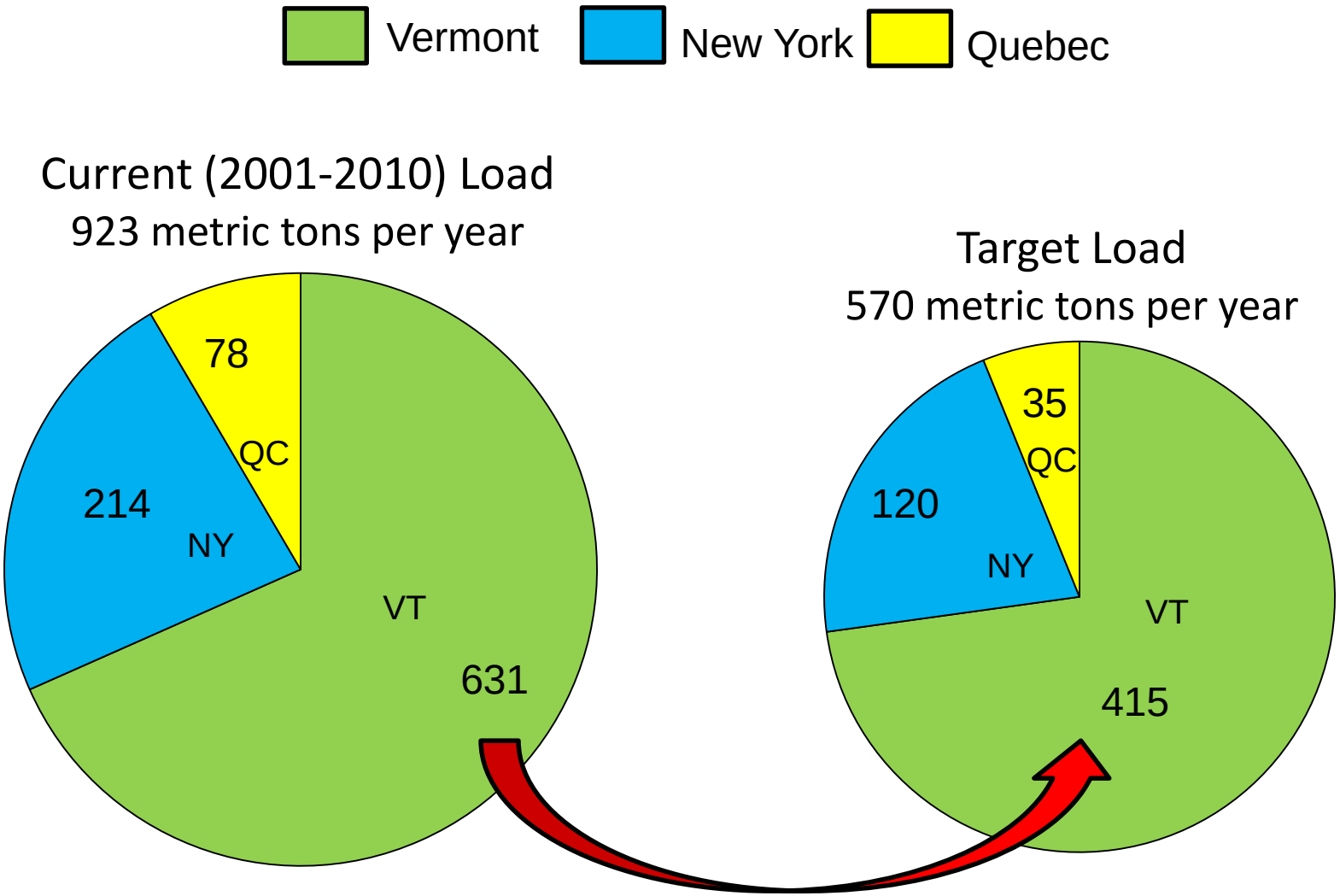
Phosphorus levels in the lake are above the allowable standards.

Vermont has taken many important actions, especially in the last 10 years.

Cleaning up the lake ecosystem is complex and recovery will take time.

We need to do a lot more.

Refined TMDL Results for Lake Champlain



TMDL = WLA + LA + MOS

TMDL — Total Maximum Daily Load (Total Loading Capacity)

The amount of pollution the lake can receive and still meet water quality standards. Determined by data and modeling. Will be expressed at the lake segment level (e.g., Main Lake; St. Albans Bay).

WLA — Wasteload Allocation ("Point Sources")

Achieved by federally required permits or other regulations.

Examples
- Wastewater discharges
- Construction stormwater
- Municipal Separate Storm Sewer Systems (MS4s)
- Combined Sewer Overflow (CSOs)
- Concentrated Animal Feeding Operations (CAFOs)

LA — Load Allocation ("Nonpoint sources")

Achieved by regulatory or non-regulatory methods. Requires "reasonable assurances."

Examples
- Agricultural runoff
- River channel instability
- Forest runoff

MOS — Margin of Safety

Accounts for uncertainty.

TMDL Equation (tons)

Lake Segment	TMDL =	WLA WWTP	+ WLA Stormwater	+ LA	+ MOS
1. South Lake B	27.3				
2. South Lake A	13.3				
3. Port Henry	6.0				
4. Otter Creek	114.7				
5. Main Lake	122.2				
6. Shelburne Bay	9.2				
7. Burlington Bay	3.0				
9. Malletts Bay	45.3				
10. Northeast Arm	15.5				
11. St. Albans Bay	10.6				
12. Missisquoi Bay	44.5				
13. Isle LaMotte	3.7				
Total	415.3				

Wasteload Allocation - WWTPs

Factors Considered:

- Relative impact of point vs nonpoint sources
- Extent to which nonpoint measures could meet the % reduction requirement
- Size of Facility
  - L:> 0.2 Million Gal/Day; M:0.1-0.199 MGD; S:<0.1 MGD
- Range of effluent limits
- Flexibility within segment

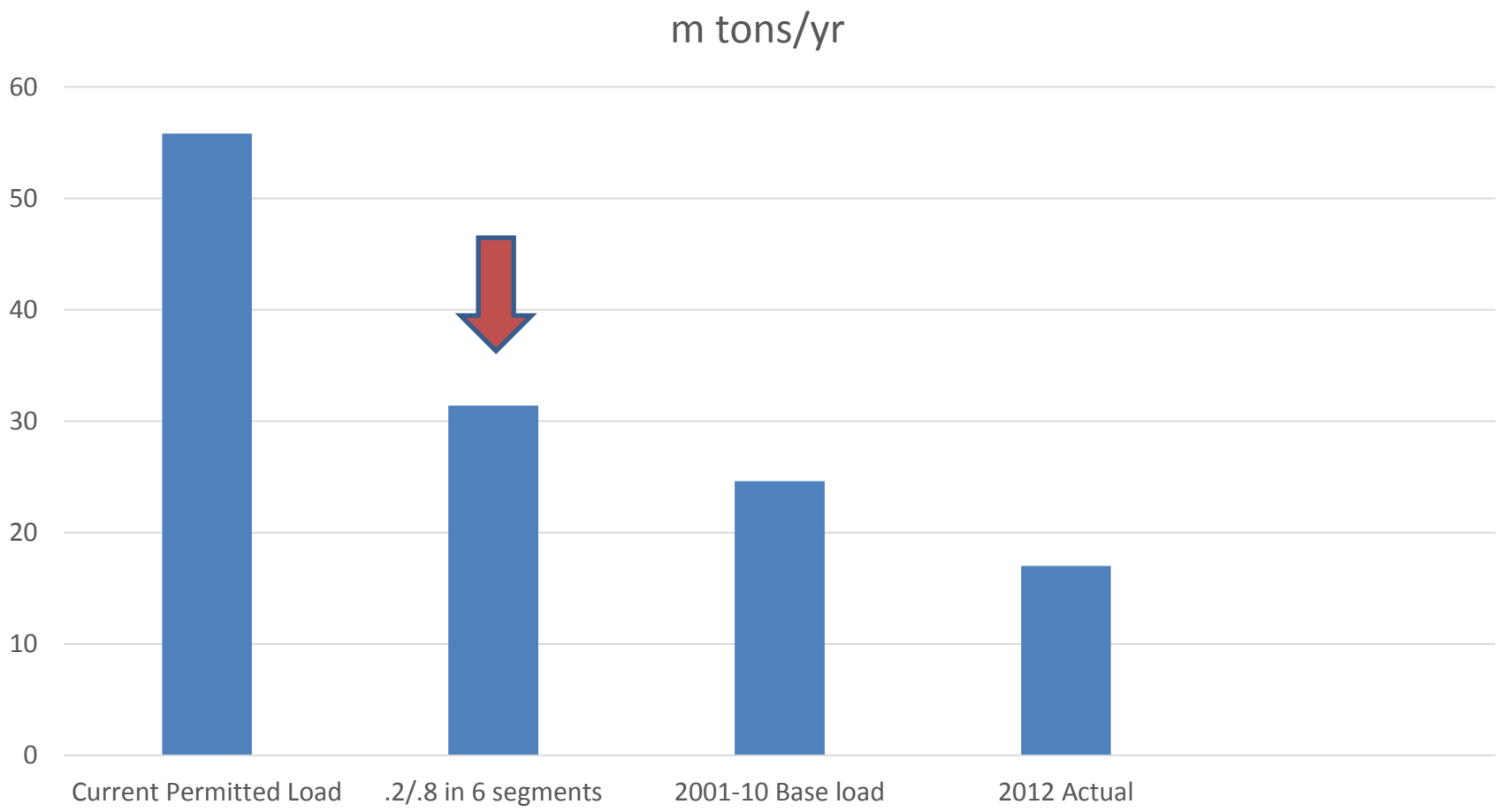
Wasteload Allocation - WWTPs

- "Targeted" – 2002 WWTP load allocation > 15% of segment base load
  - Main Lake, Shelburne, Burlington & St Albans Bays
- "Challenging" – high levels of nonpoint reductions (> 50%) needed
  - South Lake (A&B) and Missisquoi Bay
- Remaining (w WWTPs)
  - Otter Creek, Malletts Bay, Isle La Motte

WWTP Requirements

Lake Segment	Allocation equivalent to	# WWTPs L/M/S
1. South Lake B	L = 0.2; M = 0.8; S = Current permitted load	3/0/2
2. South Lake A	L = 0.2; M = 0.8; S = Current permitted load	0/0/1
3. Port Henry	No WWTPs	
4. Otter Creek	Current permitted load	8/1/3
5. Main Lake	L = 0.2; M = 0.8; S = Current permitted load	14/2/2
6. Shelburne Bay	L = 0.2; M = 0.8; S = Current permitted load	4/0/0
7. Burlington Bay	L = 0.2; M = 0.8; S = Current permitted load	1/0/0
9. Malletts Bay	Current permitted load	5/0/3
10. Northeast Arm	No WWTPs	
11. St. Albans Bay	L = 0.2; M = 0.8; S = Current permitted load	1/0/1
12. Missisquoi Bay	L = 0.2; M = 0.8; S = Current permitted load	5/1/2
13. Isle LaMotte	Current permitted load	0/1/0

WWTP Load


m tons/yr
60
50
40
30
20
10
0
Current Permitted Load
.2/.8 in 6 segments
2001-10 Base load
2012 Actual

Forms of flexibility that Vermont DEC is considering

- Effluent phosphorus limits in permits will be expressed as total annual mass loads, not as monthly concentration or mass limits.
- Construction of upgraded phosphorus treatment facilities will not be required until actual phosphorus loads approach 80% of the new TMDL limits.
- Phosphorus compliance schedules in discharge permits will allow adequate time for planning and municipal budgeting.
- Phosphorus reallocation between wastewater discharges within the same lake segment watershed will be permitted.

Wasteload Allocation: Stormwater

Factors Considered:

- Level of detail of information used to quantify source loadings
- Level of detail of information used to assign load reductions to source categories
- Jurisdictional breakdown/ownership of sources

Wasteload Allocation: Stormwater

Proposed approach:

- Aggregate within each segment
- Set % reduction for “Developed Land”
  - residential, commercial/industrial, roads
- Maximize flexibility to get reductions in most efficient way
- Rigorous tracking and accountability

Stormwater Requirements

Lake Segment	% reduction required from "Developed Land"
1. South Lake B	23%
2. South Lake A	21%
3. Port Henry	11%
4. Otter Creek	20%
5. Main Lake	24%
6. Shelburne Bay	19%
7. Burlington Bay	25%
9. Malletts Bay	26%
10. Northeast Arm	9%
11. St. Albans Bay	13%
12. Missisquoi Bay	19%
13. Isle LaMotte	14%

Stormwater permitting programs that Vermont DEC will use to implement the TMDL

- Existing permit programs that will be sustained
  - Construction General Permit
  - Multi-Sector General Permit (MSGP)
  - Existing Residual Designation Authority (RDA) sites
- Existing permit programs that will be modified to enhance phosphorus reduction
  - Municipal Separate Storm Sewer System (MS4) General Permit
  - State Operational Stormwater Permit (revised Vermont Stormwater Management Manual)
  - Vermont Combined Sewer Overflow (CSO) Policy
- Proposed new permit programs
  - State Highway Stormwater General Permit
  - Local Roads Stormwater General Permit*
  - Stormwater General Permit for Existing Developed Land*
  - Designation of additional MS4s
  - Designation of additional sites under RDA

* May be combined into one Municipal Stormwater Permit for some communities.

Wasteload Allocation Summary

Lake Segment	WWTPs	Stormwater % reduction from "Developed Land"
1. South Lake B	L = 0.2; M = 0.8; S = Current	23%
2. South Lake A	S = Current	21%
3. Port Henry	No WWTPs	11%
4. Otter Creek	Current permitted load	20%
5. Main Lake	L = 0.2; M = 0.8; S = Current	24%
6. Shelburne Bay	L = 0.2; M = 0.8; S = Current	19%
7. Burlington Bay	L = 0.2; M = 0.8; S = Current	25%
9. Malletts Bay	Current permitted load	26%
10. Northeast Arm	No WWTPs	9%
11. St. Albans Bay	L = 0.2; M = 0.8; S = Current	13%
12. Missisquoi Bay	L = 0.2; M = 0.8; S = Current	19%
13. Isle LaMotte	Current permitted load	14%

TMDL Equation (tons)

Lake Segment	TMDL =	WLA WWTP	+ WLA Developed Land	+ LA	+ MOS
1. South Lake B	27.3	0.8	6.8		
2. South Lake A	13.3	0.2	1.7		
3. Port Henry	6.0	0.0	0.6		
4. Otter Creek	114.7	12.0	14.5		
5. Main Lake	122.2	9.8	25.5		
6. Shelburne Bay	9.2	0.7	3.0		
7. Burlington Bay	3.0	1.5	1.0		
9. Malletts Bay	45.3	3.2	12.9		
10. Northeast Arm	15.5	0.0	3.4		
11. St. Albans Bay	10.6	1.1	2.3		
12. Missisquoi Bay	44.5	1.9	9.7		
13. Isle LaMotte	3.7	0.1	0.7		
Total	415.3	31.4	82.1		

Load Allocation

- With Waste Load settled and portion set aside for Margin of Safety, remainder is allocated to nonpoint sources
- Principally comprised of Agriculture, Forests and Stream bank loads
- Use lake model to determine reduction needed in each segment to attain standards everywhere
- Each lake segment interacts with one or more other segments

Credited Nonpoint Source Programs

The Scenario Tool includes the following:

- Agricultural BMPs such as cover crops, conservation tillage, ditch buffers, riparian buffers, gully stabilization, livestock exclusion, barnyard management
- Stream channel stabilization through actions that aid attainment of natural equilibrium conditions, such as re-establishing floodplain access
- Enhanced forest management practices for logging roads and water crossings.

Load Allocation

- Not one unique solution
- A likely scenario - variations possible
- Starts with 20% reduction in all segments - except Burlington Bay
- Increases % reduction in six segments as needed to attain standards

Load Allocation

Lake Segment	Target (mt)	% reduction required	reduction achievable ?
1. South Lake B	18.4	56%	?
2. South Lake A	10.6	56%	?
3. Port Henry	5.1	20%	Y
4. Otter Creek	82.5	30%	Y
5. Main Lake	80.8	31%	Y
6. Shelburne Bay	5.0	20%	Y
7. Burlington Bay	0.4	0%	Y
9. Malletts Bay	26.9	28%	Y
10. Northeast Arm	11.3	20%	Y
11. St. Albans Bay	6.6	36%	Y
12. Missisquoi Bay	30.7	75%	?
13. Isle LaMotte	2.7	20%	Y

VT Phase I Implementation Plan: Nonpoint Source Programs

- Agriculture
  - Increase regulatory requirements for agricultural land management (buffers, erosion, manure application)
  - Enhanced enforcement capacity within the Agency of Agriculture
  - Create certification program for manure applicators to improve accountability
  - Increased nutrient management planning and education
  - Small farm certification and targeted outreach
- Forestry – AMP revisions
- River/wetlands/Shoreland management

South Lake & Missisquoi Bay: Additional Measures

- Agriculture
  - Targeted inspections and education (Franklin initiative)
  - Pilot a grassed waterways program
  - Conduct on-farm tile drain demonstrations and research
  - Increase state funding for practice implementation in these regions
  - Increase coordination between partners through workgroups and new partner database

Margin of Safety

- Accounts for the uncertainty about pollutant loadings and waterbody response
- May leave a portion of the assimilative capacity unallocated (explicit)
- Or rely on use of conservative analytical assumptions (implicit)
- EPA proposes to use an explicit 5% margin of safety

TMDL Equation (tons)

Lake Segment	TMDL =	WLA WWTP	+ WLA Developed Land	+ LA	+ MOS
1. South Lake B	27.3	0.8	6.8	18.4	1.4
2. South Lake A	13.3	0.2	1.7	10.6	0.7
3. Port Henry	6.0	0.0	0.6	5.1	0.3
4. Otter Creek	114.7	12.0	14.5	82.5	5.7
5. Main Lake	122.2	9.8	25.5	80.8	6.1
6. Shelburne Bay	9.2	0.7	3.0	5.0	0.5
7. Burlington Bay	3.0	1.5	1.0	0.4	0.2
9. Malletts Bay	45.3	3.2	12.9	26.9	2.3
10. Northeast Arm	15.5	0.0	3.4	11.3	0.8
11. St. Albans Bay	10.6	1.1	2.3	6.6	0.5
12. Missisquoi Bay	44.5	1.9	9.7	30.7	2.2
13. Isle LaMotte	3.7	0.1	0.7	2.7	0.2
Total	415.3	31.4	82.1	281.0	20.8

TMDL Equation (requirements)

Lake Segment	WWTP	% SW reduction	% Nonpoint gross reduction[1]	% Overall net reduction
1. South Lake B	0.2/0.8/Current	23%	56%[2]	47%
2. South Lake A	Current permit	21%	56%[2]	50%
3. Port Henry	Current permit	11%	20%	15%
4. Otter Creek	Current permit	20%	30%	18%
5. Main Lake	0.2/0.8/Current	24%	31%	25%
6. Shelburne Bay	0.2/0.8/Current	19%	20%	13%
7. Burlington Bay	0.2/0.8/Current	25%	0%	34%
9. Malletts Bay	Current permit	26%	28%	20%
10. Northeast Arm	Current permit	9%	20%	13%
11. St. Albans Bay	0.2/0.8/Current	13%	36%	24%
12. Missisquoi Bay	0.2/0.8/Current	19%	75%[2]	67%
13. Isle LaMotte	Current permit	14%	20%	12%

[1] Includes extra reduction needed to provide margin of safety

[2] Additional measures needed to meet target

Accountability Framework: 2015-17

- Intended to ensure that commitments made in VT's Phase I Plan are carried out
- Primary focus on major milestones related to putting major programs and permits in place
- Secondary focus on implementation and enforcement of programs already in place
- Interim report card by end of 2016, determination made at end of 2017

Accountability Framework: 2015-17

- If on target, great!
- If not, consequences might include:
  - Additional reductions at WWTPs (e.g., 0.1/0.2 limits in Targeted & Challenging segments)
  - Use Residual Designation Authority (RDA) to expand NPDES coverage
  - Increased federal enforcement presence

Accountability Framework Post 2017

- Watershed specific
- Keyed to Implementation Table in five year Phase II plans
- Mid-point check-in at 2.5 years
- Major evaluation and determination as next five year plan developed
- Consequences could be tailored for watershed or applied broadly if systemic problems

Closing Thoughts

- There is not one unique solution – interaction within a segment and between segments
- Seeking solution that balances widespread application of effective and efficient measures with targeted use of other tools
- Combination of Phase 1 Plan commitments, scenario modeling and accountability framework provide reasonable assurance required reductions can be achieved in most segments

Timeline

Lake Champlain TMDL

November 17-20, 2014	Public meetings to discuss TMDL elements
November 2014	Vermont report to Legislature on funding needs and strategy
January 30, 2015	Governor's budget for Vermont FY'16 sent to EPA
Spring, 2015	EPA establishes the TMDL and conducts formal public comment period
Early Summer	EPA transmits TMDL to VT for inclusion in Water Quality Management Plan


Questions

Further Information

Send Comments to:

Perkins.Stephen@epa.gov
Voorhees.Jeanne@epa.gov
Kari.Dolan@state.vt.us

More Information

VTDEC Restoring Lake Champlain
http://www.watershedmanagement.vt.gov/erp/champlain/

EPA information on Vermont Lake Champlain Phosphorus TMDL
http://www.epa.gov/region1/eco/tmdl/lakechamplain.html

Image Credits

Lake Champlain
flickr.com/photos/katphotos/8108007447

Question Mark
flickr.com/photos/10557450@N04/6632470867/

All other Vermont Images
State of Vermont