Vermont Illicit Discharge Detection and Elimination (IDDE) Program

Center for Watershed Protection Watershed and Stormwater Conference 2012

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Baltimore, Maryland

Presentation Overview

1. *Statutory Foundation, Background*

1. *The Two Program Elements, Level of Effort to Date*

2. *Cost Effective Analysis- National Data, Vermont Data*

Vermont's Stormwater Management Statute, 1264 (b)

Year 2000 amendments

The secretary's stormwater management program shall include, at a minimum, provisions that:

-Promote public education and participation among citizens and municipalities about cost-effective and innovative measures to reduce stormwater discharges to the waters of the state.

-Promote detection and elimination of improper or illegal connections and discharges.

-Encourage municipal governments to utilize existing regulatory and planning authority to implement improved stormwater management by providing technical assistance, training, research and coordination with respect to stormwater management technology, and by preparing and distributing a model local stormwater management ordinance.

-Promote implementation of pollution prevention during the conduct of municipal operations.

Why focus on IDDE?

Average residential sewage contributes 3-5 lbs TP/yr[1]

Average cost for 1 lb of Phosphorus removal:

@WWTP - $7-1000/lb+[2]
IDDE - $5000-10,000/lb+[3]
SW Treatment - $20,000-40,000/lb[3]

[1] 2.7 g per capita/day (EPA,2002) x 2.47 persons/home, US Census data, Chittenden County, VT
[2] EPA, 2008; Eckles, 2007; VTDEC 2007
[3] VTDEC, 2012

Why a Statewide Approach?

- IDDE can be a cost effective form of nutrient pollution control compared to other best management practices for nutrient reduction.

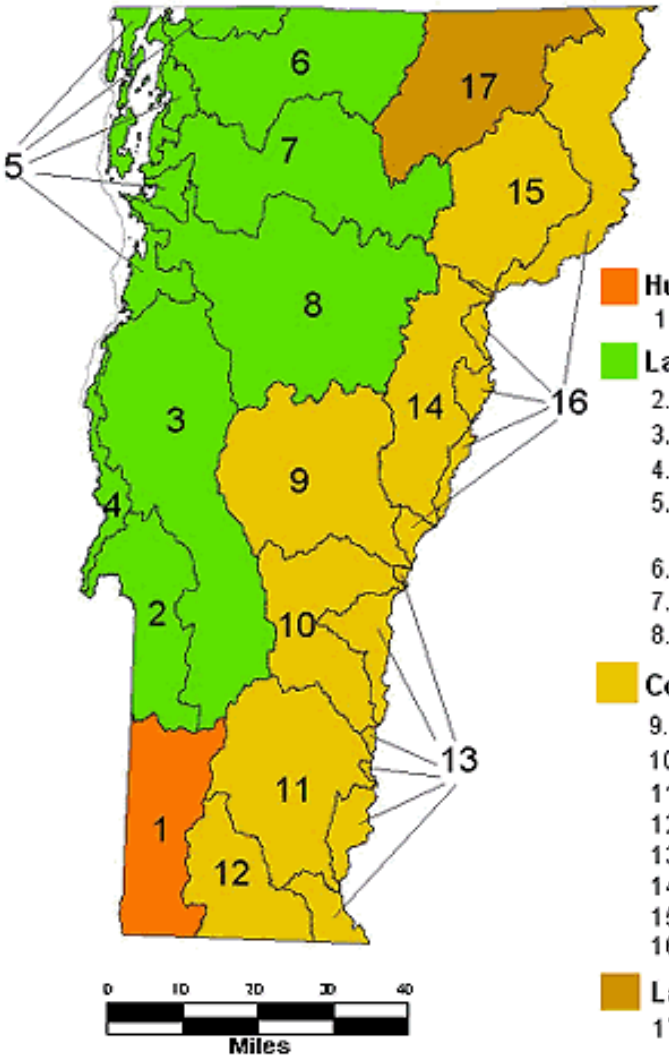
- The project data collected provides a tool for planning and design of stormwater retrofit projects to meet watershed TMDL targets.

- GIS based stormwater maps provide a tool for improved maintenance and reduced nutrient and sediment pollution as well as improved asset management of the municipal infrastructure.

- Locating water leaks saves money for municipalities.

- The maps provide a tool for more effective emergency response in the event of a hazardous waste spill or dumping.

Watersheds of Vermont



Hudson River Drainage Basin

1. Battenkill, Walloomsuc, Hoosic

Lake Champlain Drainage Basin

2. Poultney, Mettawee
3. Otter Creek, Little Otter Creek, Lewis Creek
4. Lower Lake Champlain
5. Upper Lake Champlain, LaPlatte, Malletts Bay, St. Albans Bay, Rock, Pike
6. Missisquoi
7. Lamoille
8. Winooski

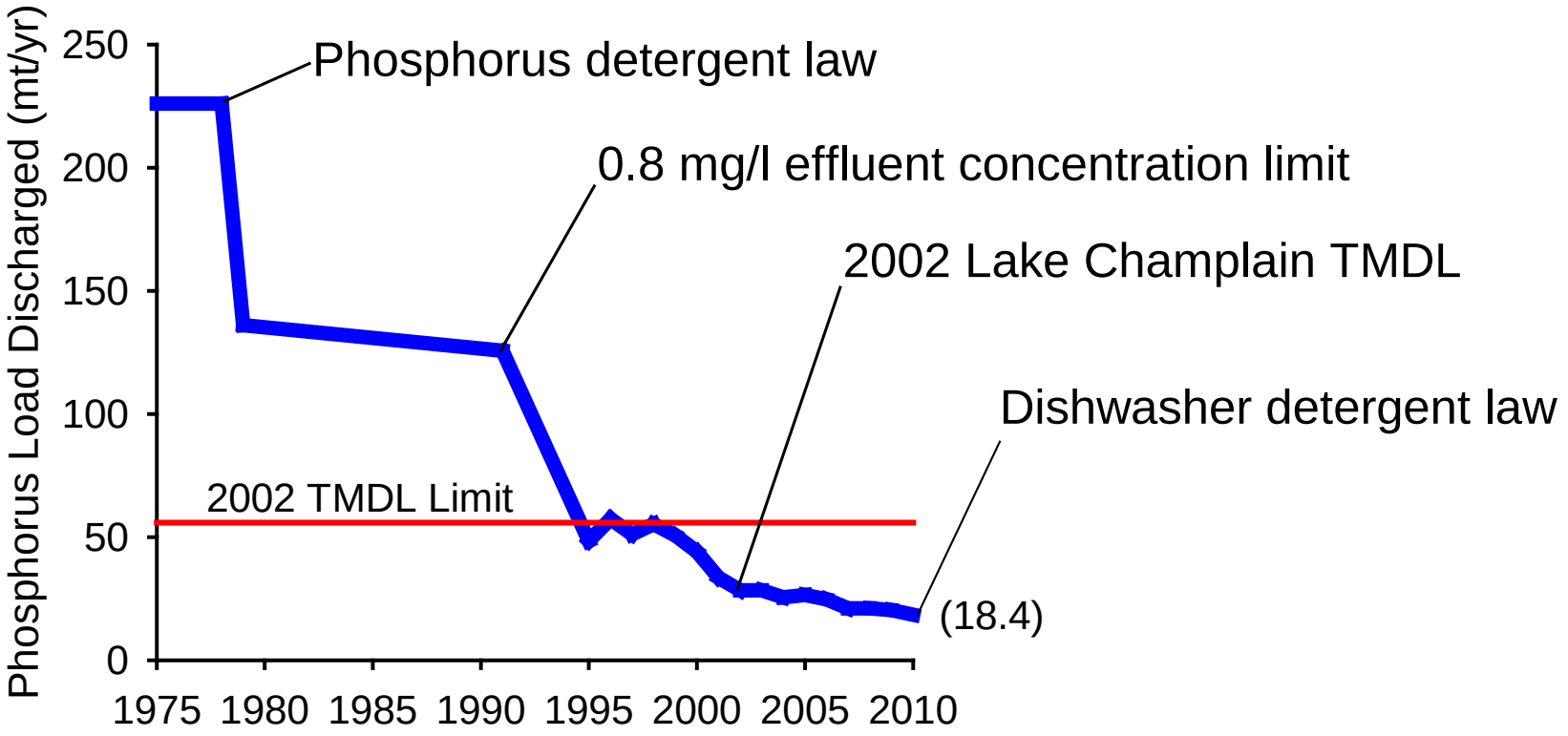
Connecticut River Drainage Basin

9. White
10. Ottauquechee, Black
11. West, Williams, Saxtons
12. Deefield
13. Lower Connecticut, Mill Brook
14. Stevens, Wells, Waits, Ompompanoosuc
15. Passumpsic
16. Upper Connecticut, Nulhegan, Willard Stream, Paul Stream

Lake Memphremagog Drainage Basin

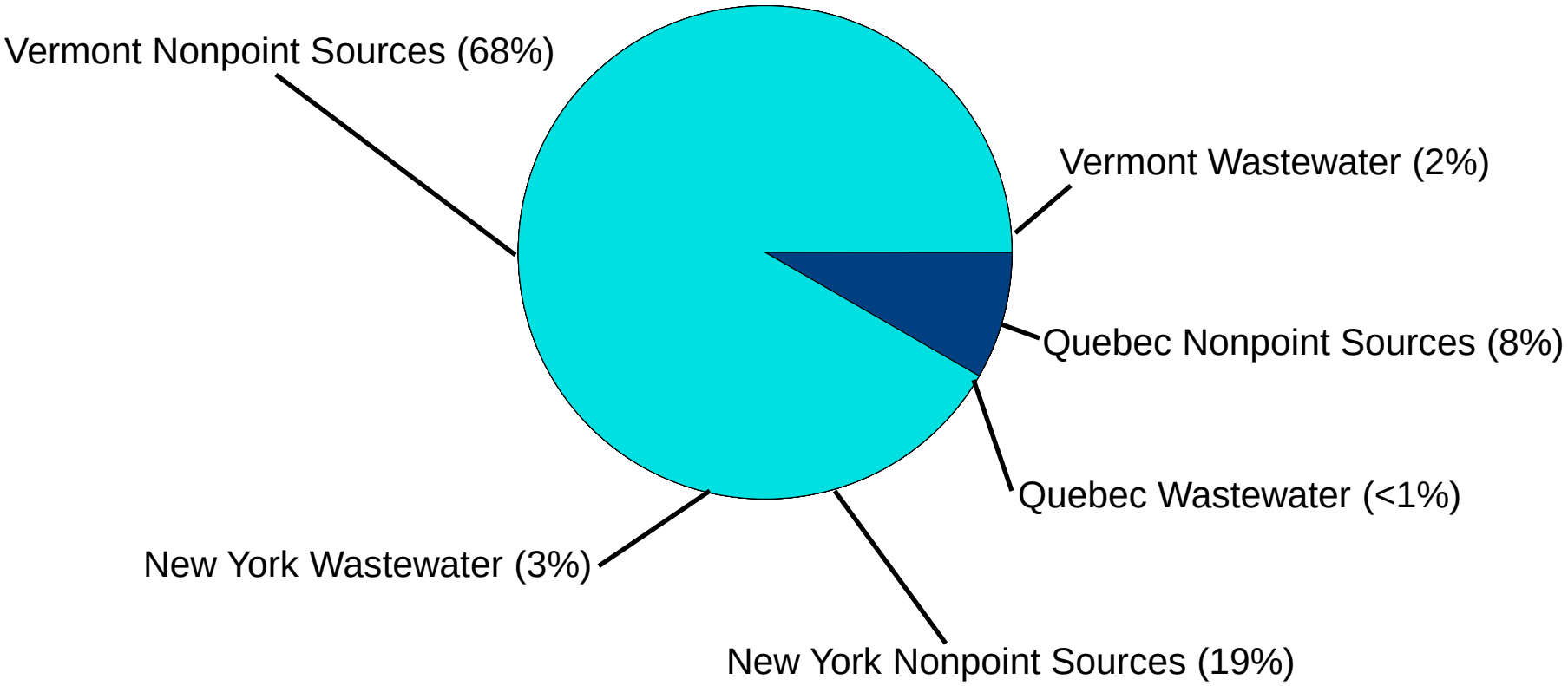
17. Lake Memphremagog, Black, Barton, Clyde, Coaticook

Vermont wastewater phosphorus loads to Lake Champlain



Between 1920-2000 $512 Million Dollars expended on municipal treatment to achieve Primary, Secondary and .8 mg/l Phosphorus limit for 95% of communities with WWTP service.

Current Sources of Phosphorus Loading to Lake Champlain

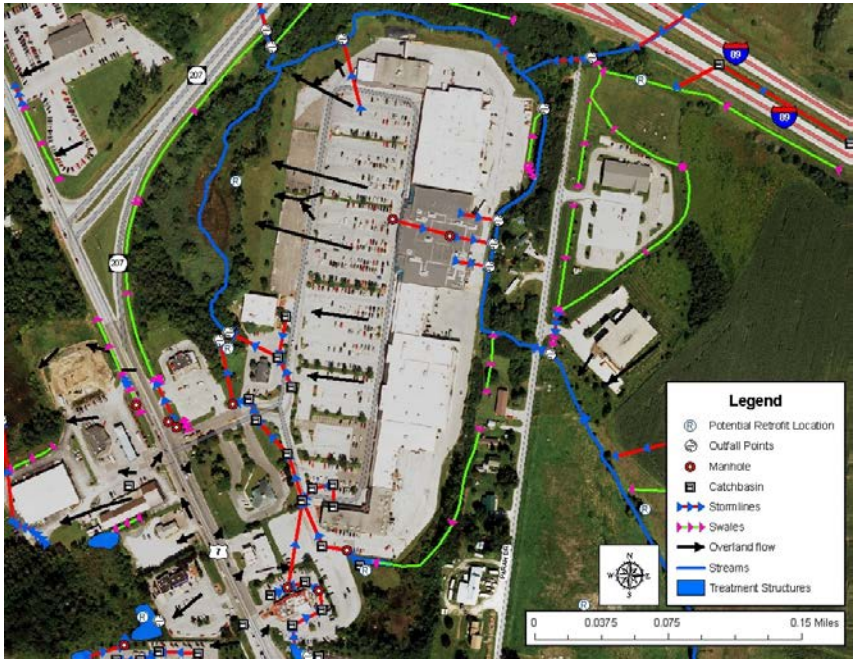


VT IDDE Program Elements

(1) Stormwater Mapping and STP Retrofit Planning

(2) Illicit Discharge Detection and Elimination

Step One: Digitizing Stormwater Infrastructure



-Drainage infrastructure added to base map images from GPS, field work, record drawings and permit plans.

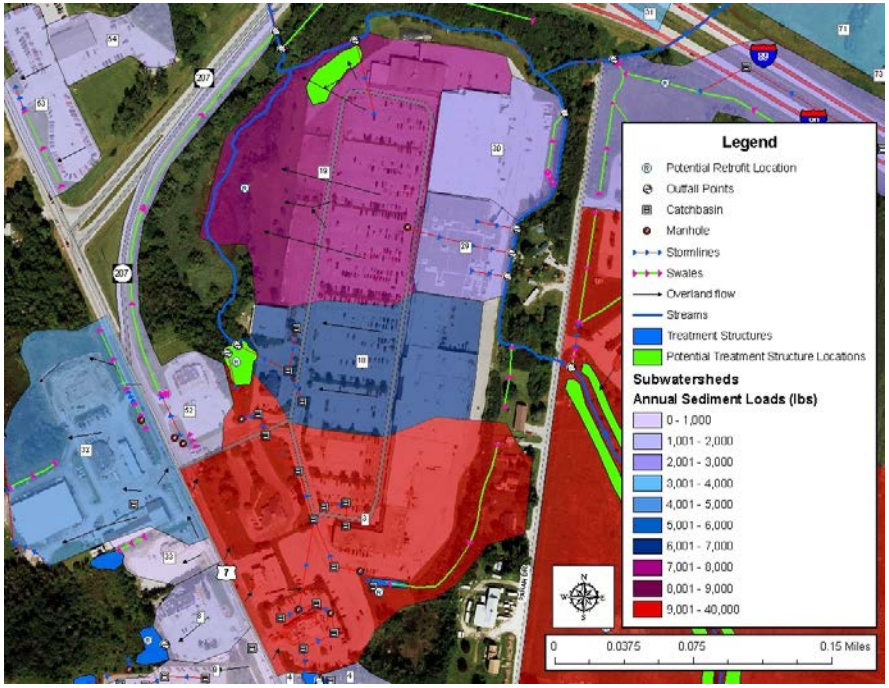
Step Two: Automated Digitizing of Impervious Cover Layer

Step Three: Delineating Subwatershed Polygons

-Subwatershed polygons were drawn around stormwater infrastructure using digitized data, Topographic maps and Digital Elevation models.

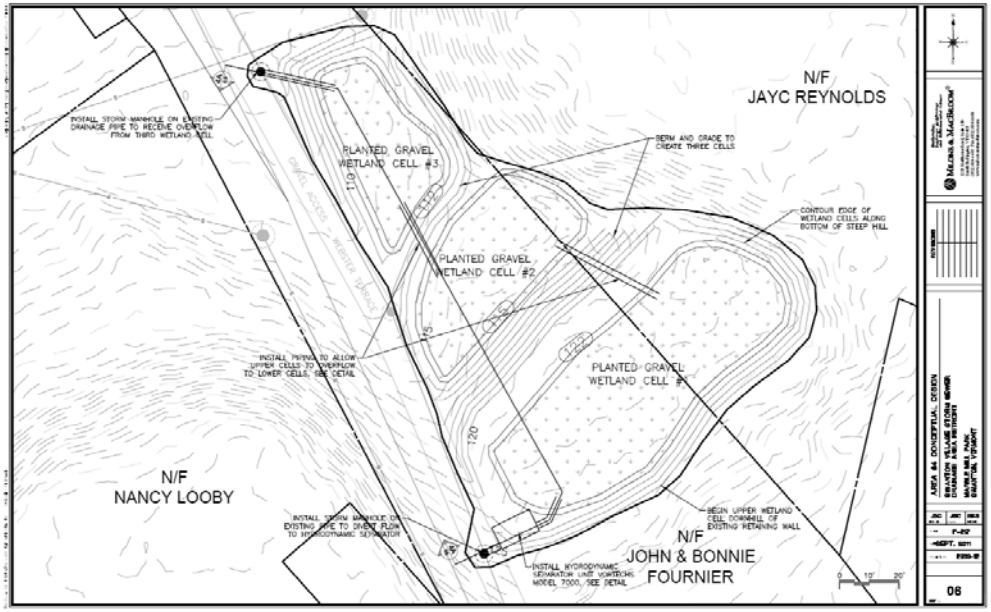
Step Four: ID Potential Retrofit Locations

-Annual phosphorus loads were calculated using the SIMPLE method. This enabled the ranking of the subwatersheds by projected TP loads showing the most problematic sub-watersheds.



Step 5: Retrofit Projects.

-The highest priority subwatersheds were looked at in more detail and potential treatment practices and funding options were suggested for each.

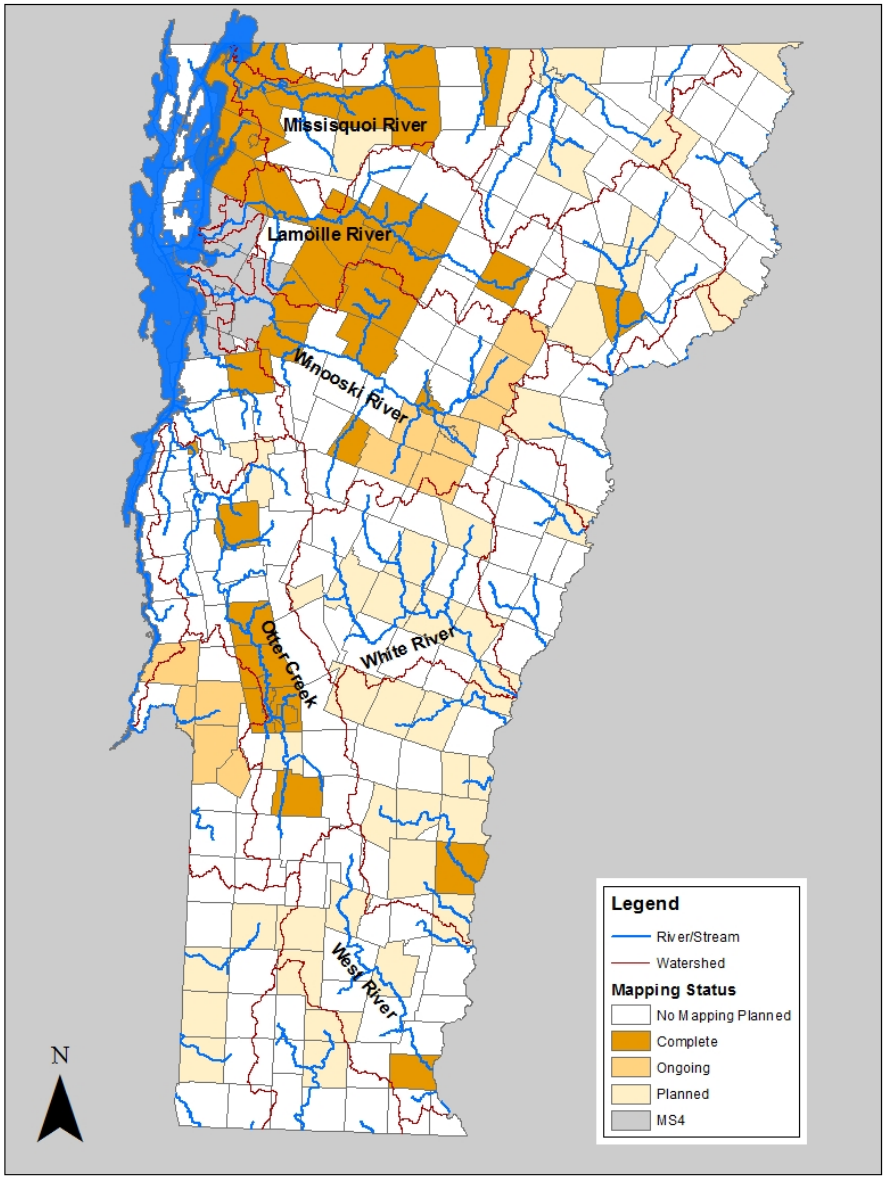


-Stormwater Treatment Practices are further developed with interested towns. Funding can come through state or federal grants. Towns must assume maintenance responsibility.

Stormwater Retrofit Status Since 2003

- 24 Publicly funded projects have been completed at a cost of $7,360,000.
- The projects mitigate stormwater impacts in eleven 303(d) sediment impaired streams.
- Phosphorus reduction from the 24 projects is estimated to be 462 lbs/yr.

Infrastructure Mapping Status



- 255 towns/cities in Vermont. Populations from 1 to 39,000
- 9 Phase 2 MS4 municipalities
- 71 non-Phase 2 towns targeted for mapping.
- Mapping completed in 33 of 71 towns.
- Mapping underway in 12 towns.

IDDE

We use a traditional IDDE approach with some variation. We believe our methods work well in Vermont, striking an appropriate balance between efficiency, expense, and capability to detect and isolate problems.

The major departures from EPA guidance:

- *Optical Brightener monitoring*
- *No bacteriological testing in initial dry-weather survey*
- *No convoluted outfall prioritization scheme. We look at everything.*

IDDE Results Summary

To date about 1700 outfalls assessed, 40-50% flowing when observed.

- *Contaminants:*
  - *Sanitary wastewater or wash water:78*
  - *Tap water: 20*
  - *Petroleum: 15*
  - *Industrial wastewater: 3*

- *Grossly contaminated discharges nearly always corrected—easier to identify source of discharge and more pressing to fix them.*

- *Diluted discharges are much more difficult. Need to convince public works directors there really is a problem they can neither see nor smell.*

IDDE since 2003

1. 40 Towns completed or under contract at a cost of $550,000.

Lake Champlain Basin

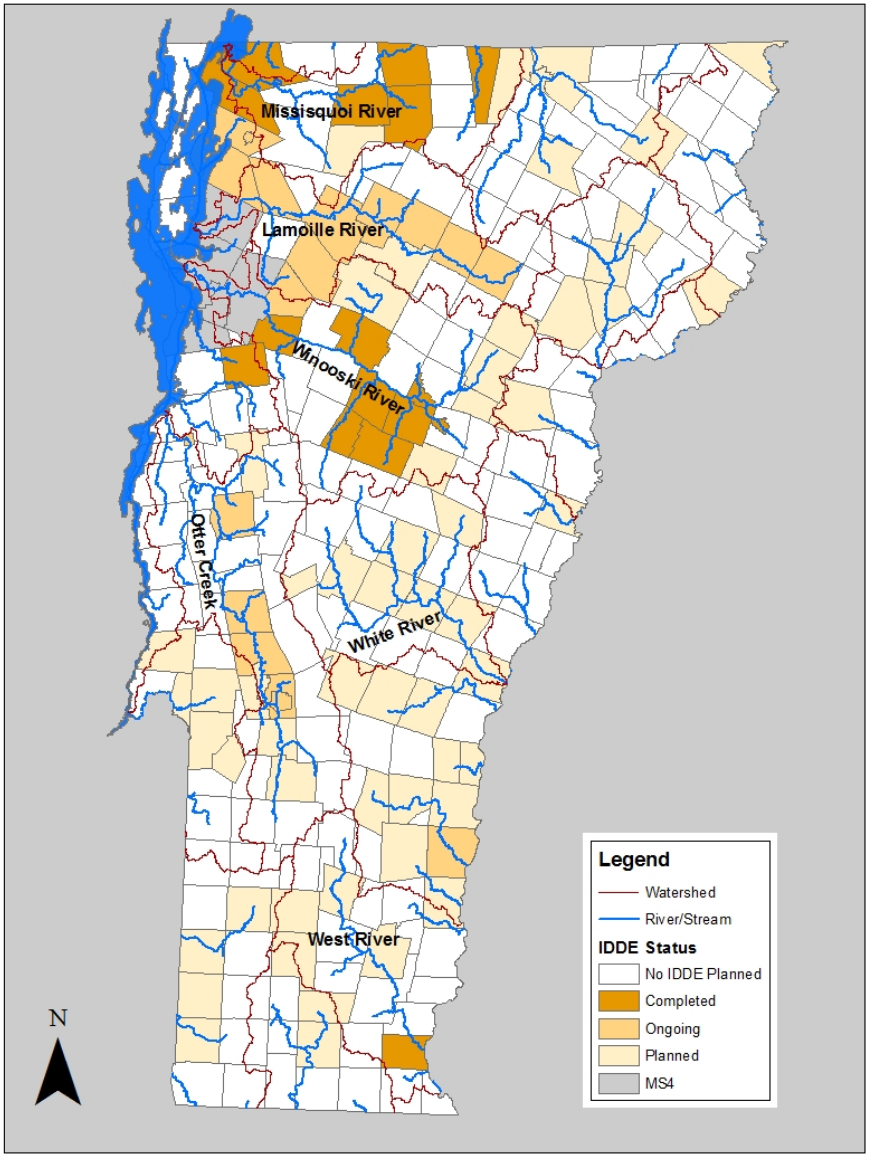
2. Regulated MS4's have eliminated an estimated 89 kg/TP/yr or 196.2 lbs/yr.

3. Non-regulated MS4 work conducted by volunteer groups and VTDEC in the Lake Champlain watershed have eliminated an estimated 227 kg/TP/yr or 500.4 lbs/yr.

Connecticut River Basin

4. One corrected discharge involving a wastewater main is estimated to have eliminated 224 kg/TN/yr. or 494 lbs/yr.

IDDE Status



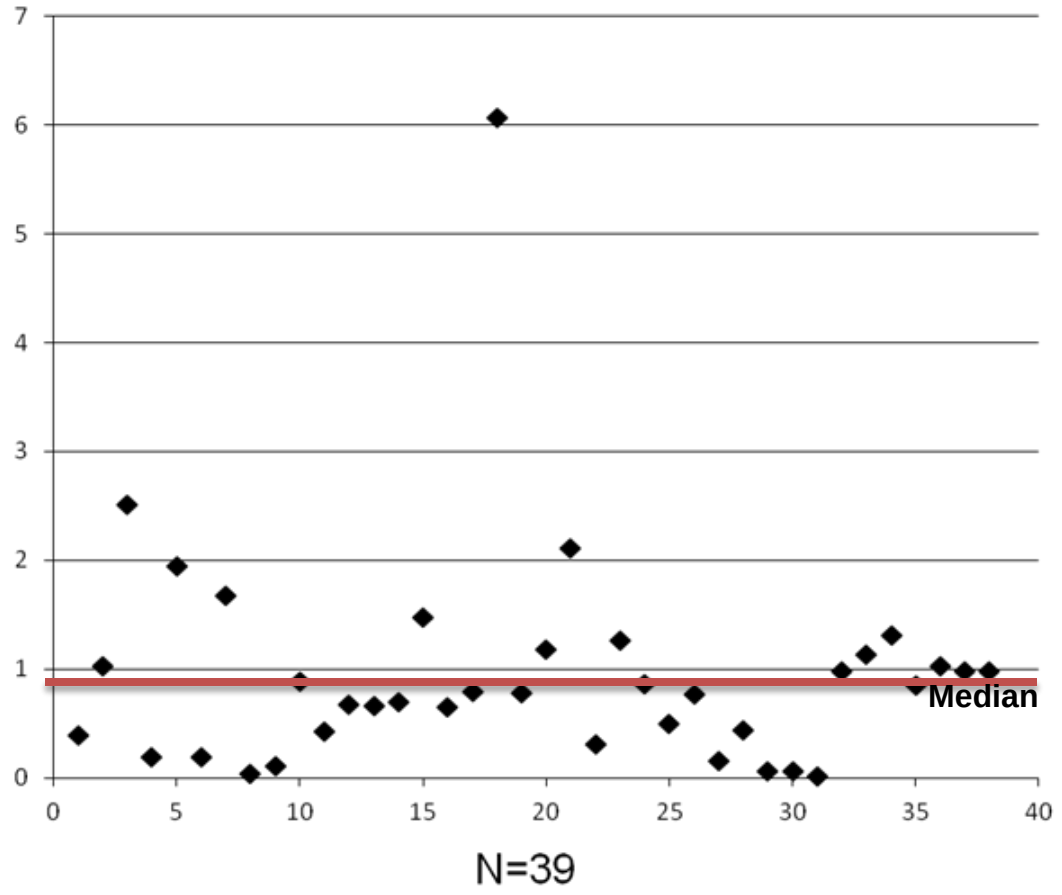
- 9 Phase 2 MS4 municipalities
- 71 non-Phase 2 towns targeted for IDDE.
- IDDE projects completed in 17 of 71 towns.
- Projects underway or under contract in 16 towns.

National IDDE Program Costs

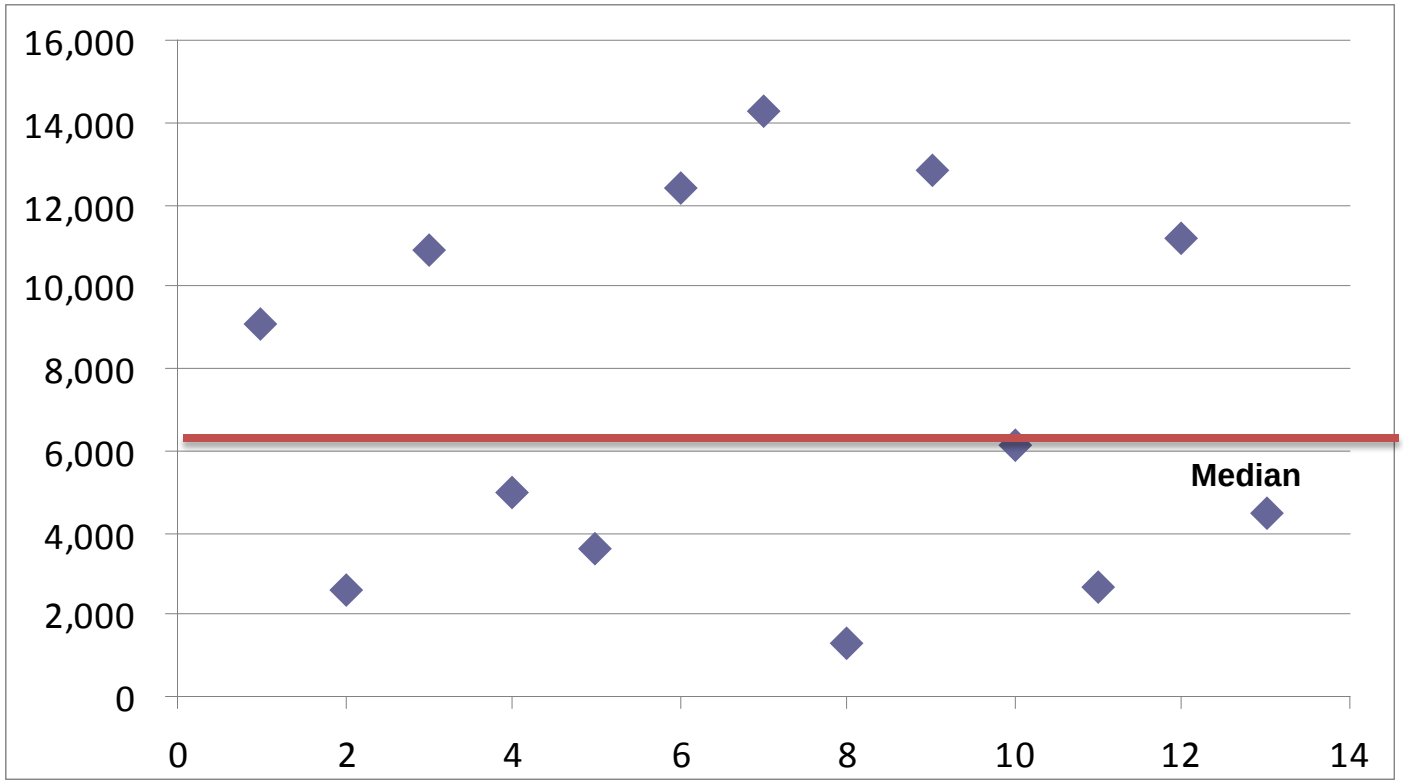
Program costs typically include mapping, inspection, administration costs.

2012 Dollars/Person/Year (in Service Area)

Average=$.95/person/year
Median=$.78/person/year



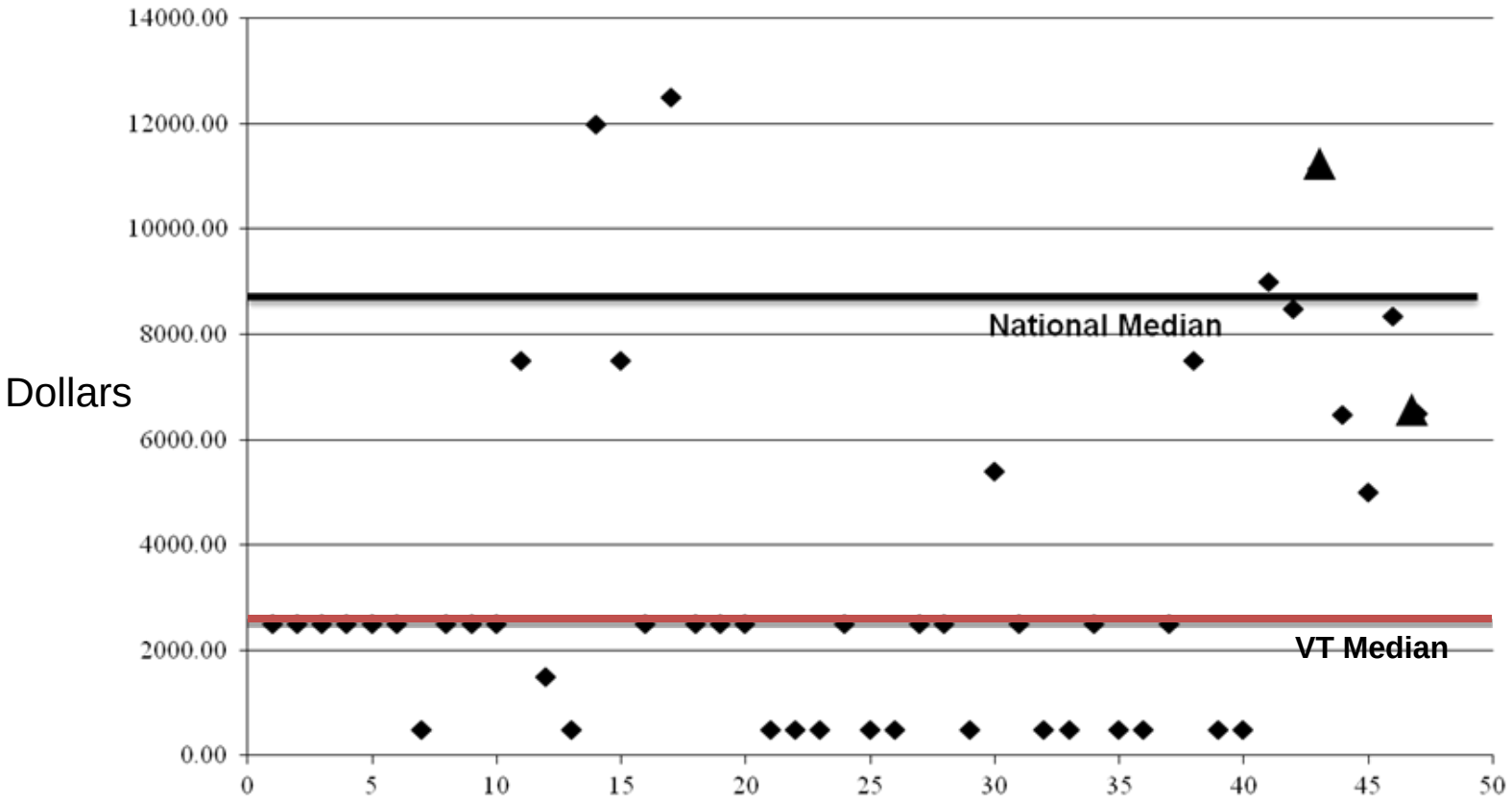
National IDDE Program Costs



Average=$7147
Median=$6156

N=13
(VT-3, National-10)

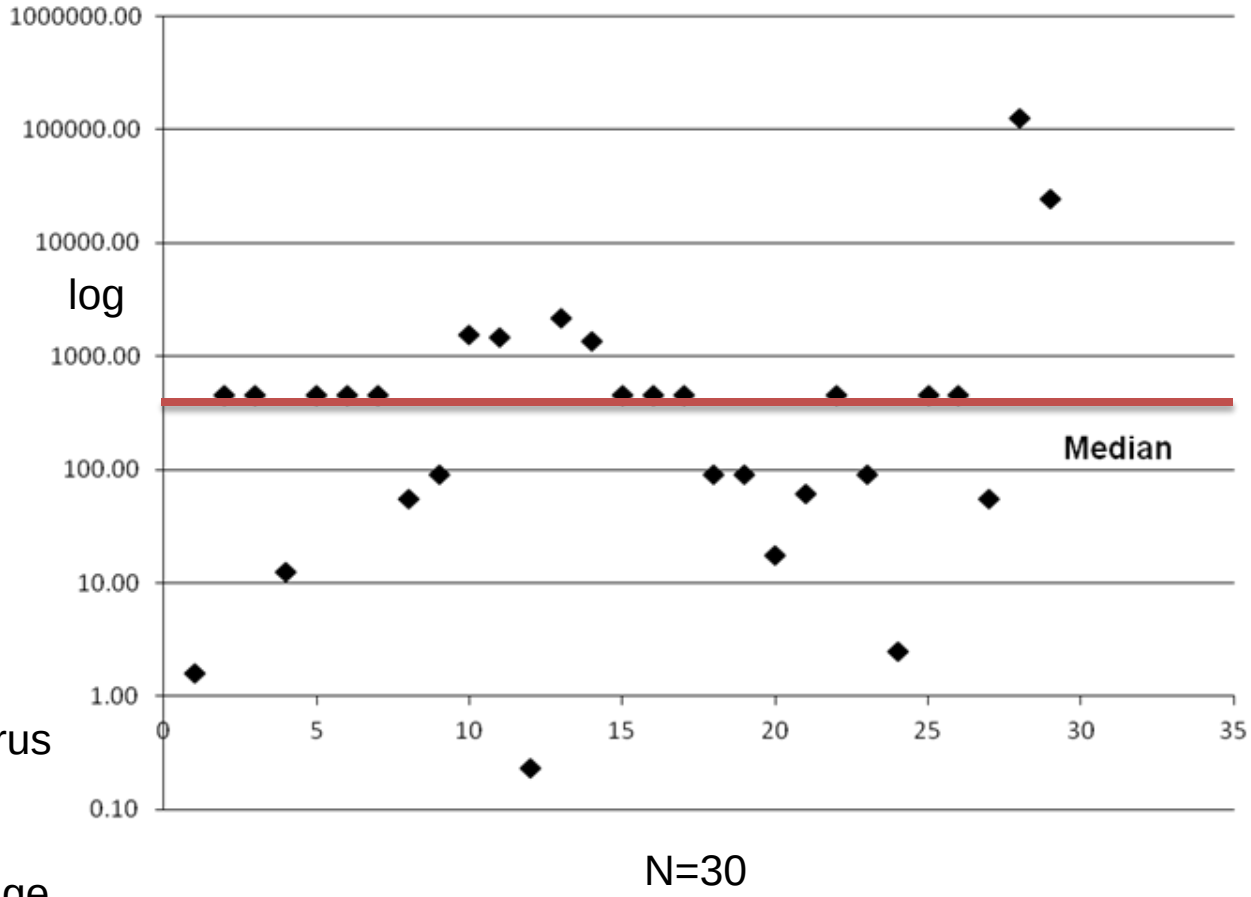
National & Vermont IDDE Repair Costs



N=1952: (VT Data=42 repair costs, National Data = 6 average costs based on 1910 Repairs). Average costs shown with .VT Average=$2656. Median=$2500. National Average=$7854. Median=$8347. Costs reported as categories-$0-1000, $1000-5000, $5000-10,000, $10,000-15,000 or exact price. Note: Unless the exact cost is known values were not corrected to 2012 dollars because cost is an estimate.

VT Repairs Phosphorus Removal Cost

Dollars/lb TP Removed



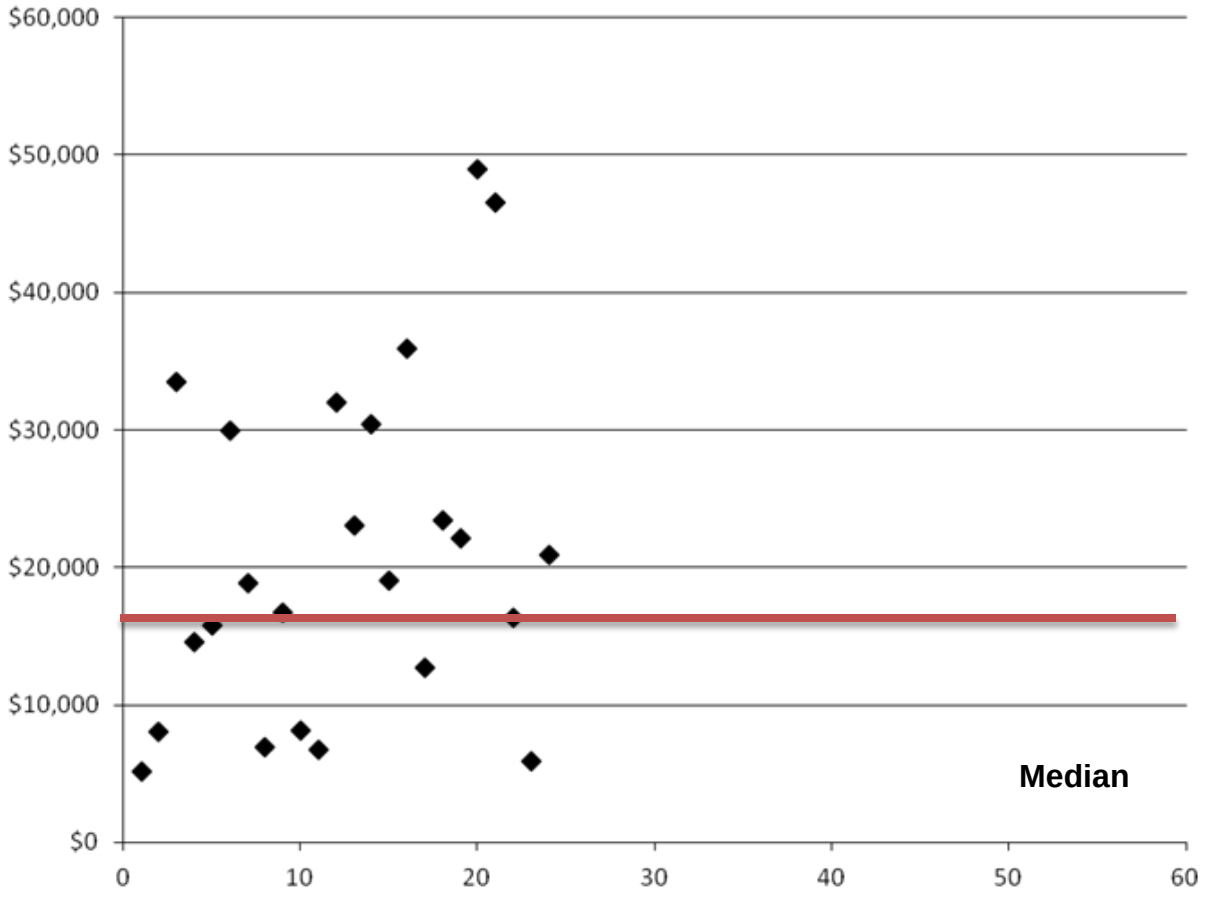
N=30

Average=$5478/lb
Median-$460

Costs reported as categories. Phosphorus loads based on instantaneous grab samples or the average residential contribution.

VT STP Phosphorus Removal Cost

2012 Dollars/Lb TP Removed



Average= $20,956/lb
Median=$16,784

N=23

Conclusions

(1) Median Survey cost + Median Repair Cost = Median Total IDDE cost

$6156 + $8347 = $14,503 (National)

(2) Larger urbanized areas tend to have greater IDDE program efficiencies resulting in lower survey/mapping costs but have higher repair costs due to built-out site conditions, utility conflicts, traffic management, etc. Smaller urbanized areas tend to have the reverse scenario.

(3) 3-5 lbs of Total Phosphorus are removed per residential discharge eliminated. A typical IDDE repair then has a TP-removal cost of about $3000-$5,000 lb/TP (National).

(4) In Vermont a typical STP such as a wet pond has a median cost of $16,700 per lb of TP removed.

(5) This analysis of available IDDE data indicates that there is a 3-5x difference in nutrient removal costs between implementation of an IDDE effort and the implementation of structural STP practices.

(6) Conducting a comprehensive IDDE effort prior to STP implementation for nutrient impaired waterways with urbanized areas is the most cost-effective approach.

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Dave Braun, Stone Environmental, Montpelier, VT

Contact information:

Jim Pease, Vermont Department of Environmental Conservation, Montpelier, VT Jim.Pease@state.vt.us (802) 490-6116

http://www.vtwaterquality.org/erp/htm/SW_IDDE_program.htm