



Department of Environmental Conservation Fiscal Year 2018

Department Performance Report

VISION

We envision a Vermont where people live in harmony with diverse and healthy natural systems; appreciate and enjoy our natural resources; work together responsibly to reduce waste and risks to human health and the environment; and prosper without significant degradation of natural systems. We envision a Vermont where people breathe clean air; drink clean water; eat safe food; and live in a sustained and healthy environment.

MISSION

To preserve, enhance, restore, and conserve Vermont's natural resources, and protect human health for the benefit of this and future generations

OVERVIEW

The Department of Environmental Conservation launched an effort beginning in 2014 to improve how the organization tracks and measures the performance of its programs using Results Based Accountability (RBA). This framework is used to challenge organizations to answer three primary questions: (1) How much did we do? (2) How well did we do it? (3) Is anyone better off?

Performance accountability and RBA are now widely used in the Department's administration and management; ranging from performance measures in grants and contracts, to incorporating RBA into strategic planning and FY18 budget development.

DEVELOPMENT OF THIS DOCUMENT

In 2014, the Department trained over 60 managers on the basics of RBA, how it is being used in state government and potential opportunities for the future which could include budgeting and strategic planning. After training managers and key staff, the Department formed an internal "Performance Management" team with members representing a diverse cross-section of programs.

In support of the FY18 budget proposal, all performance measures in this document and associated text have been updated with the most recent data, trends and program activities. In addition, a dashboard of population based indicators developed from the Department's Strategic Plan and Act 186 (an Act relating to reporting on population-level outcomes and indicators) is included in this report.

NEXT STEPS

The Department's [FY16-FY18 Strategic Plan](#) and accompanying [Score Card](#) were created using RBA framework and focus on tracking performance measures and results. The department strategic plan will be updated annually to align with changes to state-wide outcomes and indicators and the State of Vermont strategic plan.

Promoting a culture of continuous improvement throughout the Department is widely supported by leadership and management. Tracking progress towards our goals as presented in this document lays the foundation for determining which programs need more attention to achieve success in meeting the Department's shared goals or federal and state requirements. Lean process improvement is the primary tool used by the Department to move our programs towards increased effectiveness and efficiency by focusing on outcomes, identifying opportunities to improve our work flow and business processes, and implementing those changes in a timely fashion.

Each page includes next steps which outline what actions will be undertaken to maintain current trends or "turn the curve" towards the goals and outcomes identified in the Department Strategic Plan and Act 186. The measures presented in this document are the highest level measures and indicators we currently track as a Department. Over the next year, the Performance Management team will further align program-level performance measures with the Department Strategic Plan and continue to identify common measures between programs.

USING THIS DOCUMENT

This document can be used in its entirety, or each page can stand alone to describe our performance in a specific area. The indicators and performance measures presented in this document are organized by category rather than by program, division or appropriation. These outcomes are as follows:



Clean Water

Addresses: surface water and groundwater resources management; drinking water program



Clean Air

Addresses: air quality; pollution emissions; climate change; greenhouse gas reduction programs



Healthy and Safe Communities

Addresses: waste management; septic systems; natural hazards



Efficient and Effective Government

Addresses: administration and innovation; human resources; enforcement

KEY DEFINITIONS

Outcome - A condition of well-being for children, adults, families or communities.

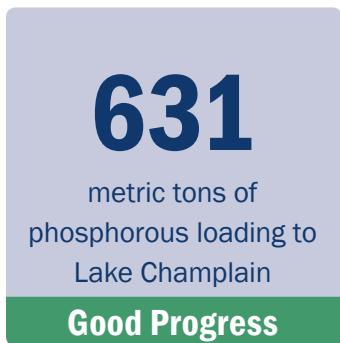
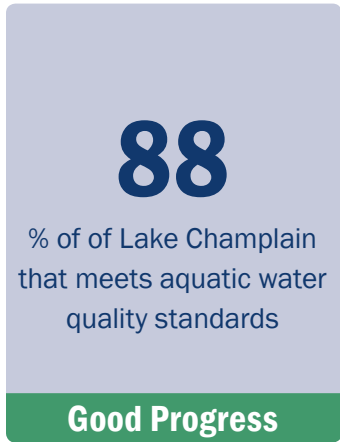
Indicator - A measure that helps quantify the achievement of a result.

Performance Measure - A measure of how well a program or agency is working.

Department of Environmental Conservation

Population Based Outcomes and Indicators

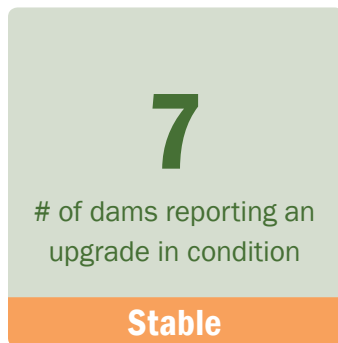
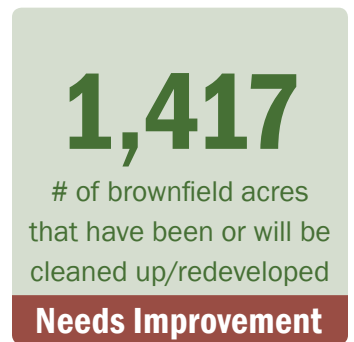
Clean Water



Clean Air



Healthy and Safe Communities



Effective and Efficient Government



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Clean Air

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Healthy and Safe Communities

INDICATORS

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Efficient and Effective Government

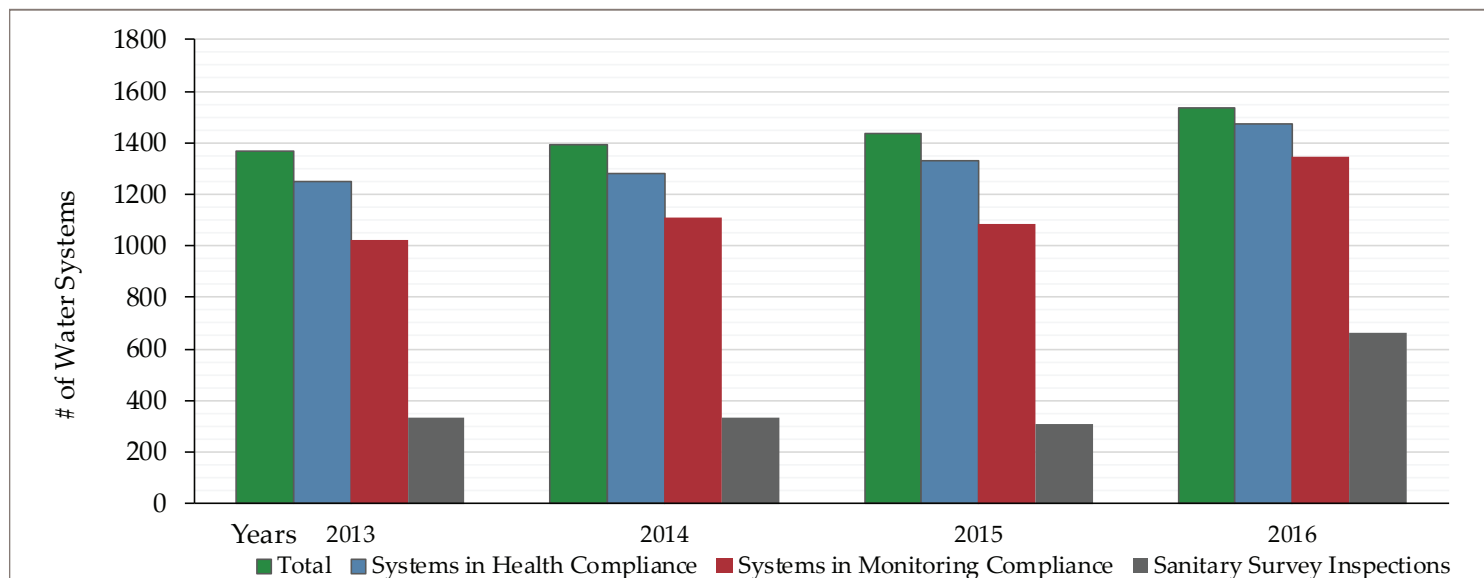
PERFORMANCE MEASURES

30. Improve Business Practices to Gain Efficiencies
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Indicator**Clean Water****Ensure Public Drinking Water System Compliance***Providing safe drinking water to Public Water System users***96%**

of Public Water Systems produced safe drinking water

INDICATOR TREND

Compliance with health standards and monitoring requirements

DATA ANALYSIS

While most public drinking water systems provide safe drinking water, approximately 4% struggle to meet standards. Primary reasons are coliform issues and disinfection by-products exceedances. Coliform contamination indicates the system's vulnerability to bacteria and viruses. Disinfection by-products form when organic matter in surface water interacts with chlorine during the disinfection process. Less frequent contamination issues include naturally occurring high levels of arsenic or radionuclides.

The Water Supply Program focuses on proactively preventing compliance problems from occurring in the first place. This is accomplished by having requirements pertaining to source protection, well construction, drinking water treatment, drinking water quality monitoring, and public water system operations.

More specifically:

- well construction plans and the source water's quality/quantity are assessed prior to issuing the source permit;
- engineering plans are reviewed to ensure technical requirements are met prior to issuing a construction permit;
- sanitary survey inspections identify unsafe or unsanitary operations; and
- operations permits contain monitoring and operational requirements including a compliance schedule to bring a system back into compliance when necessary.

When water quality exceedances occur or public health risks are found, public water systems must take action to ensure that public health is protected. For example, system owners may be required to issue boil water notices to their users or to make modifications to their system (e.g. install treatment or repair a distribution system).

NEXT STEPS

- Continue to require water systems to meet standards via the operating permit.
- Continue to monitor and assess whether water systems meet operational standards.
- Continue to monitor and assess whether water systems meet federal Maximum Contaminant Levels (MCLs), monitoring, reporting, and treatment technique standards.
- Continue to improve the source protection program, with policy and rule changes.
- Continue to provide technical assistance to municipalities and volunteer-run private systems.
- Take enforcement actions against chronic non-compliers.

Indicator



Clean Water

Percent of Vermont's Inland Waters Meeting Water Quality Standards

Vermont's inland waters are healthy overall and support fishing and swimming activities for residents' enjoyment and tourism

80%

aquatic (fishable)

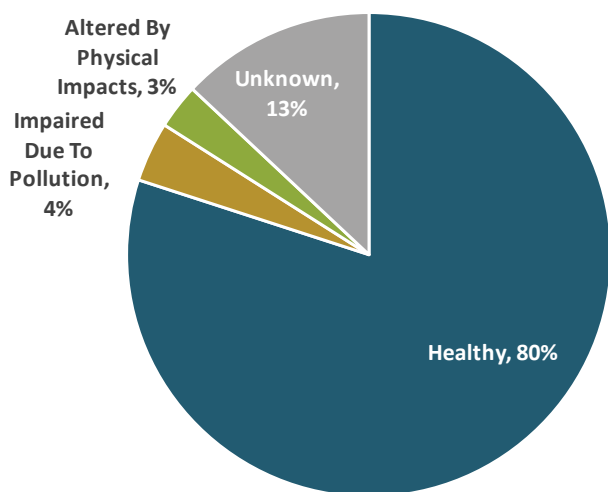
84%

recreational (swimmable)

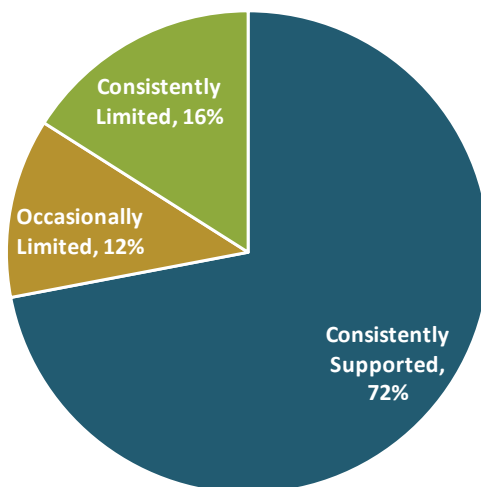
INDICATOR TREND

Aquatic (fishable) water quality of rivers and streams

Recreational (swimmable) water quality of inland lakes



Percent of total miles



Percent of total acres

DATA ANALYSIS

While our rivers, streams, and inland lakes can suffer from the stresses of pollution, channelization, invasive species, and cyanobacteria blooms, the majority of Vermont's inland waters continue to support fishing and swimming uses at all times.

In 80% of our rivers and streams, the aquatic biota is considered healthy (fishable), whereas only 7% of the aquatic biota is either impaired due to pollution or altered based on physical impacts like poorly managed dams.

In our inland lakes, 72% of the total acreage consistently supports recreational uses (swimming), meaning that the phosphorus standard is being met and invasive species or cyanobacteria blooms are not prevalent.

The Watershed Management Division works to protect, maintain, enhance, and restore our rivers, streams, and lakes by avoiding or minimizing pollution and other stressors on Vermont's waters.

Some of the key initiatives we were involved in over the last year to help improve inland water quality were:

- Refined tactical basin planning process to identify the highest priority projects to restore waters
- Streamlined priority project identification and funding processes
- Promoted proactive resource protection through surface water reclassifications, Class I Wetland designation, and revisions to Vermont Water Quality Standards

NEXT STEPS

Although the quality of Vermont's inland waters is overall very good, we are proactively and aggressively working to increase protections to improve aquatic and recreational uses. Our specific efforts include:

- Further increasing our education and training efforts
- Increasing our aquatic invasive species detection and elimination efforts
- Initiating additional protections through Class I wetland and high quality water designations

Indicator



Clean Water

Percent of Lake Champlain Meeting Water Quality Standards

Lake Champlain is well known for its high quality fishing, however recreational uses are sometimes limited; the Vermont Clean Water Act aims to improve this

88%

aquatic (fishable)

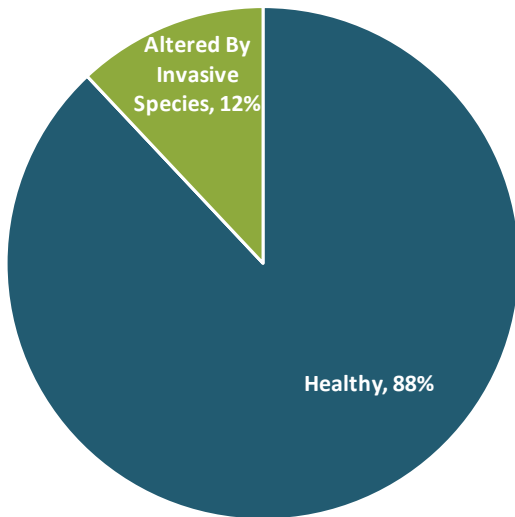
85%

recreational (swimmable)

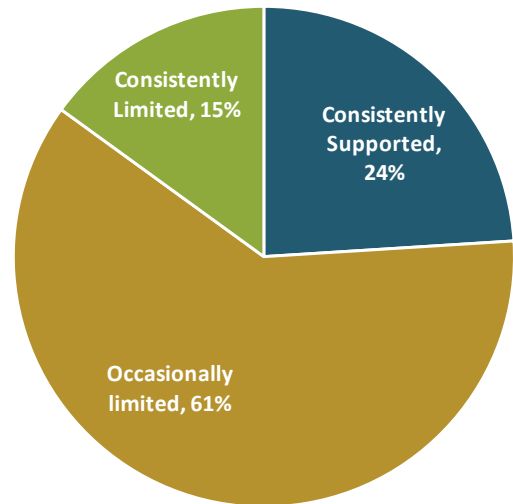
INDICATOR TREND

Aquatic (fishable) water quality of Lake Champlain

Recreational (swimmable) water quality of Lake Champlain



Percent of total acres



Percent of total acres

DATA ANALYSIS

Lake Champlain is Vermont’s largest water body at 429 square miles and 129 miles in length, running between Vermont and New York and up to Quebec. The Lake is designated as impaired due to phosphorus concentrations. Uses are also limited at times due to invasive species, and cyanobacteria blooms.

Encouragingly, the Lake Champlain fishery is considered healthy (fishable) in 88% of the lake. The remaining 12% is altered by invasive species (such as water chestnut and Eurasian watermilfoil).

Vermont has very stringent water quality standards for phosphorus. While 24% of the lake consistently has good swimming conditions, 61% of the lake is occasionally limited for swimming by invasive species

and cyanobacteria blooms. These organisms consistently limit swimming in 15% of the lake.

The Watershed Management Division works to protect, maintain, enhance, and restore our rivers, streams, and lakes by avoiding or minimizing pollution and other stressors on Vermont’s waters.

Some of the key initiatives we were involved in over the last year to help improve the water quality of Lake Champlain were:

- Finalized Lake Champlain Phosphorus TMDL Phase 1 Implementation Plan
- Developed Combined Sewer Overflow (CSO) Rule
- Identified and directed phosphorus reduction projects

NEXT STEPS

The passage of the Vermont Clean Water Act and the Lake Champlain TMDL Phase 1 Plan greatly assist our efforts to aggressively reduce in-lake phosphorus, and improve Lake Champlain’s overall water quality. The clean-up of Lake Champlain is expected to take many years. Our specific efforts will include:

- Timely implementation of requirements under Act 64, the Lake Champlain TMDL and Phase 1 Implementation Plan
- Implementing expanded permitting programs and requirements
- Continuing to tighten priority project identification and funding

DATA SOURCE: Watershed Management Division

PREPARED BY: Watershed Management Division; (802) 828-1535; <http://dec.vermont.gov/watershed>

Indicator

Clean Water

631

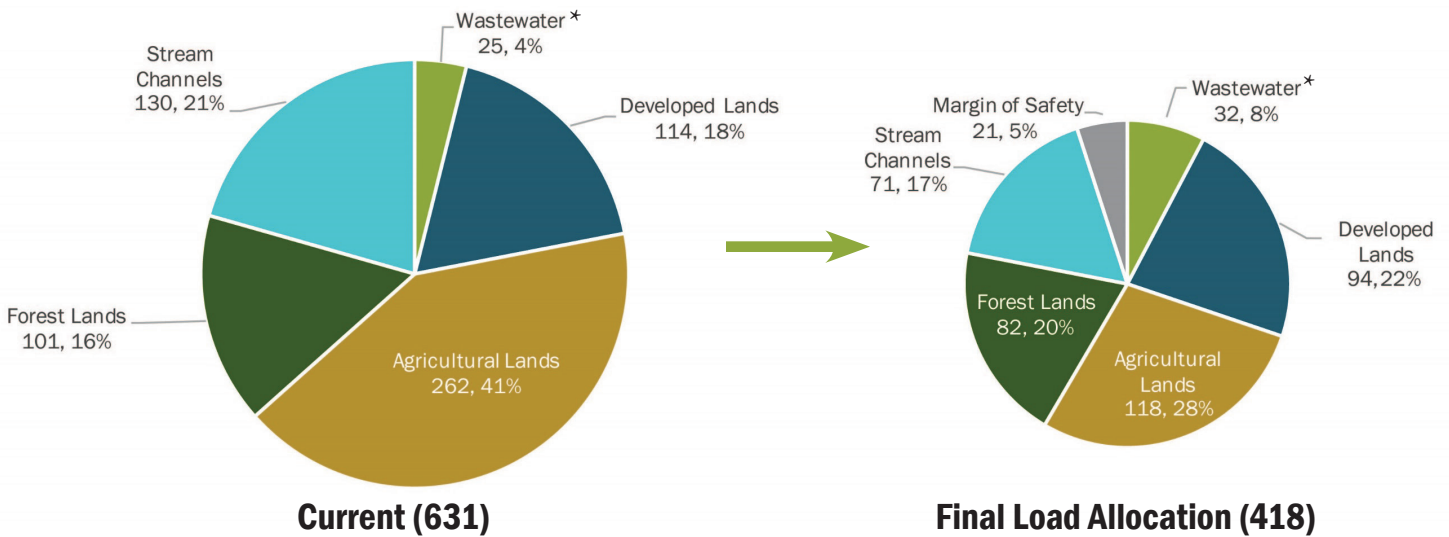
metric tons/year of phosphorus reach Lake Champlain

Total Phosphorus Loading to Lake Champlain

The Vermont Clean Water Act is intended to reduce the total phosphorus loading to Lake Champlain from Vermont sources

INDICATOR TREND

Reduction Needed in Phosphorus Loading to Lake Champlain (metric tons, percent of total)



* Current load for Wastewater is shown as current actual loads (25 MT), current permit limits are higher (56 MT). The final load allocation shows future permit limits (32 MT).

DATA ANALYSIS

The amount of phosphorus reaching Lake Champlain must be reduced to meet water quality standards. Phosphorus is a pollutant that comes from many sources (see graphic above). The current estimated phosphorus load to Lake Champlain from Vermont sources is 631 metric tons/year and the target loading, specified by the federal regulatory limits or the Lake Champlain Total Maximum Daily Load (TMDL), is 418 metric tons/year. This substantial reduction will require all contributing sectors to work together to achieve this.

The passage of the Vermont Clean Water Act (Act 64), in 2015, provides the additional regulatory and funding mechanisms necessary to reduce phosphorus pollution in Lake Champlain, as well as to restore,

protect, and maintain water quality statewide. The State has developed a tracking system to monitor progress by these regulatory and funding programs. Currently, the State is tracking phosphorus reductions for State-funded projects and is developing procedures to track reductions achieved through regulatory programs. This will allow us to report on the estimated phosphorus load reductions achieved.

Key initiatives over the last year were:

- Finalized Lake Champlain Phosphorus TMDL Phase 1 Implementation Plan
- Developed Vermont Clean Water Tracking System
- Continued to develop new regulatory programs

NEXT STEPS

The passage of the Vermont Clean Water Act will greatly assist in our efforts to substantially reduce in-lake phosphorus concentrations, and improve Lake Champlain’s overall water quality. The clean-up of Lake Champlain is expected to take many years. Specific efforts will include:

- Implementing Required Agricultural Practices
- Increasing education, training and technical assistance efforts
- Implementing expanded permitting programs
- Establishing long term revenue sources for the Vermont Clean Water Fund

Indicator

Clean Water

Square Miles of River Corridors Protected

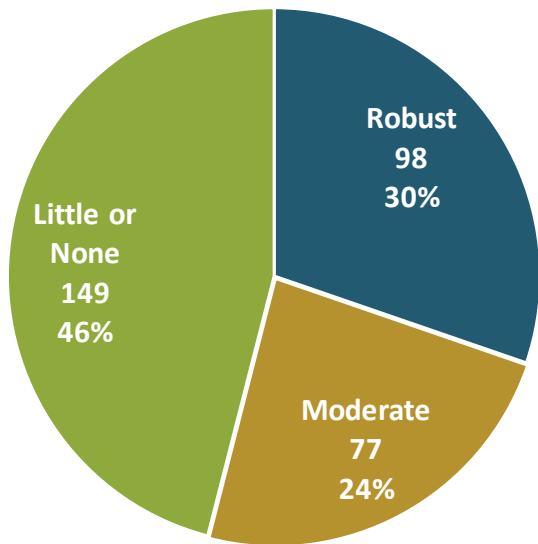
Protection of river corridors helps reduce flood and fluvial erosion hazards and improve water quality and aquatic habitat

175 sq. miles

of river corridors have protections in place

INDICATOR TREND

Types of River Corridor Protection (square miles and percent)



Robust Protections

- State Held River Corridor Easements
- State Protected Wetlands
- State/Municipal Protected Floodways
- Act 250 Parcels

Moderate Protections

- Public Lands
- Conservation Easements/Ownership
- Municipally Adopted River Corridor Bylaws
- Flood Hazard Area Protection Bylaws

DATA ANALYSIS

River corridors encompass the area of land surrounding a river. They provide the meandering, floodplain, and riparian functions necessary to restore and maintain a naturally stable or least erosive form of river, thereby minimizing erosion hazards over time. Lands within a river corridor are at higher risk to fluvial (streambed and streambank) erosion. Giving rivers room to move avoids costly measures to protect investments, which often increase erosion upstream and downstream and adversely affect public safety, landowners, and river ecosystems.

The Watershed Management Division has delineated river corridors for streams with a drainage area greater than two square miles, which encompasses 324 square miles of

land statewide. Over half the river corridor area (175 square miles) has some type(s) of protection; however not all types of protection are equal. State ownership and/or regulation with specific water resource-based land use restrictions are likely to result in more robust river corridor protections. Both robust and moderate protections help to ensure stable streams and rivers.

Naturally stable streams and rivers are a tremendous community asset. If river corridors are not protected at the community level, the State will bear an ever-increasing burden (i.e., in terms of flood disasters and associated human misery) when there are less and less places on the landscape where streams can expend the flows and erosive energy of a flood.

NEXT STEPS

River corridor protection is important to river and stream stability and has economic benefits. Specifically, we aim to help increase these protection efforts through:

- Working with regional planning commissions to assist municipalities with preparing town river corridor maps
- Continuing development of the Flood Resilient Communities Program
- Finalizing a state river corridor and floodplain protection bylaw model to assist municipal land use planning and regulation

DATA SOURCE: Watershed Management Division

PREPARED BY: Watershed Management Division; (802) 828-1535; <http://dec.vermont.gov/watershed>

ADDITIONAL INFORMATION: Vermont Flood Ready <http://floodready.vermont.gov>



Clean Water

ENHANCE Surface Water Quality Through Best Management Practices

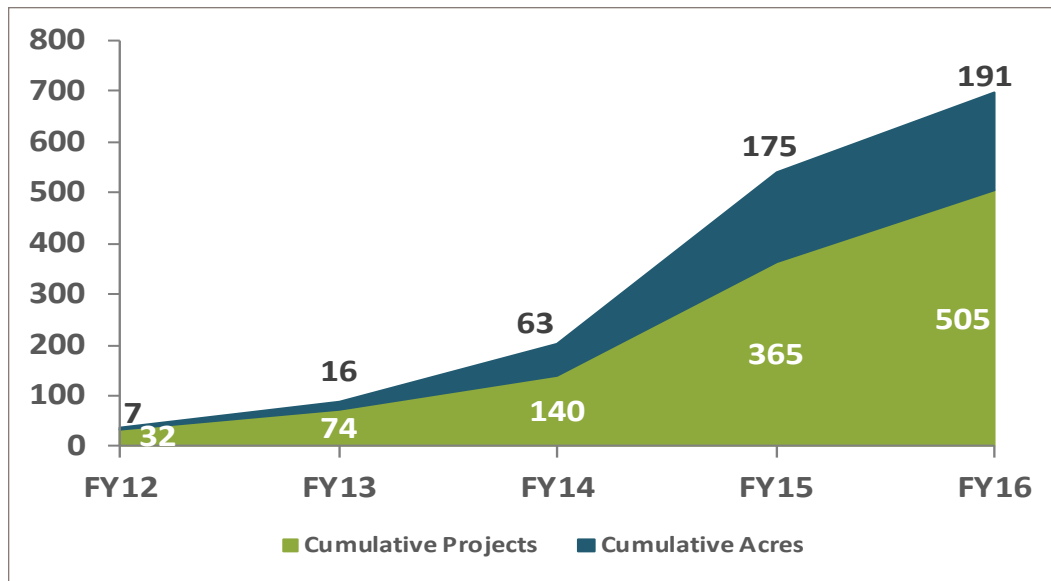
Improving ecological and hydrologic function

140 projects

undertaken to enhance water quality in 2016

PERFORMANCE TREND

Number of enhancement projects undertaken and resulting acres improved



NEXT STEPS

Enhancement projects are an important tool in WSMD’s efforts to improve water quality throughout Vermont. When implemented and sited properly, they can have significant results. To date, WSMD has relied heavily on its Tactical Basin Planning process and partner organizations to identify, develop, and implement projects.

In the future, WSMD will continue along this track, but also plans to increase its efforts by:

- Further engaging municipalities and other partners in this work
- Increasing the amount of funding available for project scoping and implementation
- Increasing the amount of technical assistance provided by WSMD staff
- Continuing to tighten priority project identification and funding
- Using Lean business process improvement tools to evaluate and advance project prioritization methodologies

DATA ANALYSIS

In efforts to enhance water quality, the Watershed Management Division (WSMD) uses a multi-pronged and comprehensive approach. This approach includes strategies to avoid, minimize, and manage impacts to Vermont’s surface waters. Managing impacts is particularly important considering that watersheds can easily become stressed or impaired as a result of cumulative and legacy impacts. In these watersheds, it is important to use best management practices and other means to enhance water quality by improving ecological and hydrologic functions.

Enhancement projects include:

- Implementation of best management practices on lake-shore properties
- Riparian buffer plantings and in-stream improvements
- Flow protection and culvert projects

- Removal of invasive species
- Installation of green stormwater infrastructure practices, such as rain gardens and bioretention

In 2016, WSMD facilitated or helped to fund 140 unique enhancement projects, collectively resulting in improvement to 16 acres. The results of some enhancement projects are measured in units other than acres, such as miles or linear feet, thereby making the restored acreage appear lower. These projects will be included in future reports. The graph above also shows a significant jump in the number of projects in 2015 due to a large number of flow protection and culvert enhancement projects and an increase in the number of acres due to wetland buffer enhancement projects.

DATA SOURCE: Watershed Management Division

PREPARED BY: Watershed Management Division (802) 828-1535; <http://dec.vermont.gov/watershed>



Clean Water

MAINTAIN Surface Water Quality Through Monitoring and Assessment

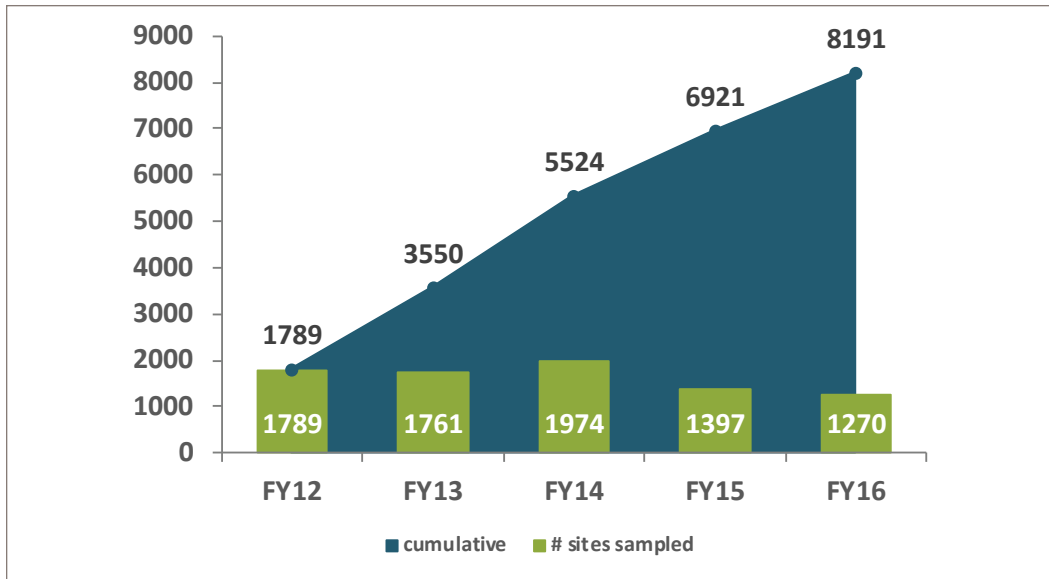
Establishing baseline conditions, tracking trends, and ensuring water quality efforts are effective

PERFORMANCE TREND

8,000+
locations

tested over the past 5 years

Total number of sampling sites



NEXT STEPS

Monitoring and assessment is a critical function provided by WSMD staff. Collected data and information helps direct implementation efforts in our watersheds. Ongoing water quality data collection and assessment, combined with permit compliance monitoring, aids in maintaining waters at a high standard. Given this, WSMD hopes to continue to steadily increase its efforts over the next few years.

WSMD also supports monitoring and assessment efforts by volunteer groups and partners. Their involvement greatly increases the number of sites monitored and thus expands the amount of available data. It also creates an important connection between the State, citizen scientist groups, and other associations. WSMD plans to bolster these local level efforts over the next few years. Specifically, WSMD will:

- Continue high level data collection and assessment efforts
- Participation in the USEPA sponsored National Wetlands Assessment
- Continue permit compliance monitoring
- Increase training opportunities for interested citizen scientists
- Increase monitoring performed by volunteer groups and partners

DATA ANALYSIS

The Watershed Management Division (WSMD) has been involved in monitoring and assessment efforts since 1977. Monitoring and assessment are critical to establishing baseline conditions, tracking long-term changes in water quality and designated uses, and informing management efforts. Through the work of staff scientists and citizen volunteers, we are able to evaluate the impacts of water quality stressors (see Vermont’s Surface Water Management Strategy), prioritize mitigation and restoration efforts, and evaluate their effectiveness.

For the 2016 reporting year, WSMD monitored 1,270 unique sites. Cumulatively, 8,191 sites have been visited over the past five years. The number of samples collected and analyzed this year was lower than the previous few years for two reasons. First, WSMD reduced the number of stream geomorphic assessments

conducted and instead shifted our focus to implementation of the projects that had been identified from the assessments from previous years. Also, the Lakes Program is using a new strategy for targeted data collection that allows scientists to make fewer visits to individual lakes, but to learn more from each visit. For these two reasons, despite the lower numbers of samples collected and analyzed this year, the Division’s monitoring and assessment efforts remained very strong.

The assessment of our monitoring data enables us to gauge compliance with the Vermont water quality standards and compare water quality to that of other states. Our monitoring and assessment efforts identify where protection, restoration, enhancement, and maintenance should be targeted to best ensure the quality of Vermont’s surface waters.



Clean Water

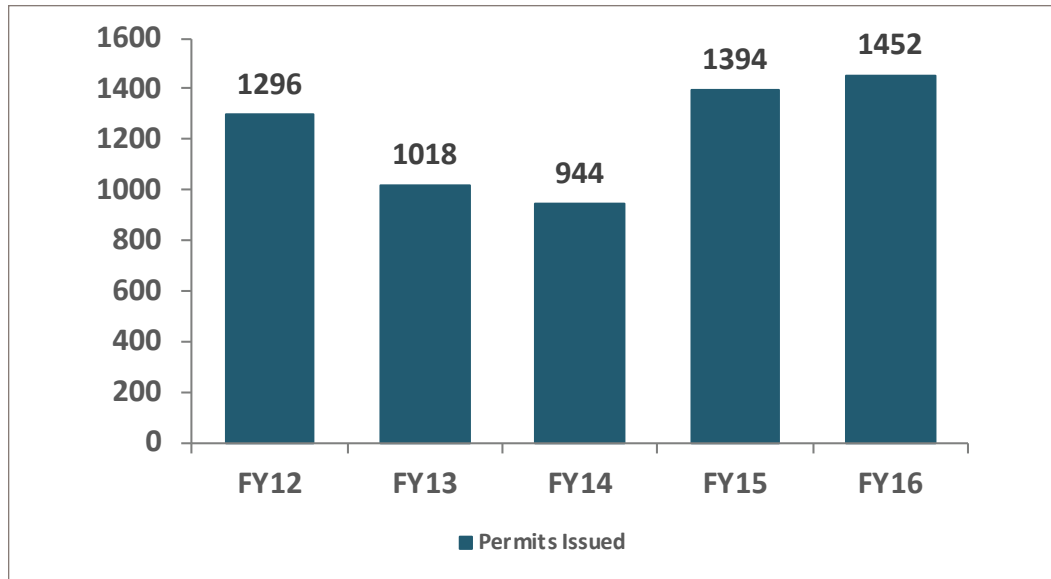
MAINTAIN Surface Water Quality Through Permitting

Permitting as a tool for maintaining water quality

1,400+
permits
issued and 4,400+
active permits managed
in 2016

PERFORMANCE TREND

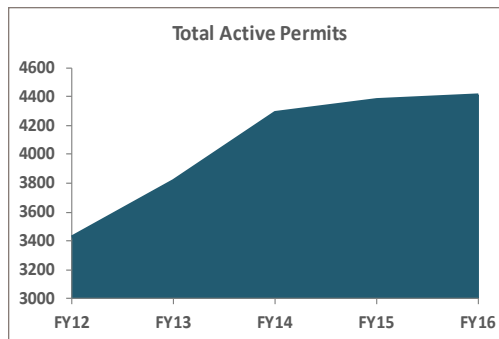
Number of permits issued by year



DATA ANALYSIS

Permit coverage is required for a variety of activities that have a potential impact on water resources. The permit process is meant to avoid or minimize impacts to water quality. Permit coverage is required for aquatic nuisance control, shoreland development, lake encroachments, stream alterations, construction and operational stormwater management, wastewater discharges and activities in wetlands. Permits often require monitoring to ensure water quality is maintained after permit issuance.

The Watershed Management Division (WSMD) issued 1,452 permits in 2016. The increase in permitting levels over the past three years reflects an increase in construction activities, and new regulatory authority for shorelands, flood hazard areas, and river corridors.



The number of active permits rose to 4,412 in 2016; a slight increase from 2015. Active permits remain in effect beyond initial project construction or development and require ongoing compliance oversight and monitoring. The long-term nature of these permit requirements is designed to ensure water quality is maintained.

NEXT STEPS

The Vermont Clean Water Act (Act 64) provided additional regulatory authority which will phase in over the next few years. Activities over the next year will include:

- Implementing the newly adopted 2017 Vermont Stormwater Management Manual
- Developing a new stormwater management rule
- Developing and issuing new stormwater general permits
- Reissuing priority wastewater treatment facility permits
- Continuing to issue tactical basin plans to identify opportunities for protecting and improving Vermont’s surface waters

Environmental permitting processes represent a large portion of Division’s workload. Given the expected permit increases in the coming years, it is critical we find ways to streamline and increase efficiency in these processes, such as:

- Engaging stakeholders in the creation of new regulatory systems
- Utilizing Lean business processes and electronic tools to improve efficiency and permit processes
- Developing an on-line permit application and electronic reporting submittal system



Clean Water

MAINTAIN Surface Water Quality Through Technical Assistance and Review

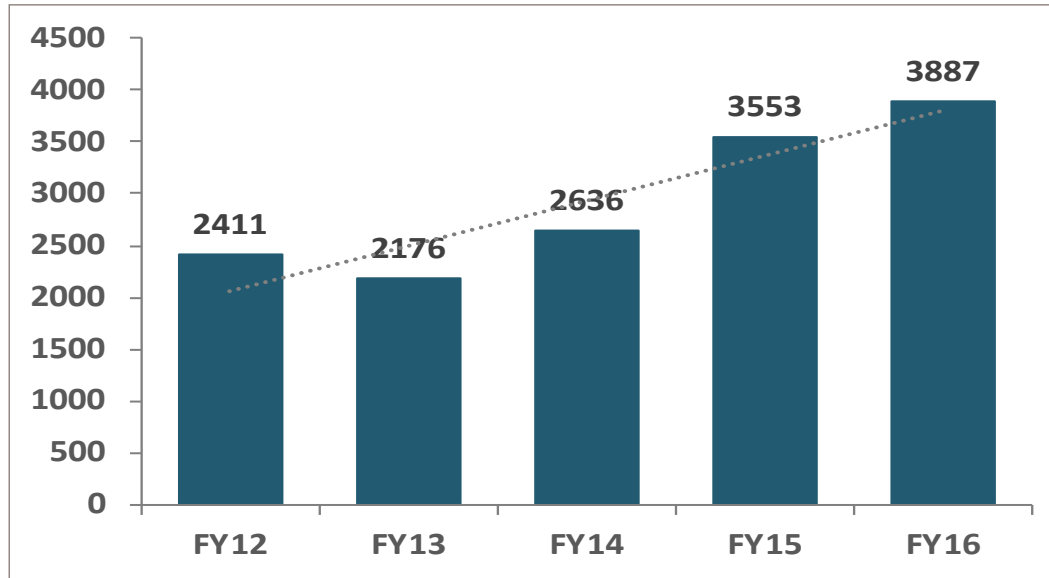
Mitigating impacts to surface waters through sound advice and scientific knowledge

PERFORMANCE TREND

3,800+
projects

reviewed to ensure maintenance of Vermont's water quality

Number of projects reviewed by year



NEXT STEPS

Technical review by experts in the environmental field is key to limiting stressors to Vermont surface waters (as described in Vermont's Surface Water Management Strategy). As stewards of Vermont's surface waters, WSMD staff members strive to have a strong, active, and meaningful presence across the Vermont landscape. As such, WSMD plans to increase the number of projects reviewed by staff over the next few years. Specifically, WSMD will:

- Continue high level involvement in project reviews
- Utilize Lean business process tools to improve efficiency and identify ways to better use limited technical resources
- Continue to support the increasing demand for project review and technical assistance
- Find new ways to support municipalities and partner organizations in project identification, development, and implementation

The data we have available currently on technical assistance and review are fairly limited. Given this, WSMD will also craft a data development plan that will set the stage for more robust reporting on this performance measure in the future.

DATA ANALYSIS

The Watershed Management Division (WSMD) regularly provides technical assistance to municipalities, landowners, developers, and partner organizations (lake and watershed associations) to ensure that water quality standards are met and ecological functions are maintained. This type of assistance can take many forms. In many cases, it is regulatory in nature, as the majority of projects coming in to WSMD do so through a defined permit process. In other cases, it is purely advisory or collaborative. For example, many WSMD staff support local partners in the design and implementation of watershed protection and restoration projects. All technical assistance provided serves a critical function in maintaining watershed health and flood resiliency.

In 2016, WSMD staff provided technical assistance on over 3,800 unique projects. This total includes jurisdictional determinations, review of permit applications and renewals,

municipal and partner support, bylaw reviews, illicit discharge detection and elimination efforts, and grant application review and management. Out of the over 3,800 projects reviewed; close to half of them were related to Vermont rivers, maintaining stream stability, connectivity, and floodplain function.

The graph above also shows a large number of projects reviewed in 2012; this is due to the additional technical assistance provided in the aftermath of Tropical Storm Irene. The continued rise from 2013 to 2015 is due to flood resiliency programs established through Act 138 to better manage river corridors, stream alterations and floodplain development. We expect our technical assistance and project reviews to continue to increase as we provide additional technical assistance related to the implementation of the Vermont Clean Water Act (Act 64).

DATA SOURCE: Watershed Management Division

PREPARED BY: Watershed Management Division; (802) 828-1535; <http://dec.vermont.gov/watershed>



Clean Water

PROTECT Surface Water Quality Through Easements and Designations

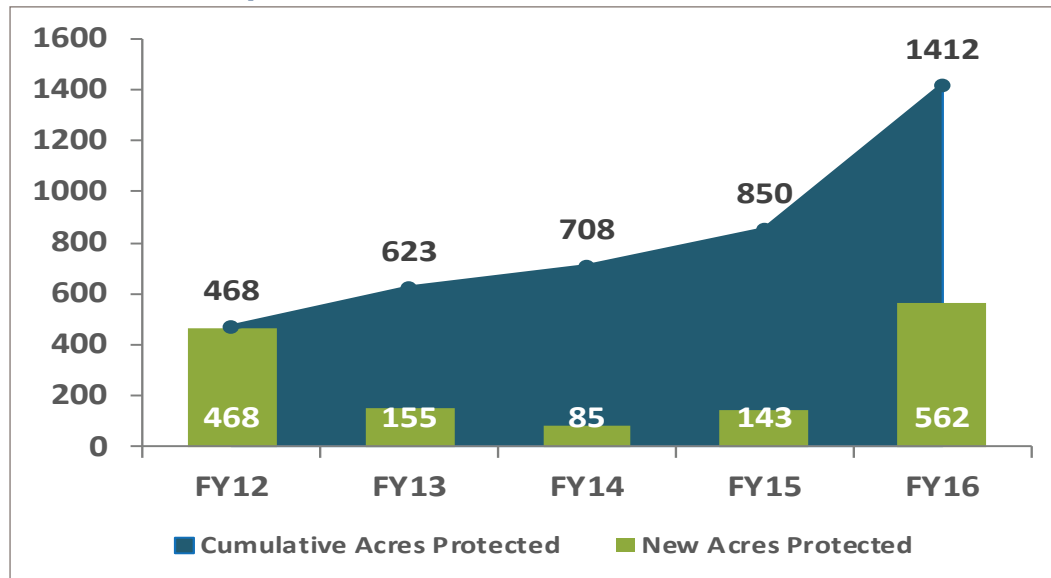
Using tools to protect water quality and increase flood resiliency

1,400+ acres

protected by easements and designations over the past 5 Years

PERFORMANCE TREND

Number of acres protected



NEXT STEPS

With an influx of funding for projects associated with the statewide Clean Water Fund, the WSMD expects to report a significant increase in the number of projects undertaken and number of acres protected in the coming years. Additionally, the WSMD is currently updating priorities to align our work with the newly revised Vermont Water Quality Standards. Strategies will include:

- Prioritizing work based on Tactical Basin Planning priorities
- Increasing the total number of projects implemented and acres protected
- Providing tools and technical assistance to municipalities and other partners
- Reviewing existing conservation prioritization methodologies
- Increasing the number of water reclassifications under the Vermont Water Quality Standards
- Designating Outstanding Resource Waters and Class I wetlands

DATA ANALYSIS

Our State’s natural aquatic ecosystems, and the functions and values they provide, are a finite resource. The Watershed Management Division (WSMD) has a primary responsibility in ensuring Vermont’s water resources remain intact for future generations.

While a variety of tools exist for safeguarding natural systems from deleterious change, designations and easements are among the most effective. These tools place restrictions on activities and are an excellent method for reducing flood hazards, protecting water quality, and restoring wetland and riparian habitats.

Protection efforts and tools include:

- River corridor easements and floodplain protection measures
- Parcel buyouts
- Reclassification of surface waters
- Outstanding Resource Water designations
- Class I Wetland designations

In the past 5 years, the WSMD has used these tools to directly protect 1,412 acres across Vermont. In 2016 alone, an additional 562 acres were preserved; 421 of which were through the Regional Conservation Partnership Program (RCPP) wetland incentive payment program. The WSMD provided additional incentive payments to farmers to enroll in the Natural Resource Conservation Service (NRCS) Wetland Reserve Easement program to restore and protect wetlands in perpetuity. These projects, and the acres protected, have added to our water quality protection efforts and helped to increase our State’s flood resilience.

The graph above also shows a large number of acres protected in 2012; this was a result of buyouts and municipal efforts in the aftermath of Tropical Storm Irene. These buyouts were a cost-effective way to ensure the protection and stability of Vermont’s rivers.

The WSMD used its new tracking system to track these performance measures in 2016, and will continue to track these performance measures in the future, especially as they relate to the accountability/reporting requirements of the Vermont Clean Water Act (Act 64) and the Lake Champlain clean-up plan.

DATA SOURCE: Watershed Management Division

PREPARED BY: Watershed Management Division; (802) 828-1535; <http://dec.vermont.gov/watershed>



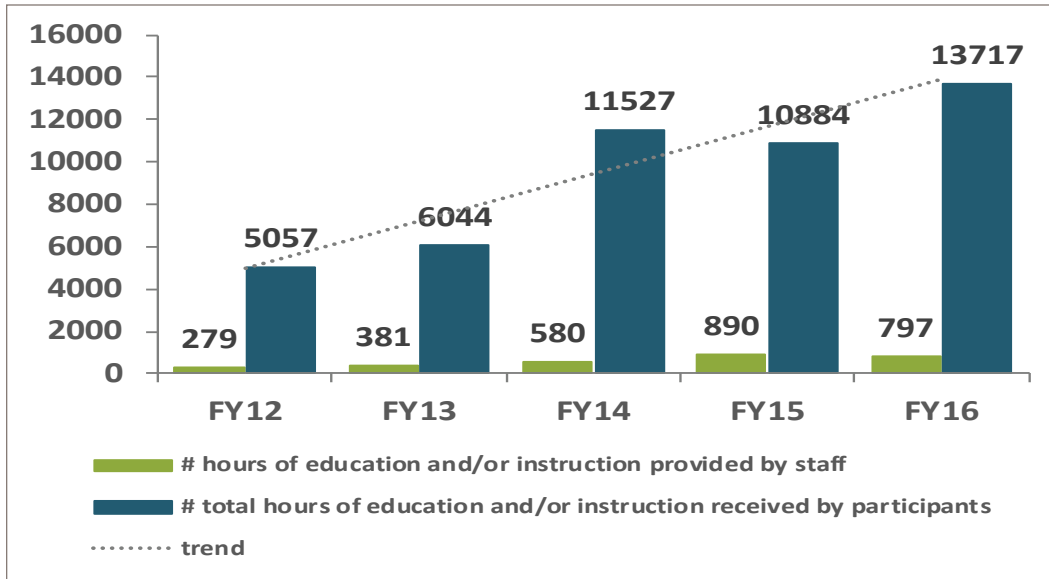
Clean Water

PROTECT Surface Water Quality Through Education and Training

Increasing environmental education and stewardship across Vermont

PERFORMANCE TREND

Hours of education and training delivered



DATA ANALYSIS

Strategies to protect Vermont’s water resources often include the procurement of easements or the designation of high quality waters. However, education, outreach, and training are also important tools to utilize in this effort. Often, only a small increase in environmental education can change individual behavior and engender environmental stewardship, especially when applied in a train-the-trainers model.

In 2016, the Watershed Management Division (WSMD) provided a total of 797 hours of education and instruction to Vermonters throughout the state. These education, outreach, and training opportunities included:

- Rivers and Roads trainings on smart road development and culvert design
- Natural Shoreland Erosion Control certification course
- Training on wetland habitats and functions
- Workshops to help prevent the spread of

aquatic invasive species

- Presentations on regulations and permit requirements to municipal officials (an example of training the trainers)
- Webinars and trainings to inform people about stormwater management alternatives and basin planning efforts
- Vermont Lake Wise workshops to Lake Wise leaders on lake-friendly development (another example of training the trainers)

In 2016, the total number of hours spent by staff in conducting outreach was slightly lower than in 2015, while the total number of hours of instruction received by participants increased substantially. This pattern is a result of concerted efforts over the past year to be more efficient in our delivery of outreach. Note that the data reported do not include technical assistance provided in terms of project review, which is reported as another measure.

797 hours

of education and/or instruction provided by staff

NEXT STEPS

WSMD believes strongly in the importance of education and instruction as a tool for environmental protection. We anticipate continuing to expand our outreach efforts through effective use of technology and expanded use of the train-the-trainers model, thereby maximizing the impact of staff time devoted to this work. During the coming year, WSMD proposes to:

- Carefully consider which events need to be delivered to small groups and which could be effective in larger formats, adjusting marketing and venues accordingly
- Continue to leverage technology to increase access to trainings by recording and uploading webinars and presentations for on-line viewing
- More effectively utilize partner distribution networks and partnerships, using a train-the-trainers model

WSMD launched an electronic reporting form to better track our education and training efforts as they relate to the Vermont Clean Water Act (Act 64) reporting requirements. These efforts are now more effectively tracked through this system allowing us better reporting on these efforts and fuller assessment of their impacts.



Clean Water

255

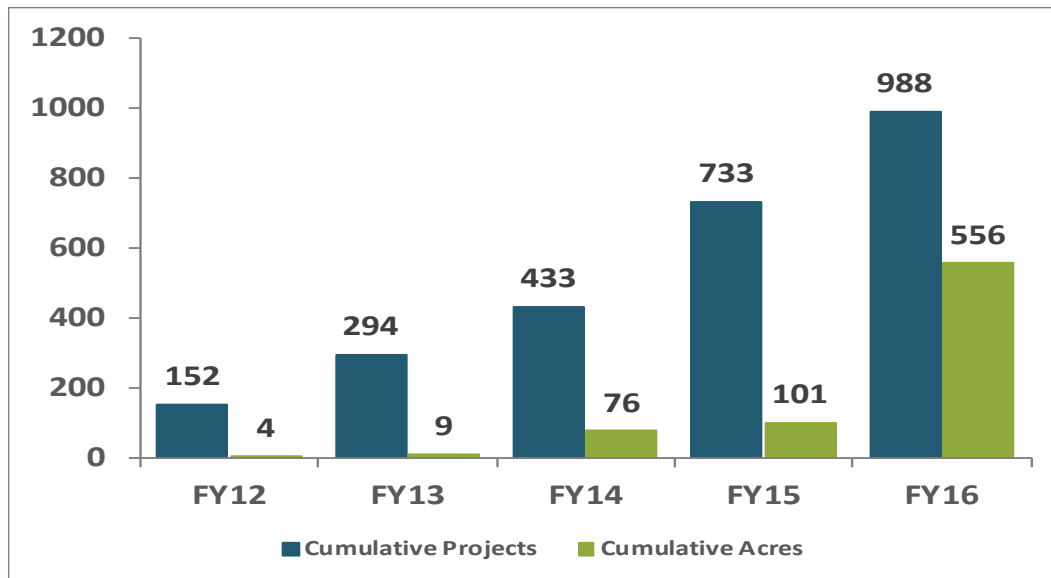
additional projects
improved the function of
455 additional acres in
2016

RESTORE Surface Water Quality Through Implementation of Priority Projects in Impaired Waters

Returning ecological and hydrologic function to impaired waters

PERFORMANCE TREND

Restoration projects undertaken and resulting acres improved



DATA ANALYSIS

Due to cumulative and legacy impacts of land uses on developed lands, roads, agricultural lands, and logging areas, some of Vermont's surface waters do not currently meet water quality standards. Restoring ecologic and hydrologic function to impaired waters is critical to support resilient and self-sustaining natural systems, and essential to achieving the water quality goals and objectives of Vermont's Surface Water Management Strategy.

The Watershed Management Division (WSMD) coordinates the implementation of priority projects to restore Vermont's impaired waters. This work includes: funding the installation of best management practices and restoration projects. This work may be driven through financial and technical assistance, permit requirements, or implementation of restoration plans.

In 2016, WSMD facilitated 255 projects aimed at restoring impaired waters. This large increase from previous years is due to increased funding available for grants and contracts through the Vermont Clean Water Fund and the Lake Champlain Regional Conservation Partnership Program (RCPP). Of the 255 restoration projects completed, 9 projects restored the ecological and hydrological function of 455 acres. Results of the remaining 246 projects are measured in units other than acres (e.g., miles or linear feet).

It should be noted that the 2012-2015 data is incomplete and likely underestimated. In 2016, WSMD used a new tracking system for State-funded projects. In future years, this measure will be expanded to include the projects with non-acre related results, especially as it relates to the accountability/reporting requirements of the Vermont Clean Water Act (Act 64) and the Lake Champlain clean-up plan.

NEXT STEPS

Technical assistance, financial and regulatory programs, and restoration plans are important tools used by the WSMD to drive implementation of priority projects to restore impaired waters throughout Vermont.

The WSMD relies heavily on Tactical Basin Plans, development and implementation of restoration plans, and increased permitting requirements for restoring water quality where it has been degraded. This approach will continue, and the WSMD plans to expand upon these efforts by:

- Increasing clean water funding for development and implementation of priority restoration projects
- Establishing long term revenue sources for the Vermont Clean Water Fund
- Increasing the WSMD's technical assistance efforts to partners
- Enhancing project prioritization methodologies to target cost effective actions
- Continuing to tighten priority project identification and funding

Clean Water

Finance Water Infrastructure Upgrades

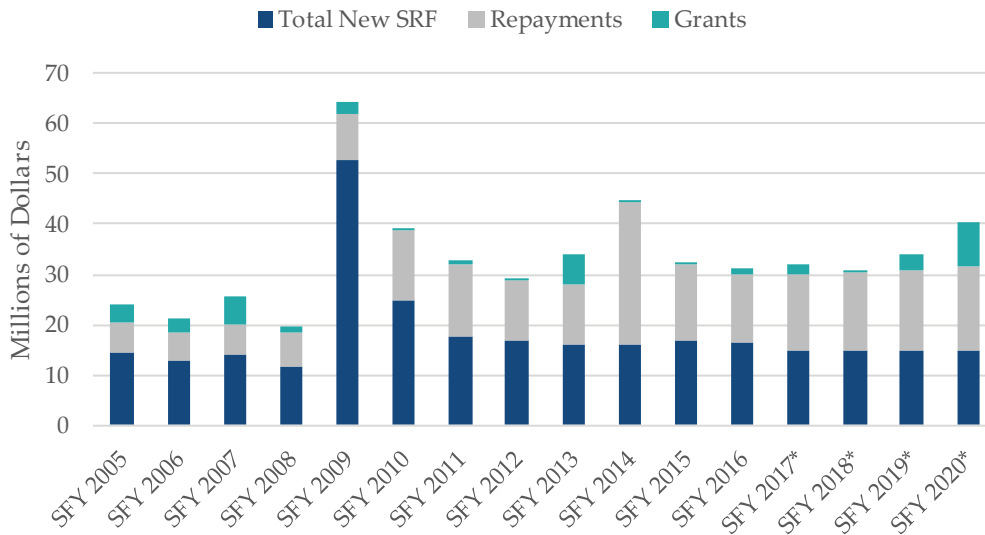
Providing low cost loans and grants to municipalities

\$86.6 million

current balance of available funds

PERFORMANCE TREND

Incoming water infrastructure loan and grant dollars



NEXT STEPS

1. Fully implement a new computer system to replace legacy systems in an effort to enhance financial management and allow for auto generating routine correspondence.
2. Fully implement checklists developed as part of the Lean process for construction inspection services provided by our program and conducting training sessions for consultants on the applicable CWSRF federal procurement requirements.
3. Revise the Municipal Pollution Control Priority System Rule and state grant eligibility requirements by December 2017 and pursuant to statutory changes in 2016 under Act 103, and implementation of the new point system for the FY19 priority list. The following are the primary reasons for revising the rule:
 - Expand eligibility of Clean Water State Revolving Fund loans and state grants for pollution control;
 - Revise the municipal pollution control priority point system; and,
 - Modernize the pollution control grant program to better align with today's water quality objectives.

DATA ANALYSIS

Grants available to municipalities for wastewater projects have generally decreased over time as other demands for state funds have been given higher priority. In the long term, loan funds available through Drinking Water and Clean Water State Revolving Funds (CW & DW SRFs) are forecasted to decrease if federal funds decrease while the long term need for these funds is projected to increase.

Historically, the priority list need is greater than available funds within the Clean Water State Revolving Fund. However, although the need has consistently outpaced available funding each year when the annual priority list is adopted, in the recent past many projects on those lists have not come to fruition or have turned to other funding sources due to various factors, resulting in a short-term build-up of SRF dollars. Some of those factors include low interest rates in the bond market and competing lenders, a difficult economy, and slow development of the Lake Champlain TMDL (TMDL). Uncertainty around the TMDL has delayed

implementation of major WWTF upgrade projects. We now anticipate a significant upswing in clean water projects due to the resolution of the TMDL in 2016 and with the passage of Vermont's Water Quality Act, increasing the priority and resources to clean up Lake Champlain and other Vermont waterways.

In addition to the CW & DW SRFs, a new onsite loan program was recently authorized and to date has provided funding to repair 16 failed residential wastewater systems and 2 failed water systems. The cumulative loan awards for the CW and DW SRFs are \$266.5M and \$199.3M, respectively, for a cumulative total of \$465.8M. Additionally, the two programs have administered \$74M in grants for a grand total infrastructure investment of \$539.8M since the loan programs came into existence.

DATA SOURCE: State records on funds available, annual requests for funding and forecasted trends.

PREPARED BY: Facilities Engineering Division; <http://www.anr.state.vt.us/dec/fed/fed.htm>

Indicator



Clean Air

Greenhouse gas emissions by Vermont

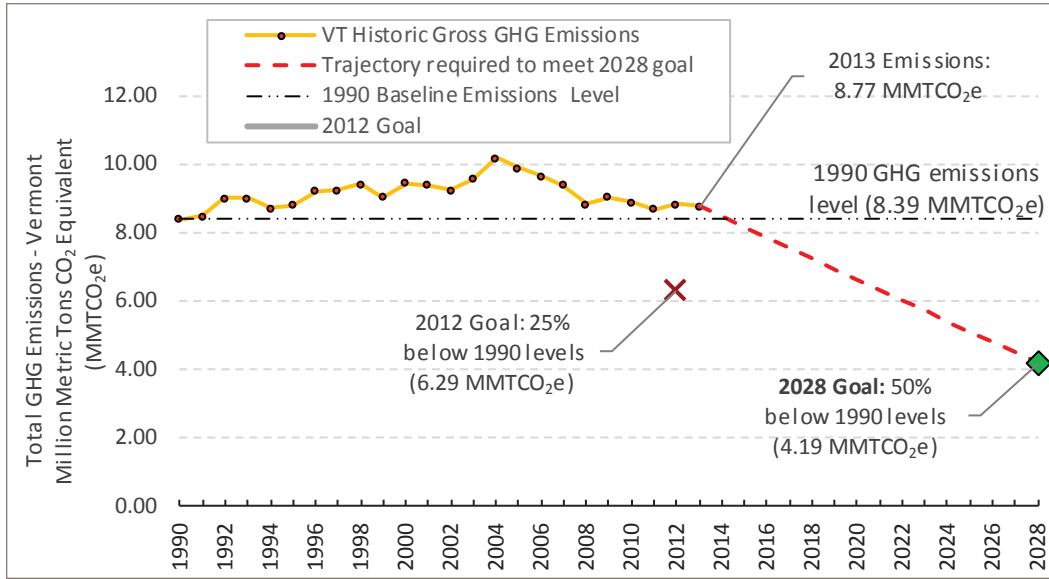
Quantifying tons of greenhouse gases emitted

14

metric tons GHGs emitted per capita in 2013

INDICATOR TREND

Vermont greenhouse gas emissions inventory, 1990-2013



NEXT STEPS

- Support lower vehicle emissions standards through the low and zero emission vehicle program (LEV and ZEV), and enhance public transportation.
- Improve building weatherization and heating efficiency improvements for the residential-commercial-industrial (RCI) sector;
- Push toward demand-side efficiencies and low carbon, appropriately-sited, renewable sources for the electricity sector.
- Continue to publish GHG emissions inventory updates on an annual basis to track progress and inform climate policy.
- Provide Vermonters with science and technical information on climate change through the State's climate change website: <http://climatechange.vermont.gov/>

DATA ANALYSIS

This indicator tracks Vermont's progress in meeting the state's greenhouse gas reduction goals. Overall GHG emissions in Vermont declined slightly between 2012 and 2013, mostly due to a drop in emissions associated with electricity generation/consumption, as well as a slight decline in emissions from the transportation sector. Emissions from most other sectors remained relatively constant, with a slight increase in the residential-commercial-industrial (RCI) sector due to heating demands during a cold winter.

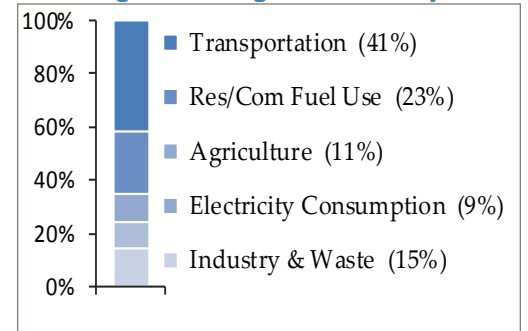
Vermont did not achieve the 2012 statutory goal (10 V.S.A. § 578) for GHG reductions. The next goal on the horizon is to attain 50% of 1990 levels by 2028. This will require substantial and immediate action. Strategies will need to be implemented in multiple sectors to attain emission reductions at levels that match or

exceed those achieved between 2004 and 2008, but must be sustained through 2028, which will require major and long term commitments.

In 2013 the average metric tons of GHG per capita was 14. To meet Vermont's reduction goals, this amount must decrease to 6.7 metric tons per capita

The Vermont Greenhouse Gas Emissions Inventory is released on an annual basis, with a delay of three years from the year that emissions are being calculated. This is due to the staggered availability of multiple data sources at state and federal levels, from which this report is compiled. The emissions inventory for 2014 will be available in late winter of 2017.

Vermont greenhouse gas emissions by sector



Indicator



Clean Air

Number of Days with Air Quality Alerts

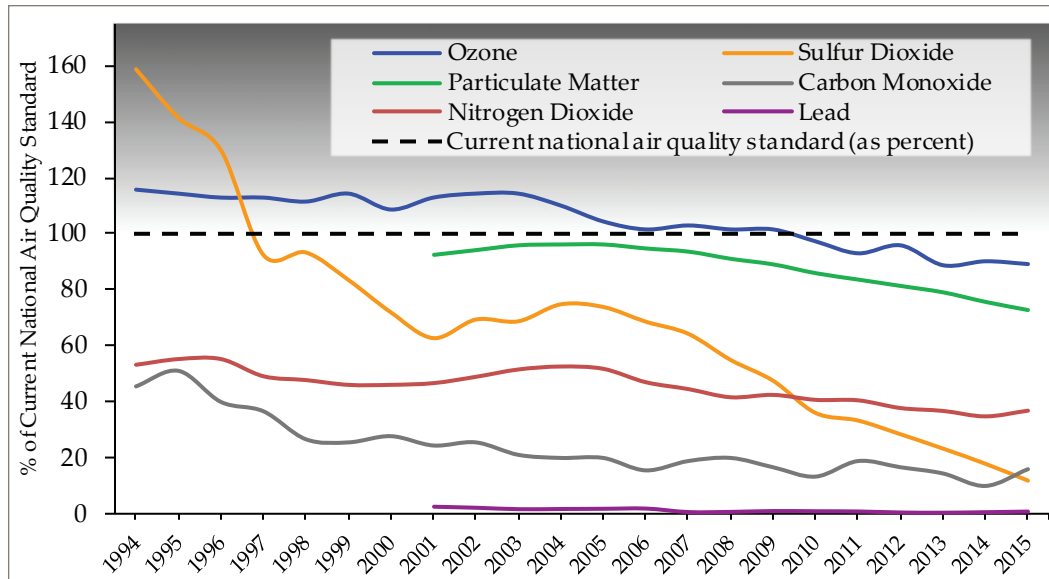
Monitoring Vermont's air pollutant concentrations

5

days with air quality concerns in 2016

PERFORMANCE TREND

Ambient air quality trends for Criteria Air Pollutants in Vermont



DATA ANALYSIS

Vermonters' health, welfare and environment are affected by exposures to many different pollutants present in our air that result from a combination of local and out-of-state sources. The US EPA sets and periodically revises National Ambient Air Quality Standards (NAAQS) for six of the most common air pollutants: ozone, particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, and lead.

Monitored concentrations of these common air pollutants in Vermont's ambient air provide an indication of the effectiveness of the integrated efforts of the entire Air Quality and Climate Division (AQCD) program to reduce air pollution emissions, in combination with parallel efforts from upwind states and national programs in the US and Canada.

Concentrations of the pollutants plotted above are based on the highest concentrations measured in Vermont, and are expressed as percentages of the current health standards, or NAAQS. All six pollutants have been declining over time, and are below the health standards (the dashed line). Although the standards are being met, there are times when elevated pollutant concentrations are unhealthy. The AQCD produces daily air quality forecasts and issues alerts to the public when pollution levels are expected to be unsafe.

Ozone and particulate matter are the pollutants that come closest to exceeding standards. In 2016, five air quality alerts were triggered due to short-term ozone levels exceeding the standard. Continued reductions of these pollutants will be needed to meet future, more stringent, standards.

NEXT STEPS

- Vermont's ground level ozone concentrations are heavily influenced by transport from upwind states, and active participation in regional organizations like the multi-state Ozone Transport Commission is essential to achieve future progress.
- Vermont's in-state contributions to ozone come primarily from mobile sources. These emissions will also need to be reduced to assure the health of future generations.
- Vermont's summer particulate matter pollution is heavily influenced by interstate transport, and will benefit from regional programs like EPA's Cross State Air Pollution Rule.
- Vermont's winter particulate levels are often dominated by local emissions, especially in mountain valley towns where reductions from local sources like wood stoves will be needed to meet more protective future standards.



Clean Air

Reduce Mobile Source Air Pollution

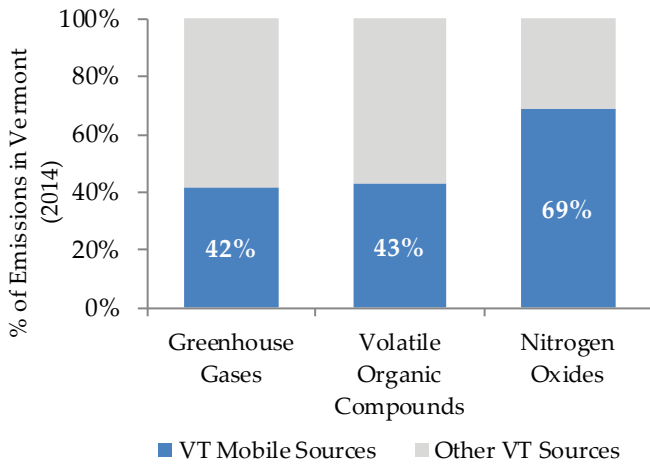
Promoting electric and other low emission vehicles in Vermont will reduce air pollution emissions

69%

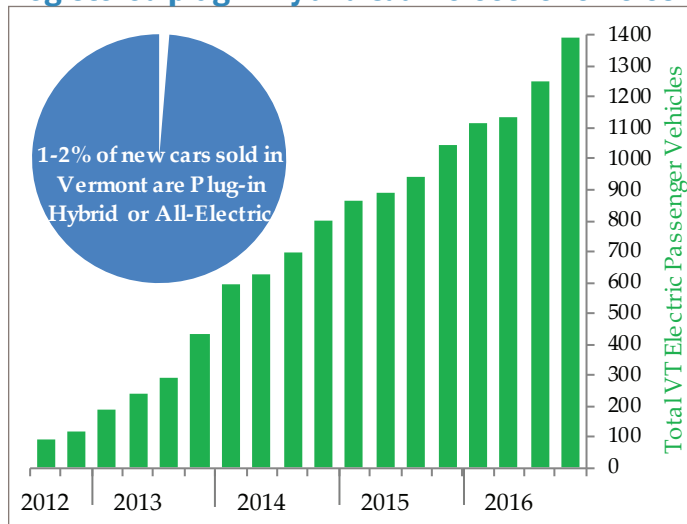
of NO_x emissions in Vermont are from mobile sources

PERFORMANCE TREND

Proportion of air pollutants from mobile sources



Registered plug-in hybrid & all-electric vehicles



DATA ANALYSIS

Mobile sources (i.e. vehicles, engines, and equipment) are the largest source of many air pollutants in Vermont, including greenhouse gases and the ozone-forming volatile organic compounds (VOCs) and nitrogen oxides (NO_x),

as well as hazardous air pollutants which contribute to human health impacts ranging from respiratory diseases to cancer.

Vehicle miles traveled (VMT) in Vermont are nearly twice as high as they were thirty years

ago. During that time, the number of cars and trucks registered in Vermont has increased by nearly 60%.

Cleaner conventional vehicles and alternatively fueled vehicles such as plug-in hybrid and all-electric vehicles are necessary to help offset potential increases in vehicle population and VMT.

While the continuous growth rate of new electric vehicles registered in Vermont is encouraging, these vehicles are still only a very small fraction of the total new vehicles registered. In order to improve air quality and meet our greenhouse gas emission reduction goals, alternative fueled vehicles will need to be a much larger fraction of total new vehicles registered in Vermont.

At the same time, efforts to reduce air pollution from conventional vehicles must continue. These include continued adoption of California vehicle emissions standards, inspection and maintenance of vehicle emission control systems, and enhancement of emissions control technology upgrade programs for diesel engines.

NEXT STEPS

- Implement Vermont’s Zero Emission Vehicle (ZEV) Action Plan which identifies actions to expand the ZEV market in Vermont, and continue to participate in Multi-State ZEV Action Plan.
- Adopt California vehicle emissions standards, including ZEV requirements.
- Enhance Vermont’s vehicle emissions inspection and maintenance program to maximize benefits from investments in emissions control technology.
- Reduce diesel emissions through technical support and funding for vehicle and equipment replacement, and installation of idling reduction technologies.
- Provide information and training to Vermont automotive technicians to ensure effective maintenance and repair of vehicle emission control systems.

DATA SOURCE: U.S. EPA 2014 National Emissions Inventory (NEI) Vermont Department of Motor Vehicles Motor Vehicle Registrations

PREPARED BY: Air Quality and Climate Division; (802) 828-1288



Clean Air

Promote the Reduction of Greenhouse Gas Emissions

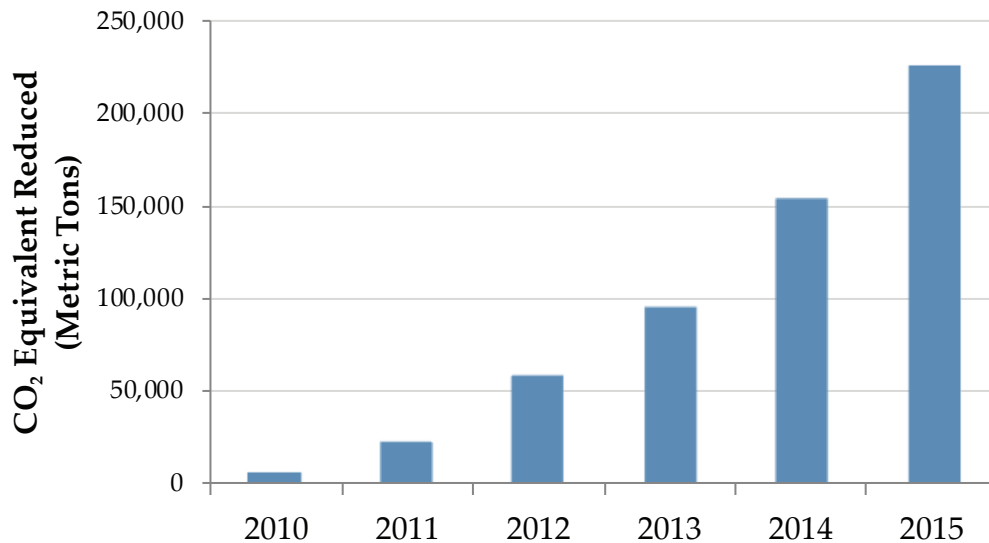
*Implementing environmental recognition programs
and assisting businesses and municipalities*

225,000

metric tons of
greenhouse gases
reduced

PERFORMANCE TREND

Cumulative greenhouse gases reduced via recognition programs



DATA ANALYSIS

The Vermont Green Business Program is a voluntary assistance and recognition program that is available to all Vermont businesses that wish to reduce environmental impacts and promote sustainability of their business operations. Vermont Green Business members implement best management practices to reduce waste, conserve water and energy, reduce toxic chemical use, and adopt environmental purchasing policies.

All program applicants are provided with an on-site visit by staff to help identify opportunities to reduce environmental impacts and become more environmentally sustainable. In the program there are sectors such as Green Hotels, Clean Marinas, Green Restaurants, Green Links, and Green Grocers. Recognition and publicity are provided to program members as well as ongoing technical assistance. The Program tracks and measures environmental outcomes from membership

applications and annual reports filed by members. There are 220 Green Business members.

The annual Vermont Governor's Awards for Environmental Excellence recognizes actions taken by businesses, not-for-profit organizations, institutions, public agencies and individuals to conserve and protect natural resources, prevent pollution, and promote environmental sustainability. Through applications received, environmental practices implemented are tracked and measured, and converted to metric tons of carbon dioxide emissions reduced, as well as other environmental outcome measures.

Since 2010, nearly 225,000 metric tons carbon dioxide emissions have been reduced through energy conservation, water conservation, waste reduction and environmentally preferable purchasing from 220 green businesses and 150 Governor's Awards applicants.

NEXT STEPS

Recognition and assistance programs prevent pollution and promote environmental sustainability in measurable ways. By publicizing these efforts, others become informed and are encouraged to take action to promote sustainability. The following strategies will be pursued for program improvement:

- Enhance publicity and marketing to increase the number of applicants to the Vermont Green Business Program and annual Vermont Governor's Awards for Environmental Excellence.
- Improve the Vermont Green Business Program web site, including improved application forms and assistance resources.
- Enhance electronic reporting and application forms for recognition programs
- Increase the number of annual applications to the Green Business Program by 100 % by 2018 and increase Program members to 250.
- Partner with various public and private organizations to enhance the visibility of these programs.



Clean Air

Reduce Public Exposure to Industrial Air Pollution

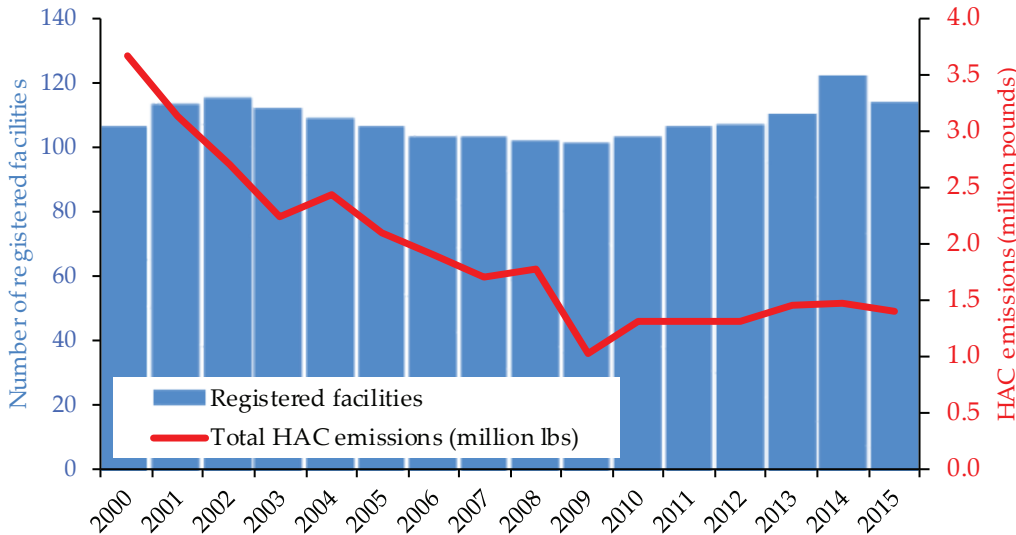
Regulating toxic air pollution emissions from stationary sources

62%

reduction in Hazardous Air Contaminant emissions since 2000

PERFORMANCE TREND

Hazardous Air Contaminant emissions and number of stationary sources



NEXT STEPS

- Continue permitting of new and modified sources to ensure they are as clean as possible.
- Continue permitting of existing sources to ensure emission reductions are achieved when reasonable and necessary.
- Continue inspections and compliance testing and outreach to ensure facilities operate properly and in compliance.
- Continue annual registration of facility actual emissions to identify emission sources and reduction opportunities.
- Expand outreach to source categories that cumulatively contribute significant emissions.

DATA ANALYSIS

The Air Quality and Climate Division (AQCD) regulates applicable stationary sources of air pollution through permits, inspections, regulations, and annual registration of actual emissions. These programs have helped reduce toxic Hazardous Air Contaminant (HAC) emissions (e.g. benzene, toxic metals, formaldehyde, and others) from these sources over time. These emissions have been reduced by 62 percent since the year 2000, even while the number of stationary sources registered has remained relatively constant. As HAC emissions are reduced at these sources, achieving further reductions to protect public health can become more difficult and require expanded efforts with smaller, or more difficult to control sources.

In 2016, the AQCD issued 35 permits for new or modified stationary sources, issued 12 operating permits for existing sources, issued 26 permits for open burning, conducted 68 inspections, reviewed 20 excess emission reports, oversaw 28 stack emission compliance tests, responded to 39 public complaints, and referred 3 cases for formal prosecution.

DATA SOURCE: AQCD Emissions Registration Program

PREPARED BY: Air Quality and Climate Division; (802) 828-1288

Indicator



Healthy and Safe Communities

Promote the Sustainable Management of Waste

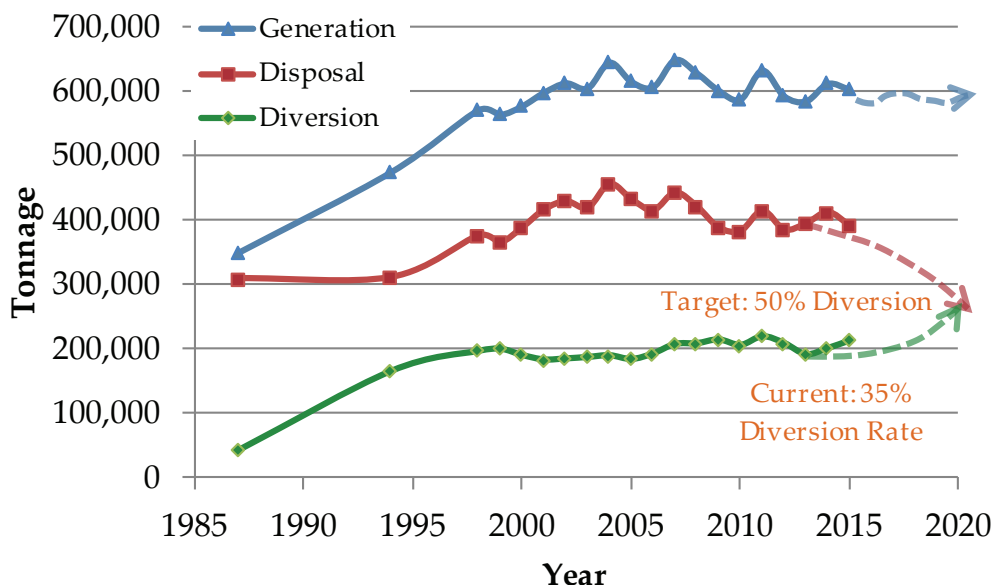
Increasing the statewide diversion rate of all solid waste generated by Vermonters

3.4 lbs

the amount of waste disposed of by an average Vermonter each day

PERFORMANCE TREND

Tons of solid waste generated, diverted and disposed of by Vermonters



NEXT STEPS

- Providing outreach and education to business and residents so that everyone knows how, where and what can be recycled and what the requirements and options are for organics management.
- Exploring funding opportunities to support implementation of organics management systems by partners.
- Supporting the parallel collection of organics at locations or by haulers that collect municipal solid waste.
- Implementing landfill ban on food scraps, which will take full effect in 2020.
- Encouraging the use of the Food Recovery Hierarchy by supporting source reduction, providing food to people and feeding animals.
- Implementation of updated Solid Waste Implementation Plans by regional solid waste management entities.
- Assessing landfill bans, particularly the recently implemented 2015 ban on recyclables and the 2016 ban on leaf and yard debris, and assuring compliance.

DATA ANALYSIS

Solid waste generation has increased steadily in Vermont, parallel to national trends. The disposal of these materials results in the loss of reusable and recyclable materials along with lost opportunities to save energy, conserve resources, reduce greenhouse gases, and create business opportunities.

In 2013 Vermont began implementing the Universal Recycling Law, an innovative and encompassing change to the State’s solid waste material management system. Largely focused on removing recyclables and organics from disposal, Universal Recycling aims to make diversion convenient and available for all residents. It is estimated that these efforts can result in a diversion rate of 50% by 2020, an ambitious, but feasible goal.

Diversion consists primarily of recycling and composting. Efforts in

2015 resulted in Vermonters diverting 35% of their waste away from landfill disposal, an increase of 2% over the 2014 diversion rate. Additional impacts of Universal Recycling have been seen by the Vermont Foodbank who has reported an approximate 40% increase in food donations in the last year. Information on 2016 diversion and disposal will be available following compilation in 2017.

Disposal decreased in 2015 by 5%. Typically, the rate of waste disposal follows trends in the economy. Achieving a decrease in disposal amidst the economic growth of the last several years is a significant achievement

Vermonters are throwing less away and recycling more while excess food is finding its way to hungry Vermonters, all signs of success.

DATA SOURCE: Solid Waste Management Program

PREPARED BY: Waste Management and Prevention Division; (802) 828-1138

Indicator



Healthy and Safe Communities

Support the Redevelopment of Vermont's Underdeveloped Properties

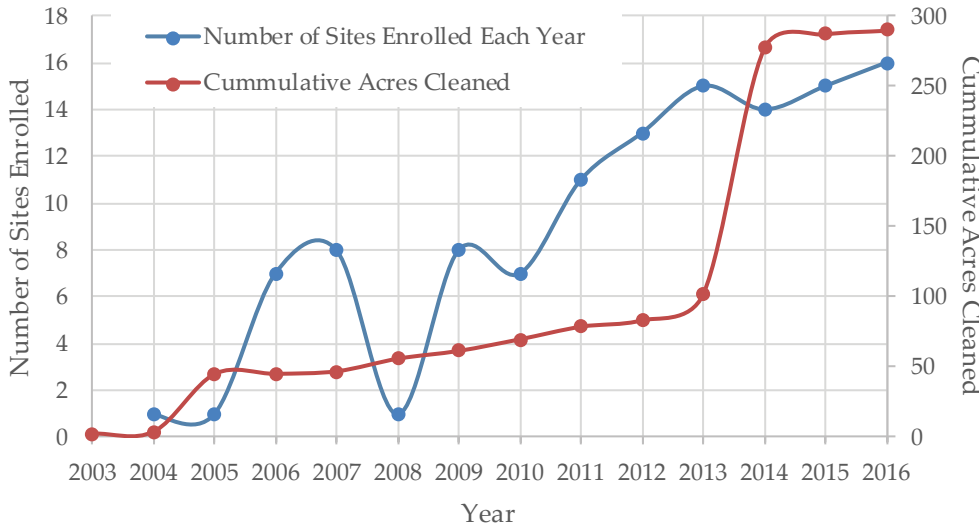
Safely clean-up and sustainably reuse brownfields

1,417

acres enrolled in the Brownfields Program

INDICATOR TREND

Brownfield enrollment numbers and acreage cleaned



NEXT STEPS

- Based on projected funding needs for current Brownfields and the historic grant awards from EPA, DEC anticipates a significant funding shortfall that will impede redevelopment. With increasing annual enrollment and declining federal funding, other funding mechanisms need to be evaluated.
- An informal analysis of potential future Brownfield sites and estimates for assessment and clean-up of these properties projects an annual need of \$19M.
- DEC does not believe it is the responsibility for tax payers of Vermont to fully fund this work. However, these legacy sites are currently a burden to Vermonters and the environment and the Brownfields Program is an investment in Vermont's future.

DATA ANALYSIS

The Brownfield Reuse Initiative provides developers interested in developing a brownfield site with the tools to complete a project in a safe, timely and cost effective manner. This is accomplished by providing technical assistance, financial assistance and legal limitations for environmental liability. This work is completed primarily through DEC, in collaboration with the Agency of Commerce and Community Development (ACCD) and regional planning commissions.

Brownfields in Vermont are defined as property on which expansion, redevelopment, or reuse may be complicated by the release or threatened release of a hazardous material. Brownfield redevelopment advance sound land-use practices promoting community and economic growth and removing impacts to the environment and public health. Brownfields are also consistent with other state goals, including

redevelopment of downtowns, providing affordable housing, cleaning up hazardous waste sites and the environment, increasing property values and tax revenue, and supporting municipal and non-profit organizations.

The Vermont Brownfields program is currently a very successful program, with 1,417 acres enrolled, but it is unsustainable with the current funding allocations. Each year DEC and ACCD apply to EPA for funds to support this work and the amount awarded is variable and unknown. DEC continues to see increased project enrollment in the Brownfields program while funding continues to decline. This funding is utilized to assist the investigation and cleanup of brownfields which allows developers and lenders to feel comfortable and understand the risks (financial and legal) they are assuming.

Indicator



Healthy and Safe Communities

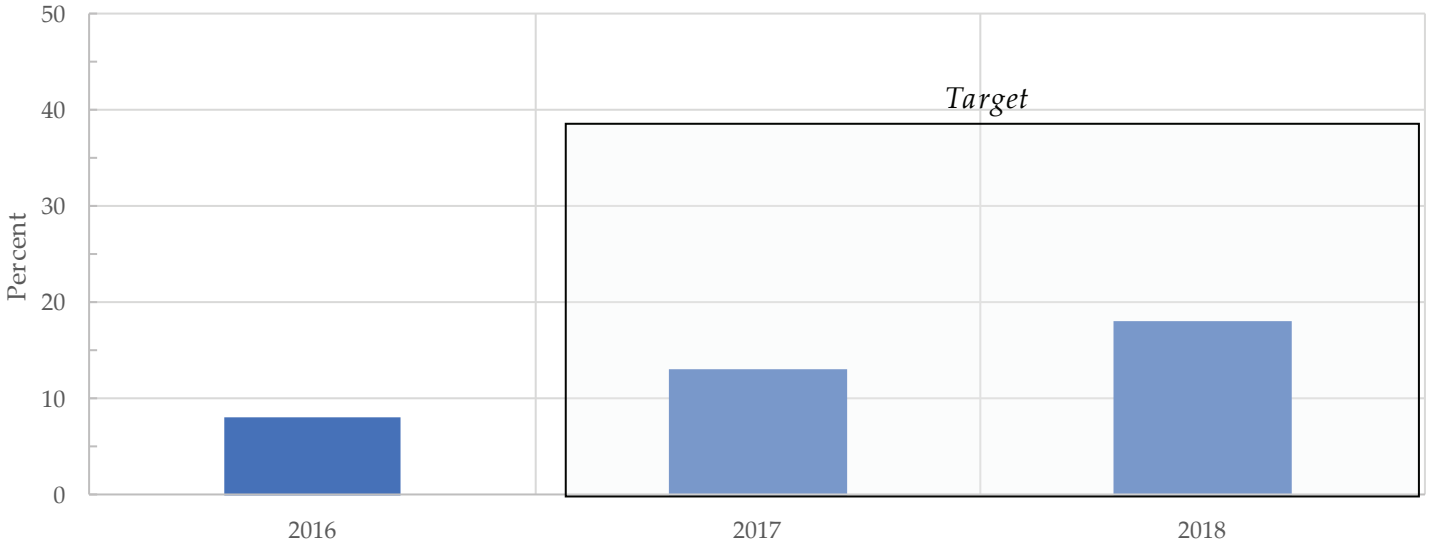
Ensure Sustainable Environmental Infrastructure

Helping public drinking water systems plan for the future

8%
of communities with asset management plans

INDICATOR TREND

Percent of public community water systems with asset management plans



DATA ANALYSIS

Money from utility reserves and public financing is not enough to address Vermont’s drinking water infrastructure needs. This financial shortfall is the greatest challenge for most public community water systems. The Drinking Water program developed a strategy to help systems meet this challenge, by encouraging systems to create and use an Asset Management Program.

An effective Asset Management Program uses detailed asset inventories, operation and maintenance tasks, life-cycle cost analyses, and long-range financial planning to build capacity and make systems more sustainable. It can help systems operate more efficiently, prolong asset life, plan and pay for future repairs and replacements, inform decisions, justify system needs, and make the best

use of limited resources.

In 2015 and 2016, several multi-day workshops were held around Vermont to instruct systems in the techniques of asset management planning. Of the 419 community water systems in the state, 35 participated in these initial efforts. It was recognized through this work that while systems can typically complete some portion of their asset management plans easily, support is needed, particularly for small water systems to complete the program. The Drinking Water program has been providing grants up to \$20,000 to public water systems to develop a complete Asset Management Plan. \$400,000 will be allocated in 2017.

NEXT STEPS

- A multi-day training workshop will be provided to community water systems across the state. These workshops help communities identify resources within their systems and assist in the preliminary development of community asset management plans.
- Grant awards, up to \$20,000, will continue to be provided to public water systems in 2017.

DATA SOURCE: Capacity Program

PREPARED BY: Drinking Water and Groundwater Protection Division; (800) 823-6500

Indicator



Healthy and Safe Communities

Percent of Dams Receiving an Upgrade in Condition

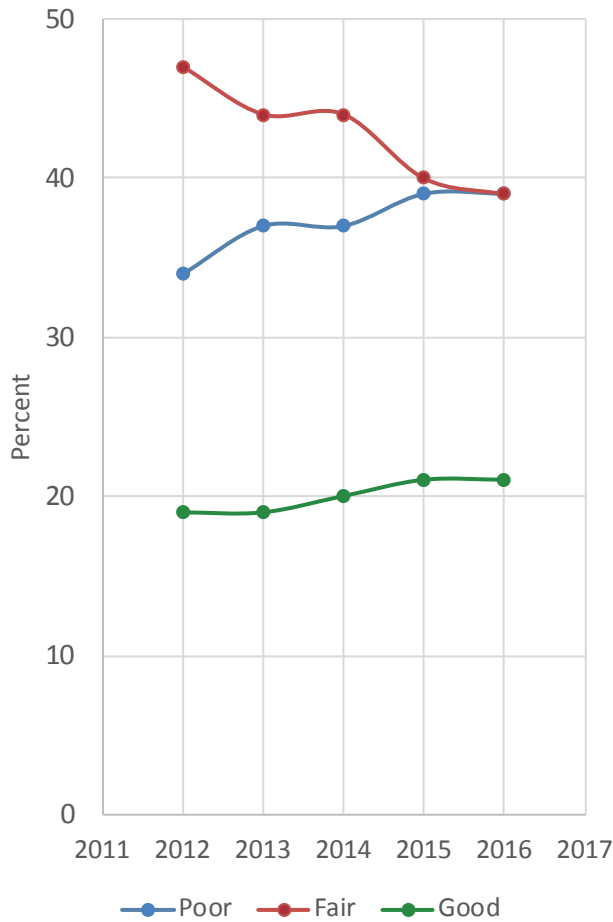
Taking actions necessary to reduce potential failure or threat from dams

7

dams received an upgraded condition ranking in 2016

INDICATOR TREND

Percent of dams in each condition class



remedied. On average, seven dams annually complete operation or management activities sufficient to receive an upgrade in condition upon re-inspection. Examples of activities that result in condition upgrades include physical repairs and maintenance improvements such as the removal of debris or brush.

The Agency may also find some dams to be unsafe and a menace to people or property above or below the dam. In these instances, the Program may administer the Unsafe Dam Revolving Fund which can provide funding to nonprofit, private or municipal dam owners for the reconstruction, repair, removal, breaching, draining, or other actions necessary to reduce the threat of a dam, or portion of a dam, determined to be unsafe.

NEXT STEPS

- Continue to educate dam owners through the inspection program. Communicating with dam owners will improve their understanding of the liabilities and responsibilities of dam ownership.
- Seek additional staff resources to increase the number of inspections. Increased inspection rates will improve communications to dam owners and increase the rate of dam reconstruction, repair and/or removal.

DATA ANALYSIS

The assignment of a hazard class is based upon the potential of damage or loss of life if a dam were to fail, but it is not related to the potential for failure. For this reason, the Dam Safety Program also assigns a condition to each dam under their jurisdiction.

Reported condition of a dam is based on field observations at the time of inspection and any other data available to the Dam Safety Program. Only through continued care and regular inspection is there any chance that unsafe conditions are detected and can be

There are currently 422 dams registered. More than a quarter of significant and low hazard dams are in poor condition.



Healthy and Safe Communities

365

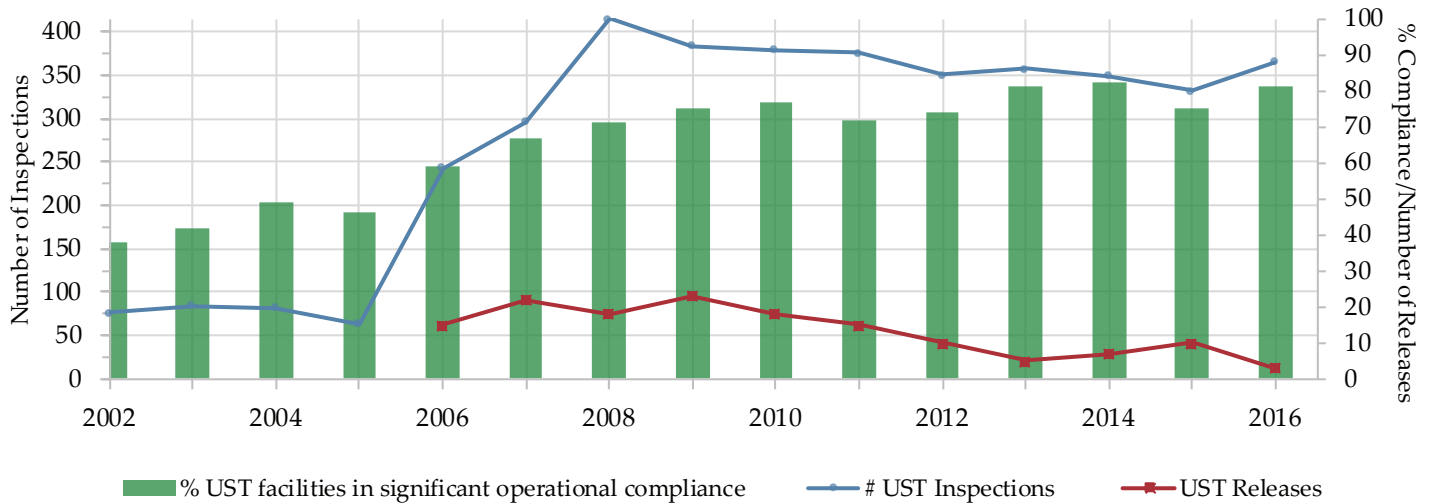
underground storage tank facilities were inspected in 2016

Minimize Exposure to Hazardous Materials

Ensuring proper management of hazardous materials to prevent releases and site contamination

PERFORMANCE TREND

Underground storage tank (UST) inspections reduce the number of new sites



DATA ANALYSIS

Many waste management activities aim to identify hazardous materials and dangerous practices. Once we have identified potential problems, we work with businesses to ensure that these materials are well managed, minimizing the likelihood that they will be leaked or spilled.

By encouraging appropriate property management and containment of hazardous materials, and ensuring compliance with appropriate regulations, we minimize the exposure and release of these materials before a property becomes contaminated. The direct impact is that there are fewer releases resulting in less contaminated sites listed each year.

An action that has contributed to fewer hazardous materials exposures and property contamination is the work of the Underground Storage Tank (UST) program. In 2005, this program streamlined their inspection process and dramatically increased the number of

annual inspections completed at underground petroleum storage tank facilities. This increased site presence has resulted in a nearly 30% increase in the number of facilities found to be in significant operational compliance with relevant management practices.

The UST program has also decreased the number of emergency spill responses which has directly resulted in a reduction in the number of underground storage tank facilities being listed as contaminated sites each year.

NEXT STEPS

- Enforcement of the Salvage Yard Rules, which require the registration and the development of best management practices of salvage yards.
- Enforcement of the Above Ground Storage Tank rules which will improve compliance with the best management practices for design, installation, and removal of potential contaminated sources.
- Completion of annual self-registration of compliance by small quantity generators of hazardous waste which will increase awareness of regulations and improve overall compliance rates.



Healthy and Safe Communities

20

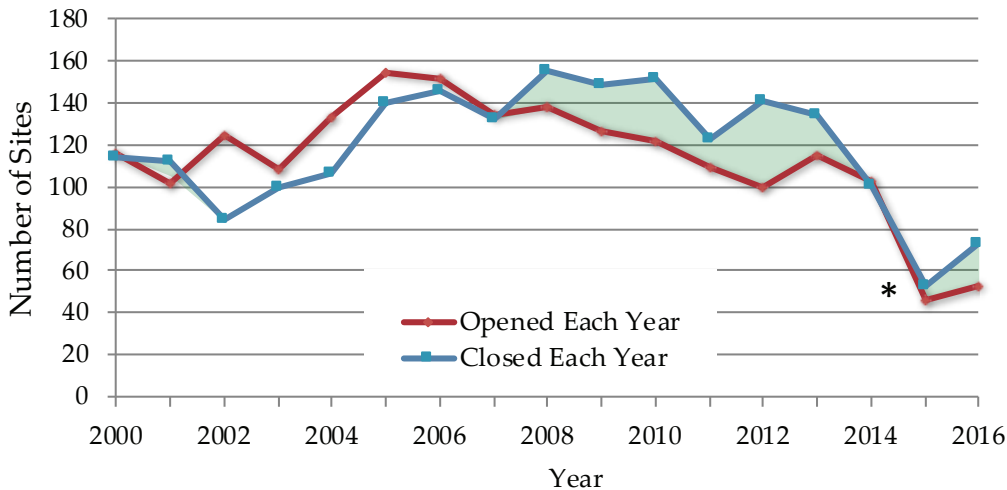
more sites were cleaned and removed from the Sites Section than were added in 2016

Transition Contaminated Sites Back to Productive and Beneficial Use

Facilitating efficient clean-up and closure processes for contaminated sites

PERFORMANCE TREND

Contaminated sites opened and closed (cleaned) each year



*Residential heating oil releases began being treated as spills in 2015

DATA ANALYSIS

Many factors contribute to successful remediation of contaminated sites, including the extent and type of contamination, financial capability of the property owner, and degree of impact on the environment or human health. The Sites Management Section (SMS) contributes to supporting successful clean-up of these properties by providing technical and financial assistance for site assessment and supporting the implementation of clean-up remedies. In all cases, the ultimate end goal is to be protective while returning the impacted property to a productive and beneficial use.

In 2016, the SMS rapidly responded to wide-spread contamination by per- and polyfluoroalkyl substances (PFAS), such as PFOA, throughout Bennington county. The contamination has been found at significant levels in drinking water within North Bennington and Bennington and within groundwater at various other locations across the state. This contamination has impacted nearly 300 private water supplies within North

Bennington/Bennington alone. The SMS has coordinated the response and testing of over 500 drinking water supplies, facilitated the installation of point of entry treatment systems, coordinated with potentially responsible parties and pursued long term solutions like water line extensions for the area. This wide-spread contamination will require active management and significant resources for many years to come.

Despite the significant time commitment that the PFAS response required, the SMS has continued to manage 1,300 active sites, added 53 new sites into the program, and successfully supported the remediation and closure of 73 sites; twenty more sites were closed in 2016 than 2015. The ability to remain a viable program despite the stresses on resources is due in part to process improvements that the SMS has adopted in recent years.

NEXT STEPS

Environmental Contingency Fund (ECF)

- The ongoing PFAS response has placed unexpected demands on the ECF. In combination with our contractual financial obligations at federal superfund sites and ongoing costs to cleanup Vermont's orphan sites such as dry cleaner sites, the balance of the ECF is projected to become negative within the next two years.
- DEC has investigated ways to sustain the ECF while still completing critical site work. In its annual report to legislature, DEC recommended use of state capital funds to cover superfund obligations and the collection of a sales tax on dry cleaning services.

Petroleum Cleanup Fund (PCF)

- In 2014 the PCF reimbursement process was evaluated. Major efficiencies and enhancements were implemented for both staff and stakeholders. Our final significant process improvement, online claim submissions, is currently undergoing final external stakeholder testing.



Healthy and Safe Communities

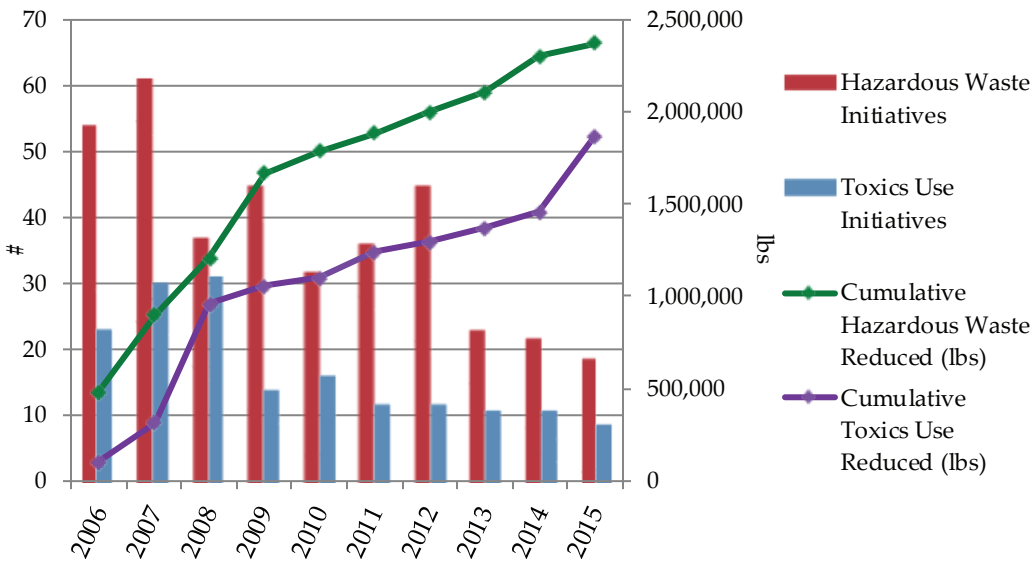
Reduce Hazardous Waste Generation and Use of Toxic Chemicals

Working with businesses to increase pollution prevention

PERFORMANCE TREND

2.3 million lbs of hazardous waste reduced & **1.8 million lbs** of toxics use reduced since 2006

Hazardous waste and toxics use reduced through Department initiatives



DATA ANALYSIS

Vermont’s largest users of toxic chemicals and generators of hazardous waste are required to develop three-year plans to identify opportunities for reducing those items in industrial processes. These facilities are required to then implement reduction practices that are identified as technically and economically feasible. Many Vermont facilities have been subject to planning requirements since 1994.

Initially there were nearly 200 facilities subject to planning; now there are about 65 facilities. Over the years, many facilities reduced their toxics use and hazardous waste below the thresholds required for planning. Nearly 100% of facilities are in compliance with planning requirements which include annual progress reports in addition to the three-year plan. In addition to reviewing plans for compliance, the Environmental Assistance Office provides technical assistance in identifying and

implementing reduction measures. Facilities are visited on-site at least once during the three-year planning cycle where staff review progress in planning, assist in identifying new reduction opportunities, and provide assistance when requested in evaluating technical and economic feasibility of these opportunities.

Reduction strategies may include employee training to prevent waste of materials, equipment upgrades, and chemical substitution of less toxic and hazardous materials in manufacturing processes. Often, by implementing reduction strategies, Vermont businesses are saving money, reducing liability and reducing worker exposure to toxic and hazardous materials.

NEXT STEPS

Information sharing and technical assistance are important to sustaining toxics use and hazardous waste reduction over time. The Environmental Assistance Office will be focusing on the following strategies:

- Enhance web site resources on toxics use and hazardous waste reduction methodologies.
- Develop technical workshops and webinars for businesses.
- Focus on assisting facilities that are new to the planning process.
- Develop and publicize case studies of successful toxics use and hazardous waste reduction efforts that are transferable to other businesses.

The Environmental Assistance Office will also focus on the following strategies to enhance the effectiveness of the planning requirements:

- Develop electronic reporting systems for all reporting requirements.
- Continue to identify facilities that are subject to the requirements but not filing plans as required by law.
- Evaluate alternative sustainability planning for facilities that have exhausted all opportunities.



Healthy and Safe Communities

Meet Environmental Standards for Potable Water and Waste Water Projects

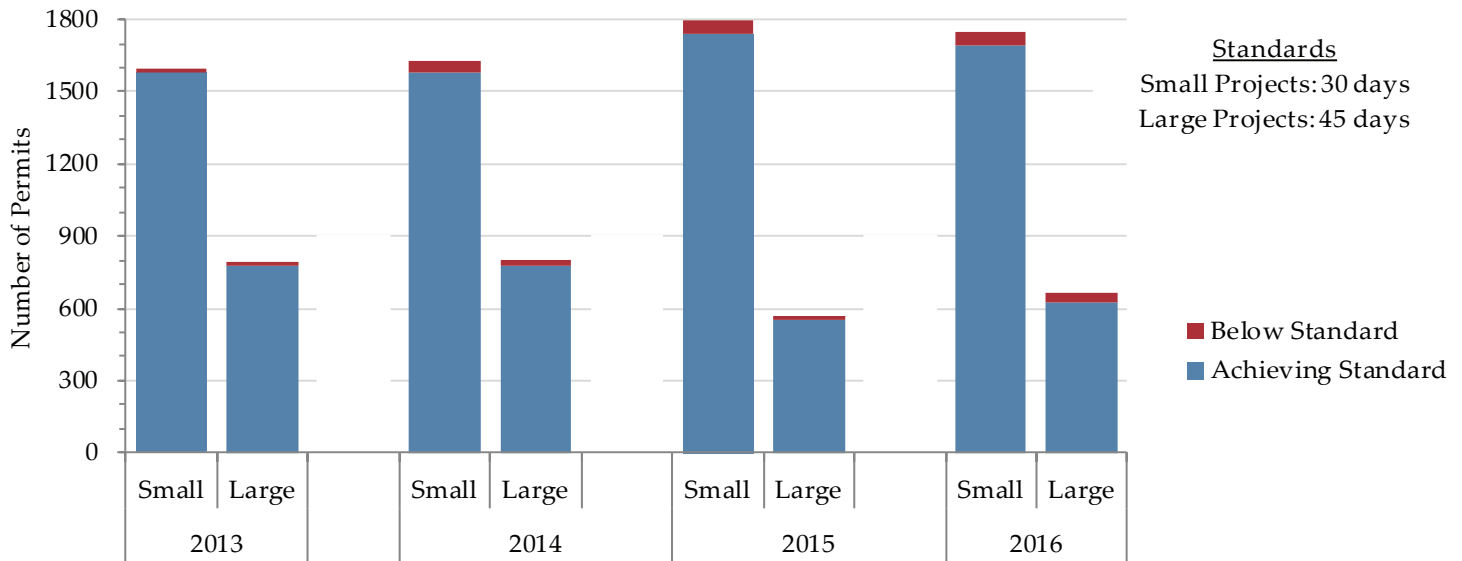
Issuing permits in a timely manner

95%

permits are issued within time standards; averaging 15 days in house

PERFORMANCE TREND

Water and wastewater permits achieving time limits



DATA ANALYSIS

Timely permitting supports local economic development, both on an individual homeowner level up to large commercial and community developments.

The Regional Office Water/Wastewater Program has processed approximately 2,400 permits every year for the last four years. Permits are separated into two classes, small projects (<500 gallons per day flows), typically residential, and large projects (≥500 gallons per day flows). Staff aim to achieve an in-house review time of 30 days for small systems and 45 days for large systems.

The Regional Office Program recently went through significant reductions in staff. During FY16 nine staff were reassigned and removed from the Regional Office Program. Despite these staff reductions, a new wastewater tracking system was developed and deployed in April 2016. As part of this system, permit applicants are required to submit all

applications electronically and applicants have the ability to track their permit through the review process.

The Regional Office Program processed 2,353 applications during FY16, with 95% of the applications processed within the standard review time. Review times varied during the year as staff adjusted to increased workload that included completing projects left by those who were reassigned to other duties. The average number of in-house review days was approximately 15, typically three days to log-in projects and 12 days to complete the technical review. Overall, the percent of applications meeting standard review time decreased from 97 % to 95 % this year and the average review days increased from 11 days to 15 days this year.

NEXT STEPS

- Hold a Lean process improvement event to review the newly implemented online application submittal process and discuss approaches for continuous improvement.
- Complete the tracking database to enable compliance tracking.
- Train designers and internal staff on the new database and applications.



Healthy and Safe Communities

Ensure Dam Safety to Protect the Public and Environment

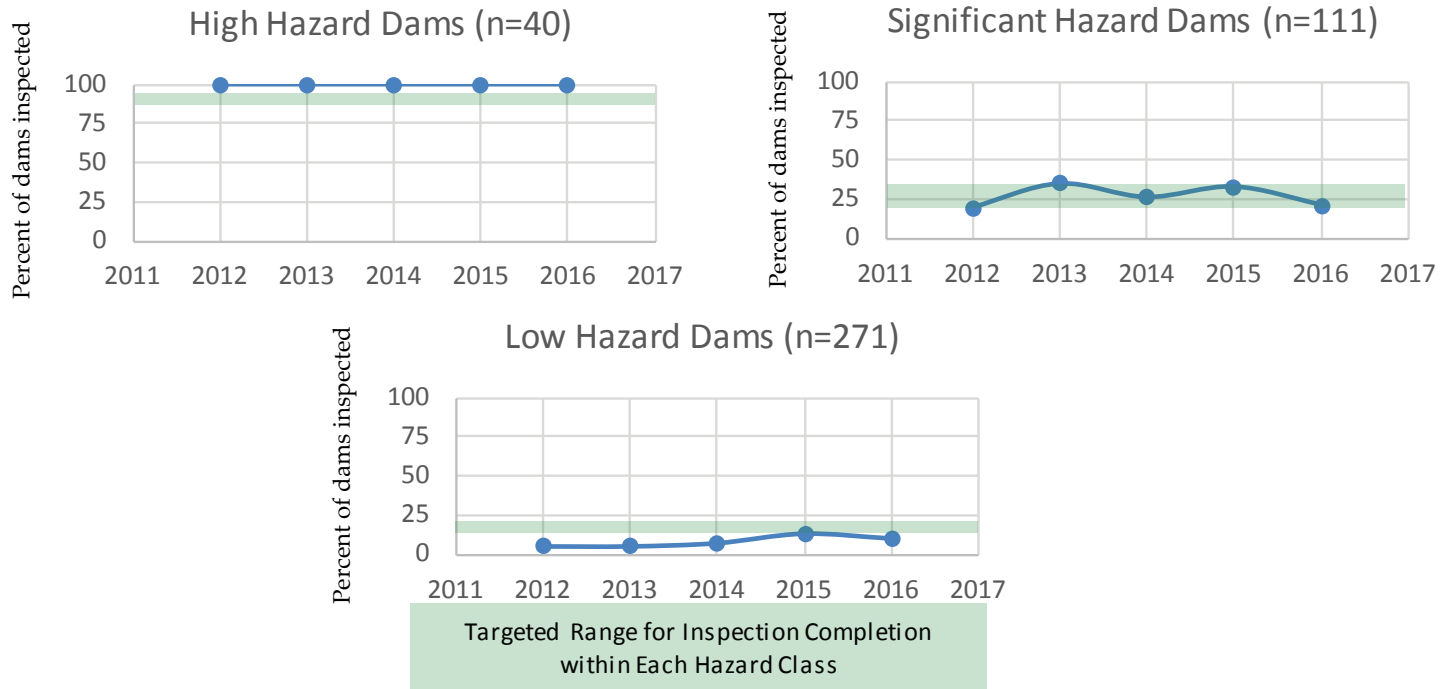
Through inspections, permits and informing dam owners

70%

of dams receive timely inspections

PERFORMANCE TREND

Percentage of dams inspected in each hazard class



DATA ANALYSIS

Dams that impound more than 500,000 cubic feet of water, sediment or other liquid are regulated by the Dam Safety Program and are known as jurisdictional dams. These 422 dams are all subject to periodic inspections by the Program, with the frequency of those inspections being determined by the applicable hazard class, with more hazardous dams being inspected more frequently.

The assignment of a hazard class is based upon the potential of damage or loss of life if the dam were to fail, but is not related to the condition of the dam, or the potential for failure.

A dam's classification may change, based on reassessment of downstream conditions (new houses or construction) or breach analysis. Vermont utilizes three tiers of hazard: high (extensive economic impact, loss of life is more than a few); significant (notable economic impact, loss of life is few); and low (minimal economic impact, no loss of life).

Annually, the program inspects all high hazard dams and targets inspection completion on 20%-33% of significant hazard dams (a 3-5 year inspection cycle) and 10%-20% of low hazard dams (a 5-10 year inspection cycle). The program generally meets the target inspections for significant hazard dams, but less for the low hazard dams due to staff resource restrictions.

Almost half of the low hazard dams have not been inspected in the last decade, which means they have also not been recently evaluated for any potential change in condition.

NEXT STEPS

- Continue to pursue transfer of the ownership of three flood control dams to the Army Corps of Engineers. This will free some staff resources to increase inspection rates.
- Seek additional staff resources to increase the number of annual inspections. The goal would be to increase the number to 130 inspections completed annually.



Healthy and Safe Communities

Protect Public Health Through Aquifer Characterization

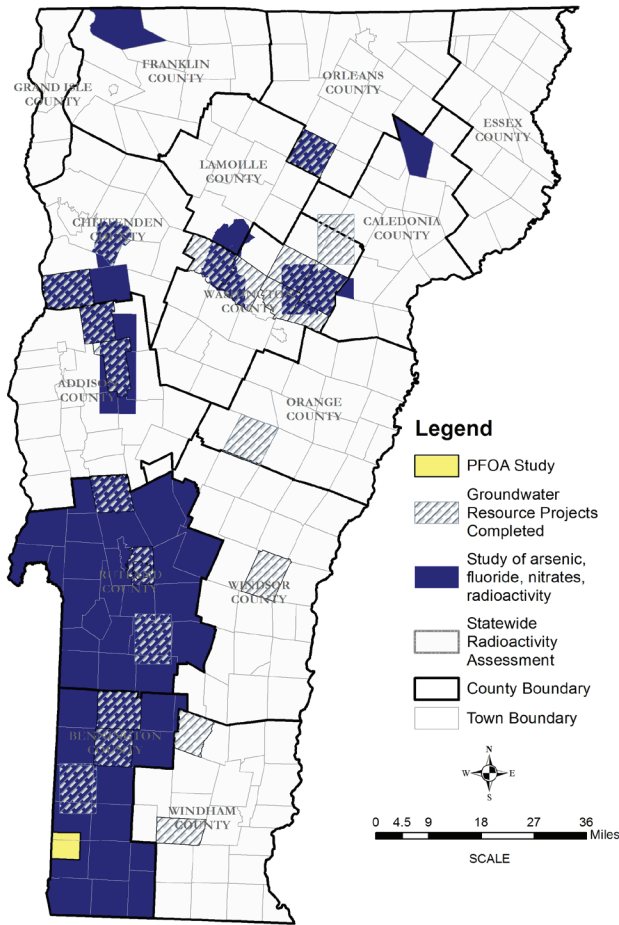
Providing Essential Geoscience for Vermont Communities

20

town groundwater projects completed

PERFORMANCE TREND

Regions benefitting from geologic solutions



glacial deposits, characterize the aquifer and understand the groundwater system. By continuing to research issues like this, the VGS can provide reliable advice to assist in reducing Vermonters' exposure to chemical and mineralogical contaminants.

In addition to addressing contaminants of immediate concern, data is also regularly collected and compiled to build datasets in support of planning for groundwater drinking supplies and protection. Data from drilled water wells, geologic maps and anthropogenic information is used to develop aquifer favorability maps for counties and to identify priority areas for more detailed groundwater resource mapping. Additionally, groundwater chemistry from naturally occurring sources (ex. arsenic, radioactivity) can be directly associated with regional bedrock geology and unconsolidated sedimentary deposits.

In 2016, workshops were held to learn about regional priorities for groundwater resource evaluations. Projects for further development were identified through these meetings for the towns of Monkton, Calais and Cabot. VGS provides ongoing support to communities and state agencies through conducting sampling and research to determine sources of groundwater contaminants. Examples include a recent study of nitrates in groundwater; and addition of projected water use maps to the ANR Atlas (mapping site).

NEXT STEPS

- Prioritize projects and document the extent of naturally occurring and human induced contamination through well water sampling, data analyses, monitoring and field studies.
- Collaborate with partners, to increase public awareness of geologic influences on groundwater to reduce exposure of Vermonters to these known hazards.
- Build statewide databases for groundwater and produce GIS maps as a planning tool for at risk public water supplies.
- Maintain funding for mapping programs and their application to groundwater resources.

DATA ANALYSIS

In 2016, the Vermont Geological Survey (VGS) investigated per- and polyfluoroalkyl substance (PFAS) contamination of groundwater. This aquifer characterization included building a three-dimensional and temporal understanding of the bedrock and surficial aquifers by mapping, geophysical testing, and water analyses. This work to protect human health and the environment will continue in 2017.

As seen in the map above, groundwater resource projects have been conducted across the State. By collecting data and interpreting the geochemistry from drinking water wells, and determining the influence of the local bedrock, the VGS and our university partners can inform the public about the potential risks and how to minimize potential exposure. An intense effort by VGS staff partners is on-going in the Bennington area to map bedrock and



Healthy and Safe Communities

Identify Vulnerability to Geologic Hazards

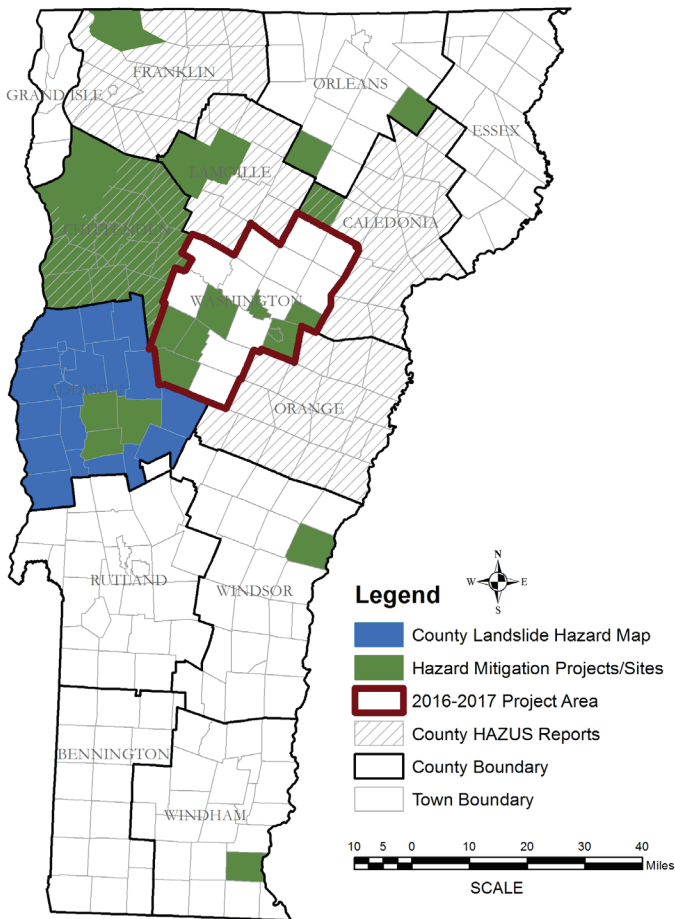
Geologic assessments of landslide, erosion, drought and seismic hazards

1

county landslide hazard map completed in 2016

PERFORMANCE TREND

Hazard mitigation sites and completed assessment projects



Commissions, Vermont Emergency Management, and towns to implement the landslide hazard mapping protocol. The map shows areas where studies have been conducted, including local landslide sites and regional seismic hazard analyses.

As a geologic responder to landslides, assessments are made on the likelihood of continued slope failure and risk to Vermonters. Sites of concern are often identified while mapping bedrock and glacial deposits; they are also identified through community reports and targeted hazard assessments. LIDAR and GIS are significant tools that allow us to accelerate landslide hazard mapping at a planning level. In 2015 the Geological Survey began a program to provide planning-level landslide hazard maps for Vermont counties. In 2016, landslide hazard susceptibility maps were prepared for all towns in Addison County and for the Town of Highgate; a map for Washington County is in progress. The maps help Vermont prepare for safer growth and development, develop mitigation and hazard avoidance strategies, avoid economic loss, and be prepared to respond to events.

NEXT STEPS

- In partnership with the Central Vermont Regional Planning Commission and Norwich University, assess the hazard and produce a landslide hazard susceptibility map for Washington County.
- Respond to and monitor landslide and rockfall events.
- Conduct surficial geologic mapping and identify areas prone to erosion and landslides.
- Conduct regional groundwater studies for drought resiliency and response.
- Continue coordination with Vermont Emergency Management, the Northeast States Emergency Consortium (NESEC), Regional Planning Commissions and universities to create hazard mitigation information.

DATA ANALYSIS

The Vermont Geological Survey collects and interprets data about landslides, earthquakes, flood and drought in order to inform mitigation efforts and preparedness for these low frequency, high impact events. The Division provides reliable, science-based information regarding frequency, magnitude, extent, and consequences of physical

hazards, and when possible, hazard avoidance strategies. By identifying regions sensitive to physical hazards and utilizing a scientific assessment to characterize the risks, the Division provides a tool to protect Vermonters in vulnerable areas and guide land use planning.

The Division works with Regional Planning

Efficient and Effective Government

Improve Business Practices to Gain Efficiencies

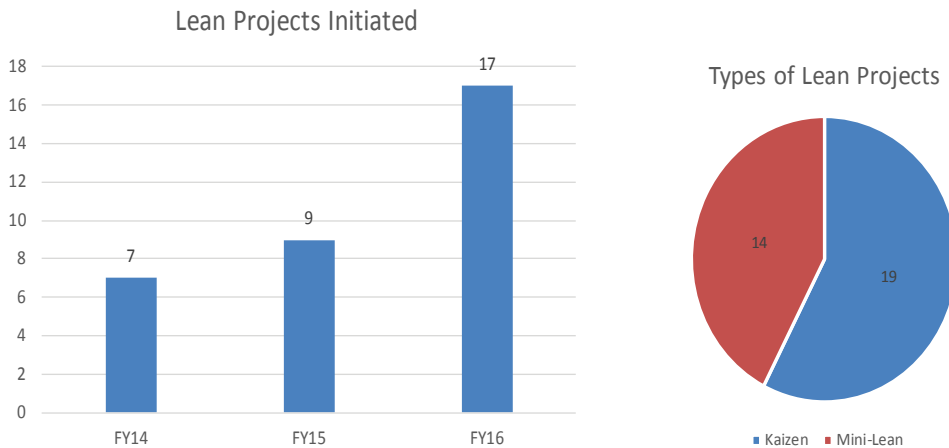
Developing a culture of continuous improvement through Lean

33

Lean projects initiated since 2013

PERFORMANCE TREND

Number and type of Lean projects initiated



DATA ANALYSIS

The Vermont Department of Environmental Conservation (DEC) adopted Lean in 2013 in an effort to better serve the Vermont public through more efficient, timely and transparent processes. Lean is a term used to describe a management philosophy and set of practices developed by Toyota that helps organizations improve the speed, transparency and quality of processes while minimizing cost and protecting the environment.

In 2016, the Department broadened its use of the Lean methodology by undertaking a series of targeted, narrowly scoped, shorter duration improvement projects, usually referred to as “mini-Leans.” At least ten of these projects were initiated, touching upon process such as grants and contracts, encroachment and shoreland permitting, records requests, and water quality monitoring. The projects above were in addition to our typical array of 3-5 day “kaizen” events, of which there were seven. In total, 33 Lean projects have been initiated over

the past three years.

In terms of participation, at least 95 DEC staff and 88 other state employees or outside stakeholders, participated in Lean activities this fiscal year. Over the past three years, those numbers total 177 (representing almost 60% of the Department) and 116 respectively.

Our Lean efforts have resulted in a number of tangible improvements, including but not limited to:

- A consolidation of public noticing processes from 85 to 5.
- A return of over \$3,000,000 to the State Revolving Loan Fund.
- The transfer of two licensing programs to the Office of Professional Regulation.
- A very successful first year for our ECO AmeriCorps program allowed us to expand the program by 20% in year two.

NEXT STEPS

- Expand training opportunities for staff and managers.
- Increase the diversity and number of Lean events occurring across the Department.
- Work collaboratively with VTrans, AHS and AOA on developing a statewide model.
- Leverage Lean resources and expertise from surrounding New England states.
- Roll out the FY17 - FY19 three year implementation plan.
- Help spread Lean to other state agencies by continuing to share our trainings, soliciting participation in our internal Lean events, holding cross-agency events.



Efficient and Effective Government

Improve Staff Performance Evaluations

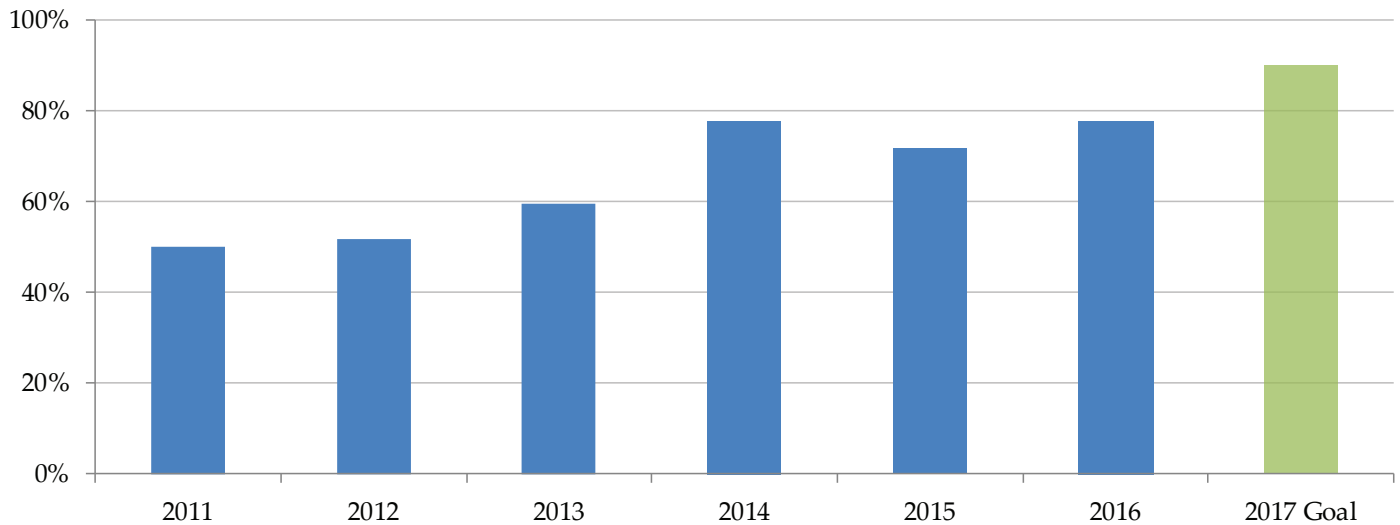
Completing evaluations on time and enhancing supervisor and staff communication

78%

of all performance evaluations were completed in 2016

PERFORMANCE TREND

Percent of staff performance evaluations completed



DATA ANALYSIS

Approximately 25% of Department of Environmental Conservation (DEC) staff are responsible for supervising other employees. Over the past several years, DEC has launched efforts to improve staff morale and job satisfaction. This includes increased communication between upper management and mid-level management, regular supervisor meetings, and an improved performance evaluation process. In addition, all supervisors meet three times a year to discuss policy, operations and staff engagement and morale.

In November 2013, DEC began using a new process for performance evaluations, which includes regular quarterly performance meetings between employees and supervisors, a pre-evaluation survey completed by the employee and a thorough evaluation that clearly states what type of activities the employee can do to improve.

The number of performance evaluations completed in 2016 has increased slightly from the previous year. DEC is experiencing a significant number of retirements and staff turnover, and new staff filling supervisory positions are receiving training on the performance evaluation system.

The performance evaluation process has identified areas where management can support staff in being more successful in their positions and/or advancing their careers in state government. One major change management implemented is an increased focus on employee development by establishing training budgets, where funds are allocated in each division’s specifically to assist with formal staff training. Another item currently in the works is a “career ladder” system for technical staff. There have been ongoing discussions with management and staff on how to make career ladders accessible to employees at every level.

NEXT STEPS

- Continue tri-annual meetings for all DEC supervisors
- Provide ongoing training on the performance evaluation system
- Seek feedback and continue to improve performance evaluation process
- Evaluate the Agency’s career ladders for technical staff



Efficient and Effective Government

Support the Implementation and Use of Online Permitting

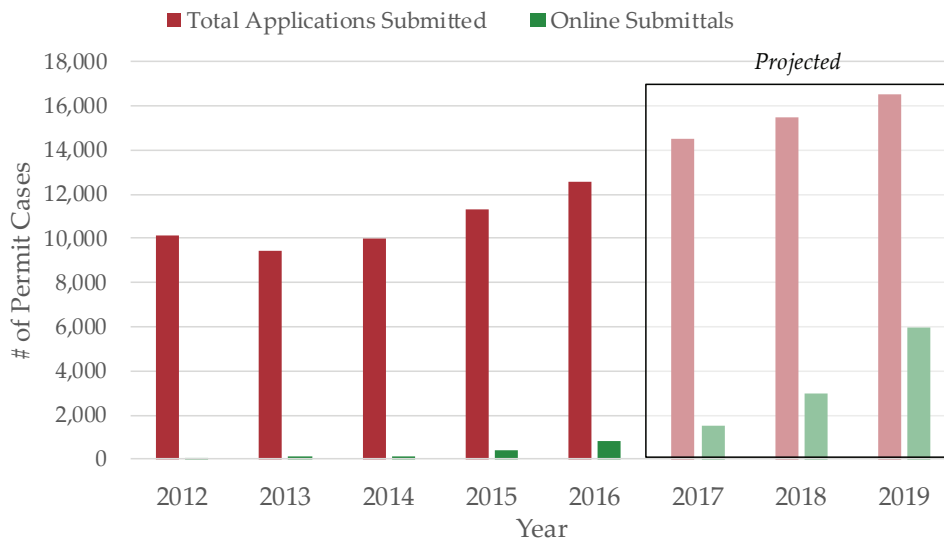
Increasing use of technology for a web-based submittal system

7%

of permit applications submitted online

PERFORMANCE TREND

ANR Online electronic application submittal



NEXT STEPS

- Grow capacity for a web based permit application, data submittal system, and payment process.
- Train program staff to create on-line forms.
- Prioritize submittals needing ANR Information Technology services to provide functionality connecting to program databases.
- Leverage technology by electronically tracking the status of submittal and notifying applicant of status.
- Build capacity by reducing the need for data entry and satisfy customer request for online submission and payment.
- Work to eliminate paper processes to simplify information requests.

DATA ANALYSIS

Programs in Air, Water, Waste and Facilities have numerous permitting programs which include construction, treatment, discharge, operations, certifications, registrations, and licensing. These programs necessitate technical assistance and regulatory oversight to ensure compliance with state and federal law. In State fiscal year 2016, approximately 12,600 permitting cases were received, 93% of which were received in paper format.

In 2016 we continued to rollout our electronic submittal system known as ANR Online and more than doubled the number of applications received electronically. The number continues to grow as solid waste management compost facility applications, hazardous site petroleum cleanup applications, drinking water state revolving funds applications, annual dam safety applications, and applications for Wastewater Systems and Potable Water Supplies come online.

Since Act 150 was passed into law in early 2016, the department has been working diligently creating the Environmental Notice Bulletin Version 2 which will publicize all notices and documents related to permits being processed. One feature that will be available is an email subscription service the public, consultants, etc., may subscribe to, enabling them to receive all public notice updates for applicable activities or permits. Stakeholder input has been extremely positive. We remain on track to deliver a preliminary working version by February 2017 with full department implementation by January of 2018 as required under Act 150.



Efficient and Effective Government

Provide Permit Assistance

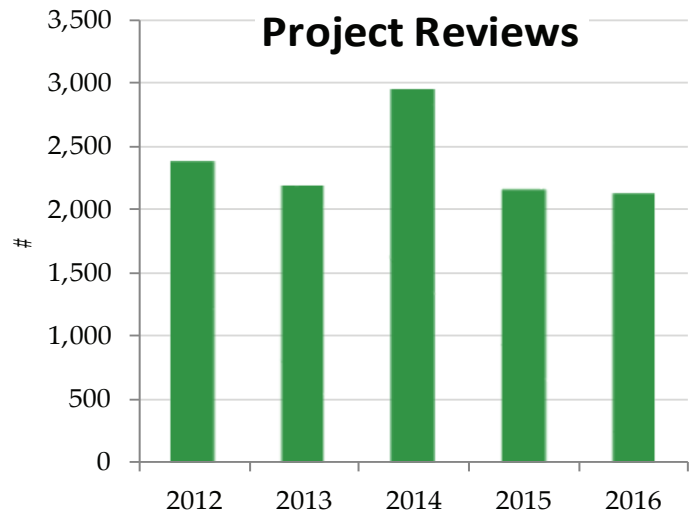
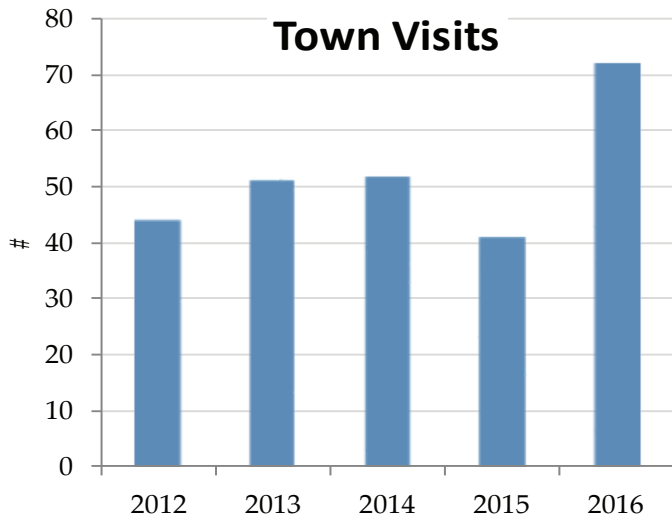
Assisting the public in identifying needed environmental and state permits

2,130

Project reviews in 2016

PERFORMANCE TREND

Number of town visits and project reviews



DATA ANALYSIS

Permit Specialists in the five ANR regional offices (Barre, Essex, Rutland, St. Johnsbury, and Springfield) assist permit applicants or their consultants in identifying environmental and other state permits that may be required for a development project. This is often accomplished by completing a Project Review Sheet that identifies potential permits, provides contact information, and a fact sheet description of the relevant permit programs.

In addition to project reviews, the Permit Specialists respond to general questions from the public about the state permitting process, answer questions about general permit requirements or policies and direct public inquiries to the appropriate state agencies. Permit Specialists also assist municipal officials, such as zoning administrators, in understanding the state permitting process so that local project applicants are aware requirements. They represent the Department

at a variety of public events to explain its regulatory authorities and provide general information on other state agency programs.

Although the number of project reviews can be affected by the strength of the economy, there is a general upward trend in numbers. Assistance visits to town offices has increased beyond the 20% of towns annually visited to provide permit information and assistance. The Permit Handbook, which contains fact sheets and contact information on most state permits, and the Do You Need a Permit? brochure are widely disseminated by hard copy or via the web and are frequently in need of update due to changes in permit programs and program contacts.

NEXT STEPS

To enhance Permit Assistance functions provided in the ANR Regional Offices, the following strategies will be implemented:

- Update the the Permit Handbook, as needed, in 2017.
- Enhance Permit Assistance web pages and resources.
- Increase the number of municipal site visits by 25% in 2017.
- Increase outreach and public presentations to business groups and consultants about the Permit Assistance Program.



Efficient and Effective Government

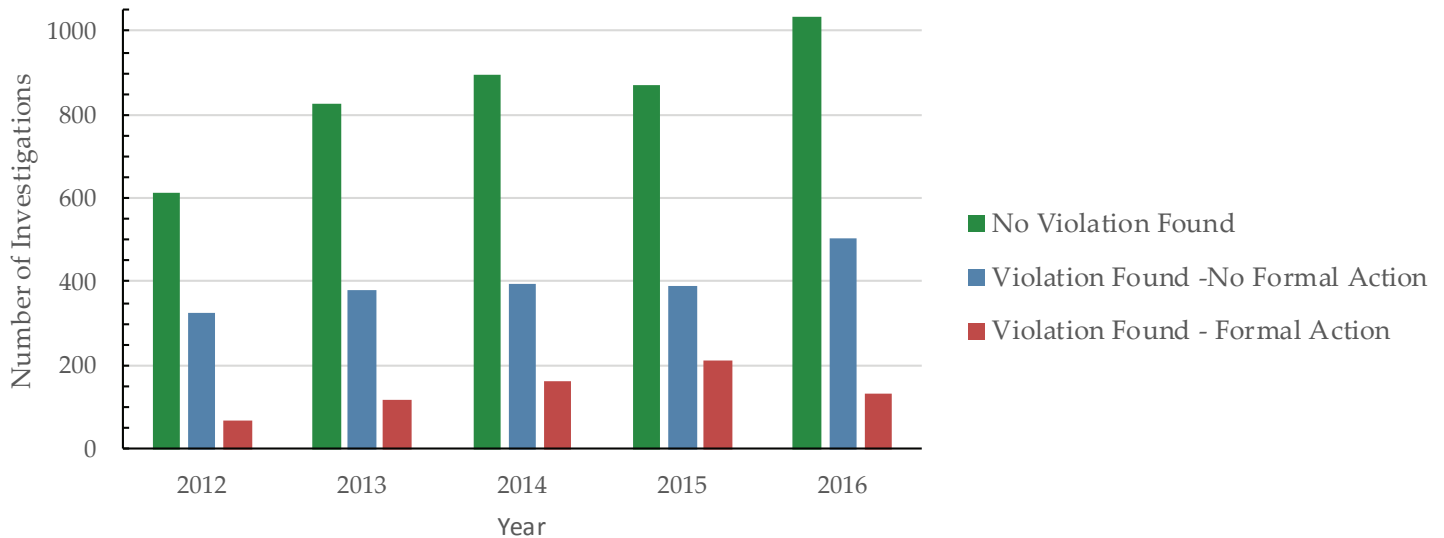
Improving Response to Citizen Complaints

By training more program staff to efficiently manage investigations

1,627
alleged violations
investigated in 2016

PERFORMANCE TREND

Number of violations and the number of formal actions taken in response



DATA ANALYSIS

As part of the State’s delegation of authority to run federal environmental programs, the Department of Environmental Conservation (DEC) is required to respond to citizen complaints and reports of environmental infractions in a timely manner. These citizen complaints and reports often lead to the discovery of violations, at which point formal actions by Environmental Enforcement Officers (EEOs) may be pursued.

Over the last five years the total number of complaints received by the Environmental Enforcement Office has been fairly steady. However, over the same time, the number of complaints closed has increased.

In March 2015, the Environmental Enforcement Office hired an additional EEO, who achieved fully trained status in early 2016. This led to over 100 more

complaints being closed by EEOs in 2016.

Improvements have been seen in investigations conducted by the programs (i.e. non-EEO DEC staff) which could be attributed to ongoing trainings offered by the Environmental Enforcement Office on enforcement basics and case development.

A formal environmental enforcement referral review committee (ERRC) was created in late 2015 to streamline the referral process and to facilitate the training of staff in other DEC programs. This has resulted in a doubling of program case referrals.

NEXT STEPS

- Continue and expand trainings offered to non-EEO DEC staff members.
- Support program referrals in the Enforcement Referral Review Committee (ERRC) to increase the number and quality of formal actions.
- Strategically prioritize cases by impact to human health and the environment.