



Vermont Environmental Indicators and Performance Trends Report

Presented in Support of the Fiscal Year 2022 Proposed Budget

January 2021

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

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 the performance of our programs and processes through the application of two continuous improvement frameworks: Results Based Accountability (RBA) and Lean. The former provides a mechanism for measuring and monitoring the success of our programs while the latter provides a means for improving the effectiveness and efficiency of our processes. Both are now widely used in the administration and management of the Department, which has resulted in the inclusion of performance measures in grants and contracts, the streamlining of various Department regulatory programs, and the incorporation of RBA into our strategic planning and FY20 budget development. In alignment with Act 186, the following report provides information on a number of Results Based Accountability indicators and performance measures for which the Department and its programs are responsible. Information about the Department's recent Lean efforts can be found [here](#).

DEVELOPMENT OF THIS DOCUMENT

The information contained in this document was pulled together by an internal "Performance Management" team with members representing a diverse cross-section of the Department's programs. Members of the Performance Management Team work with technical staff and managers in their respective divisions to gather the data and develop content for the informational sheets which highlight some measurable results delivered by the Department. In support of the FY22 budget proposal, all performance measures in this document and associated text have been updated with recent data, trends and program activities.

NEXT STEPS

The measures presented in this document are the highest level measures and indicators we currently track as a Department and include state-wide Population Based Indicators that are annually reported to the Vermont General Assembly. Each page includes next steps which outline what actions we will undertake to maintain current trends or "turn the curve" and change the direction of an undesired trend to move towards our goals and targeted outcomes.

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:

Our Water

Surface water and groundwater resource management, drinking water program

Our Air

Air quality, pollution emissions, climate change, greenhouse gas reduction programs

Our Land

Waste management

Our Communities

Financial resources, environmental assistance and risk assessment

Our Customers

Administration and innovation, continuous improvement, enforcement

KEY DEFINITIONS

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

Indicator - A measure that helps quantify the achievement of an outcome.

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

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Indicator



Our Water

Ensure Public Drinking Water System Compliance

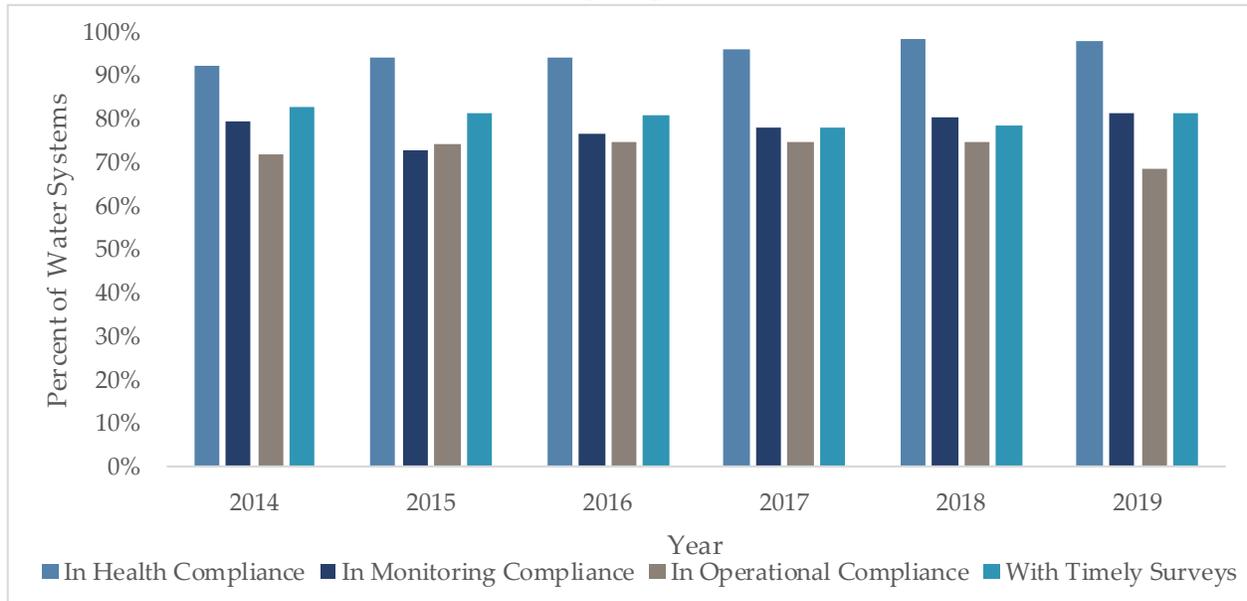
Provide safe drinking water to Public Water System users

98%

of public drinking water systems are in compliance with health-based standards.

PERFORMANCE TREND

Compliance with Health Standards and Monitoring Requirements



DATA ANALYSIS

Public Drinking Water is regulated by both state and federal rules, and public drinking water systems throughout the state must meet established standards of water quality and system construction, operation, and maintenance. Three broad categories of compliance are identified in the figure above:

- Health compliance: compliance with the health-based standards of the regulations;
- Monitoring compliance: sampling for all required potential chemical and biological contaminants at required times; and
- Operational compliance: operating the water system in a safe and sanitary manner and addressing any identified operational deficiencies or other compliance directives in a timely fashion.

Common reasons for health-based non-compliance include detections of *E. coli*, and detections of naturally occurring (ex: arsenic or radionuclides) or human-introduced (ex: disinfection byproducts) contaminants that

exceed established standards.

As can be seen in the figure, public drinking water systems in Vermont maintain a high level of compliance with health, monitoring, and operational guidelines. As of the close of fiscal year 2019, 98% of Vermont's public water systems were in compliance with health-based standards.

The Public Drinking Water Program focuses on proactively encouraging compliance before non-compliance occurs. This is accomplished through permitting of source, construction, and operational changes. In addition to assessing health and monitoring compliance, the Division conducts regular sanitary survey inspections of water systems to assess operational compliance status. Program staff provide extensive technical and compliance assistance to systems to avoid compliance issues down the road.

NEXT STEPS

- Continue to assess whether water systems meet operational standards and if not, direct compliance with these standards via the operating permit.
- Continue to assess whether water systems meet federal Maximum Contaminant Levels, monitoring, reporting, and treatment technique standards.
- Improve drinking water source protection policies and rules.
- Continue to provide technical assistance to water systems.
- Encourage water systems to prioritize improvements to infrastructure and maintain compliance.

Indicator



Our Water

Water Quality of Vermont's Rivers and Lakes

Vermont's rivers and lakes are healthy overall and support fishing and swimming activities for residents' enjoyment and tourism.

80%

healthy for fishing.

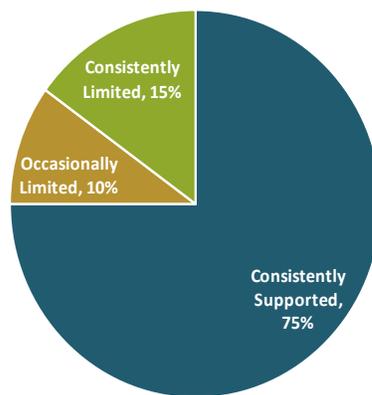
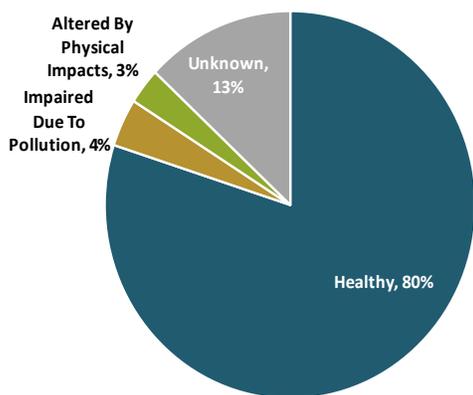
85%

support swimming.

PERFORMANCE TREND

Quality of rivers and streams for fishing

Quality of lakes for swimming (excluding Lake Champlain)



DATA ANALYSIS

The majority (more than 80%) of Vermont's rivers, streams, and lakes are swimmable and fishable. Only a small proportion are severely impacted by human activities on the land or in the water. Examples include nutrient and sediment pollution from runoff, eroding streambanks caused by instream-activities, and introduction of aquatic invasive species.

Eighty percent of Vermont's rivers and streams support healthy communities of aquatic organisms and are considered fishable under the Vermont Water Quality Standards. This has held stable from the previous year. Only 7% of total river/stream miles are impaired due to pollution or altered by physical impacts, such as water level fluctuations from dam operations. The remaining 13% of waters are qualified as "unknown" condition because there is insufficient data to classify them.

Excluding Lake Champlain, 85% of Vermont's lakes are swimmable. Swimming is occasionally limited in up to 10% of those lakes due to aquatic invasive species or

cyanobacteria (blue-green algae) blooms. In the remaining 15%, swimming is consistently limited for these reasons. The slight increase in the percentage of lakes that support swimming/recreational since 2017 is largely attributable to phosphorus reductions in Ticklenaked Pond and aquatic invasive species management efforts.

The Watershed Management Division uses science-based decision making and adaptive management to continually evaluate how we can be most effective in achieving our goals to protect, maintain, enhance, and restore Vermont's surface waters.

To protect Vermont's existing high-quality waters and restore impaired waters, we utilize five core strategies:

- Protective easements and designations
- Implementation of pollution-reducing practices and projects
- Education and training
- Technical assistance and permitting
- Monitoring, assessment, planning.

NEXT STEPS

Through a variety of approaches and legislative tools, such as the 2015 Vermont Clean Water Act (Act 64), WSMD has the authority to broaden its mitigation of pollutant sources. New sources of water pollution are limited, and existing sources will continue to be reduced. Specific next steps include:

- Work with stakeholders to revise the designation and petition process available to conserve critical surface waters and wetlands.
- Utilize priority lists (also called "implementation tables") within tactical basin plans to identify and prioritize projects across the state.
- Host continuing education workshops that teach pollution prevention and mitigation practices and implementation techniques to contractors and consultants.
- Improve the process for applicants to receive jurisdictional determinations and apply for permits that set construction or operational conditions to reduce potential impacts.
- Utilize biomonitoring to assess water quality.

Indicator

Our Water

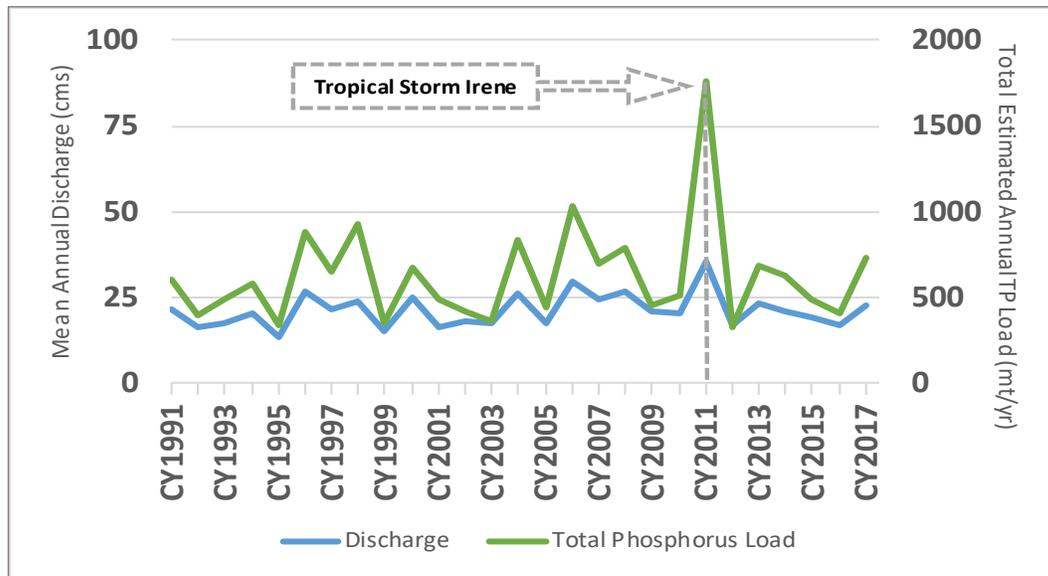
734
metric tons per year
of total phosphorus
loading to Lake
Champlain.

Reduce Lake Champlain Phosphorus Pollution

The Vermont Clean Water Act targets reducing the total phosphorus pollution reaching Lake Champlain from Vermont sources.

PERFORMANCE TREND

Lake Champlain tributary data, Calendar Years 1991-2017



NEXT STEPS

- Continue to implement pollution-reducing practices and projects.
- Expand classroom and online education and training to increase knowledge of behaviors that protect and provide stewardship of our waters.
- Provide technical assistance and improve permit process to prevent pollution from degrading our surface waters.
- Continue to utilize the Tactical Basin Planning process to address nonpoint source loading.

DATA ANALYSIS

The amount of phosphorus reaching Lake Champlain must be reduced to meet water quality standards and improve overall lake health. Phosphorus loading to the lake fluctuates annually due to changes in land use as well as weather and precipitation patterns. Higher amounts of precipitation, as was seen in 2017, move more phosphorus from the land to flowing waters where it is carried downstream to the lake by our rivers. As a result, annual phosphorus loading patterns closely follow annual river flow, or “discharge” patterns. The graph above reflects how closely these are correlated.

The graph shows the correlation between the annual fluctuation in total phosphorus (TP) loads and the average annual river flows that are precipitation, or “discharge” driven. The target total

phosphorus loading is 418 metric tons per year (mt/yr) reflecting the maximum amount of phosphorus the lake can receive per year in order to meet the targets set for Vermont segments of Lake Champlain in the Total Maximum Daily Load (TMDL). When the Total Phosphorus Load is less than 418 the discharge annual average has been less than 17.5 cubic meters per second (cms). The Total Phosphorus Load for the most recent calendar year was 734 metric tons for the year, an amount that was directly related to the high rainfall that year with a discharge of 22 cubic meters per second.

With the passage of the Vermont Clean Water Act (Act 64) in 2015, the Watershed Management Division gained additional permitting and funding tools to implement projects

to reduce phosphorus loads to our lakes, rivers, and streams. It is expected that decreased loading will first be measurable at a local level in individual smaller rivers and streams. While targets may be met at the local scale, it will take many years before the cumulative improvements are observable in larger tributaries and subsequently in Lake Champlain. Incremental reductions to phosphorus loading at the watershed level have been observed, such as in the LaPlatte River. Further performance metrics to reflect Watershed Management Division’s progress to protect, maintain, enhance, and restore Vermont water quality can be found in the Division’s performance measures.

Our Water

**5,534
acres**

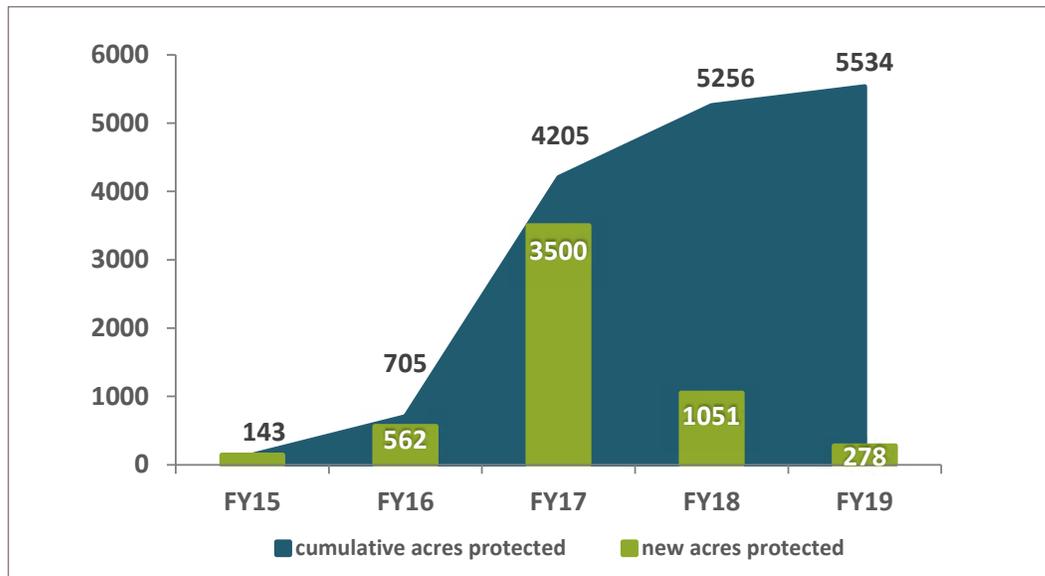
protected by easements
and designations over
the past 5 years

Easements and Designations to Protect Surface Water Quality

*Protecting water quality and increasing flood resilience,
recreational opportunities, and wildlife habitat.*

PERFORMANCE TREND

Number of acres protected



NEXT STEPS

Strategies to better utilize easements and designations to protect water resources include:

- Increasing the number of surface water reclassifications under the Vermont Water Quality Standards.
- Continuing to increase the number of wetlands designated as Class I under the Vermont Wetland Rules.
- Providing tools and technical assistance to municipalities and other partners so they can better protect designated and conserved waters.
- Refining our methods for identifying conservation priorities.
- Finalizing the procedure for designating Outstanding Resource Waters (ORW).
- Initiating ORW designation candidates through tactical basin planning.

DATA ANALYSIS

Vermont’s natural aquatic ecosystems and the functions and values they provide are irreplaceable. They provide clean drinking water, places to swim, fish and boat, and habitat for wildlife. The Watershed Management Division (WSMD) has a primary responsibility to ensure these water resources remain healthy for this, and future generations.

Designations and easements are among the most effective tools for safeguarding natural systems from degradation. These tools place restrictions on activities that would harm our natural resources; enabling them to help us reduce flood hazards, protect water quality, and restore wetland and riparian habitat.

Easements and designations include:

- River corridor easements and floodplain protection measures
- Parcel buy-outs
- Reclassification of surface waters

- Outstanding Resource Water designations
- Reclassification of wetlands (Class I Designation)

Over the past five years, the WSMD has used easements and designations to directly protect more than 5,500 acres; 278 newly protected in FY19. The number of new acres protected in FY19 is lower than the past few years as there were no wetland reclassifications in FY19. Wetland reclassifications are complex in that they require a rule change: one reclassification is in process which we will report on next year.

Easements and designations help to protect water quality and increase our State’s flood resilience, recreational opportunities, and wildlife habitat. Class I designations protect wetlands that are determined to be irreplaceable or exceptional in their contribution to Vermont’s natural heritage.

DATA SOURCE: Watershed Management Division

PREPARED BY: Watershed Management Division: <http://dec.vermont.gov/watershed>

Our Water

Education and Training to Increase Knowledge and Stewardship of Vermont's Waters

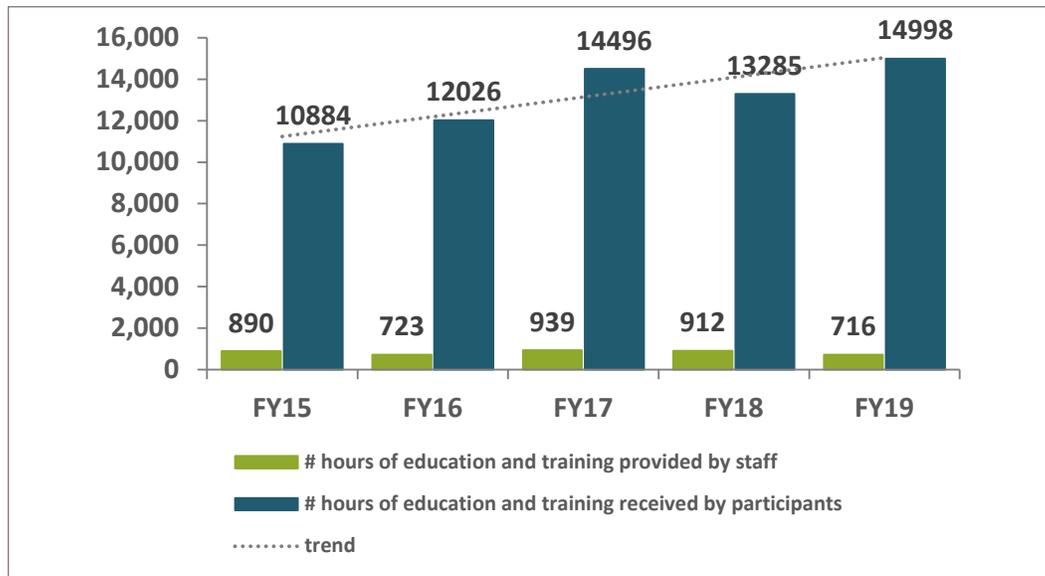
Empowering Vermonters to protect and enjoy our water resources.

nearly
15,000
hours

of education and training received by participants.

PERFORMANCE TREND

Hours of education and training



NEXT STEPS

As we continue the implementation of the Clean Water Act (Act 64) and the WSMD strategic plan, we anticipate expanding education and training efforts through the effective use of technology and train-the-trainer models. This approach maximizes the impact of staff time devoted to this work.

Strategies to increase and improve our education and training efforts include:

- Increasing the diversity and frequency of classroom and online trainings to promote WSMD core goals to protect, maintain, enhance, and restore Vermont's surface waters.
- Identifying and addressing skills needed by staff to enhance outreach and education offerings and outcomes.
- Utilizing ECO AmeriCorps members to assist with updating education and outreach materials and broadening the reach of trainings offered to diverse audiences across Vermont.
- Continuing to utilize our website and blog (vtwatershedblog.com) to highlight key information and training resources.

DATA ANALYSIS

Reducing the amount of pollution reaching our lakes, rivers, and wetlands requires sound land use policies and practices. All Vermonters – governmental agencies, commercial and agricultural businesses, municipalities, and individuals – have a responsibility to minimize their impact on our shared water resources. Learning why this is important and how to identify and implement the best management practices (BMPs) to reduce pollution is essential.

Education and training about our water resources and the BMPs and pollution prevention tools that will protect them is integral to achieving our water quality goals. Participating in a workshop or training can change individual behavior and promote environmental stewardship.

In 2019, more than 700 hours of education and training were provided by the Watershed Management Division (WSMD) staff, providing nearly 15,000 cumulative hours of education and training received

by participants. Although there was a dip in hours of education provided by staff, there was an increase in hours received by participants due to a focus to provide trainings to larger groups. Note that these hours do not include technical assistance provided for project review.

Education and training opportunities include:

- Rivers and Roads trainings on smart road maintenance and culvert design
- Natural Shoreland Erosion Control Certification courses
- Training on wetland habitats and functions
- Workshops to help prevent the spread of aquatic invasive species
- Vermont Lake Wise workshops focused on lake-friendly shoreland management

For additional details on education and training accomplishments, refer to the Vermont Clean Water Initiative Performance Report at <https://dec.vermont.gov/water-investment/cwi/projects#Reports>.

DATA SOURCE: Watershed Management Division

PREPARED BY: Watershed Management Division: <http://dec.vermont.gov/watershed>

Our Water

3:1

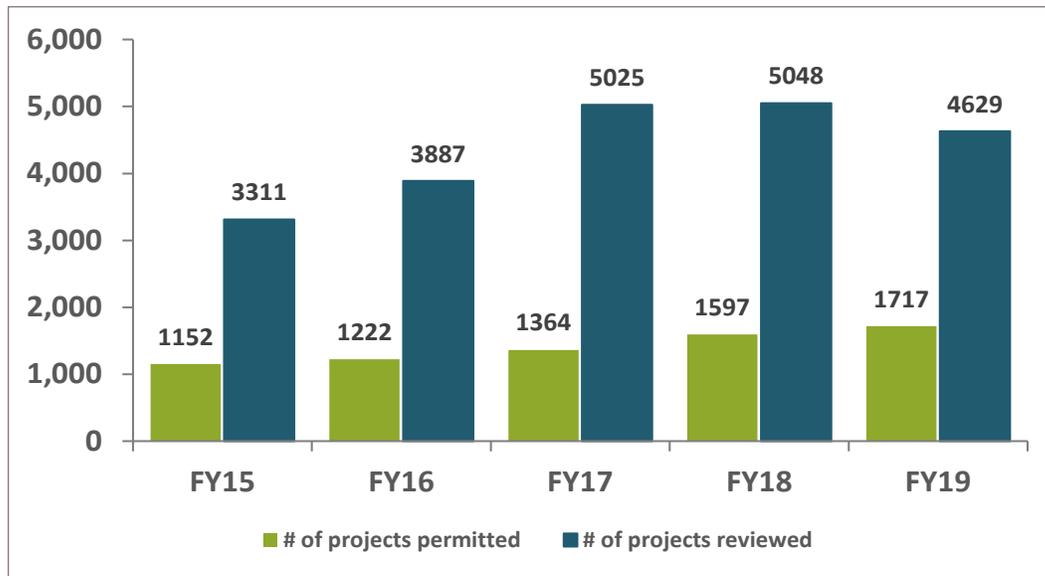
consult on three projects for every one that ends up being permitted

Technical Assistance and Permitting to Protect Water Quality

Preventing pollution from degrading surface waters and preventing wetland loss.

PERFORMANCE TREND

Number of projects reviewed and permits issued



NEXT STEPS

Given the increase in regulatory authority granted by the Clean Water Act (Act 64), it is critical that we find ways to standardize technical assistance and streamline permit issuance. Actions to achieve this include:

- Digitize application and compliance forms for online completion, payment, and submittal.
- Improve jurisdictional determination outreach .
- Streamline compliance review by automating business processes.

DATA ANALYSIS

The Watershed Management Division (WSMD) utilizes a combination of technical assistance and permitting approaches to prevent pollution from degrading surface waters. This two-pronged approach gives WSMD staff an opportunity to work with potential permit applicants to avoid or mitigate project impacts. These activities represent a large portion of the Division’s workload. Currently there are five programs providing technical assistance and issuance of permits: Rivers, Lakes, Wetlands, Stormwater, and Wastewater.

Activities requiring permits include:

- Construction and operational stormwater management
- Wastewater discharges
- Aquatic nuisance control, and Shoreland development
- Stream alterations
- Activities in wetlands and their buffer zones

WSMD regularly provides technical assistance to municipalities, landowners, developers, and partner organizations to ensure that water quality standards are met, and ecological functions maintained. Examples of technical assistance or projects reviewed include:

- Redirecting project design to fall outside protected areas of wetlands, shorelands, river corridors, and floodplains
- Consultation regarding road designs to avoid impacting river or stream flows
- Next flood measure technical review to address streams and rivers compromised due to a flood event
- Consultation or review of Section 248 and Act 250 projects to ensure they meet water quality standards

Where activities create potential impacts to water quality, general

permitting conditions guide applicants to design projects in a way that reduces potential discharges or practices that would contribute to runoff or natural resource loss. When impacts cannot be completely avoided, individual permits with conditions to minimize impacts to water quality and protect wetland function and value may be issued.

In FY19, WSMD staff provided technical assistance or project review to over 4,600 projects and issued 1,717 permits. The technical assistance that the Division provides and permits are both two important tools in our efforts to protect water quality.



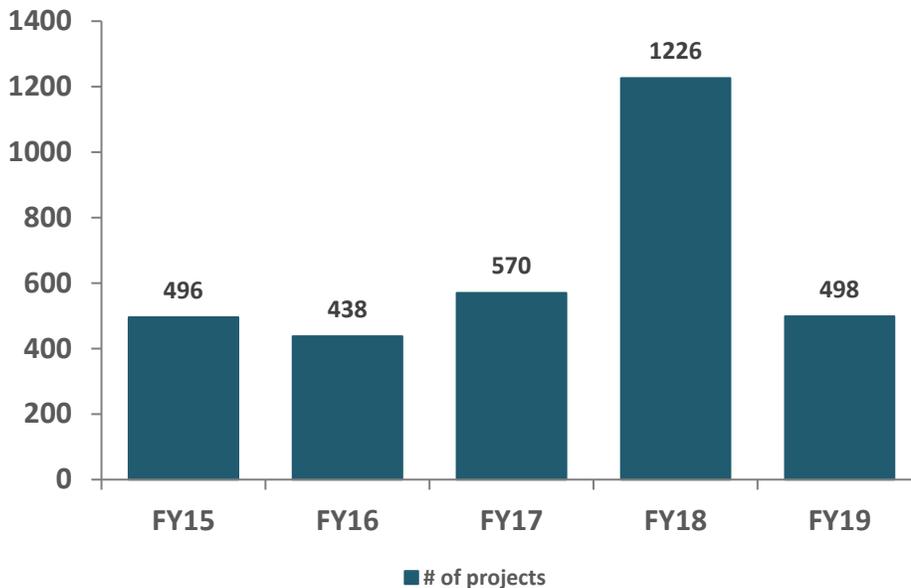
Our Water

Project Implementation to Improve Water Quality

Restoring and enhancing water quality in our rivers, lakes, and wetlands through coordinating and funding project implementation.

PERFORMANCE TREND

Number of water quality improvement projects funded and implemented



DATA ANALYSIS

Pollutants that degrade Vermont's water quality include both point and non-point sources. Point source pollution are discharges directly from a pipe. Non-point sources, often called "runoff" transport pollutants from land to surface water by rain and snowmelt. Pollutants carried off the land via runoff include sediment from eroded or disturbed lands, heavy metals from roads, and nutrients collected from lawns and farmlands.

Pollution from non-point sources - neighborhoods, downtown and commercial areas, roads, farmland, and logging sites - cause the majority of impacts to surface waters in Vermont. Protecting and restoring Vermont's waters requires utilizing best management practices across diverse land uses prevent and mitigate non-point source pollution.

To accomplish this, the Watershed Management Division (WSMD) and Water Investment Division (WID) work together to support identifying and funding (through

grants) water quality improvement projects. Project examples include:

- Implementation of best management practices on riparian and lake-shore properties, such as planting buffers
- Stream and floodplain restoration to achieve stream stability and connectivity
- Installation of green stormwater infrastructure practices that infiltrate stormwater runoff
- Wetland restoration and protection to slow or trap runoff carrying nutrients

In FY19, WSMD and WID facilitated nearly 500 unique improvement projects. This number was significantly lower than in FY18, as Block Grants were issued in place of individual Ecosystem Restoration Program (ERP) grants; allowing the Department to get more money on the ground more efficiently. All state investments in clean water projects and results of project implementation are summarized in the Vermont Clean Water Initiative - Annual Investment Report.

498

water quality improvement projects implemented in FY19

NEXT STEPS

When projects are properly constructed and maintained, they play a critical role in achieving Vermont Water Quality Standards to ensure that they are fishable and swimmable for all to enjoy. WSMD and WID rely heavily on the Tactical Basin Planning process and partner organizations to identify, prioritize, develop, and implement projects.

The WSMD and WID plan to expand and improve on these efforts by:

- Continuing to update all Tactical Basin Plans on a 5-year cycle, providing the best data available to identify and prioritize projects.
- Enhancing project prioritization methodologies with GIS mapping tools that can be referenced by all stakeholders.
- Enhancing grant programs to provide clarity to process and eligibility of projects to receive funding.
- Increasing participation in voluntary measures and leveraging media and awards to provide recognition for assisting WSMD attain its goals.

Our Water

43%

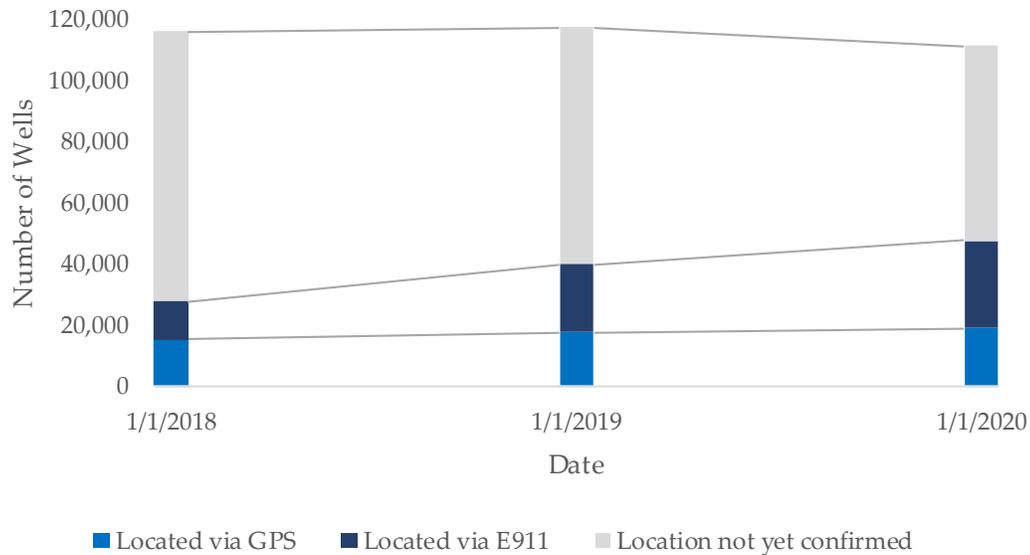
of groundwater wells have E911 or GPS locations.

Protecting Groundwater as a Public Trust Resource

Improving well location data to better protect groundwater as a public resource

PERFORMANCE TREND

Well Locational Data Improvements



DATA ANALYSIS

Background Information on Groundwater Management

Groundwater protection law under Title 10 Chapter 48 states that groundwater resources are held in trust for the public. A comprehensive groundwater management program has been developed that includes the Groundwater Protection Rule and Strategy (GWPRS), the Vermont Groundwater Management Plan, and the long-standing Groundwater Coordinating Committee. The GWPRS is being revised to include aspects of the public trust test, petition and reclassification process for groundwater and updated values for Groundwater Enforcement Standards.

Well Location Improvement Project

Accurate well locations are an important part of groundwater protection because state agencies and the consulting community use this information to provide adequate well protection in their work.

In 2005, the Drinking Water and Groundwater Protection Division began requiring well drillers to supply GPS or geolocated coordinates for well locations. In order to improve the accuracy of older well locations, the Drinking Water and Groundwater Protection and Geology Divisions obtained a USGS grant in 2017 to improve E911 well location data. Staff have been conducting a systematic review and update of well locations.

As can be seen in the figure above, these efforts are already making an impact. The green bars represent old locational data with unknown accuracy. The blue and red bars represent GPS/geolocated and E911 location data, respectively. As location accuracy continues to improve, we expect to see the number of wells with E911 or GPS/geolocated locations increase. As of the end of calendar year 2019, 43% of wells were either GPS/geolocated or E911 located.

NEXT STEPS

As work continues on revising and implementing the Groundwater Protection Rule and Strategy (GWPRS), the Division intends to pursue several next steps:

- Integration of the revised GWPRS requirements into DEC permitting programs.
- Publicizing well location tools, including a Well Location Improvement Tool on the ANR Atlas to be used by the public to update information.
- Continued implementation of the Vermont Groundwater Management Plan.
- Evaluate groundwater supplies and further public understanding of groundwater public health risks.

Our Water

27

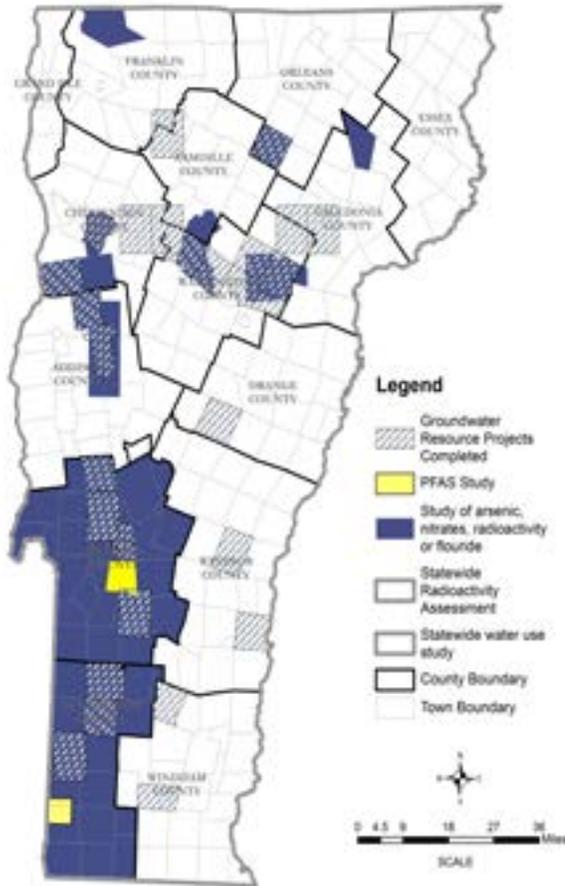
town groundwater projects completed

Protect Public Health Through Aquifer Characterization

By providing essential geoscience for Vermont communities

PERFORMANCE TREND

Regions Benefiting From Geologic Solutions



to chemical and mineralogical contaminants, thereby serving to protect human health and the environment. Aquifer characterization projects are ongoing in Bennington, Rutland, and Sutton. Work to investigate groundwater-surface water interaction will begin in 2020 at Lake Carmi.

Another component of VGS's work is the collection and compilation of datasets used to support planning and protection of public and private drinking water. 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. Since 2017, with funding through a federal grant, the VGS has upgraded data for drinking water wells, large groundwater withdrawals, snowmaking, wastewater facilities and hydroelectric plants. Data is made available to the public and will be used to evaluate statewide water use. This work will improve understanding of local groundwater recharge and water budgets and will better inform planning for drinking water supply.

VGS provides support to communities and state agencies through sampling, research and mapping. As seen in the map above, a variety of groundwater resource projects have been completed, but there is still significant work to be accomplished. Active collaboration with the Waste Management, Drinking Water and Groundwater Protection and Watershed Management Divisions in DEC, university partners, non-profit organizations and federal partners (EPA and USGS) are key to our success.

NEXT STEPS

- Prioritize projects, document the extent of naturally occurring and human induced contamination and conduct studies to assist in mitigation of groundwater and surface water issues. This includes publication of results from Bennington, on-going work in Rutland and Sutton, and new work at Lake Carmi.
- Collaborate with partners, to increase awareness of geologic influences on groundwater and provide information for source protection.
- Build statewide databases for Phase 2 of the water use project. Produce GIS maps as planning tools for public water supplies.
- Maintain funding for mapping programs and their application to water resources, groundwater protection and planning.

DATA ANALYSIS

Vermont's geology, characterized by deformed rock and unconsolidated glacial deposits, holds our valuable groundwater resources. Groundwater chemistry, including naturally occurring contaminants (ex. arsenic, radioactivity), is directly related to regional geology. By collecting data, interpreting the geochemistry from drinking water wells, interpreting the sub-surface and determining the influence of the local geologic materials, the Geologic Survey (VGS) can inform the

public about aquifer quality and quantity.

The Division investigates groundwater contamination from non-geologic sources, such as per- and polyfluoroalkyl (PFAS) contamination and nitrates. Geologic maps provide base information for our process to characterize the aquifer, develop three-dimensional and temporal models, and understand the groundwater system. This type of work provides reliable data to assist in reducing exposure

Indicator

Our Air

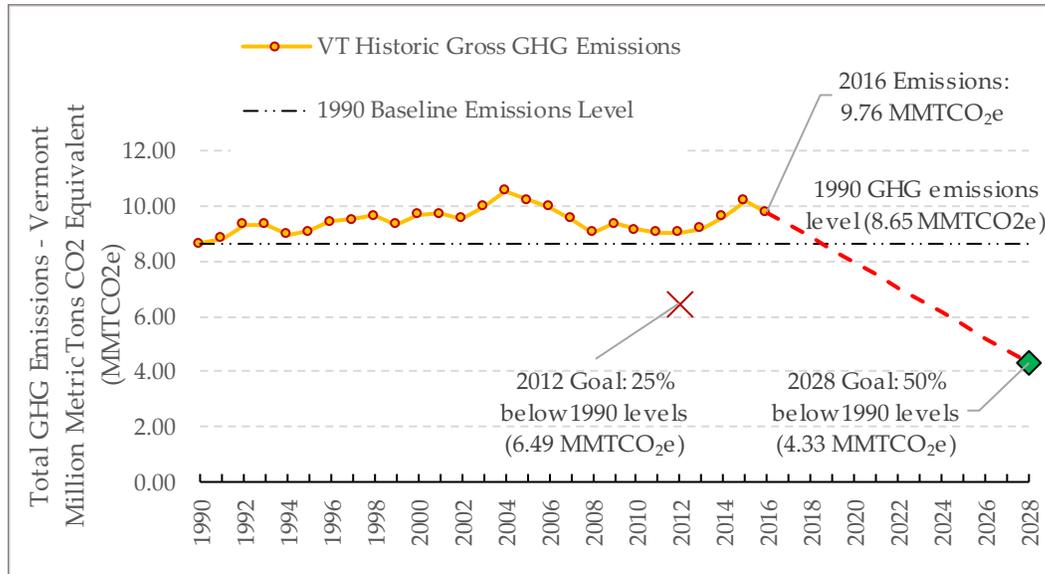
Greenhouse Gas Emissions by Vermont

Quantifying tons of greenhouse gases emitted

16
metric tons
of GHGs emitted per
capita in 2016

PERFORMANCE TREND

Vermont greenhouse gas emissions inventory, 1990-2016



NEXT STEPS

Strategies to reduce GHG emissions

- Support lower vehicle emissions standards through the low and zero emission vehicle program (LEV and ZEV), enhance public transportation, and promote electric vehicle (EV) adoption.
- Expand on building weatherization and heating efficiency improvement efforts.
- Push toward demand-side efficiencies and low carbon, appropriately-sited, renewable generation sources for the electricity sector.
- Continue to publish GHG emissions inventory updates on an annual basis to track progress and inform climate policy.

DATA ANALYSIS

Vermont fell short of meeting the statutory goal for 2012 (10 V.S.A. § 578) to reduce greenhouse gas (GHG) emissions to 25% below 1990 levels. The next goal on the horizon is to attain 50% of 1990 levels by 2028.

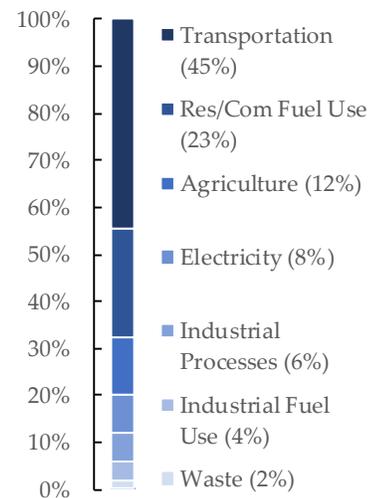
The Vermont Greenhouse Gas Emissions Inventory Update and Forecast is released on an annual basis, about three years after actual emissions due to the staggered availability of data sources at state and federal levels.

The latest report shows that emissions in Vermont decreased from 2015 to 2016, but remain 13% above the 1990 baseline. Emissions decreases in the 2015 to 2016 period were driven mainly by the Electricity and Residential, Commercial, & Industrial (RCI) fuel use sectors. If substantial progress is to be made toward

meeting the 2028 emissions reduction goal, significant and immediate action must be taken in multiple sectors.

Vermont’s participation in the U.S. Climate Alliance has led to a greater understanding and focus on short-lived climate pollutants (SLCPs). These climate forcers have high warming potentials (more potent than CO₂) and short atmospheric lifetimes and include methane (CH₄), black carbon (BC), and hydrofluorocarbons (HFCs). Reducing emissions of these gases is considered a necessary mitigation “quick-fix” which must be coupled with longer term initiatives and strategies to reduce emissions of longer lasting CO₂. Act 65 has been adopted by the legislature to phase down the use of high global warming potential HFCs in Vermont which will help to mitigate the emissions from this sector of short-lived climate pollutants.

Vermont GHG emissions by sector



DATA SOURCE: Air Quality & Climate Division GHG Inventory Update and Forecast 1990-2016

PREPARED BY: Air Quality & Climate Division; dec.vermont.gov/air-quality; (802) 828-1288

Indicator

 Our Air

59

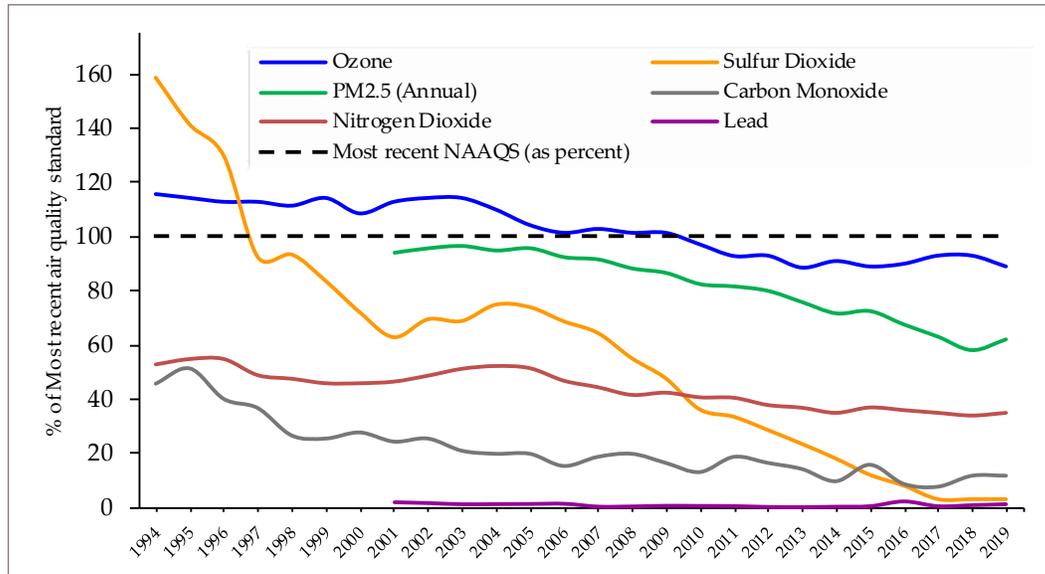
days in 2019, ambient air quality posed a moderate or greater risk to sensitive populations

Number of Days Air Quality Moderate or Worse

Monitoring Vermont's air pollutant concentrations

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, illustrated in the graph above.

The monitored concentrations of 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 declined

over time, and are below the threshold for what is considered unhealthy (based on the NAAQS, illustrated by the dashed line). While these air quality standards are being met, there are episodes when elevated pollutant concentrations are unhealthy in Vermont. The AQCD produces daily air quality forecasts and issues alerts to the public when pollution levels are expected to be unsafe. In 2019, there were 59 days when air pollution posed a moderate or greater risk to sensitive groups such as people with heart or lung disease, older adults, children, and teenagers. Concentrations of ozone or fine particulate matter reached an Air Quality Index (AQI) of Moderate or Unhealthy for Sensitive Groups (USG) in at least one area of Vermont, as measured by the air quality monitoring network, on each of those days.

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 such as 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.

Our Air

Reduce Mobile Source Air Pollution

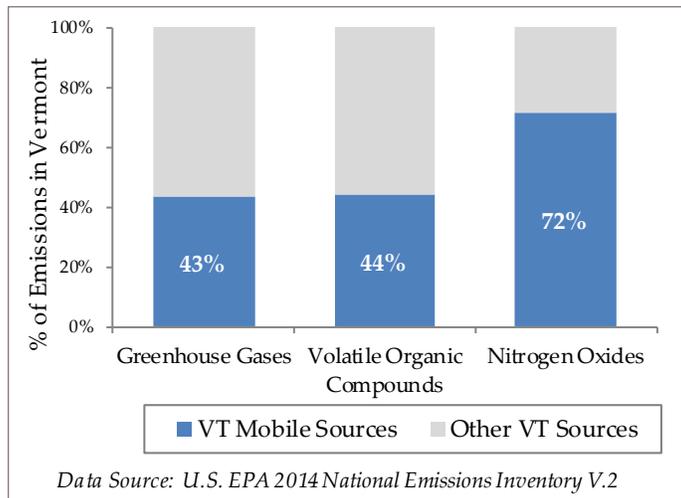
Promoting electric and other low emission vehicles in Vermont will reduce air pollution emissions

72%

of NO_x emissions in Vermont are from mobile sources.

PERFORMANCE TREND

Proportion of air pollutants from mobile sources



cars and trucks registered in Vermont has increased by 33%.

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.

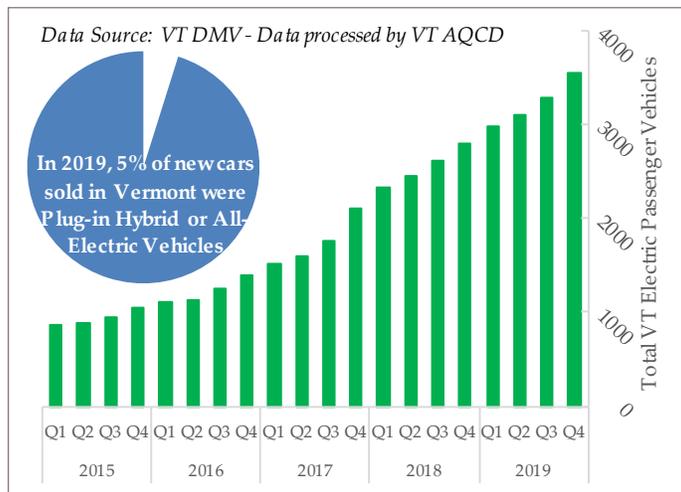
While the continuous growth rate of new electric vehicles registered in Vermont is encouraging, these vehicles are still only a very small fraction of the total new vehicles registered. In order to improve air quality and meet our greenhouse gas emission reduction goals, alternative fueled vehicles will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

- Update 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.
- Continue to 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.

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 (NOX), as well as hazardous air

pollutants which contribute to human health impacts ranging from respiratory diseases to cancer.

Based on FHWA data, vehicle miles traveled (VMT) in Vermont are about 22% higher than thirty years ago. During that time, the number of

DATA SOURCE: U.S. EPA, Federal Highway Administration, and Vermont Department of Motor Vehicles.

PREPARED BY: Air Quality & Climate Division; dec.vermont.gov/air-quality; (802) 828-1288

Indicator

 Our Land

Promote the Sustainable Management of Waste

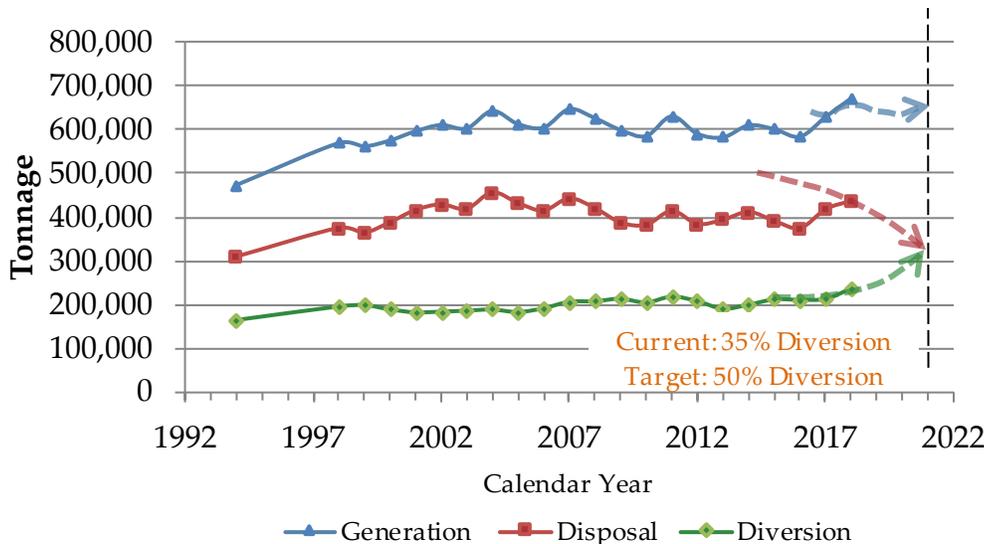
Increasing the statewide diversion rate of all solid waste generated by Vermonters

3.82 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

- Provide outreach and education on what, where, and how materials can be recycled, donated, and composted.
- Support market development for recyclables and compost products through communication and collaboration between states, internal arms of Vermont state government, and private and nonprofit sectors.
- Conduct direct business outreach in collaboration with Solid Waste Management Entities (SWMEs) to ensure compliance with Universal Recycling Law.
- Encourage the use of the Food Recovery Hierarchy by supporting source reduction, providing food to people and feeding animals.
- Support regional solid waste management entities in fulfilling the goals and commitments of their recently updated Solid Waste Implementation Plans.
- Enforce the landfills ban on recyclables and leaf and yard debris, and mandatory diversion of food scraps by commercial/industrial generators.

DATA ANALYSIS

Parallel to national trends, Vermonters have continued to discard more and more materials over the past few decades. Data shows that while Vermont residents, businesses, and institutions are recycling, donating and composting more, they also continue to send reusable, recyclable, and compostable materials to the landfill. When Vermonters keep these valuable materials out of the landfill it saves landfill space, fuel and energy, conserves resources, reduces greenhouse gases and creates new business opportunities.

In recent years, two events have significantly changed Vermont’s material management, the first was the Universal Recycling law focused on increasing convenience, choices available, and requirements for proper management of recyclables and organics. The second was the significant revision and adoption of the statewide Material Management Plan (MMP), which establishes performance measures for the Agency and partners intended to drive steady progress towards achieving statewide goals.

Despite generating more waste than ever before in 2018, Vermonters continued to successfully recycle, reuse and compost that waste. 35% of

the produced waste was diverted away from disposal through available programs. This includes the estimated 50% of Vermonters that are separating some, or all, of their food waste for feeding animals or backyard composting and the nearly tripling of the amount of food collected from businesses for redistribution by the Vermont Foodbank a result of prioritizing the prevention of wasted food.

Even with this marked success in recycling, food donation, and composting, 5% more materials went to the trash in 2018 than in 2017. This increased the per capita disposal from 3.6 to 3.8 pounds per person per day and continues a two-year trend of increasing disposal rates. Many factors influence the total waste generated each year, including population size, economic activity, and changing materials types within the waste stream. Regardless of the cause, the 2018 continued increase in waste disposal shows there is more work to be done to encourage waste reduction, recycling, and composting.

DATA SOURCE: Solid Waste Management Program

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

Our Land

310

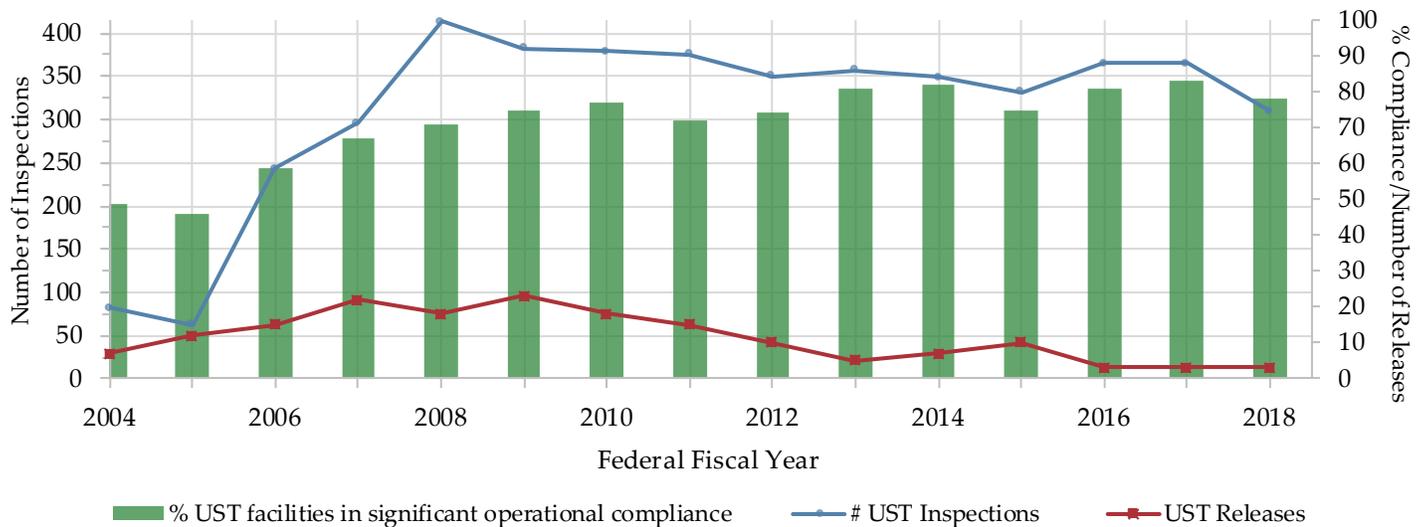
underground storage tank facilities were inspected in 2018

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 failures



DATA ANALYSIS

Many waste management activities aim to identify hazardous materials and dangerous practices. Once potential problems are identified, staff work with individuals or businesses to guide appropriate management and containment of hazardous materials and ensure regulatory compliance. This minimizes potential exposure or release of these materials before a property becomes contaminated.

The Underground Storage Tank (UST) program work reduces hazardous materials exposures and soil and groundwater contamination. In 2005, this program streamlined their inspection process and dramatically increased the number of annual inspections completed at petroleum UST facilities. This increased site presence resulted in a nearly 30% increase in the number of facilities found to be in significant operational compliance (SOC) with relevant management practices. During fiscal year 2018, the SOC rate was 78%, which remains slightly below the targeted 85% SOC rate that the program aims to attain in coming years.

These continued efforts have directly decreased the number of emergency spill responses and the number of UST facilities listed as a contaminated site and needing to complete clean-up efforts each year. Vermont has

required installation of double-wall UST's since 1987, which means that the newest single wall UST's are now 30 years old and being required to complete closure in the coming years. While it is a phased deadline, the greatest number of these tanks were permanently closed by January 1, 2018. It was expected that many of these tanks would exhibit contamination from previously undetected spills and minor leaks that there would be a corresponding increase in the number of discoveries. It was welcomed news by Department and the UST owners to learn that very few were found to have caused a serious release to the environment and the total number of releases in 2018 remains below 10; a number that has been steady the past three years.

Last year the UST Program revised the Underground Storage Tank Regulations to incorporate stricter federal standards for the demonstration of significant operational compliance. Adoption and implementation of these new standards will likely influence the percentage of facilities achieving significant operational compliance in the future.

NEXT STEPS

- Continue inspecting every Category One UST at least once every three years.
- Implement the updated 2018 Underground Storage Tank Regulations.
- Complete closure of remaining 48 single-walled USTs.
- Support the former single-walled tank owners that have transitioned to double-walled tanks in attaining the management and compliance requirements appropriate to their new systems.
- Continue publishing and distributing the semi-annual UST Talk Newsletter which provides a valuable method of communicating to UST owners and operators on requirements, recommendations and guidance.

Our Land

Transition Contaminated Sites Back to Productive and Beneficial Use

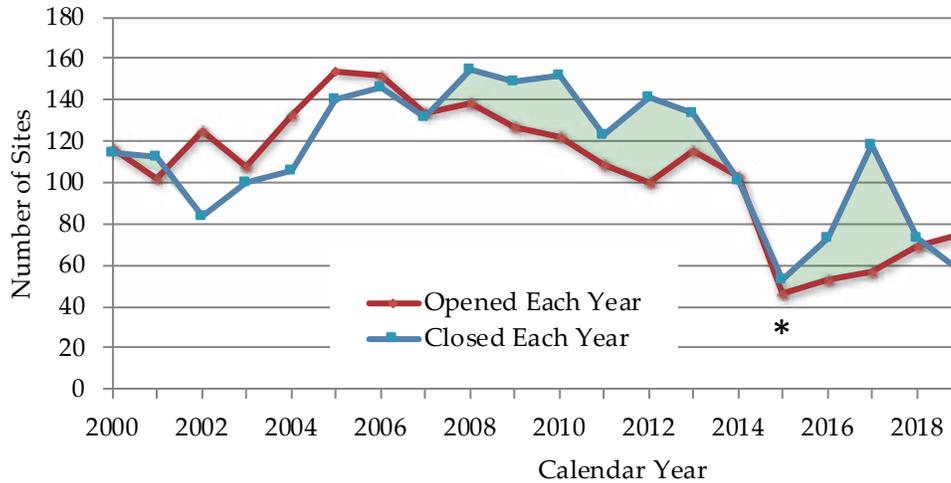
Facilitating efficient clean-up and closure processes for contaminated sites

PERFORMANCE TREND

57

sites were cleaned-up in 2019

Contaminated sites opened and closed (cleaned) each year



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

NEXT STEPS

- **New Staff** - The ongoing PFAS response has placed significant demands on capacity and the ability to cleanup and close conventional sites. Hiring new staff to assist with managing PFAS and other emerging contaminant challenges will greatly assist in completing additional site cleanups throughout Vermont.
- **Reduce petroleum releases** – prevention work is critical for reducing the number of new releases requiring investigation and clean-up. Petroleum tank releases compromise over half of the open sites and so the implementation of two updated rules should serve to reduce the number of new sites in coming years:

· *Aboveground Storage Tank Rules*
These rules include a tank inspection requirement, phased in over three years (ends August 2020), and prohibits deliveries to non-compliant tanks that are high risk of release. These new rules have resulted in thousands of tank upgrades and replacements and should result in a significant drop in new releases by mid-2020.

· *Underground Storage Tank Rules*
These new rules, adopted in the fall of 2018, require inspection and testing of spill containment, piping and overfill devices that lack secondary containment, at least once every three years, starting by September 2020, for commercial motor fuel underground storage tanks.

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 implementation of clean-up remedies. In all cases, the goal is to be protective of human health and the environment while returning impacted property to a beneficial use.

In 2019, the SMS continued rigorous response to wide-spread contamination by per- and polyfluoroalkyl substances (PFAS), including PFOA throughout Bennington county, PFAS impacted public water supplies throughout the state discovered as part of the required public water system testing of Act 21, and PFAS in the environment from sources evaluated as part of our PFAS response plan. In North Bennington and Bennington, PFAS has impacted over 400 private water supplies alone. The SMS has coordinated ongoing response and testing of drinking water supplies, has facilitated

the installation and ongoing operation and maintenance of point-of-entry treatment systems, has coordinated with the potentially responsible parties for the ongoing installation of 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 over 1,200 active sites. In 2019 the SMS added 75 new sites into the program (six more than in 2018). In 2019 the SMS successfully supported the remediation and closure of 57 sites, resulting in a net increase of 18 sites on our active sites listing. The ability to remain a viable program despite the stresses on resources is due in part to business process improvements that the SMS has adopted in recent years.

Our Land

Reduce Hazardous Waste and Toxic Chemical Use

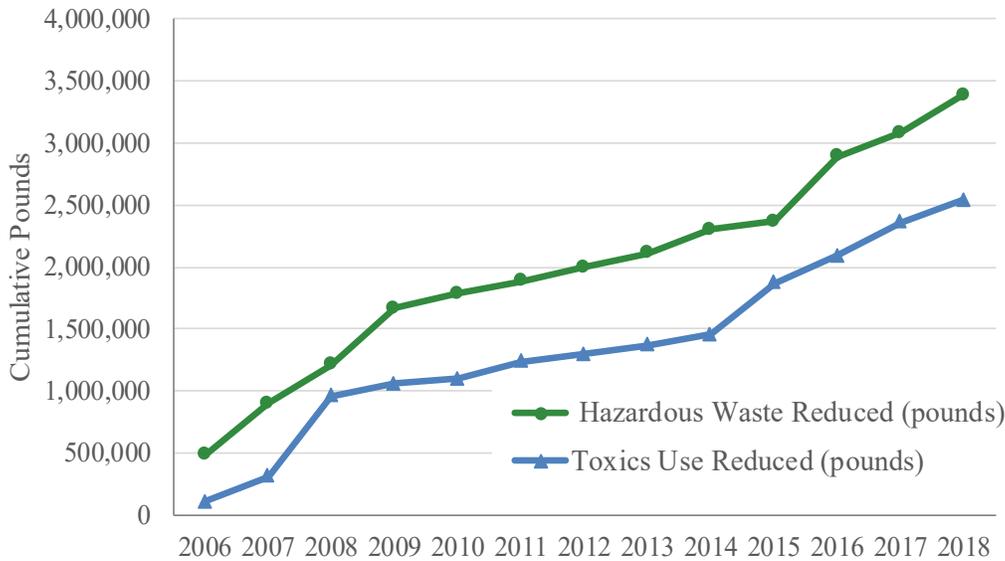
By working with businesses to promote and support pollution prevention.

5.9 million lbs

of hazardous waste and toxic chemicals use reduced since 2006

PERFORMANCE TREND

Reduction in hazardous waste and toxic chemical use



DATA ANALYSIS

By implementing hazardous waste and toxics use reduction strategies, Vermont businesses can:

- save money
- reduce liability
- reduce worker exposure to hazardous chemicals
- reduce regulatory obligations
- satisfy customer demand for safer products
- protect the environment

In Vermont the largest generators of hazardous waste and users of toxic chemicals (Planners) are required to develop three-year plans to identify opportunities to reduce generation of hazardous waste and use of toxic chemicals in their industrial processes. These Planners must generate more than 2,640 pounds of hazardous waste per year or use more than 1,000 pounds of listed toxic chemicals per year. The graph

above demonstrates that this required planning process continues to reduce hazardous waste generation and toxics use. The program’s success is further evidenced by numerous facilities that have reduced their hazardous waste generation and toxics use to below the thresholds required for planning.

DEC visits planning facilities at least once during each three-year planning cycle to review progress in planning to reduce pollution, assist in identifying new pollution reduction opportunities, and evaluate technical and economic feasibility of these opportunities.

In October 2019, the first ever Pollution Prevention Planning conference was held to bring Planners together for networking, sharing success stories, learning about toxics use reduction, and discussing process improvements.

NEXT STEPS

Information-sharing and technical assistance are important to sustain reductions in toxics and hazardous waste use. Efforts to support this will include:

- Working with Planners to provide training and networking opportunities.
- Developing and publicizing case studies of successful toxics use and hazardous waste reduction efforts that are transferable to other facilities.
- Identifying new Planners and helping them develop effective pollution prevention plans.

Additional efforts will focus on updating and enhancing the effectiveness of the planning requirements, including:

- Providing input and recommendations for ways to modernize the program’s enabling statute.
- Improving efficiency in administration of the program to increase capacity of program staff to focus on direct outreach and assistance.

Indicator



Our Communities

2

dams rehabilitated

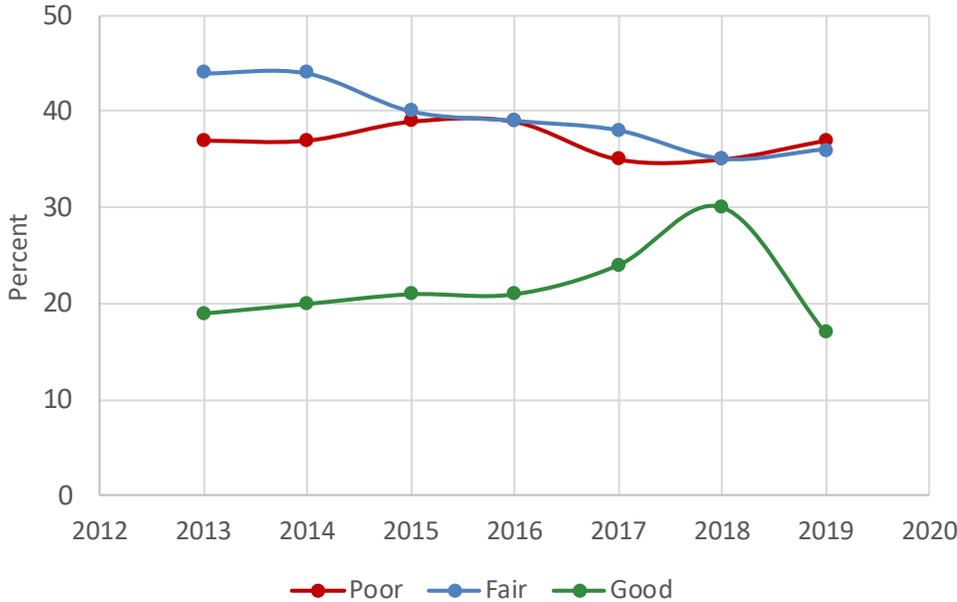
2

dams removed under 10 VSA Chapter 43: Dams in 2019

Percent of Inspected Dams Receiving a Change in Condition Rating

Taking actions necessary to reduce potential failure and risk from dams

PERFORMANCE TREND



*10% of inventoried dams have an unknown condition rating

NEXT STEPS

- The Dam Safety Program is on target for adopting rules by July 1, 2020 regarding administrative requirements, hazard class, and inspections. Additional rules regarding design standards are to be adopted by July 1, 2022.
- The Dam Safety Program was awarded a FEMA High Hazard Potential Dam Grant for the investigation of high hazard dams in poor condition. This grant is the first step in a potentially progressive process leading to repair and risk reduction projects for the State’s highest risk dams.

DATA ANALYSIS

The Dam Safety Program performs inspections of non-power, non-federal dams under 10 VSA Chapter 43 that impound greater than 500,000 cubic feet of water, liquid, and sediments that require authorization to repair, rehabilitate, replace, or remove. The program will also perform inspections on dams that impound less than 500,000 cubic feet if requested by the owner. As part of the inspection, the Dam Safety Program assigns a condition rating (Good, Fair, Poor) as well as reviews the existing hazard classification, or if necessary, assigns a hazard classification. Hazard classification (High, Significant, Low) is based on the potential for damage or loss of life downstream if a dam were to fail. It is not related to the potential for failure or the condition of the dam.

The 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 can be detected and remedied. Annually, a small number of dam owners complete repair, rehabilitation, or operation and management activities that result in an upgraded condition upon re-inspection. There are currently 411 inventoried dams capable of impounding more than 500,000 cubic feet that are in

the Program’s jurisdiction and inspected on a regular schedule.

The chart above shows the most recently recorded condition for all dams (prior to 2019, the data that was reported was only for dams inspected that year). The consideration of additional data and factors during inspections as well as continued lack of maintenance and neglect at a significant number of dams have resulted in a change from a fair to poor condition rating. Approximately 10 percent of the 411 dams have an unknown condition.

The Department may also undertake unsafe dam proceedings and find that a dam is unsafe and a menace to people or property above or below the dam. In these instances, the dam owner may access 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. In 2019, the Dam Safety Program and DEC Rivers Program worked with the City of Rutland to address the deteriorating Dunklee Pond Dam in Rutland, resulting in partial dam removal just prior to the October 2019 Halloween Flood, averting potential catastrophic failure, loss of life, and property damage.



Our Communities

Finance Water Infrastructure Upgrades

Providing low-cost loans and grants to municipalities

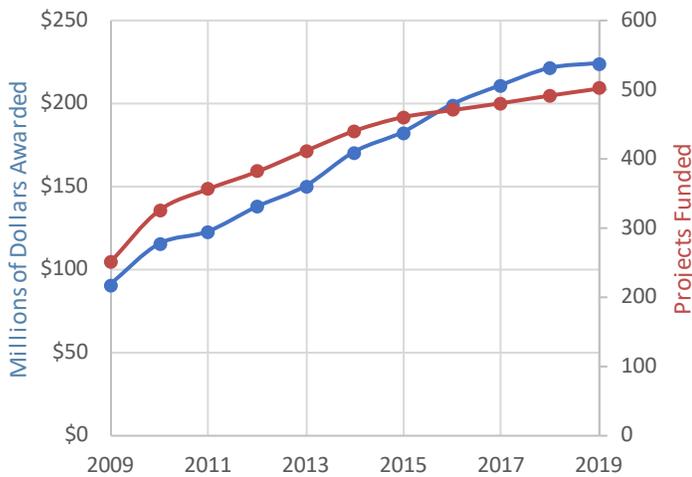
\$294
million

invested in infrastructure upgrades in the past 10 years

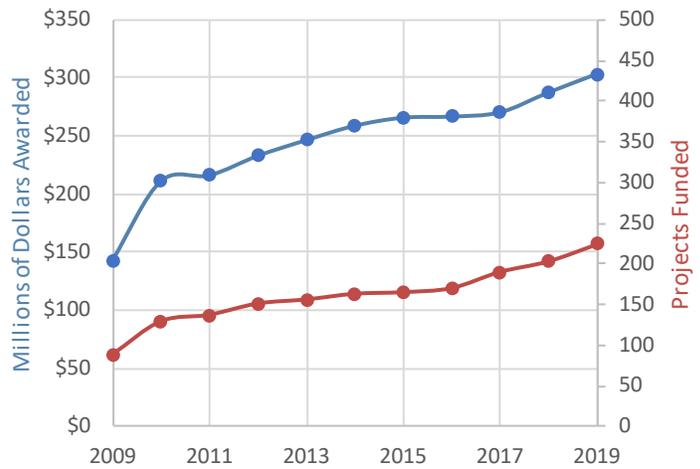
PERFORMANCE TREND

Investments for wastewater and drinking water infrastructure upgrades

Drinking Water



Wastewater



DATA ANALYSIS

Municipalities and certain private entities are eligible to apply for low interest loans from the Clean Water (CWSRF) and Drinking Water (DWSRF) State Revolving Loan Funds. These funds are made available by the US EPA, with matching funds from state capital appropriations. The CWSRF provides low cost loans to municipalities for projects such as wastewater collection and treatment system upgrades, stormwater conveyance and/or treatment, and combined sewer overflow abatement.

With the passage of Act 185 in 2018, CWSRF also provides funding for natural resource projects such as wetland restoration, dam removal, and land conservation that are paired with a traditional CWSRF “sponsor” project through the Water Infrastructure Sponsorship Program (WISPr).

The DWSRF provides low-cost loans to municipal and some privately-owned public water systems for capital improvements that increase public health protection and facilitate compliance with the Safe Drinking Water Act. There are over 400 public community drinking

water systems in Vermont that include both municipally and privately owned water systems serving residential units. Additionally, non-profit, non-community systems qualify for this funding, which are systems serving non-residential uses, such as schools. Vermont has had great success at awarding loans to small water systems, with 90% of funding awarded to systems serving less than 10,000 people.

DEC oversees the application, selection, coordination for financing, construction oversight, and engineering review for these projects. In 2019, the CWSRF secured 21 loan commitments totaling \$16 million and the DWSRF secured 10 loan commitments totaling \$3 million.

Upgrading Vermont’s aging water infrastructure is critical to supporting a vibrant economy by investing in safe drinking water and protecting our rivers, lakes, and ponds. Some of Vermont’s most vulnerable populations benefit from these low-cost loans that help maintain affordability of public drinking water and wastewater infrastructure.

NEXT STEPS

- Implement the Municipal Pollution Control Priority System Rule using a new funding formula
- Improve accuracy of the 20-year municipal infrastructure upgrade projections to enhance capital budget planning
- Accelerate the pace of WISPr projects
- Continue to implement the expanded eligibilities for the CWSRF
- Further develop innovative funding strategies for stormwater including co-funding, public/private partnerships, and impact fee-based trading

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

PREPARED BY: Water Investment Division; <https://dec.vermont.gov/water-investment>

Our Communities

Ensure Sustainable Environmental Infrastructure

Helping public drinking water systems plan for the future

166

public drinking water systems have utilized Asset Management programs since 2014.

PERFORMANCE TREND

Public Community Drinking Water System Receiving Asset Management Assistance



■ Cumulative Number of Community Water Systems Receiving Assistance

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, mapping, 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. DWSRF set-aside funds are used to provide programs that support the

development of Asset Management Plans, as well as Asset Maintenance Programs such as water loss control programs, valve locating and exercising programs, stand-by power evaluations, and lead reduction strategies grants. Since 2014, approximately 166 community water systems have utilized one or more of these programs.

Through proactive communication and outreach, in collaboration with water systems, partners, and other stakeholders, the DWGWPD continues to seek innovative approaches to Asset Management and new technologies to help Vermont’s water systems plan for the future.

NEXT STEPS

- Continue to offer asset management workshops, water loss control programs, and lead reduction strategies grants.
- Continue to offer 100% forgivable asset management planning loans to five community water systems each year.
- Begin offering valve condition and location assessment programs and water rate evaluation services to continue to support Community Water Systems’ Asset Management Programs.

Our Communities

Village Wastewater Solutions Initiative

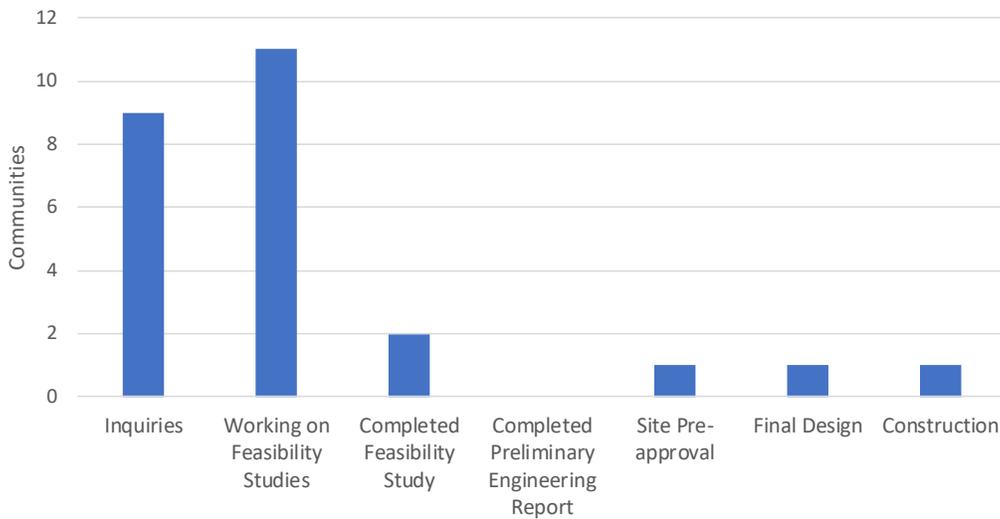
Supporting communities with their water infrastructure planning and financing

11

Number of communities pursuing feasibility studies in 2019

PERFORMANCE TREND

Communities Working on Water/Wastewater Projects (2019)



NEXT STEPS

- Hold Groundwater Festivals with NBRC villages
- Evaluate existing policies and procedures for infrastructure and permitting, for efficiency and effectiveness
- Evaluate and update the Policy of Working with Communities with Failed Wastewater Systems
- Continue to develop and evaluate tools for assisting in rural infrastructure project development
- Promote the indirect discharge pre-approval process

DATA ANALYSIS

DEC has set a strategic goal of supporting drinking water and wastewater infrastructure in Vermont's unserved and underserved communities. In the summer of 2018, DEC along with staff from the Agency of Commerce and Community Development (ACCD) and Department of Health (VDH) collaborated to form an inter-agency workgroup to provide support to rural communities interested in exploring the feasibility of public water or wastewater infrastructure. Workgroup partners include: RCAP Solutions, USDA-Rural Development, VT Council on Rural Development, VT Rural Water Association, and Lamoille and Windham Area Regional Commissions.

In 2019, the group continued to make strides supporting drinking water and wastewater infrastructure, including holding a feedback session on managerial capacity of developed systems, updating the website with videos and more resources, issuing two engineering planning advances to perform feasibility studies, and drafting case studies of several of the project outcomes. Staff also attended public informational events, regular wastewater committee meetings, and several individual meetings with interested municipalities.

In the summer of 2018, DEC successfully applied for a grant from the Northern Border Regional Commission. The project

focuses effort onto three villages: Wolcott, East Burke, and West Burke. Grant progress has included the hiring of coordinators and consulting engineers/hydrogeologists, numerous village committee meetings, a community septic survey and inventory, and private drinking water well testing in West Burke Village.

There is significant interest among Vermont's communities in exploring water and wastewater infrastructure projects. The support, guidance, and resources that are available from the group have been helpful in jump-starting the decision-making process. Eleven communities are undergoing feasibility studies, including East Burke, Fairlee, Highgate, Londonderry, Montgomery, South Londonderry, South Hero, West Burke, West Dummerston, Westminster West, and Wolcott. Two villages have completed feasibility level studies, including Marlboro and Jamaica. Nine other communities have expressed interest, and conversations are ongoing about next steps.

Through collaboration with RCAP Solutions and VDH private drinking water well testing was performed in Jamaica, Marlboro, Grafton, West Dummerston, Westminster West, and West Burke villages. A community wastewater disposal system refurbishment project for Hyde Park village went to construction in 2019 and Addison Four Corners Wastewater System completed final design and is anticipated to go to construction in the spring of 2020.



Our Communities

Identify Vulnerability to Geologic Hazards

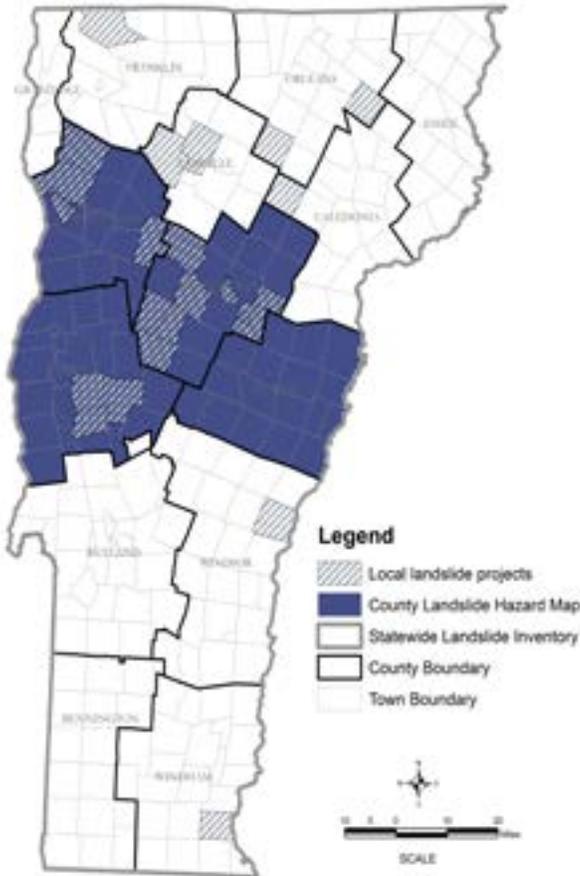
Geologic assessments of landslide, erosion, drought, and seismic hazards

4

county hazard maps
completed since 2016

PERFORMANCE TREND

Hazard mitigation sites and completed assessment projects



identified while mapping bedrock and glacial deposits; they are also identified through community reports. LIDAR and GIS are significant tools used for landslide hazard mapping. In 2016-2019, the Geological Survey completed landslide mapping for Addison, Washington, Chittenden and Orange counties. Data, compiled as a statewide landslide hazard inventory, is posted on the Open Geodata Portal, on the ANR Natural Resource Atlas and included in the US Geological Survey's published inventory. 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.

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. Communication of physical hazards and avoidance is facilitated through our hazards web pages which include an on-line Report a Landslide feature in which the public can add to our landslide inventory. We recently focused efforts on communication of seismic hazard to areas in northwest Vermont, areas identified by USGS as having a moderate risk of experiencing damaging earthquakes.

NEXT STEPS

- Conduct surficial geologic mapping and identify areas prone to erosion and landslides.
- Seek funding to continue essential county landslide inventory maps.
- Respond to and monitor landslide and rockfall events.
- Conduct regional groundwater studies for drought resiliency and response.
- Continue coordination with FEMA, Vermont Emergency Management, the Northeast States Emergency Consortium (NESEC), Regional Planning Commissions and universities to create seismic hazard mitigation information and communicate hazards to the public.

DATA ANALYSIS

The Vermont Geological Survey collects and interprets data about landslides, earthquakes, flood and drought 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. Hazard maps identify areas of higher risk and are the primary tool for hazard avoidance and mitigation.

The above map shows where studies have been conducted, including local landslide sites and regional seismic hazard analyses. Sites of concern are often

Indicator



Our Customers

Improve Business Practices to Gain Efficiencies

Developing a culture of continuous improvement through Lean

65%

DEC Employees feel encouraged to share improvement ideas

PERFORMANCE TREND

Percent of staff who feel encouraged to share improvement ideas



note - no survey results are available for 2018

NEXT STEPS

- Build upon successes to date and expand utilization of Lean principles and tools across the Department.
- Encourage and support everyday improvements at the operational level.
- Provide assistance to managers in their efforts to improve program performance.
- Track performance of ongoing and completed projects to ensure they're meeting performance goals.
- Continue to build staff capacity through training and practical application.
- Bolster communication about Lean efforts internally and externally.
- Support staff facilitation training through participating in the white, yellow and green belt trainings offered by the Agency of Administration.

DATA ANALYSIS

The Department adopted Lean in 2013 to better serve the Vermont public through more efficient, timely, and transparent processes and to build a culture of continuous improvement. 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.

Ten different Lean projects were started in 2019. Through these events, 75 staff were engaged across the Agency of Natural Resources. In 2019, 13 projects are in ongoing implementation and 6 projects have been completed this year.

DEC currently has 26 active continuous improvement facilitators certified through the Agency of Administration, the highest percentage of staff certified in any state Department. By leveraging staff resources through all DEC's divisions, there is a large array of expertise for a variety of facilitation needs. Ongoing training and involving staff in Continuous Improvement and Lean

training and events has led to an improved culture of continuous improvement. The Annual Employee Engagement survey indicates a significant increase in the percent of staff who feel encouraged to share improvement ideas increasing from 37% in 2013 and climbing to 65% in 2019.

Example accomplishments in 2019 include:

- **Aquatic Nuisance Grants-in-Aid:** Consolidated 25% of individual grant projects into overarching grant agreement. This increased the efficiency of delivery of project funds as decreased the administrative burden associated with management individual grant agreements.
- **Ecosystem Restoration Grants:** Increased transparency and communication to grant applicants by developing a Granting Policy Plan resulting in a 15% increase in administratively complete projects.

DATA SOURCE: DEC Business Transformation Initiative Annual Report, DHR Employee Engagement Survey

PREPARED BY: Administration and Innovation Division; (802) 585-8171



Our Customers

Deliver Quick and Easy Access to Information

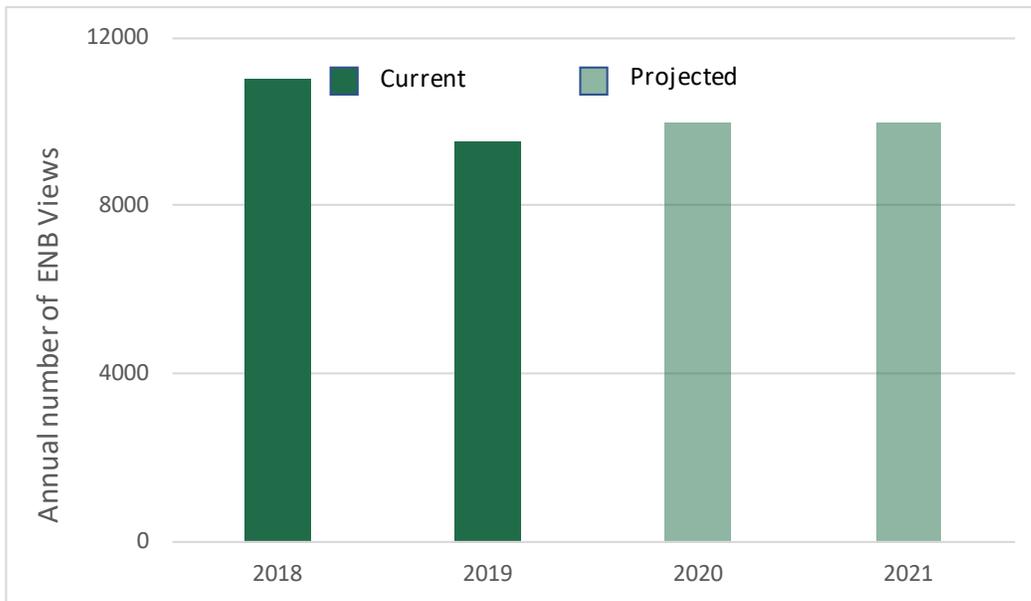
Providing real-time information on permit applications under review

9,535

Views of Environmental Notice Bulletin in 2019

PERFORMANCE TREND

Environmental Notice Bulletin (ENB) - Annual Number of Views



DATA ANALYSIS

In 2018, the Department launched the Environmental Notice Bulletin Version 2 (ENB) to publicize most notices and documents related to permits being processed by the Department. This online system integrates data from 13 databases and 20 Department programs. The ENB includes an email subscription service for the public, consultants, and other interested parties enabling them to receive all public notice updates for selected regions, activities, or permits. The ENB allows the public to provide comments and request public meetings. These efforts all serve to improve accessibility, transparency, and user satisfaction.

During calendar year 2019, 2,394 permitting activities were posted to the ENB, and the Department received 117 public comments online through the ENB. The number of accounts created on the ENB continues to increase, and at the end of 2019 there were 908 active accounts (460 were created in 2019) and 20,534 views of activity pages on the ENB

(9,535 views were from 2019). The system sent out over 63,000 email notifications to interested parties regarding permit approval activities.

The annual number of page views of the ENB is lower in 2019 than in 2018. One possible reason for the lower number of views is that, when ENB launched in 2018, staff members may have been checking the ENB from the public side to be sure their activities were posted correctly. The Department also issued a survey to all users with an email address stored in the database in 2019, and found that 62% of respondents self-reported rarely using the ENB website. We also found that 56% of respondents agreed or strongly agreed with the statement “The emails sent by the ENB get the right information to the right people, including town officials and others who are interested in the activity”. This indicates that the public is getting the information they need from the email service, and may not often have a need to visit the ENB website for more information.

NEXT STEPS

- Launch development that enables the Environmental Notice Bulletin to provide more accurate permit project locations for large and linear projects for improved user interface.
- Continue development and updates to ENB with a customer service focus, utilizing results from the survey.
- Support the current system and troubleshoot database compatibility issues.
- Provide technical assistance to external users through individual support to applicants over the phone. Continue to offer training to internal staff and external users through formal training at conferences and events.



Our Customers

Support Implementation and Use of Online Permitting

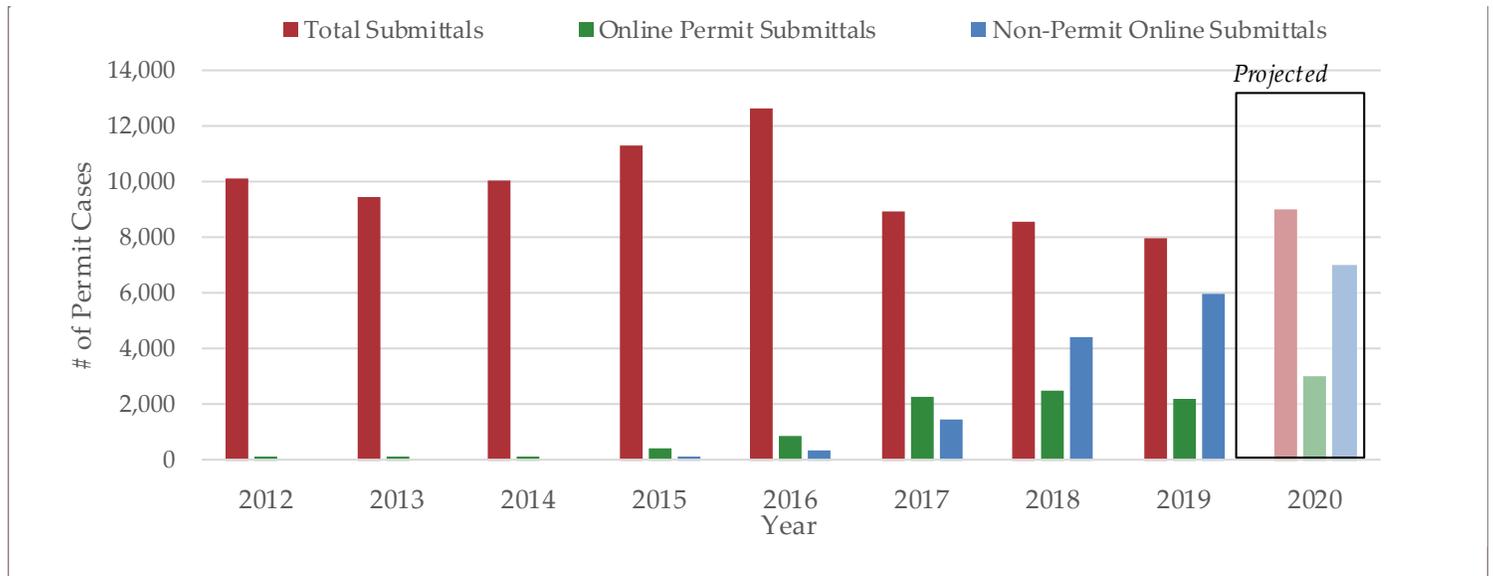
Increasing use of technology for a web-based submittal system

28%

of permit applications submitted online

PERFORMANCE TREND

ANR Online electronic submittals



DATA ANALYSIS

Programs across the Department 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 2019 (SFY19), approximately 8,174 “external” online submittals were received by the Department, 2,218 of which were specifically for permits (28%) and an additional 5,956 submittals covered other important transactions including online compliance reports.

The number of permit applications is not increasing as quickly as previously anticipated because the Department has put a larger emphasis on other non-permit related electronic transactions including submitting online compliance reports. Data entry associated with these manual reports often creates a larger administrative burden than processing paper permit applications.

While we continue to develop additional compliance reporting forms, the department is now increasing the development of permit application forms.

Most of the increase in online reporting between SFY’18 and SFY’19 was attributable to an increase in volume of two compliance reporting forms, the Wastewater Program’s Discharge Monitoring Report (DMR) form and the Stormwater Program’s Annual Inspection Report form. Each of those forms saw an increase of approximately 500 submissions in SFY’19. There were also a number of new forms launched that contributed to the overall increase. However, use of most of the new forms was just beginning at the end of SFY’19 so they didn’t contribute significantly to the increase in volume. Approximately 55 forms are currently available in ANR Online with additional forms currently under development.

NEXT STEPS

- Grow capabilities for a web based permit application, data submittal system, and payment process
- Train program staff to create online forms
- 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.



Our Customers

Resolving Environmental Violations

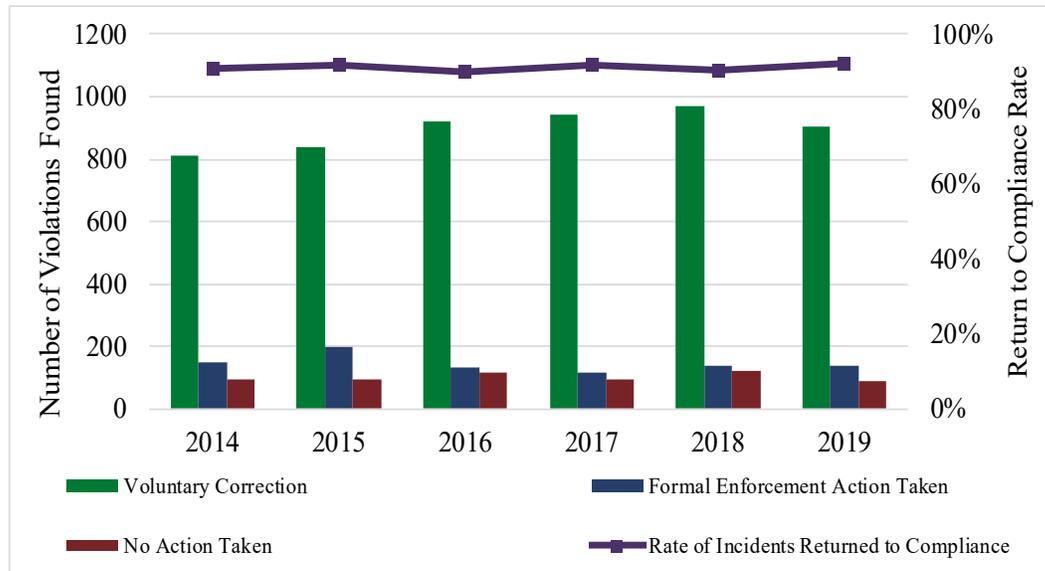
Through investigations and enforcement actions.

92%

of incidents were returned to compliance after a violation was found in 2019

PERFORMANCE TREND

Outcomes for incidents with a violation found



DATA ANALYSIS

The Department is responsible for investigating and documenting all alleged violations (including all citizen complaints) of environmental permits, rules, regulations, and statutes that are under the jurisdiction of DEC.

DEC closed over 2,300 incidents in 2019. About 47% of these incidents were found to have been a violation. Of that 47%, 92% of incidents have been returned to compliance. The yearly rate of incidents returned to compliance has remained steady since 2014.

Compliance can be sought through a variety of methods including: voluntary correction, directed correction, requiring a permit to be obtained, or pursuing formal enforcement through a case or citation. Infrequently, when a violation is found, returning the incident to compliance may not be achieved. This may be due to a lack of resources, a lack of evidence, or the violation may have had a minimal impact on human health or the environment.

Compliance is mostly attained through voluntary correction (80%). If an incident is particularly egregious, threatens DEC program integrity, or voluntary compliance does not occur, formal enforcement action may be pursued (12%). Formal enforcement action typically involves compliance directives to return the incident to compliance and a monetary penalty to deter both the respondent and regulated community from committing future violations.

To deliver services more efficiently and consistently, the Enforcement Section has developed and continues to develop trainings on enforcement basics and case documentation to offer to ANR staff members. In 2019, ECD offered three new trainings on inspections, photos, and reports. Employee training has assured rapid response and helped maintain a strong return to compliance rate.

NEXT STEPS

- Deliver and expand trainings offered to DEC staff members on enforcement basics and case documentation including the three new trainings on inspections, photos, and reports.
- Strategically prioritize investigations and cases by the potential and/or actual impact to human health and the environment.
- Implement the 2019 DEC Compliance Procedure.
- Continue and improve collection of program incident data related to enforcement