

FISH & WILDLIFE DEPARTMENT PERFORMANCE-BASED BUDGET 2022 REPORT



DEPARTMENT OVERVIEW

We are biologists, game wardens, educators and support staff.

Our MISSION is conserving fish, wildlife, plants, and their habitats for the people of Vermont.

Administration: provides policy, legal, personnel, and financial leadership for the department. The division oversees license sales and more than 15 other permits related to resource protection. It also promulgates rules and regulations via the Commissioner and the Fish & Wildlife Board.

Fisheries: conserves and manages the state's fish populations and aquatic habitats. This includes: operating five fish hatcheries; maintaining 203 fishing access areas; controlling the spread of fish diseases, invasive fish and aquatic nuisance species; restoring populations of fish such as muskie, lake sturgeon and landlocked Atlantic salmon; and protecting aquatic species and critical aquatic habitat through technical assistance of regulatory processes such as Act 250, Section 248, hydroelectric dam relicensing, stream alteration and shore land protection permits, and aquatic organism passage.

Division of Warden Service: protects Vermont's fish and wildlife from poaching and illegal trade, in addition to ensuring that the state's 170,000 licensed hunters, anglers, and trappers are compliant with rules and regulations. State Game Wardens respond to human - wildlife conflicts, animal damage complaints, potentially diseased animals, and remove dead big game animals

from roadsides. They also perform standard law enforcement duties such as search and rescue, assistance to other law enforcement agencies, and boating, snowmobile, and ATV operation enforcement.

Outreach: connects Vermonters of all ages and abilities to the natural world. This includes operating the department's two Green Mountain Conservation Camps and reaching thousands of people through conservation education programs. Outreach staff also produce the annual law digests and calendar; develop press releases and content for the department's website and social media pages; and respond to public inquires.

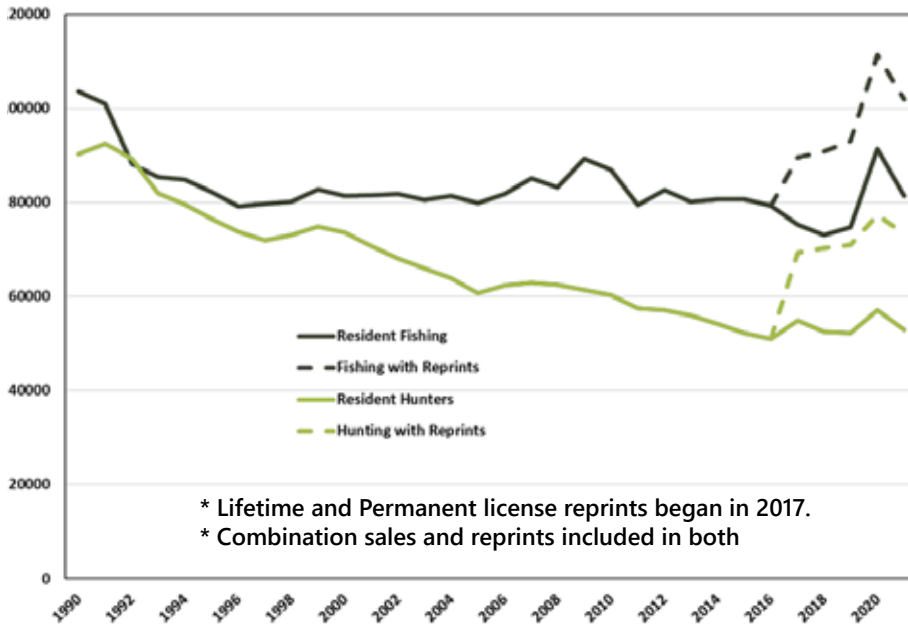
Wildlife: protects, manages, and restores all wildlife, plants, and their habitats throughout Vermont. Division staff work on three main areas—management and conservation of hunted or trapped species; public and private land and habitat conservation, management, and restoration; and the protection and recovery of rare, threatened, and endangered species. This includes the oversight of 101 Wildlife Management Areas and participating in the protection of important wildlife habitat through the Act 250 and Act 248 processes, among others.

PARTICIPATION IN HUNTING, FISHING AND TRAPPING



Performance measure: Maintain the number of Vermonters participating in hunting, fishing and trapping, as measured by active licenses.

Resident Hunting and Fishing License Sales Including Reprints*



* Lifetime and Permanent license reprints began in 2017.
* Combination sales and reprints included in both

*License sales are recorded by calendar year. 2022 licenses sales will be reported in next year's report.

Even if yearly sales don't always reflect it, the pandemic underscored the importance of hunting and fishing to Vermonters.

License sales surged during the COVID-19 pandemic. Some increase was expected. Surveys have repeatedly found that "not enough time" and "family/work obligations" are the biggest barriers to hunting and fishing participation. However, the magnitude of the increase was greater than expected.

The pandemic clearly allowed thousands of Vermonters the time they said they needed to get outdoors. Unfortunately, there has been no permanent change in behavior. In 2021, sales of most resident license types declined. While still above pre-pandemic levels, a 'hangover' effect may suppress sales over the next few years if residents spend less time outdoors to make up for lost time with other activities.

The department's capacity to conserve fish and wildlife as well as the viability of businesses that depend on wildlife-related recreation are linked to sporting license sales and hunting, fishing and trapping participation.

Yearly license sales are not equivalent to the number of hunters and anglers in the field. Youth under the age of 15 fish for free, and, if their property is unposted, landowners do not need licenses to hunt and fish on their own land. More importantly, many resident hunters hold permanent and lifetime licenses; license types that are not considered sales after the first year of purchase.

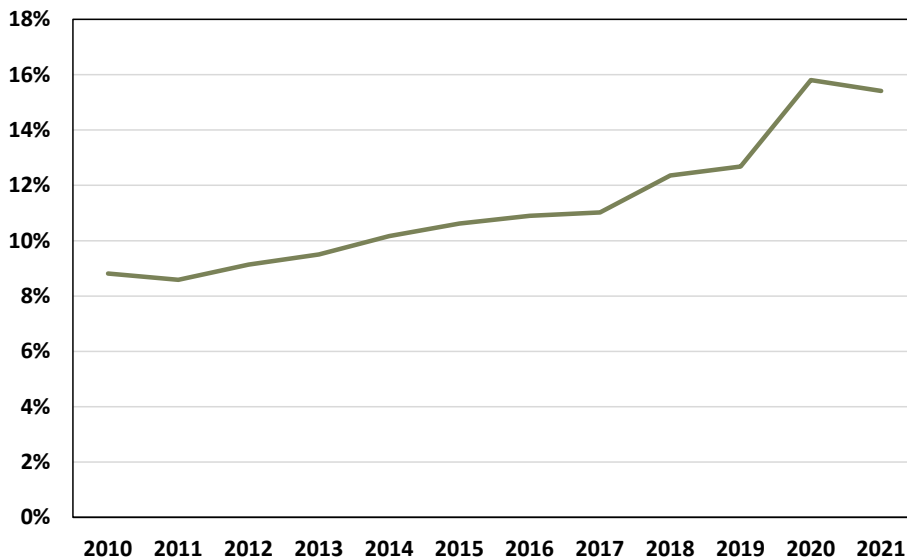
Starting in 2017, the department has required yearly 'reprints' of these licenses from those planning to use them, and, when added to license sales, the totals show a much smaller decline in participation than sales alone had previously suggested. Reprints, however, are directly related to the state's demographics. As Vermont ages, they will likely decrease over time.

WOMEN IN THE OUTDOORS



Performance measure: Increase the number of women participating in hunting, trapping and fishing in Vermont, as measured by license sales.

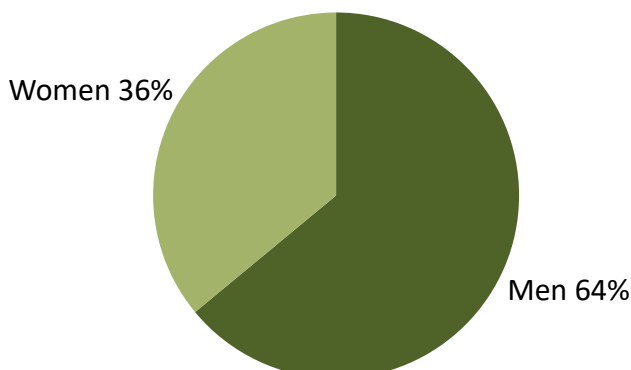
Women by Percentage of Resident Hunting and Combination License Sales



The number of female hunters increased in the 2000s and has since leveled out.

Both the number and percentage of female hunters in the hunting population had risen steadily over the last decade. Not coincidentally, the number of female hunter education students is also following this trend. In calendar year 2021, 36 percent of hunter education graduates were female and more than half of them went on to hunt in the fall. This purchase rate (56%) was essentially equal to the percentage of male hunter education students (57%) who also went on to hunt in 2021.

Resident Fishing License Sales by Gender



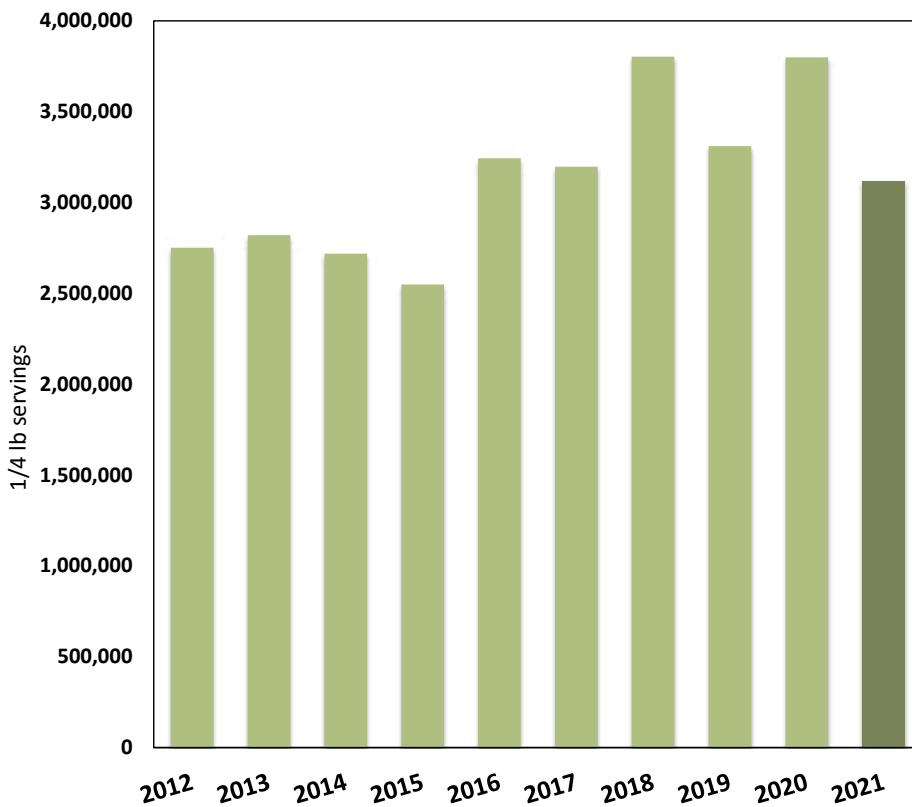
Meanwhile, women account for a third of all resident fishing license sales and represent a quarter of all anglers, a ratio that has remained stable for decades.

MEAT HARVESTED THROUGH HUNTING



Performance measure: The amount of meat, fish and other resources from fish and wildlife, taken annually, during regulated seasons shall be maintained at sustainable levels.

Meals of Venison Provided Through Regulated Hunting



Hunting and fishing provide Vermonters with free-range, local, sustainable, and affordable food sources.

Vermont is a leader in ‘Farm to Table’ and eating locally is a primary motivation for first-time hunters, especially those who are not from hunting backgrounds. Among experienced hunters, meat ranks among the top reasons to hunt. Anecdotally, the importance of meat has only increased due to food security concerns related to the pandemic and inflation.

Fishing is mostly associated with relaxation and spending time with friends and family, though some species like yellow perch, walleye and crappie owe most of their popularity to their taste. Keeping fish is particularly common during the winter when cold temperatures both in and out of the water keeps fillets firm and fresh.

CONSUMER SPENDING AND WILDLIFE-RELATED RECREATION



Performance measure: Maintain consumer spending related to wildlife-recreation.

Long hunting and fishing seasons are a testament to the sustainability of carefully managed fish and game species while the steady, off-season traffic they create provides reliable income to rural general stores, restaurants, gas stations, and retailers.

The economic benefits of wildlife extend beyond hunting and fishing. Vermont is home to a number of wildlife-watching hotspots that draw both residents and nonresidents, all of whom must eat, sleep and be outfitted. Dead Creek Wildlife Management Area (WMA), for instance, is known throughout Vermont, even among the most casual observers, for its up-close views of snow geese each fall. In contrast, serious birders from New England and beyond visit Wenlock Wildlife Management Area and the surrounding area for its accessible opportunities for boreal birds, such as black-backed woodpeckers, gray jays and spruce grouse.

As immeasurable as wildlife's cultural importance may be to the state, wildlife-related recreation generates significant economic activity and the sum of this passion quickly adds up and represents a significant contribution to the economy.

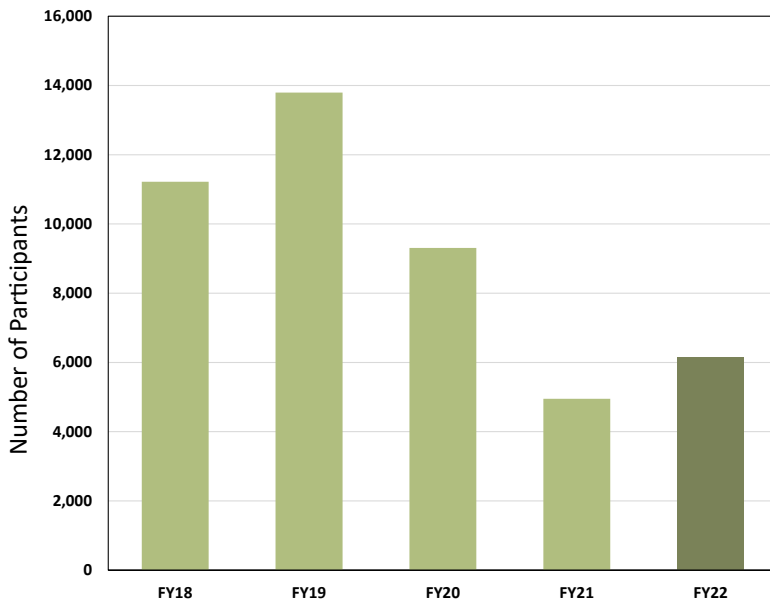
- ❖ A US Department of Commerce, Bureau of Economic Analysis found only snow sports topped hunting, shooting and trapping in total, value-added economic impact in Vermont with boating and fishing coming in fourth. The recreational activities examined ran the gamut from the conventional (camping, hiking and climbing) to agritourism, outdoor concerts and even gardening.
- ❖ Wildlife-related spending is particularly important to rural areas and often coincides with the 'off-season' for other tourism.
- ❖ Anglers make a significant contribution to tourism; the bulk of their spending is on food, lodging and related trip expenses.
- ❖ According to survey conducted by UVM's Center for Rural Studies, Lake Champlain generates an average expenditure of \$88 per angler, per day.
- ❖ Vermont draws dedicated wildlife watchers from around the region, not counting casual viewing by residents and tourists.
- ❖ The economic impact of bird feeding in Vermont cannot be overstated. The US Fish and Wildlife Service estimates almost half of Vermont households feed birds.

CONSERVATION EDUCATION AND OUTREACH PROGRAMS



Performance measure: Maintain or increase the public's support for, and knowledge of, fish and wildlife conservation and land stewardship.

Fish & Wildlife Education Program Participation (in person)



Fish & Wildlife programs are affordable. Other than the Green Mountain Conservation Camps and educator's course, all programs are free. Camp tuition is a fraction of the cost of almost any other week-long, residential camp. Plus, there are an ample number of scholarships available for those in need. All applicants that demonstrate need receive financial support.

The department works to maintain Vermonters' strong connection to the land.

The department's education programs strengthen an understanding of ecology, build support for conservation and teach the outdoor skills needed to responsibly enjoy our woods and waters. As expected, COVID limited in-person participation in the first half of the fiscal year. As a result, the department continued to augment opportunities with virtual and online educational programs, including fishing clinics, game cooking seminars, wildlife tracking and basic firearm and bowhunter hunter education certification courses. In all, this content reached 4,700 people.

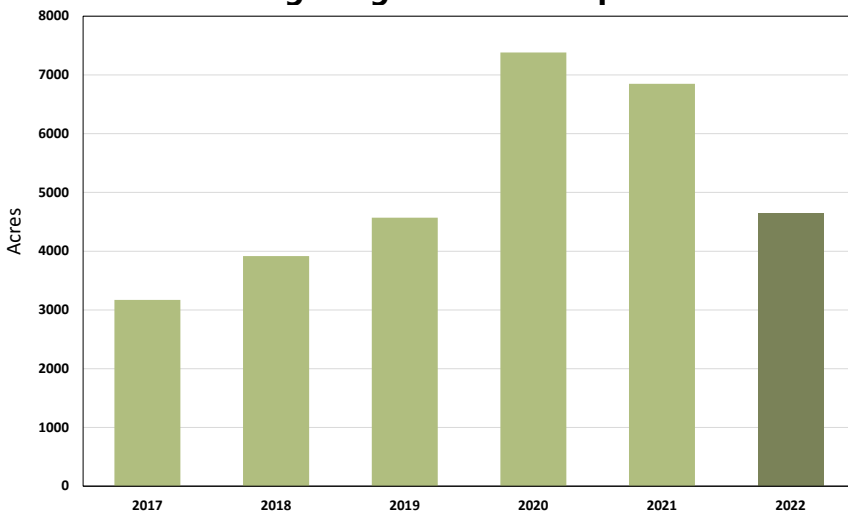
The department has been working with New American communities in the Burlington area to enhance their access to outdoor recreation. Fishing clinics have proven to be the most relevant and successful of these programs, as fishing is affordable and readily accessible and can double as a food source. In FY22, these clinics, in partnership with other organizations, reached 175 New Americans. The participants received free fishing rods, life jackets, and occasionally fishing licenses.

HABITAT CONSERVATION THROUGH ACT 250

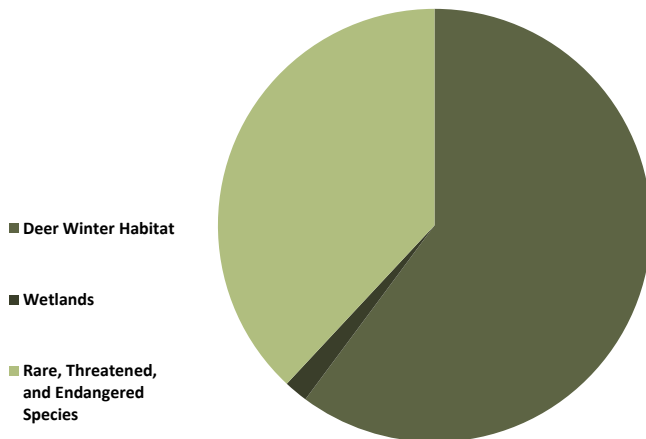


Performance measure: Increase the number of acres of habitat and miles of shoreline protected through the regulatory process.

Acres of Habitat Preserved, Per Year, through Regulated Development



Habitat Protected by Type Through Regulated Development Projects in 2022

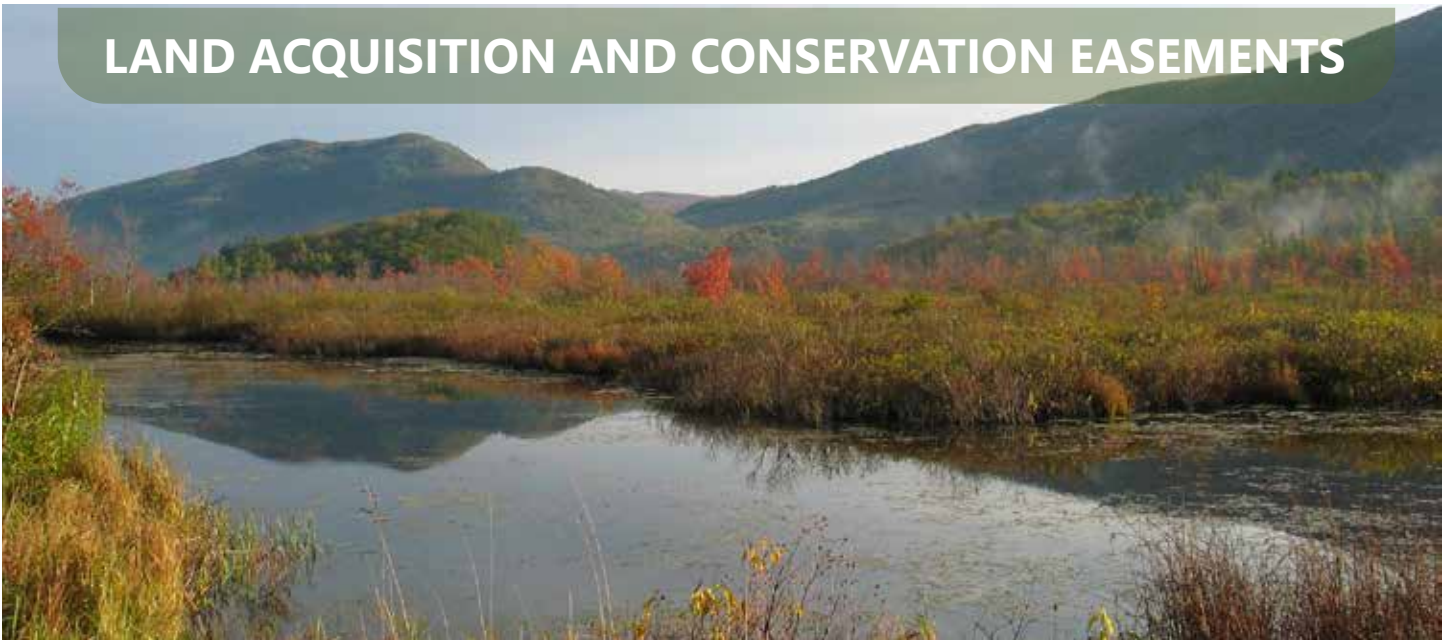


Act 250 works to protect important habitats for fish and wildlife.

The department plays an essential role in the protection of ecologically important fish and wildlife habitat by providing technical assistance through Act 250 and Section 248. In FY22, this included reviewing 431 projects and protecting 4,646 acres. Work for the Vermont Public Utility Commission included the assessment of 4,383 acres of forestland destined to fuel the Burlington Electric Department and Ryegate Associates biomass energy facilities.

Only 3 to 5 percent of all development projects in Vermont are regulated by Act 250. As a result, Vermont loses roughly 6,500 acres of undeveloped land every year, an area roughly the size of Montpelier. As part of its strategic plan, the department pursues alternate solutions to minimize habitat loss and fragmentation such as advising town and regional planning commissions and assisting private landowners with conservation practices.

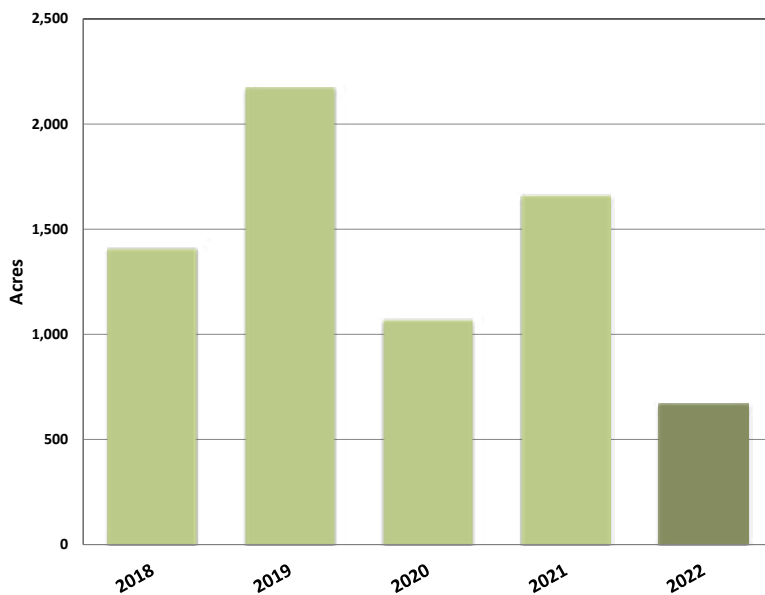
LAND ACQUISITION AND CONSERVATION EASEMENTS



Performance measure: Increase the cumulative number of acres of high-value habitats and natural communities conserved through acquisition or easements.

Strategically targeting critical habitats for conservation.

Wildlife Habitat Conserved through Acquisitions and Easements



The department's public lands are open to hunting, fishing, trapping, wildlife watching or for just connecting with nature.

Working with many partners, the department is safeguarding important fish and wildlife habitat through acquisitions, easements, and management agreements. The department closed on seven real estate transactions in the fiscal year totaling 671 acres.

Most notably, the department continued its acquisition of ecologically significant wetland habitat in the towns of Brandon and Sudbury by adding close to 400 acres to the Brandon Swamp Wildlife Management Area (WMA). Brandon swamp is one of the seven named swamps that make up the 15,500-acre Otter Creek Swamps complex. Considered the most biologically diverse swamp complex in New England, conserving these properties provides species habitat and public access to a unique Vermont landscape. The project was funded by the department's Duck Stamp Fund.

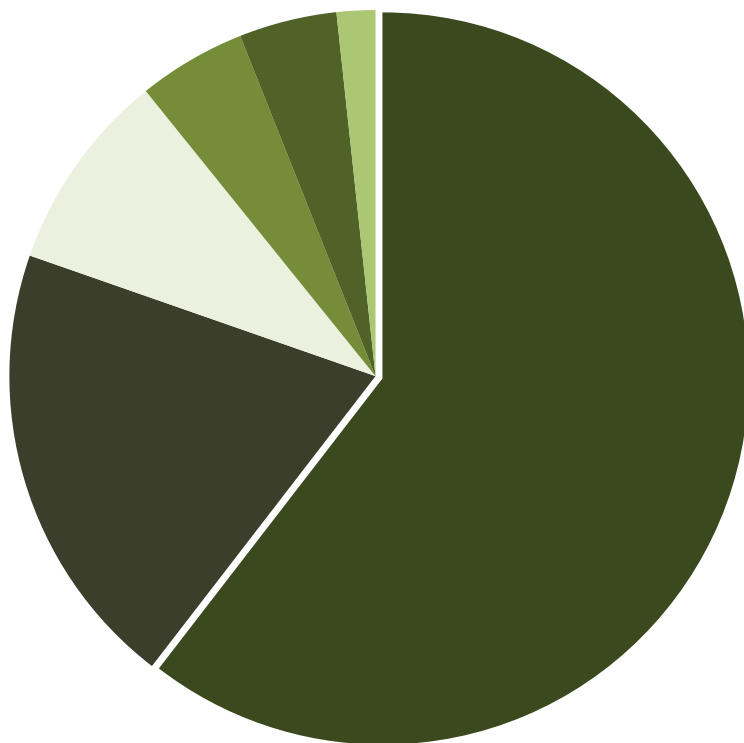
Other FY22 projects included two acquisitions, totaling just over 360 acres, that will enhance water quality through wetland restoration and add wildlife habitat at Dead Creek WMA in Addison County, one our most popular WMAs. They were a result of the Environmental Protection Agency Wetland Acquisition and Restoration grant. Eight additional projects, also being funded by this grant, are in various stages of development.

HABITAT ASSISTANCE FOR PRIVATE LANDOWNERS



Performance measure: Increase the cumulative number of acres of high-value habitats improved through private lands technical assistance.

Wildlife Habitat Improved on Private Lands through Fish & Wildlife Staff Technical Assistance



- Invasive Species Control / Herbaceous Weed Control
- Mast Tree Release
- Forest Stand Improvement
- Young Forest Habitat Created
- Apple Tree Release
- Other

Approximately 80 percent of Vermont land is privately owned, working with landowners is essential to wildlife habitat.

In FY22, department staff conducted 540 site visits and provided wildlife habitat technical services to more than 450 landowners. The primary focus of these visits was to familiarize landowners with potential habitat management activities and funding sources, and more broadly, to introduce a ‘conservation-based’ way of thinking about the future of their property.

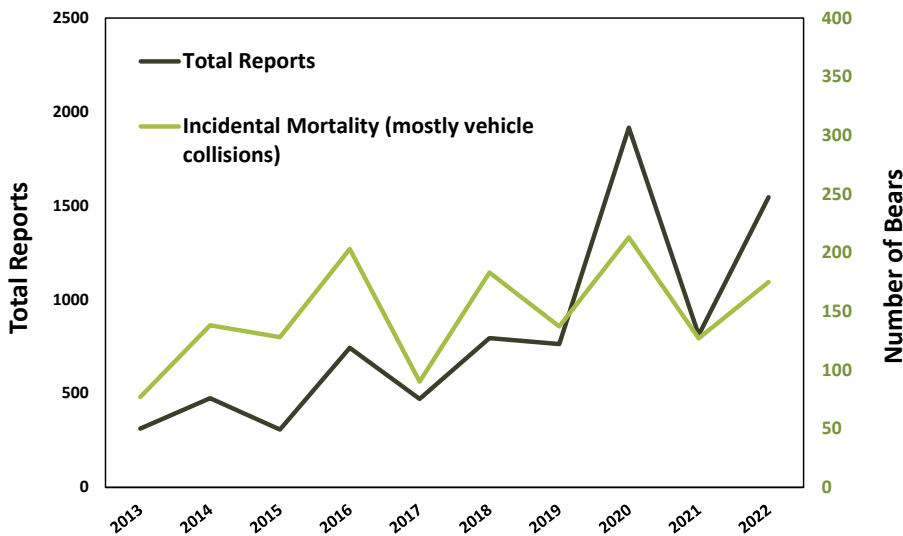
These visits also resulted in direct improvement to 1,282 acres of important wildlife habitat through the federal Natural Resources Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP) program. In addition, department staff worked closely with 21 partnering organizations to coordinate landowner habitat technical assistance efforts and presented workshops to conservation organizations, natural resource professionals, and students.

WILDLIFE DAMAGE AND CONFLICT



Performance measure: Minimize the total number of negative interactions occurring between wildlife and Vermonters to achieve acceptable levels of human safety and tolerance and to protect critical wildlife habitats.

Public Reports of Bear-Human Conflicts & Incidental Bear Mortalities



Two people were injured by bears in 2022. Both attacks appear to have been defensive, and both involved dogs and their owners surprising bears at close range.

On August 20th, a Strafford woman was charged while she was walking her two dogs in the woods behind her home. In her attempt to avoid the bear, she stumbled over a stonewall, and, now on the ground, the bear scratched her back and bit her once in the upper leg. Fortunately, one of her dogs then aggressively confronted the bear, allowing the woman escape. Based on the evidence, the department suspects the bear was leaving a natural food source when it was caught off guard. It may also have had cubs, but this wasn't confirmed. It was likely not preventable.

On November 2nd, a Winhall resident was attacked, at night, just outside her home when she took her dog outside at night. Unbeknownst to the woman, a female bear and her cubs were feeding on pumpkins in the courtyard of her condo development. The dog immediately scared a cub up a tree and the adult bear attacked the woman. Her partner was able to drive the bear off and pull her inside to safety. She received 15 wounds on her leg, hand, and head – many of which needed sutures or staples. The development and surrounding ski resort had a history of bears accessing human food.

Prior to 2022, Vermont had only three documented cases of bears injuring people. Two of these involved individuals who were intentionally feeding bears (2011, 2018), while the third, in 1943, was the result of a hunter attempting to recover a wounded bear.

Record numbers of bear-human interactions are challenging the department's capacity to provide direct and effective assistance.

Since 1990, the bear population has doubled, but reports of bears causing damage has increased 20 to 30-fold. Dealing with these complaints falls mainly on the shoulders of game wardens and wildlife staff.

Reported conflicts increased dramatically in 2022. This was partially expected. Conflicts tend to fluctuate with natural food availability. Beechnut and acorn crops were poor this year and other seasonal food sources were spotty. However, the number of complaints was more than twice what would typically be expected in a poor food year. This was also the case in 2020, but 2022 also included two bear attacks and a troubling rise in bears entering or attempting to enter homes. Contributing factors for the increase are thought to include:

- ❖ Bears expanding their range into areas whose residents have no long-term experience living in bear country.

WILDLIFE DAMAGE AND CONFLICT



Performance measure: Minimize the total number of negative interactions occurring between wildlife and Vermonters to achieve acceptable levels of human safety and tolerance and to protect critical wildlife habitats.

Beaver Baffle Program

Beaver-created wetlands are valuable wildlife habitat that can also improve flood resiliency and water quality and help mitigate the impacts of drought. These same wetlands, however, can also threaten public and private infrastructure and create safety hazards. To help road crews and landowners resolve conflicts and maintain these important wetlands, the department established the beaver baffle program over 20 years ago.

Beaver baffles can maintain the water level in a beaver-created wetland at a lower, more manageable water level. While not effective in all situations and certainly not a replacement for beaver population management, the devices allow some water to pass through a dam without the need to breach the dam and, just as importantly, without the beavers figuring out how to stop it. The baffles are one of many techniques that the program employs or recommends to minimize damage, including fencing to protect culverts and wire mesh or special paint to prevent gnawing.

Since the project's inception in 2000, 326 structures (194 baffles and 132 exclusion fences) have been installed around the state, impacting 3,664 acres of beaver created wetland habitats.

In FY22, program staff:

- ❖ Responded to over 545 public inquiries related to beaver conflicts
- ❖ Conducted 52 site visits
- ❖ Installed 11 exclusion fences and 5 baffles
- ❖ Influenced 314 acres of beaver created wetlands.

Bear-Human Interactions (continued)

- ❖ An influx of people from suburban and urban environments outside Vermont who lack experience with bears.
- ❖ A shift in behavior as more bears learn that human foods are an easy to find and reliable.
- ❖ A web-based reporting form, introduced in 2018, made it easier for people to report incidents.

Garbage, compost, birdfeeders, and backyard chickens are the most frequent targets, with complaints related to garbage and compost making up over 50% of yearly reports. Damage to beehives and crops, and livestock predation is also common.

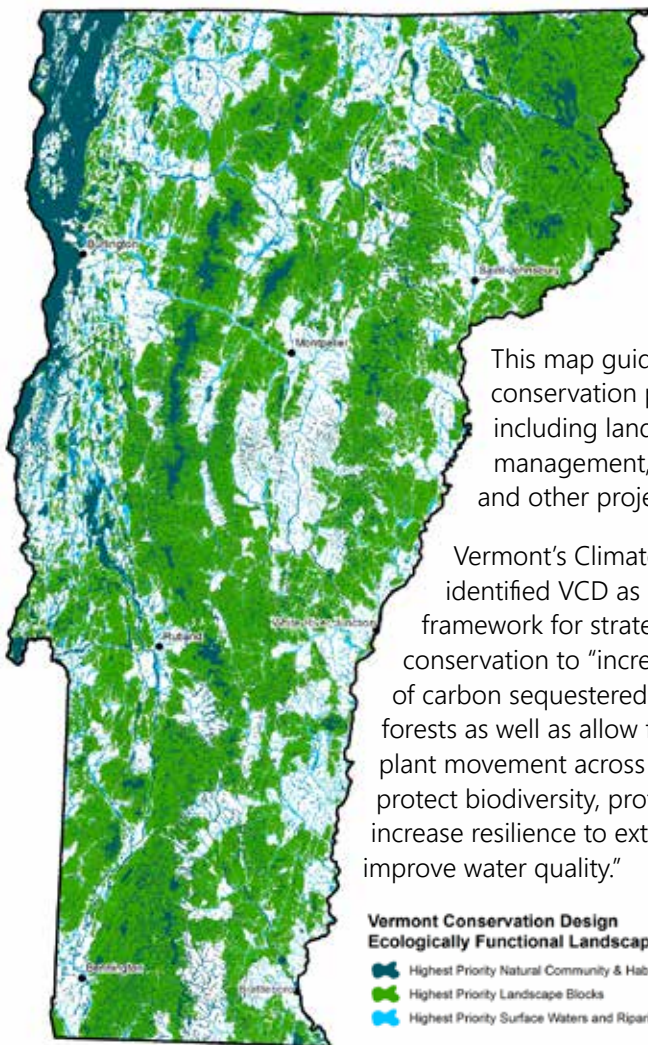
Education centered around preventing access to human foods is critical. In 2022, the department's expanded outreach and education efforts included on-the-ground technical assistance, presentations on living with bears, online content, social media posts, and television and radio spots. While some of this outreach was statewide, staff targeted communities with the highest problems.

Education, however, cannot overcome systemic problems with garbage and food scrap storage. People must have access to secure storage devices. To help address this, the department has increased coordination with Department of Environmental Conservation solid waste, solid waste districts, trash haulers, and USDA (APHIS) Wildlife Services.

MAINTAINING ECOLOGICAL FUNCTION THROUGH VERMONT CONSERVATION DESIGN



Performance measure: Increase the percentage of lands and waters containing the highest priority forest blocks and riparian areas identified in Vermont Conservation Design in some form of protection, conservation, improvement or restoration.



This map guides department conservation programs including land acquisition, land management, land use planning and other projects.

Vermont's Climate Action Plan identified VCD as a guiding framework for strategic land conservation to "increase the amount of carbon sequestered and stored in our forests as well as allow for wildlife and plant movement across the landscape, protect biodiversity, protect climate refugia, increase resilience to extreme weather and improve water quality."

- Vermont Conservation Design Ecologically Functional Landscape**
- Highest Priority Natural Community & Habitat Features
 - Highest Priority Landscape Blocks
 - Highest Priority Surface Waters and Riparian Areas

Vermont Conservation Design (VCD) is a science-based vision to sustain our forests, waters, and wildlife for future generations.

VCD identifies the intact, connected, and diverse lands and waters that are highest priority for ecological function. Thoughtful management and conservation of these places helps maintain a healthy environment and all the benefits it provides to fish, wildlife, plants and people.

As a result, VCD informs land acquisition, land management, land use planning and other conservation efforts. In 2022, the department used it to encourage landowners, towns, and partner organizations to voluntarily focus conservation and stewardship in high priority areas and to help identify species that need specific conservation attention for biological or social reasons.

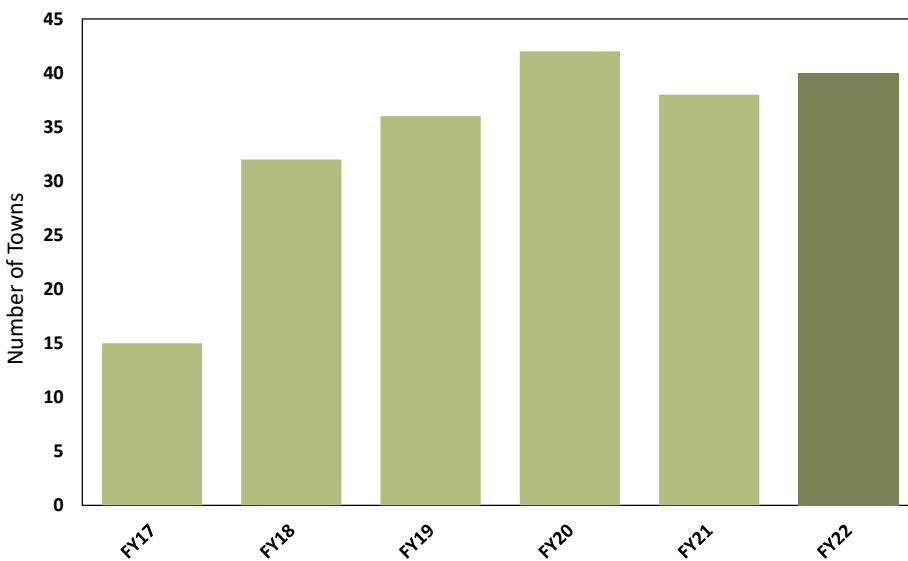
Find VCD at vtfishandwildlife.com/consERVE/vermont-conservation-design

COMMUNITY WILDLIFE PROGRAM



Performance measure: Provide technical planning assistance to all Vermont municipalities

Direct Technical Assistance to Towns by Fiscal Year



The department's Community Wildlife Program uses Vermont Conservation Design as the scientific basis for its land use planning recommendations.

The Community Wildlife Program uses a three-pronged approach to assist municipalities: 1) webinars to generate interest in, and the understanding of, conservation planning; 2) Environmental Leadership Training to improve the effectiveness of municipal commission members, and 3) direct technical assistance to towns that are updating plans or regulations.

In FY22, Community Wildlife Program staff served 96 towns and provided 679 hours of technical assistance, including direct support to 40 towns. The webinars series reached 410 people and the Environmental Leadership Trainings provided in-depth training to 32 people. In addition, the program worked with 9 Regional Planning Commissions, engaged 53 partner organizations, participated in 10 collaborative partnerships, and offered 205 events (presentations, meetings, trainings, webinars).

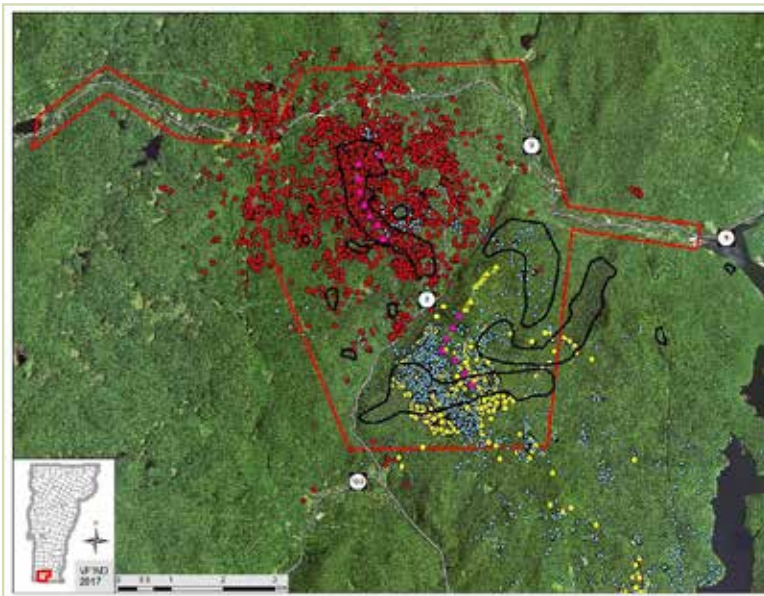
The Community Wildlife Program serves Vermont municipalities with technical assistance for conservation planning.

VCD was developed to support stewardship and conservation, particularly land use planning, and is available on the Vermont Agency of Natural Resource's BioFinder website. The tool identifies features at the landscape and natural community scales that are necessary for maintaining an ecologically functional landscape—a landscape that conserves current biological diversity and allows species to move and shift in response to land-use patterns and climate change.

BALANCING WILDLIFE WITH RENEWABLE ENERGY



Performance measure: Maintain the functionality of high-value habitat in areas targeted for renewable energy development.



Locations of three study bears during 2015 near the future Deerfield Wind Energy Project (pink triangles). The red circles and yellow circles represent the locations of two different female bears and the blue circles are the locations of a male bear. The black polygons are mapped stands of bear scarred beech concentrations. The red polygon is the virtual fence – collars within the fence collect one location every 20 minutes. Construction of the wind facility did not begin until the fall of 2016.

Wind and solar are essential components of Vermont’s carbon-free future. However, energy development must be balanced with needs of wildlife, particularly irreplaceable habitat, natural communities and travel corridors.

Since 2011, the department has been researching the effects of a large wind energy project on black bears in southern Vermont. This is the first industrial-sized wind project on United States Forest Service (USFS) lands and the only research project investigating the potential effects of wind energy on black bears, specifically their use of critical foraging habitat.

The primary objective is to determine how bears respond to disturbances associated with the construction and operation of the turbines. The research area includes extensive concentrations of American beech trees that are used seasonally by bears as a critical source of high caloric food. Data collection was completed in the spring of 2021. A total of 45 bears were fitted with satellite GPS collars to track their movements and habitat use. Further 40 wildlife trail cameras were used to document bear presence and behaviors within the wind facility project area. The department is now in the process of recruiting a researcher to finalize the data analysis.

RESEARCHING THE DECLINE IN VERMONT'S MOOSE POPULATION



Performance measure: Monitor and minimize the impact of disease on wildlife populations.

Shorter winters and abundant moose are increasing winter tick densities in the heart of Vermont's moose range.

The department recently completed a three-year study in the Essex County area to understand the impacts of winter ticks on Vermont moose. Beginning in 2017, 60 eight-month-old moose calves and 36 adult cows were captured and outfitted with radio/GPS collars.

Overall, winter ticks killed almost half of all the moose calves. Collared cows fared much better (87% winter survival), but they produced fewer calves than would be expected. This was likely due to poor body condition because of winter tick infestations. Additionally, lungworm, another parasite, was found in 70 percent of the dead calves. While usually not fatal, lungworms can increase the risk of death from blood loss due to winter ticks.

Results of the study clearly indicated that ticks remain at high enough levels to limit moose population growth. As a result, the department reinstated a limited hunt in 2020 designed to reduce the moose density in Essex County to, in turn, reduce winter tick density and allow moose to persist. Results from the 2021 hunt indicated that tick counts remained high, and the physical condition and reproductive rates of moose remained poor. It will take several years to reduce moose population to the density that research has shown is necessary to impact winter ticks.

The 2019 Big Game Survey found the majority (65%) of Vermonters support the use of hunting to manage for a smaller moose population if it reduces the number of moose that die from ticks.



Winter tick infestation

THE DEPARTMENT'S APPROACH TO FISH & WILDLIFE DISEASES



Performance measure: Maintain or restore fish and wildlife populations at healthy and sustainable levels.

The department actively works to identify and monitor fish and wildlife diseases to ensure sustainable and diverse wildlife populations in the future.

One of the earliest discoveries about COVID-19 was its ability to be transmitted between humans and wild and domestic animals. In response, department biologists have been working with experts from across the country to assist with the latest research and to determine what measures are needed to safeguard the safety of both humans and native wildlife.

COVID-19 is just one of a long list of fish and wildlife diseases that department monitors. Highly pathogenic avian influenza (HPAI) has been detected in more than 83 wild birds since March 2022, including ten bald eagles (and suspected in five other eagle deaths). Its arrival was expected, and monitoring began in January 2022, when the highly contagious strain was first detected in North America.

HPAI poses a low risk to human health. However, the virus, endemic to the continent, causes severe illness and high mortality in poultry. Transmission from wild birds is a primary cause of infection in domestic flocks, and human exposure can contribute to its spread.

Among Vermont's wild birds, waterfowl and birds of prey appear to have been the most susceptible,

but there's no evidence of any population-level effects. Previous outbreaks have usually ended with the onset of the following winter. However, this strain is proving tenacious; it has already completed its second year in Europe. The Wildlife Division and Warden Service devoted significant staff time to responding to public calls, investigating potential cases, and collecting samples. The department continues to work closely with USDA Wildlife Services and the Agency of Agriculture Food and Markets.

Other diseases being monitored by the department include: Chronic Wasting Disease (deer and moose), White-Nose Syndrome (bats); Whirling Disease (trout); rabies and canine distemper virus (particularly furbearers); Viral Hemorrhagic Septicemia (all fish species); and the emerging threat of Rabbit Hemorrhagic Disease Virus 2, a highly contagious and often fatal virus that is spreading rapidly in multiple species of domestic and wild rabbits and hares in the Western United States.

The department's multi-disciplinary approach to disease includes:

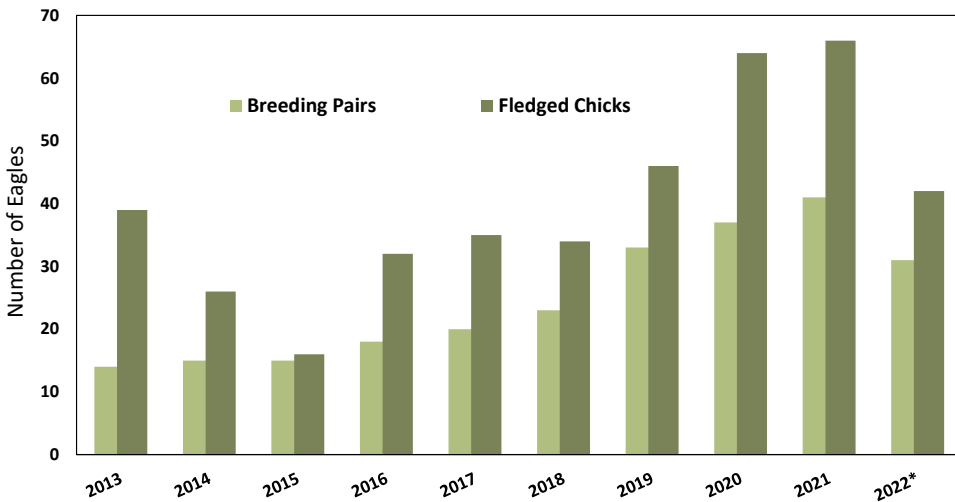
- ❖ Two Fish Health Biologists stationed at the Fish Health Lab at the Vermont Agriculture and Environmental Laboratory in Randolph.
- ❖ Three wildlife disease response teams (mammals, birds and reptiles and amphibians) operating under the guidance of disease surveillance plans.
- ❖ Membership, training and communications with the Northeast Wildlife Disease Cooperative and regional wildlife professionals, as well as state, regional and federal agencies.



THREATENED AND ENDANGERED SPECIES

Performance measure: Maintain or restore fish and wildlife populations at healthy and sustainable levels.

Vermont Bald Eagle Recovery Area Monitoring Results for Breeding Pairs and Fledged Eagles



*Not all nests were monitored because, in 2022, the species was formally removed from the state's Threatened and Endangered Species list.

In 2022, 31 nesting pairs of bald eagles successfully fledged 42 chicks. A remarkable achievement for a species that's first successful nest in the state in more than 60 years was just 14 years ago in 2008.

Two other once endangered bird species had successful nesting seasons:

- 36 nesting pairs of peregrine falcons fledged 65 chicks (*the department no longer monitors every nest*)
- 105 nesting common loon pairs successfully fledged 112 chicks

The department works strategically to keep common species common and prevent vulnerable species from becoming threatened and endangered.

The Wildlife Action Plan is a 10-year framework designed to assess the health of Vermont's fish and wildlife species, identify the problems they face, and outline the actions needed for long-term conservation. Some species such as moose, spruce grouse, and marten may be at risk due to climate change. Many species, from the Jefferson salamander to the Northern goshawk, are at-risk due to habitat loss and land fragmentation.



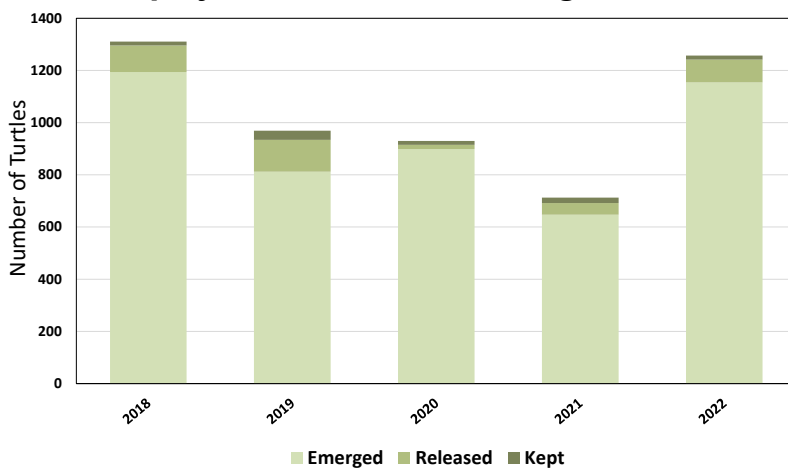
Jefferson Salamander by Andrew Hoffman (CC BY-NC-ND 2.0)

THREATENED AND ENDANGERED SPECIES



Performance measure: Monitor and minimize the impact of disease on wildlife populations.

Spiny Softshell Turtle Nesting Success



Spiny softshell turtles are a state-threatened species. In Vermont, they are only found in Lake Champlain, and nesting-related problems are a primary reason why they are imperiled. Threats to nesting include habitat loss due to development and competing vegetation, depredation by raccoons, foxes and skunks, and periodic flooding of nesting sites when lake level is high.

The department is working to minimize these threats by:

- Covering known nesting sites with wire mesh after females have laid their eggs to prevent predation.
- Employing USDA APHIS Wildlife Services to reduce nest predator abundance at the most sensitive nesting beaches.
- When found, removing any live eggs/young from hatched nests, then incubating them and raising the hatchlings in captivity for release into Lake Champlain the following spring.
- Increasing public awareness and outreach by partnering with the ECHO Leahy Center for Lake Champlain and conducting annual volunteer turtle beach cleanups.

Conserving Vermont's diversity of species involves protecting important habitats and reducing other threats that impact survival.

The Northeastern bulrush (*Scirpus ancistrochaetus*) was first described in scientific literature in 1962. It was known from only two sites and both were in Vermont. At the time, its habitat was best described as a Connecticut River backwaters and, for several years, this is where the department searched for the federally endangered species.

However, in 1993 two populations were discovered in beaver flowages away from the river. The search was repeated in 1994 and two additional populations were found. Since then, improved surveillance has located more than two dozen new populations, mostly in beaver-influenced wetlands in Windham and southern Windsor Counties. There are now approximately thirty known populations in Vermont.

Additional populations have been found in other northeastern states and Quebec, bringing the total known population to 120. As a result, the US Fish and Wildlife Service has recently proposed to remove the Northeastern bulrush from the federal endangered species list. The department's botanist has been requested to be on the recovery team and assist in developing a post delisting monitoring plan.

WILDLIFE MANAGEMENT AREAS



The department manages 101 Wildlife Management Areas (WMAs) and many Streambank Management Areas (SMAs) totaling 135,000 acres.

These properties showcase quality habitat management for all wildlife species and ensure public access for hunting, fishing, trapping and wildlife watching. While WMAs and SMAs are open to all, their acquisition and maintenance is primarily funded through sporting license sales and federal funds derived from excise taxes on hunting equipment with additional assistance from Habitat Stamp donations.

Highlights from FY22 include:

- ❖ 4,796 acres of direct habitat management including grassland mowing, controlled burns and invasive plant control.
- ❖ 127 acres of timber harvested where young forest habitat was needed.
- ❖ 465 waterfowl nesting structures and boxes were installed and maintained.
- ❖ 31 dams and dikes were maintained to actively manage 1,732 acres of wetland.
- ❖ 24 bridges and culverts were repaired or replaced.
- ❖ Infrastructure maintenance, vital for public access, included work on 25 miles of roads, 39 kiosks, 7 miles of boundary lines, 42 parking areas and 5 gates.

Improving Public Access on WMAs

American Rescue Plan Act and Capitol Bill funds continued to allow the department to make significant investments in public access on WMAs. In FY22, work was completed at Densmore Hill WMA, Little Acutney WMA, Pomainville WMA, West Mountain WMA, Wenlock WMA, and Bill Sladyk WMA. Projects included expanding parking areas, replacing or repairing of bridges and culverts, improving kiosks, and the grading, graveling, daylighting, and water-barring of roads.



LAKE CHAMPLAIN WETLAND CONSERVATION AND RESTORATION INITIATIVE



The department has a long, successful history of conserving, managing and restoring wetland habitat.

Sandbar Wildlife Management Area (WMA), established as a refuge for migratory waterfowl in Milton in 1920, was the first state-owned WMA in the eastern United States. To date, the department has conserved almost 30,000 acres of essential wetlands and is the largest owner of wetlands in the state.

In keeping with this tradition, a wetland conservation and restoration initiative was created in 2019 to accelerate conservation and restoration in the Lake Champlain drainage basin. This initiative is funded by the EPA (\$1.75 million for three years) with support

from the Department of Environmental Conservation (DEC) and Lake Champlain Basin Program and is focusing on improving water quality and fish and wildlife habitat in Lake Champlain and its tributaries.

In FY22, the department used the funds to secure two parcels, totaling just over 360 acres, that will improve water quality through wetland restoration and expand Dead Creek WMA in Addison County. Eight other wetland restoration projects are in various stages of development.





Performance measure: Maintain or restore fish and wildlife populations at healthy and sustainable levels.

The department works to conserve a diversity of aquatic species.

This includes well known fish like lake trout, salmon, muskie and sturgeon as well as lesser known species such as channel darters and dwarf wedgemussels.

Lake sturgeon populations had declined precipitously in Lake Champlain by the mid-1900s due to dams, pollution and commercial fishing and sea lamprey likely pushed them over the edge.

In 2016, the department released a new lake sturgeon recovery plan and stepped up its efforts to restore this state endangered fish to Lake Champlain and its tributaries. The plan was initiated with the knowledge that full recovery could take generations since it takes 25 years for the ancient, long-lived fish to even mature.

In 2022, biologists continued efforts to better understand behavior and habitat use in the little-known population that spawns in the Missisquoi River. One adult fish was captured and tagged north of North Hero during spring sampling, and another was captured during the fall, in the same area, bringing the total of number of tagged sturgeon from northern Lake Champlain to three. Biologists also continued public outreach efforts, including updating signage on spawning rivers in several languages to remind anglers that the fish cannot be legally targeted and should be immediately cut off if inadvertently hooked. Efforts in 2023 will include continued assessment of tagged fish near the Winooski and Lamoille rivers, monitoring the movement of the northern fish, as well as sampling in Missisquoi River and Otter Creek.

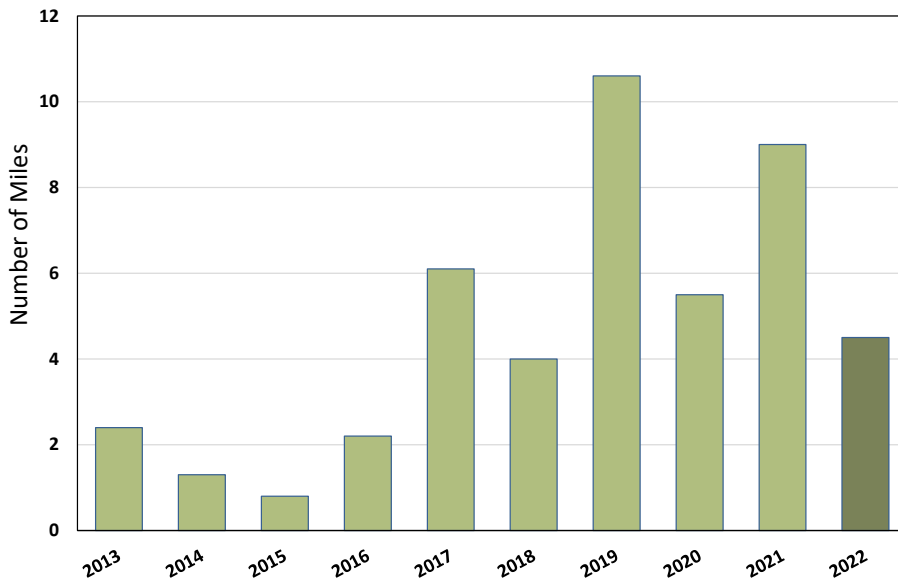


TROUT HABITAT MANAGEMENT



Performance measure: The number of stream-miles restored.

Miles of Wild Trout Stream Restored in the Northeast Kingdom



Fisheries biologists, in cooperation with Trout Unlimited, have been strategically adding woody material to streams in the Northeast Kingdom. Brook trout population monitoring reveals that brook trout abundance has more than doubled in treated areas.

Fisheries biologists work with Trout Unlimited and other partners to improve trout habitat on the East Branch Nulhegan River.

Department biologists recently completed a decade-long survey of wild brook trout and found that present day populations are comparable to those from more than 50 years ago.

This is a remarkable conclusion for Vermont’s favorite fish given that populations of wild brook trout have declined significantly across much of the species’ historic range in the eastern United States.

While most measures were similar, significantly higher densities of young brook trout were found. This may reflect the improved environmental protections put in place since the 1950s, particularly legislation and programs focusing on water quality and aquatic habitat protection.

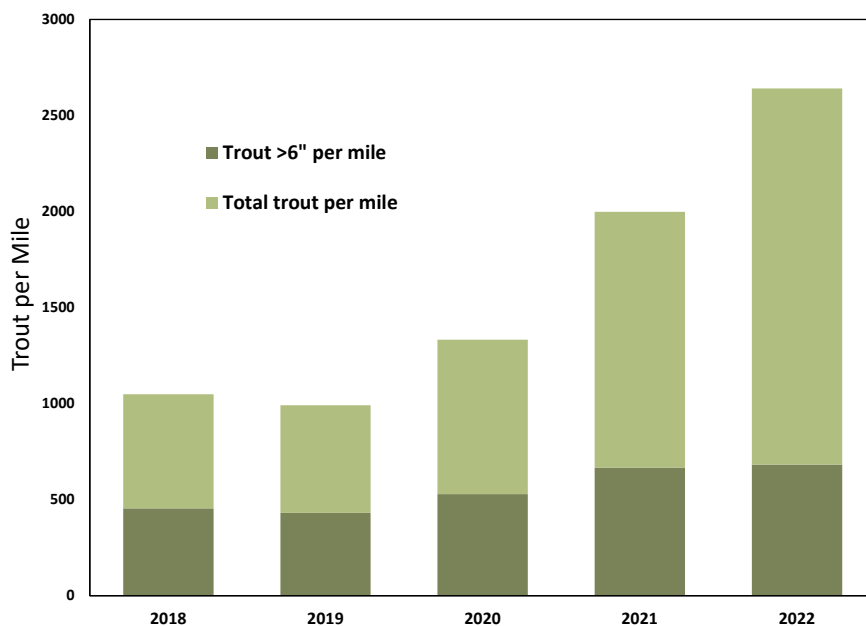
The survey included sampling of 138 streams within 17 watersheds between 2005 and 2016, all of which were originally sampled between 1952 and 1960.

WILD TROUT FISHERIES RESTORATION



Performance measure: The number of catchable trout per mile.

Trout per Mile, Twin Rivers Restoration Site, Batten Kill River



The department is working to provide quality trout fishing opportunities by restoring and maintaining self-sustaining wild trout fisheries.

Vermont's finest wild trout rivers include the Batten Kill and the Dog River, and the department is working to improve a number of other streams too, including in the Northeast Kingdom.

The size and age composition of Vermont's trout populations increase when instream habitat is restored by strategically felling mature trees along the streambank into the water. The "Twin Rivers" project site on the Batten Kill in Arlington was the river's first instream habitat restoration project. Work started in 2006 and the stretch's trout population has increased in the years that followed. But felling trees isn't enough. The vegetated streambanks must also be restored if they are going to be a source of instream habitat. Biologists are working with partners and private landowners to restore wood both in and alongside streams to benefit trout populations today and in the future.

On the Batten Kill, the department's message is getting out. Anglers are spreading the news that large wood is where the fish are, partners are encouraging landowners to leave fallen trees where they fall, and neighbors of restoration projects are taking advantage of opportunities to have trees planted on their streamside properties.





PROTECTING AND RESTORING STREAMBANK HABITAT AND AQUATIC ORGANISM PASSAGE

Performance measure: Miles and acres of streambank habitat enhanced or restored, and miles of river connected.

The department works with state and federal agencies and non-profits to protect and restore habitat for fish and other aquatic creatures.

Trout depend on cold, clean, complex and connected rivers and streams with unconstrained flow. These conditions occur naturally when: trees that grow along the banks are left after they fall in; stream channels are given room to meander and flood their banks; bridges and culverts are appropriately sized; and dams are removed. To put it another way, it is cheaper and more effective to protect and restore habitat than it is to create it. Healthy aquatic habitat is also essential to water quality and flood resilience. FY22 highlights include:

- ❖ Removing the department-owned Pelletier Dam in Castleton, allowing brook trout and other species to access over 30 miles of habitat upstream of the dam for the first time in over a century. This project was managed by the Vermont Natural Resources Council with the support of DEC staff and Habitat Stamp and DEC Clean Water funding.
- ❖ Providing \$201,000 in funding, \$87,000 in leveraged federal, state and private dollars and in-kind match, and over 100 hours of technical assistance towards the removal of five deadbeat dams and the enhancement of four Aquatic Organism Passage (AOP) compliant culverts on important brook trout streams.
- ❖ Assessing the condition and AOP of 55 recently repaired or replaced stream crossings.

- ❖ Measuring fish passage at 11 culverts that were retrofitted with baffles and weirs to enhance upstream aquatic organism passage.
- ❖ Monitoring stream temperature at 97 locations. In 2021, the most recent year for which data are available, stream temperatures continued to increase in July, August, and September.
- ❖ Co-teaching four Rivers and Roads trainings with DEC. This course presents river process, aquatic habitat and aquatic organism passage concepts and designs to state and municipal staff and consultants who design and maintain road infrastructure.
- ❖ With the Nature Conservancy, planting 2.5 acres on department-owned parcels in Wolcott to restore a forested riparian area.
- ❖ Continuing to implement a 4.6-acre experimental tree planting on the Otter Creek WMA to test riparian forest restoration in the presence of beavers, a significant source of early tree mortality at many riparian restoration sites in the state.
- ❖ Monitoring tree plantings at 12 sites across the state to study practices that can increase growth and survival of planted trees, particularly in the presence of beavers, and enhance natural tree regeneration.
- ❖ Providing technical assistance to Stream Wise, a public education and outreach campaign to promote healthy forested streamside areas.
- ❖ Awarding \$70,000 in Watershed Grants to 13 watershed organizations, conservation districts and regional planning commissions to plan, implement and educate the public on water quality and aquatic habitat projects.

TROUT PRODUCTION FOR RECREATION AND RESTORATION



Performance measure: Meet the management request for cultured fish (+/- 10%) to support recreation and restoration goals.

Vermont's fish culture facilities are operating at full capacity again.

The completely reconstructed Roxbury Fish Culture Station resumed operation in 2021, ten years after being devastated by Tropical Storm Irene. The station, originally built in 1891, now produces 60,000 brook and rainbow trout a year and the first yearling trout stocking took place in the spring of 2022.

Having Roxbury back online has relieved the pressure placed on the department's other facilities after Irene to make up for its loss. The station and the outside grounds are open to the public, with detailed displays and fish observation sites



Vermont's Fish Health Program

Vermont's Fish Health program helps protect wild fish populations and fish reared at fish culture stations by preventing and managing serious fish diseases. Its fish health laboratory is equipped to diagnose many parasitic, bacterial and viral fish pathogens. The program:

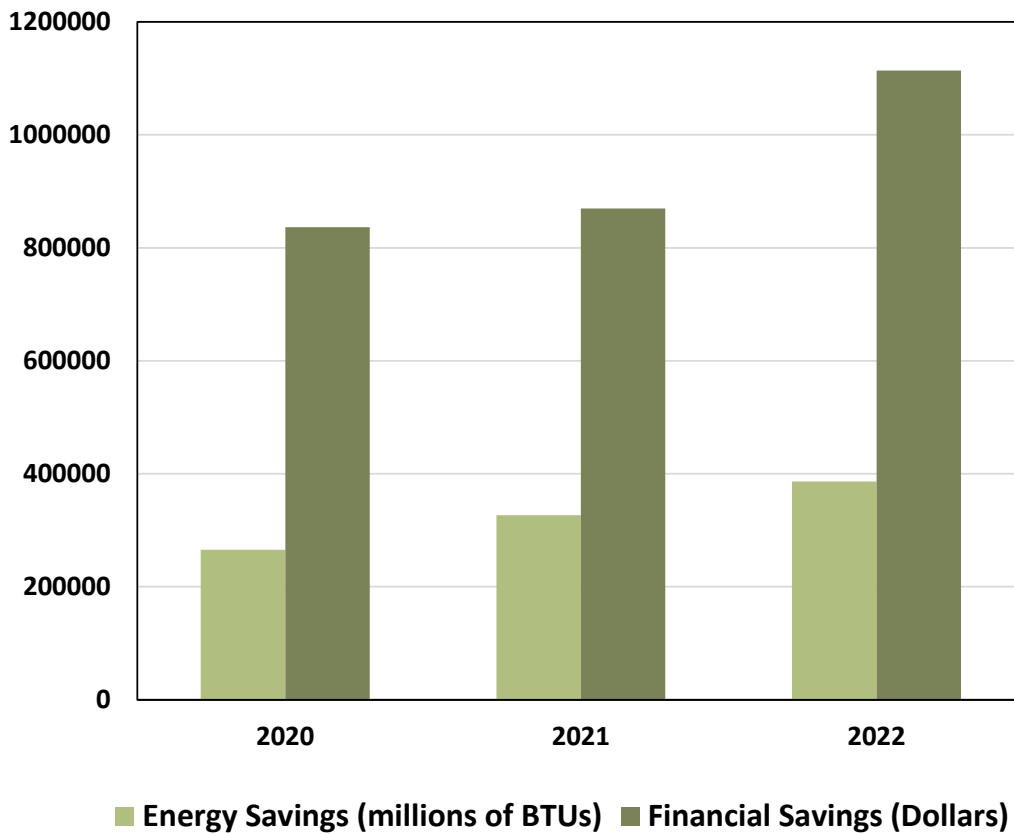
- ❖ Conducts annual fish health inspections on all state owned and private fish culture stations and investigates specific diseases when they occur on facilities.
- ❖ Develops statutes and regulations designed for preventing and managing serious fish diseases.
- ❖ Administers Vermont's fish importation, baitfish dealer and fish propagation permit programs.
- ❖ Investigates fish kills and study fish disease agents in the natural environment.
- ❖ Provides technical assistance in fish health related matters to fisheries staff and the public.

ENERGY EFFICIENCY UPDATES AT FISH HATCHERIES



Performance measure: Increase management effectiveness and efficiency.

**Cumulative Savings Over Time
Vermont Fish Hatchery Energy Efficiency Projects**



The department is a conscientious steward of energy resources and constantly works to increase its efficiency and reduce costs.

Switching fish hatchery energy use to solar power saves enough energy every year to power the entire town of Grand Isle for a year. This not only saves money—\$244,000 in FY22—but also reduces our carbon footprint. Cumulatively, these projects are estimated to have prevented the release 17,000 mega tons of greenhouse gases.

PUBLIC ACCESS FOR BOATING AND SHORE FISHING



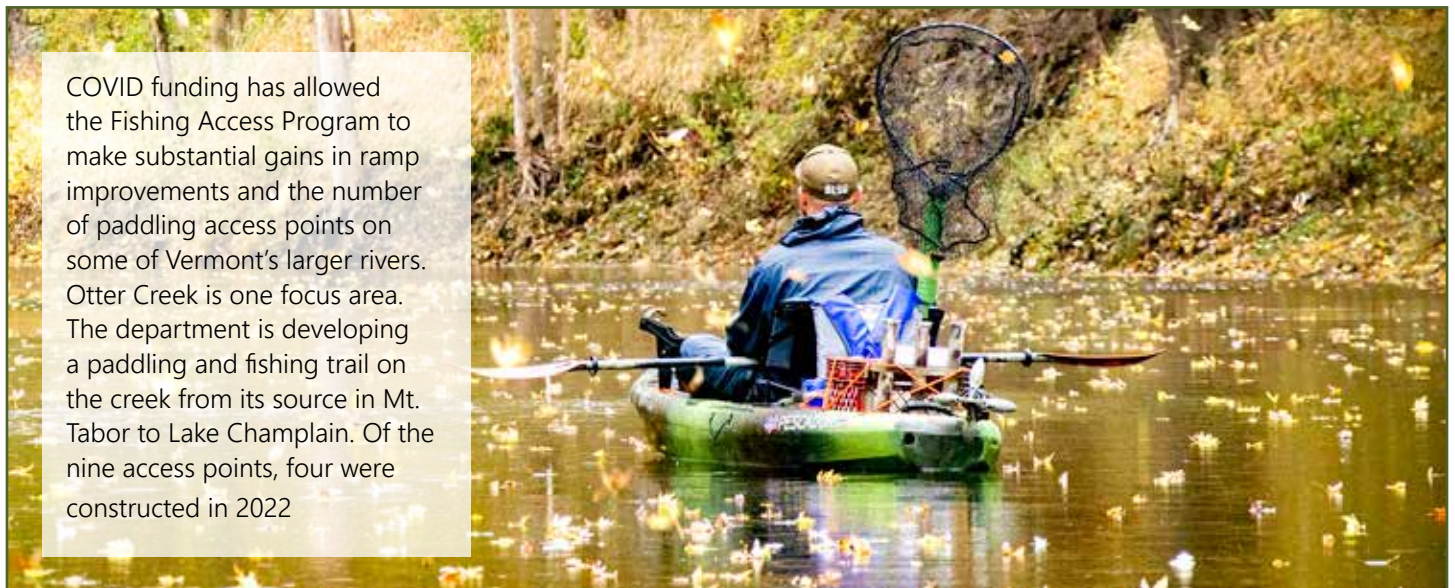
The department's access area program provides the state's 28,000 registered motorboat owners and 149,000 resident and nonresident licensed anglers with safe and reliable access to 130 unique bodies of water at 203 locations.

All access areas are free and include:

- ❖ 143 with concrete or gravel boat ramps
- ❖ 39 sites with at least one courtesy dock
- ❖ 37 dedicated to non-motorized boats, including seven new paddling sites on the Moose River and Otter Creek.
- ❖ 22 with accessible shore fishing platforms

Fishing Access Areas are funded through state and federal sources. Fishing license revenues and motorboat registration fees are used to leverage federal funds derived from excise taxes on fishing tackle and the federal marine fuel tax. Non-motorized watercraft and non-anglers are welcome to use the sites, provided they follow access area rules.

Over the past decade, the department has completed 147 infrastructure improvement projects, such as upgrades or replacements of boat ramps and docks and the creation of paddling access sites. They were made possible by combination of capital appropriations, state motorboat registration fees, Federal Aid in Sport Fish Restoration, and more recently federal COVID stimulus and general funds.



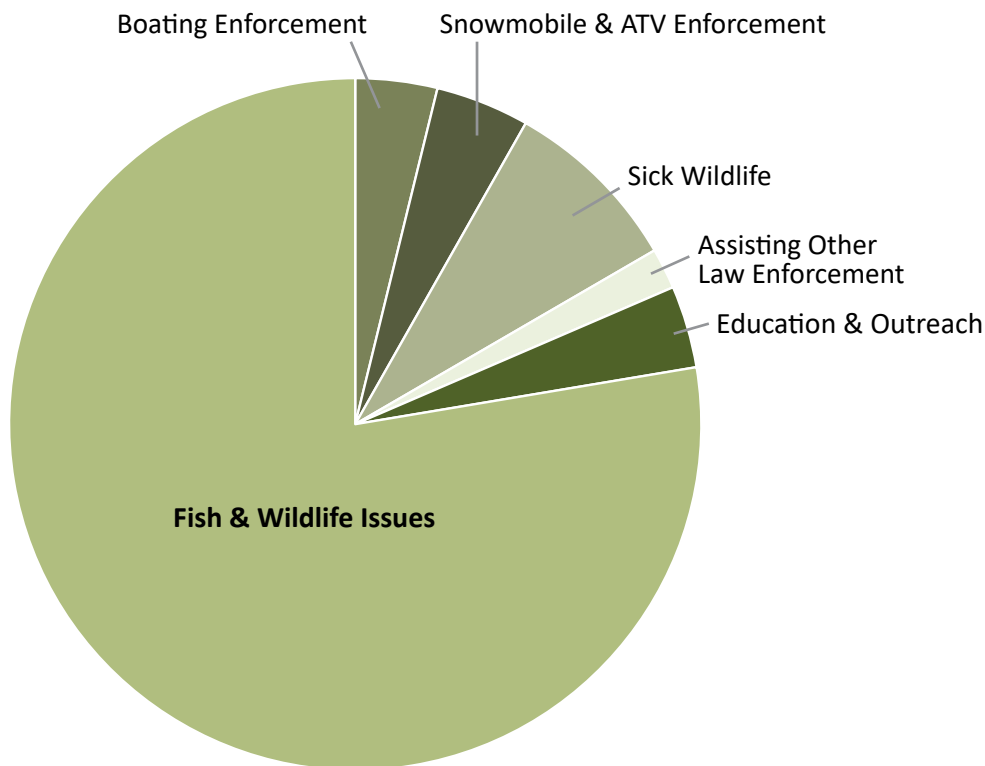
COVID funding has allowed the Fishing Access Program to make substantial gains in ramp improvements and the number of paddling access points on some of Vermont's larger rivers. Otter Creek is one focus area. The department is developing a paddling and fishing trail on the creek from its source in Mt. Tabor to Lake Champlain. Of the nine access points, four were constructed in 2022

WARDENS SERVE THE PUBLIC



Performance measure: Reduce human-wildlife conflicts and improve safety and compliance among all outdoor recreationists.

Warden Activities Benefiting the Public



Wardens apply their broad range of skills and expertise to provide a wide variety of services that Vermonters increasingly rely on.

Conservation law enforcement is, and will remain, the Division of Warden Service's highest priority. However, it's not their only mandate. Wardens also respond to rabid animal calls and human-wildlife conflicts, enforce boating, ATV and snowmobiling laws, participate in outreach and education programs, conduct search and rescue operations, collect vital biological data used to monitor wildlife populations and diseases, and provide mutual assistance to other agencies. Mutual assistance calls have almost doubled in the last decade due to strained law enforcement budgets around the state.

COMMUNITY-BASED LAW ENFORCEMENT



Performance measure: Increase positive interactions with the public to improve law enforcement capabilities.

Effective law enforcement is the result of building trust and credibility within the community through positive interactions and strong individual relationships.

Wardens are part of their communities with home offices and publicly listed phone numbers.

Game Warden in Training

Last spring, a warden was attempting to catch an orphaned bear when he received a call from a family who said the cub had been showing up on their property. He met with the landowner and her daughter, who, as it turned out, was a fan of the TV show *Northwoods Law*. The young girl told the warden she wanted to be a game warden when she grows up and even asked the warden for his autograph.

The warden returned the next day after asking the landowner if her daughter would be available to assist with the cage trap. The young girl was thrilled and helped carry the heavy trap into the woods. Along the way, they talked about bear biology and their keen sense of smell.

Together they selected a location for the trap, secured, camouflaged, and, mostly importantly, baited it with sardines, fish oil and some barbeque sauce.



They caught the cub the next afternoon. The cub was malnourished and underweight

and was taken to a rehabilitation facility in New Hampshire. With the help of the young girl, the cub's survival was secured.

Warden Comes to the Rescue

This past summer while patrolling St. Albans Bay a warden met a boy who was struggling with his fishing reel. The boy explained he was trying to fish while his father played volleyball in the park, but the reel wouldn't cast. The warden tried to assist, and even took the reel apart without success. Knowing the boy would be waiting a while for his father,



the warden went to a nearby general store and purchased a new fishing rod and reel combo for the boy. Making for one happy young boy.

Making the Most of Roadkill

Wardens regularly salvage road-killed deer, moose, and bear, but only a handful of the people who actually need the meat end up accepting a carcass. They don't have the time, knowledge, or space to process the animal.

To address these challenges, wardens have been working with local butchers—who donate their time and wrapping materials—around Vermont to ensure the animals are not wasted. The wardens drop the carcasses off at the processors and then deliver the meat to a local food shelf and dispose of the left-over carcasses. In districts where processing is unavailable, some wardens are even processing the meat themselves. In FY22 alone, 2,256 lbs. of boneless meat was distributed, the equivalent to 10,000 individual meals.