Vermont Forest Health

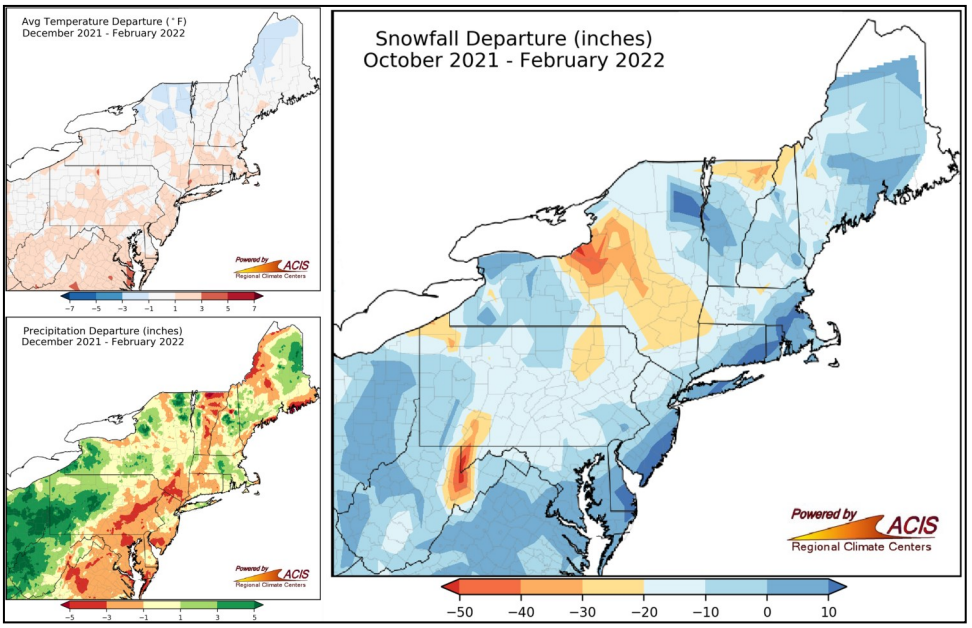
Insect and Disease Observations — March 2022

Department of Forests, Parks & Recreation
March 2022 vtforest.com

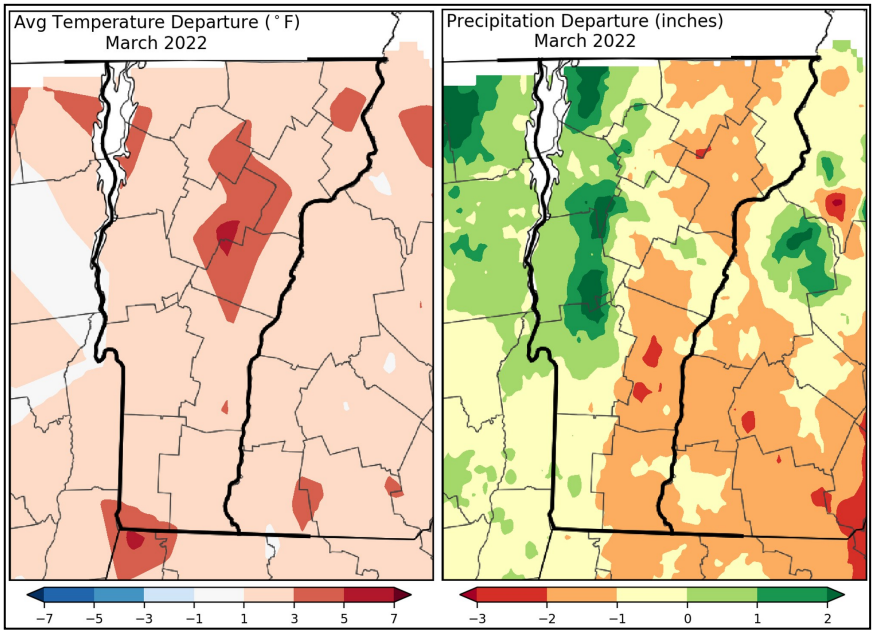
Winter Recap: Weather

Vermonters faced a slightly colder and wetter winter of 2021-2022, compared to years past. From December 1 to February 28, state-wide temperatures averaged 20.9°F, which was 1.2 degrees colder than the winter of 2020–2021. Average precipitation across the state was 7.99 inches, which was 0.14 inches more than last year's average.

Winter snowfall ranged from 40 inches below normal (dark orange) to 10 inches above normal (dark blue).



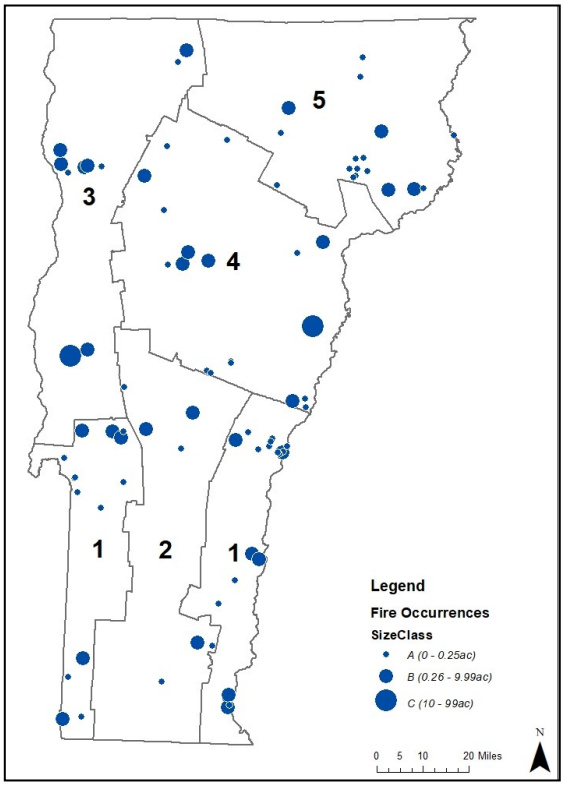
Average temperature, precipitation and snowfall departure from normal. Maps and data: Northeast Regional Climate Center.



March of 2022 was wetter than March of 2021. State-wide temperatures averaged 30.8°F, which was the same average temperature as March of last year. Statewide precipitation averaged 3.04 inches, which was 1.54 inches more than March of last year.

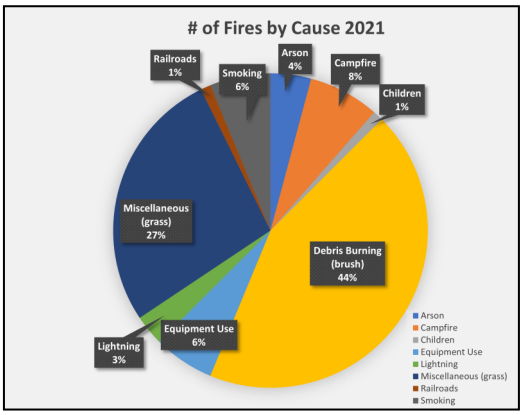
Temperature and precipitation departure from normal. Maps and data: Northeast Regional Climate Center.

Vermont Wildland Fire Season in Review



In 2021, 96 reported fires escaped in Vermont that burned a total of 157 acres. Compared to the state's 10-year average, there were 10% more escaped fires than reported in 2020.

Debris burning was the most common cause of escaped fires in 2021 (right) which is consistent with historical data.

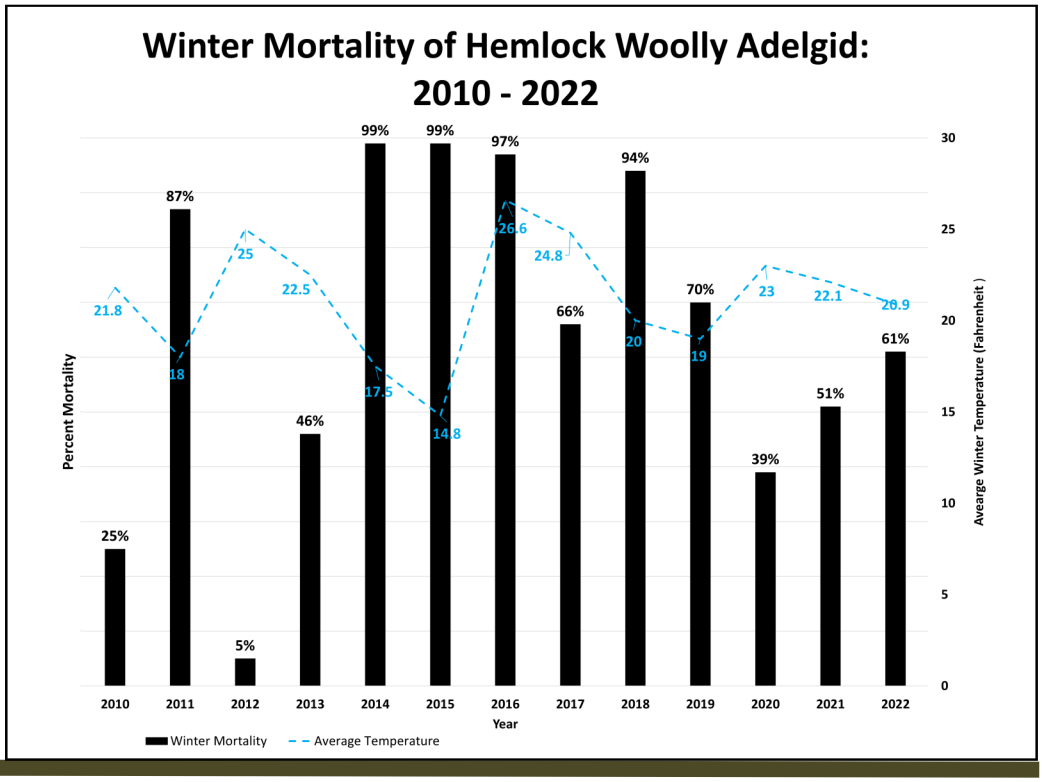


Distribution of reported escaped fires across the state by size in 2021 (left). Map and data: FPR Staff.

Hemlock Woolly Adelgid Overwintering Mortality

Sixty-one percent of the hemlock woolly adelgids (HWA) examined during the annual winter mortality survey were dead. Although winter temperatures were only slightly colder than last year, in February we experienced periods of warming temperatures followed by successive days of deep freezes. This fluctuation could have contributed to winter mortality by killing otherwise surviving HWA before they could reproduce. In the past, we have often found infestations in new locations following years with mild winters and low levels of HWA mortality. 2021 surveys observed no spread of HWA within the state.

Assessments of overwintering mortality in hemlock woolly adelgid conducted on March 16-17, 2022, indicated that 61% of the adelgids had died.



HWA winter mortality (black bars) and average winter temperature (blue dashed line). Data: FPR Staff and Northeast Regional Climate Center.

Supplemental Sightings

Flooding and ice damage were observed damaging trees along the West River in Jamaica in February. With several days of warm temperatures, snowmelt and additional rainfall caused stream banks to overflow and water and ice to flood neighboring forests. Most hardwood species can tolerate flooding during the dormant season, however, prolonged submersion and erosion from moving water can cause an increase in tree stress, predisposing it to other tree pests and pathogens.

Flooded forest. Photo credit: FPR Staff.

Blackberry seed gall caused by a cynipid gall wasp *Diastrophus cuscutaeformis*, was observed on blackberry stems this winter. Although this looks like one giant stem gall, blackberry seed gall is a cluster of many small galls that are formed during the growing season. These galls provide food and shelter for immature larvae.

Blackberry seed gall. Photo: FPR Staff.

Spongy moth (*Lymantria dispar dispar*) eggs were found on hemlock twigs in southern Vermont. Spongy moth eggs can be laid on a variety of surfaces which could include but are not limited to tree trunks, branches, firewood, outdoor furniture, and camping gear. Although normally a hardwood defoliator, the spongy moth can also defoliate softwood trees including pine, spruce, and hemlock when populations are high.

Spongy moth egg mass. Photo credit: FPR Staff.

Cordyceps fungi were observed growing out of a hawk moth in Johnson. This entomopathogenic fungus colonizes the infected host with its hyphae, consuming its tissue from within. This fungus has the ability to take over the host's living functions, controlling their minds and their bodies. Hosts climb to high vantage points before fruiting to aid in the fungi's dispersal and increase infections. To learn more about this group of fungi, check out this video of cordyceps infecting ants.

Cordycep infected hawk moth. Photo credit: Andrew Hirsch.

White pine weevil (*Pissodes strobi*) damage was observed on eastern white pine saplings in southern Vermont this winter. Terminal dieback, commonly known as a "shepherd's crook" occurs when larvae feed and develop within the shoot, girdling the branch. Although a shepherd's crook typically first becomes apparent in mid-June, it can stay attached to the tree for several years. The adult weevils that emerge overwinter in the adult stage beneath host trees, and are one of the first pests to become active in the spring.

Shepherd's crook caused from white pine weevil feeding. Photo credit: FPR Staff.

Buck rub (*Cervidae*) were observed on numerous hardwoods in Huntington this month. In late summer-early fall, male deer rub the velvet off their new antler growth, leaving behind a scent that deters other males and attracts females. This scrape removes the protective bark from trees and often wounds the lower bole of trees. The exposed wound can serve as an entry point for pests and pathogens to become established, and in young trees, can girdle stems, leading to dieback and mortality.

Buck rub. Photo credit: FPR Staff.

Aspen trunk rot (*Phellinus tremulae*) was observed in harvested aspens in the Northeast Kingdom this winter. This trunk rot is the most common stem decay of Aspen species in North America, causing a spongy and fibrous decay column to form in the xylem. This fungus does not colonize dead trees and enters new hosts through wounds and branch stubs.

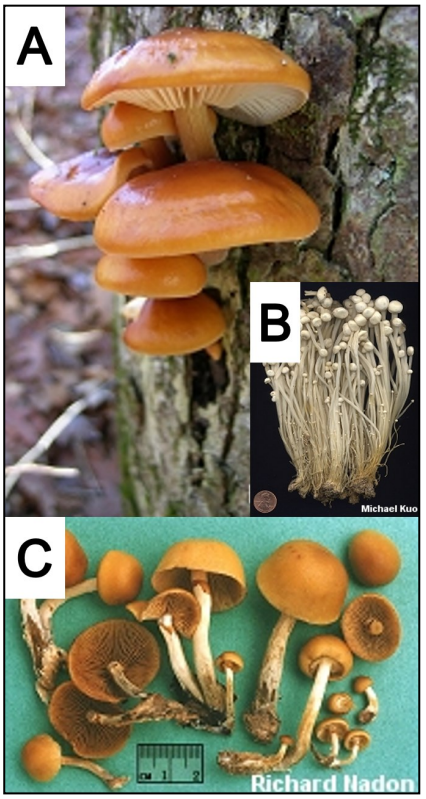
Aspen infected with aspen trunk rot. Photo credit: Joseph Obrien, USDA Forest Service, Bugwood.

Porcupine (*Erethizontidae*) damage was observed in softwood stands this month. During the winter months, porcupines peel off the bark on branches and the main stem to consume the inner bark. Often confused with squirrel damage, porcupines prefer softwood species, whereas squirrels prefer hardwood species. Similar to deer scrape damage, exposed wounds can serve as an entry point for pests and pathogens to become established and can girdle trees.

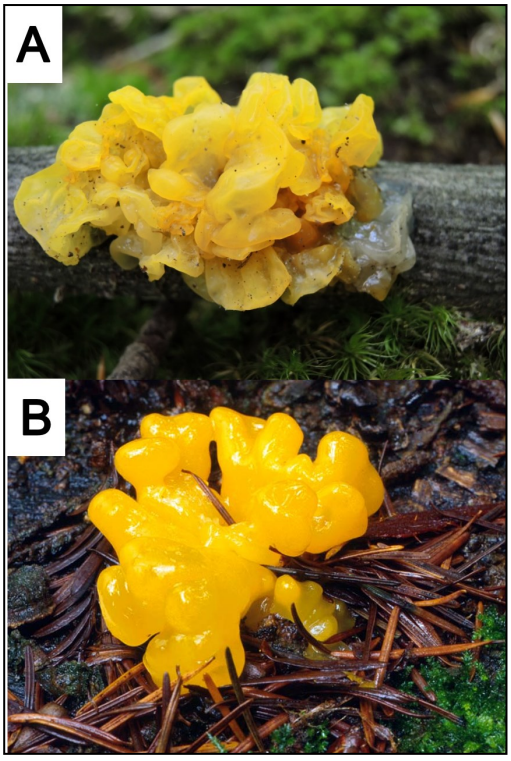
Porcupine damage. Photo credit: Joseph Obrien, USDA Forest Service, Bugwood.

Foraging For Fungi

Enoki (*Flammulina velutipes*) is a highly sought-after edible that is commonly purchased at the grocery store. This fungus is saprotrophic and can be found growing out of decaying hardwoods. The cap of this fruiting body varies in color, being dark orange, brown or yellow-brown, has a convex shape, and is 1-7cm wide. The stem is pale to yellow-brown in color when young and matures to rust-brown to black with a velvet coating. The stem is 2-11cm long and 3-10mm thick. It has white to yellowish gills that gives off a white spore print, and its cap has a red reaction with KOH when fresh. This mushroom has a poisonous look-a-like, the funeral bell (*Galerina marginata*). This fungus is also saprotrophic and can be found on hardwood and softwood species. The cap of this fungus is honey yellow-orange when young, maturing to a cinnamon-brownish orange color. Its cap is convex when young, but also can be flat or bell-shaped. The stem is whitish to rusty brown and is 2-7.5cm long and 3-8mm thick. Its gills are yellow to rusty brown in color and give off a rusty brown spore print. This fungus also has a red to dull red reaction with KOH.



A: Wild **B:** Cultivated enoki. Photo credit: Michael Kuo, MushroomExpert. **C:** Funeral bells. Photo Credit: Richard Nadon, MushroomExpert.

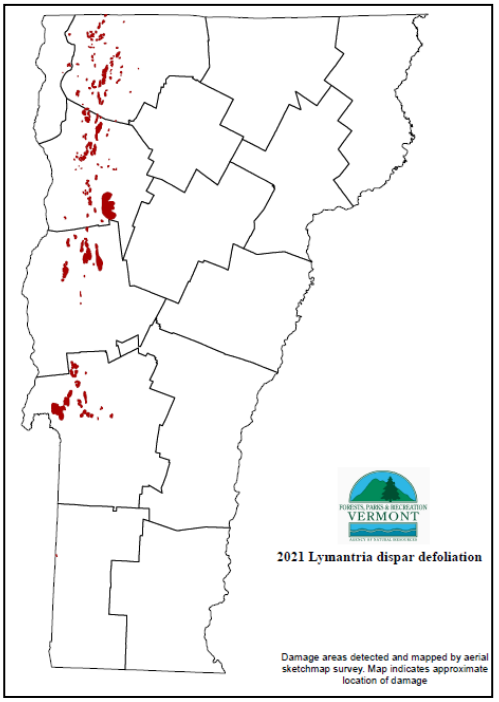


A: Which's butter. Photo credit: Michael Kuo, MushroomExpert. **B:** Yellow-orange jelly. Photo credit: Michael Wood.

Witch's butter (*Tremella mesenterica*) is a medicinally foraged native fungi that can fruit year-round. This fungus is a yellow-lobed mass with a gelatinous consistency that is often found in association with dead or decaying hardwoods. This fungus is a parasite and grows directly out of the mycelium of a crust fungi in the genus *Peniphora*. Its mass measures 2-5 cm across and 1-3cm high when fully moist, but dries to a thin hard yellow-orange crust in the absence of moisture. This fungus can be confused with the yellow-orange jelly fungi (*Dacrymyces chrysospermus*) another medicinal native jelly fungus. This fungus is saprotrophic on softwood species and has a similar size and texture to witch's butter. This fungus is yellow to yellow-orange in color and dries to a thin hard reddish crust. Under the microscope, the yellow-orange jelly has tuning-fork-shaped basidia whereas witch's butter does not.

As with all wild mushrooms, there are risks to eating and misidentifying them which can be both dangerous and fatal. Always ensure you have the correct identification before consuming any wild edible. ***The State of Vermont accepts no liability or responsibility for the consumption and/or misidentification of any mushrooms mentioned in this publication.***

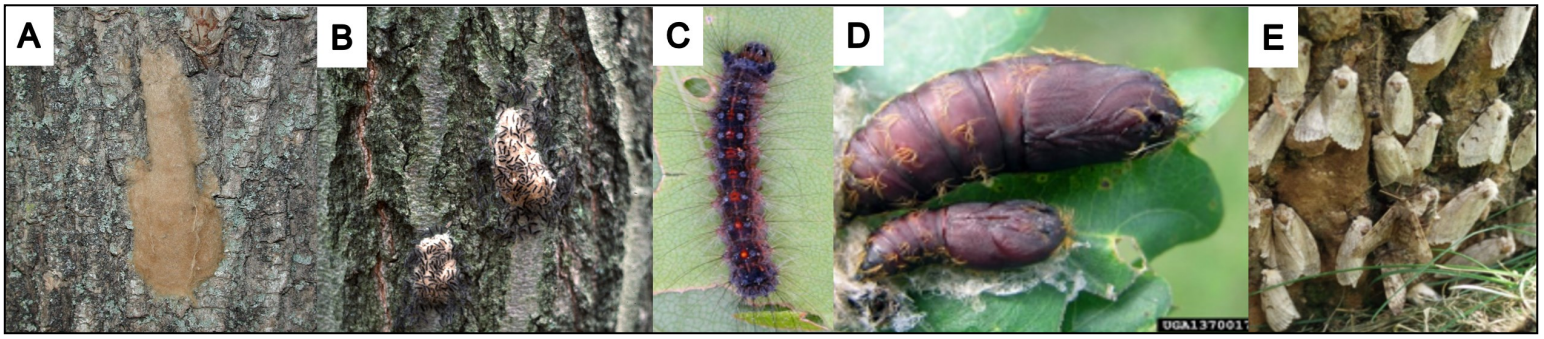
Pests in the Spotlight: Spongy Moth



The spongy moth (formerly known as gypsy moth, *Lymantria dispar dispar*) is an invasive hardwood defoliator that has been observed in Vermont since the late 1800s. In Vermont, the most commonly defoliated trees are oaks, but the caterpillars will feed on over 300 species of trees and shrubs including sugar maple.

In 2021, 50,945 acres of defoliation were mapped during Forest Parks and Recreation's statewide aerial surveys. This was the first time since the early 1990s that significant defoliation from the insect was mapped. Most defoliation occurred in oak and maple forests in the Champlain Valley, extending east to the foothills of the Green Mountains.

Spongy moth caterpillars emerge from egg masses in late April-June, feeding in groups on expanding leaves. Young caterpillars spread by "ballooning" from long threads, which break in the wind and carry caterpillars to a new location. As they grow, they molt 5-6 times, increasing in size and appetite.



Life stages of spongy moth. **A:** Intact egg masses found in fall/winter. Photo: FPR Staff. **B:** Hatched egg mass found in spring. Photo: FPR Staff. **C:** Late instar caterpillar. Photo: FPR Staff. **D:** Pupal cases. Photo: USDA Forest Service. **E:** Adult moths laying eggs. Photo: FPR Staff.

Feeding is complete by early July, then spongy moth caterpillars pupate, where skins are shed and a new purplish-brown shell forms around the larva. After 1-2 weeks, an adult moth emerges from the pupal shell. Moths mate and lay eggs on bark fissures and crevices in August. These egg masses are yellowish-tan in color and outbreaks can number in the hundreds on individual trees.

The fungus *Entomophaga maimaiga* typically keeps caterpillar populations in check when sufficient moisture is present, but fungal activity has been reduced due to recent droughts. Outbreaks collapse from a combination of factors: starvation, malnutrition, viral or fungal diseases, and high rates of parasitism. Outbreaks may also collapse if eggs hatch early and a frost occurs. Most infested trees will recover, but defoliation stress can incite tree decline if other stresses are present. In addition to drought, consecutive years of defoliation, severe winters, and other disturbances magnify the impact and lead to tree mortality. For more information or to report a sighting, visit VTinvasives.

Finding Fun In the Phenology of Invasive Plants

Phenology is the study of the life cycle events of living things – like tracking when plants get their leaves, their flowers, and their fruits. Knowing this information gives us a better understanding of the species in our ecosystems, can guide the timing of our invasive plant management work and can help us track the impacts of climate change on plants in Vermont. In 2022, The Vermont Department of Forests, Parks & Recreation (FPR) is spearheading a few projects geared towards tracking the phenology of invasive plants and we need your help!

Emerging leaves of *Lonicera morrowii*. Photo credit: FPR Staff.

Intrigued? There are several ways people can contribute to invasive plant phenology observations. The projects FPR is leading are listed below, organized by the amount of time they ask of volunteers. Sign up for the project(s) that make the most sense for you or connect with us if you have questions. Also, check out the VTinvasives website for a full list of volunteer opportunities.

Monthly involvement: Statewide Invasive Plant Phenology Monitoring Project
Are you a Vermonter on the go or someone visiting Vermont this spring/summer, who wants to volunteer? During the second full week of each month of the growing season, volunteers note the invasive plant phenology of whatever Vermont county they happen to be in at the time. This gives us a snapshot of plant phenology across the state. It is a great opportunity for anyone who is hiking in the warmer months, who travels extensively around Vermont, or who is here on vacation and wants to be involved in protecting our local biodiversity. Click here to learn more about this statewide project.

Weekly involvement: Pesky Plant Trackers (in Vermont!):
Concerned about wild parsnip or knotweed in your community? Are there wild parsnip or knotweed plants near where you live or work? Consider joining a regional effort to better understand these plants. Observers "adopt" specific wild parsnip or knotweed plants and track the plants' phenology through the growing season. Click here to learn more about this regional project.

Vermont Invasive Plant Phenology Project:
Looking to regularly contribute to scientific research as part of a long-term project? This project collects phenology data on invasive plants at specific locations across Vermont. If you can contribute weekly observations and want to know if you live near one of our study sites, please be in touch.

Useful links:

- Volunteer Opportunities
- VT FPR Invasive Plant Program Contact

Want to be a Pesky Plant Tracker?

The Pesky Plant Trackers Campaign is a community science opportunity focused on wild parsnip and knotweed. Successful management of these plants is linked to their "phenology," aka their life cycle events, like when they develop leaves, flowers, and fruits. VT Dept. Forests, Parks & Recreation is helping the researchers for Pesky Plant Trackers bring their efforts to track invasive plant phenology into the Northeast, and we need your help! To participate, all you need is a Nature's Notebook account, a smartphone or computer, and the ability to regularly return to your plants to make observations. **Join us, and make a real difference, today!**

Creating a Calendar Of Invasive Plant Activity In Vermont

Since 2017, volunteers have collected information on invasive plants throughout the growing season with Vermont's Statewide Invasive Plant Phenology Monitoring Project (SIPPMoP). This year, FPR is at it again and we need your help!

We want to answer the question "what are invasive plants doing, and when?". This work is part of a scientific field of study called "phenology" and knowing when plants enter which life stages like leaf out and seed set is invaluable for timing management and tracking changing trends through the years. What does that mean for you as a potential volunteer? Our observers take note of invasive plants and their seasonal changes one week each month.

In 2022, observations will take place April 10-17; May 8-15; June 12-19; July 10-17; August 14-21; and September 11-18. Though the project runs from April through September, we welcome short-term volunteers as well.

What: Volunteer for Vermont's Statewide Invasive Plant Phenology Monitoring Project

Who: Anyone that wants to take part, and can identify (or learn to identify) invasive plants

When: Involvement is monthly (one week a month from April to September)

Where: Wherever in Vermont you happen to be!

Why: Add to a dataset that directly informs management and restoration efforts across the state

Contact anr.fprInvasivePlants@vermont.gov, for more information, or to sign up!

FORESTS, PARKS & RECREATION
VERMONT
AGENCY OF NATURAL RESOURCES

For more information, contact the Forest Biology Laboratory at 802-505-8259 or:		
	Windsor & Windham Counties.....	Springfield (802) 289-0613
	Bennington & Rutland Counties.....	Rutland (802) 786-0060
	Addison, Chittenden, Franklin & Grand Isle Counties.....	Essex Junction (802) 879-6565
	Lamoille, Orange & Washington Counties.....	Barre (802) 476-0170
	Caledonia, Orleans & Essex Counties.....	St. Johnsbury (802) 751-0110

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