



Macro-fungi



Plant pathogens



Slime molds



Mycorrhizal fungi

Fungi of Vermont



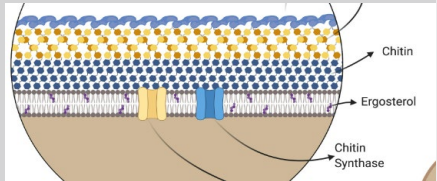
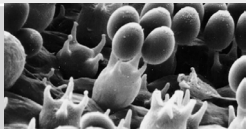

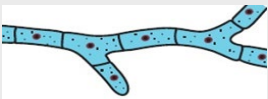
Lichens



Micro-fungi

Jess Rubin and Savannah Ferreira
Fungal Scientific Advisory Group

What are Fungi:

Fungi	Plants	Animals
Cell wall -Chitin 	Cell wall	No cell wall
Absorptive heterotroph	Autotrophs	Digestive heterotroph
Spore 	Seed 	Zygote
Hyphae 		

Habitat: live freely in soil or water, or form a spectrum of relationships with other organisms

Importance: recycling nutrients, parasites/pathogens, soil stability, sequestering carbon, providing food/shelter for other organisms, and mediating ecosystem stability

Brief history of Mycoliteracy in US

Fungi were known as

- 1700's: Plants
- 1800's: Thallophytes
- 1900's: Fungi

Before 20th Century

- No state heritage program tracking fungi
- Federal Endangered species Act did not recognize Fungi

20th Century

- 1990s West Coast Forest Ecosystem Monitoring Team
- 1996 NEMF & NAMA: Conserving Mycological Diversity

21st Century

- 2012 IUCN Red list ->1st NA Red List Committee formed
 - 48 species to the IUCN Red List
- Today 597 Species (100 > than in Europe)
 - FunDIS: East & West Coast Rare Fungi Challenges



Caloboletus peckii

https://redlist.info/iucn/species_view/223743

Fungal SAG Origin Story

- Estimated 2.2- 3.8 million macrofungi worldwide
- March 2022 following Endangered Species Committee (ESC) discussion formed Bryophyte Scientific Advisory Group (SAG)
- Former assistant VT Botanist Aaron Marcus initiated FSAG to align fungal conservation with NatureServe methodology (Vt Natural Heritage, ESC); VT Agency of Natural Resources to include *Funga* with Flora & Fauna

Delimitation of Funga as a valid term for the diversity of fungal communities: the Fauna, Flora & Funga proposal (FF&F) (Kuhar et al. 2018)



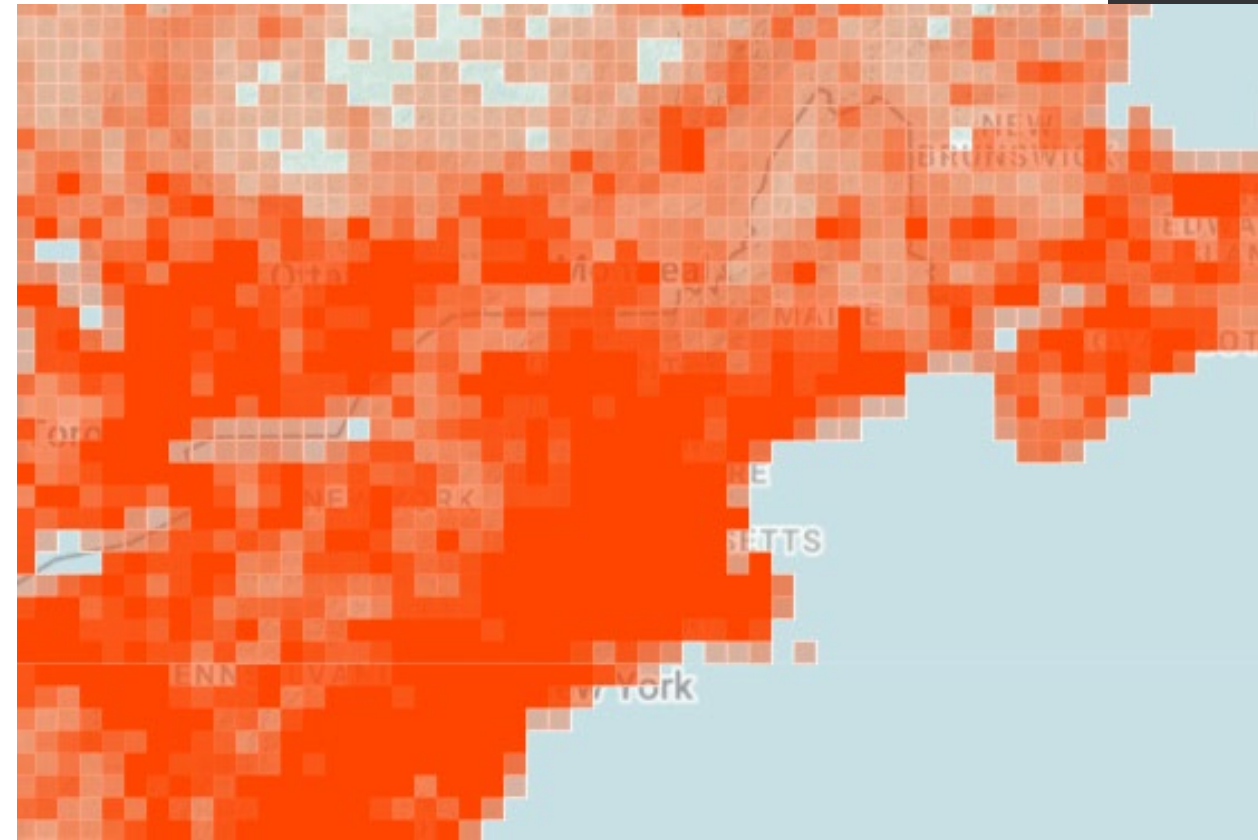
Fungal SAG Priorities

1. Baseline Inventory of Known Species
2. Assessment and Review of Existing Species
3. Outreach and Conservation



1. Baseline Inventory

- What does baseline mean?
- What species have historically occurred in VT?
- What species currently occur in VT?
- What species are missing, that are present elsewhere in the Northeast (including NY and Canada)?



Kindom Fungi observations uploaded to INaturalist

Baseline Inventory: Database Results

<https://val.vtecostudies.org/projects/vermont-fungi-atlas/>



EXPLORE DATA

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NEWSFEED ▾

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PROJECTS VERMONT FUNGI ATLAS

Vermont Fungi Atlas



36,628
records



3,826
species



117
datasets



4,248
contributors



27,251
images

Search the Atlas...



- 1,165 species were observed and reported in VT (2023)
- 3,826 species (as well as variations and/or subspecies) (2025)

Database Use



EXPLORE DATA PROJECTS NEWSFEED EVENTS REPORTS HELP ABOUT DONATE VCE WEBSITE »

Squamanita complex

GENUS *Squamanita* (ACCEPTED)



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S-Rank: *N/A*
IUCN: *N/A*
VT List: *N/A*
Vermont Fungi Records: [2](#)
First VTF Record: [11 Jul 1964](#)
Last VTF Record: [20 Jul 2024](#)

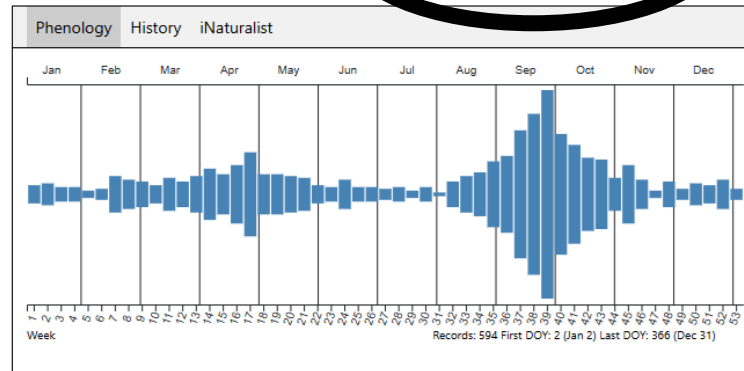
Birch Polypore SPECIES *Fomitopsis betulina* (ACCEPTED) <= SPECIES *Piptoporus betulinus* (SYNONYM) <= SPECIES *Polyporus betulinus* (SYNONYM)



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S-Rank: *N/A*
IUCN: *N/A*
VT List: *N/A*

Vermont Fungi Records: [600](#)
First VTF Record: [01 Oct 1910](#)
Last VTF Record: [19 Aug 2025](#)



Fomitopsis betulina, commonly known as the **birch polypore**, **birch bracket**, or **razor strop**, is a common bracket fungus and, as the name suggests, grows almost exclusively on birch trees. The brackets burst out from the bark of the tree, and these fruit bodies can last for more than a year.

Wikipedia for synonym [Piptoporus betulinus](#)
Wikipedia for synonym [Polyporus betulinus](#)

About

TAXONOMY

The fungus was originally described by Jean Bulliard in 1788 as *Boletus betulinus*.^[2] It was transferred to the genus *Piptoporus* by Petter Karsten in 1881.^[3] Molecular phylogenetic studies suggested that the species was more closely related to *Fomitopsis* than to *Piptoporus*,^{[4][5]} and the fungus was reclassified to *Fomitopsis* in 2016.^[6]

The specific epithet *betulina* refers to the genus of the host plant (*Betula*).^[7] Common names for the fungus include birch bracket,^[8] birch polypore, and razorstrop fungus.^[9]

DESCRIPTION

The fruit bodies (*basidiocarps*) are pale, with a smooth, grayish-brown top surface, while the creamy white underside has



Fomitopsis betulina

2. Assess & Review Existing Species

- What fungi would benefit from State ranks?
- What fungi are currently red listed?
- Assign S-ranks to selected taxa
- Perform dedicated searches for potentially rare species

Natural Community State Ranks

These ranks indicate the relative rarity of natural community types and are assigned by the Vermont Natural Heritage Inventory of Vermont Fish & Wildlife Department.

S1: very rare in the state, generally with fewer than five high quality occurrences

S2: rare in the state, occurring at a small number of sites or occupying a small total area in the state

S3: high quality examples are uncommon in the state, but not rare; the community is restricted in distribution for reasons of climate, geology, soils, or other physical factors, or many examples have been severely altered

S4: widespread in the state, but the number of high quality examples is low or the total acreage occupied by the community type is relatively small

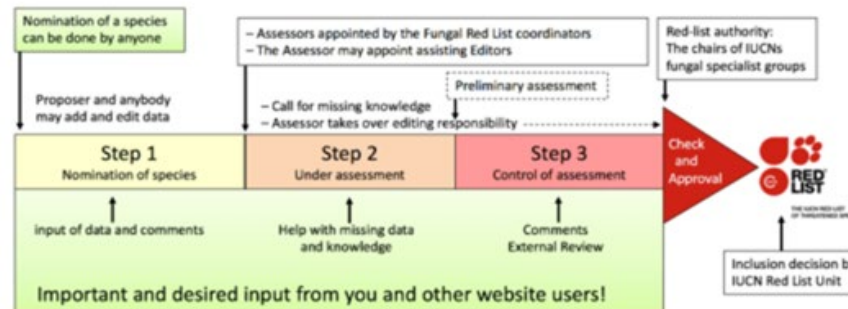
S5: common and widespread in the state, with high quality examples easily found

G1 or S1	G2 or S2	G3 or S3	G4 or S4	G5 or S5
Very rare (Critically Imperiled)	Rare (Imperiled)	Uncommon (Vulnerable)	Common to uncommon (Apparently secure)	Common (Secure)
At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very	At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer)	At moderate risk of extinction or extirpation due to restricted range, relatively few populations or	Locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other	Widespread and abundant

The Global Fungal Red List Initiative

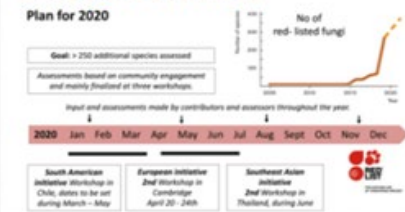


Species of fungi are threatened by habitat loss, loss of symbiotic hosts, pollution, over exploitation, and climate change, but the vast majority of fungal species have not been assessed.

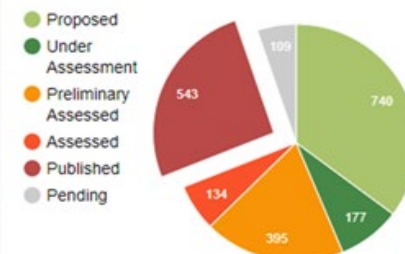


The aim of the global IUCN Red List of Threatened Species™ is to convey the urgency of conservation issues to the public and policy makers, as well as help the international community reduce species decline and extinction. The IUCN Red List is widely recognized as the most comprehensive, objective global approach for evaluating the conservation status of animal, fungal and plant species, and it has a large impact on the setting of priorities in nature conservation.

214 fungi red-listed 2019



Current Assessment status



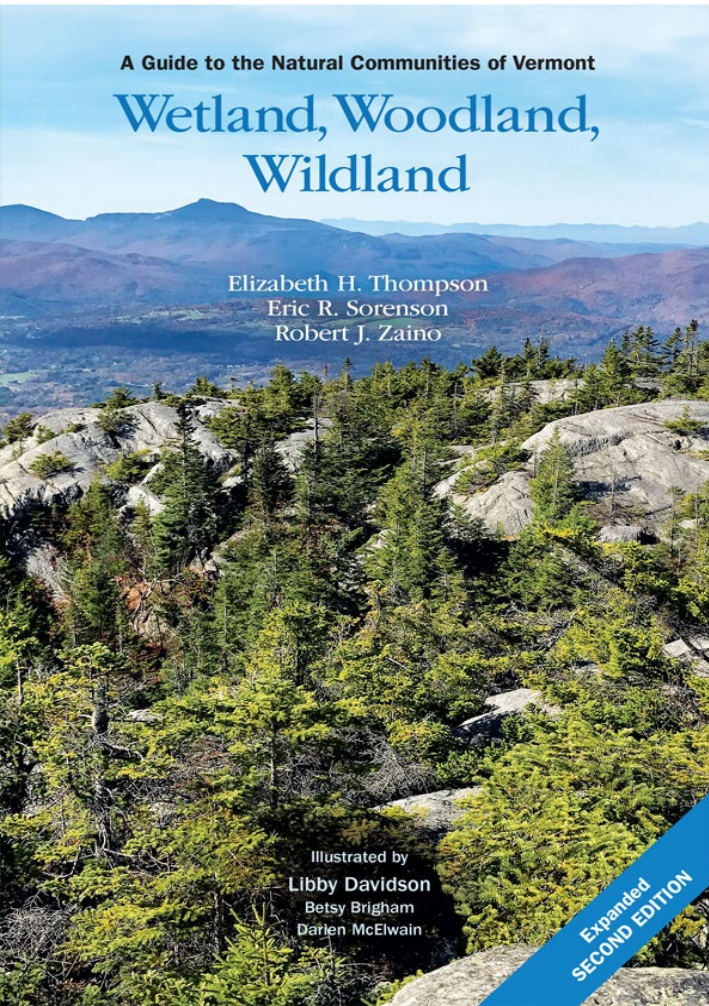
VT FSAG Challenges

- Amidst IUCN protocol, ephemeral nature of fruiting bodies
 - Challenging to legally protect
- Nature Serve uses S Ranks, different than IUCN ranking
- Distinctions of rare vs uncommonly collected
 - Charismatic species are more likely to be observed & recorded
- Coordination with other SAGs in corresponding associations
 - i.e. many plant species showing declines are mycorrhizally dependent



(Epifagus virginiana)

Assessment and Review of Existing Species: Natural Communities



Upland natural communities

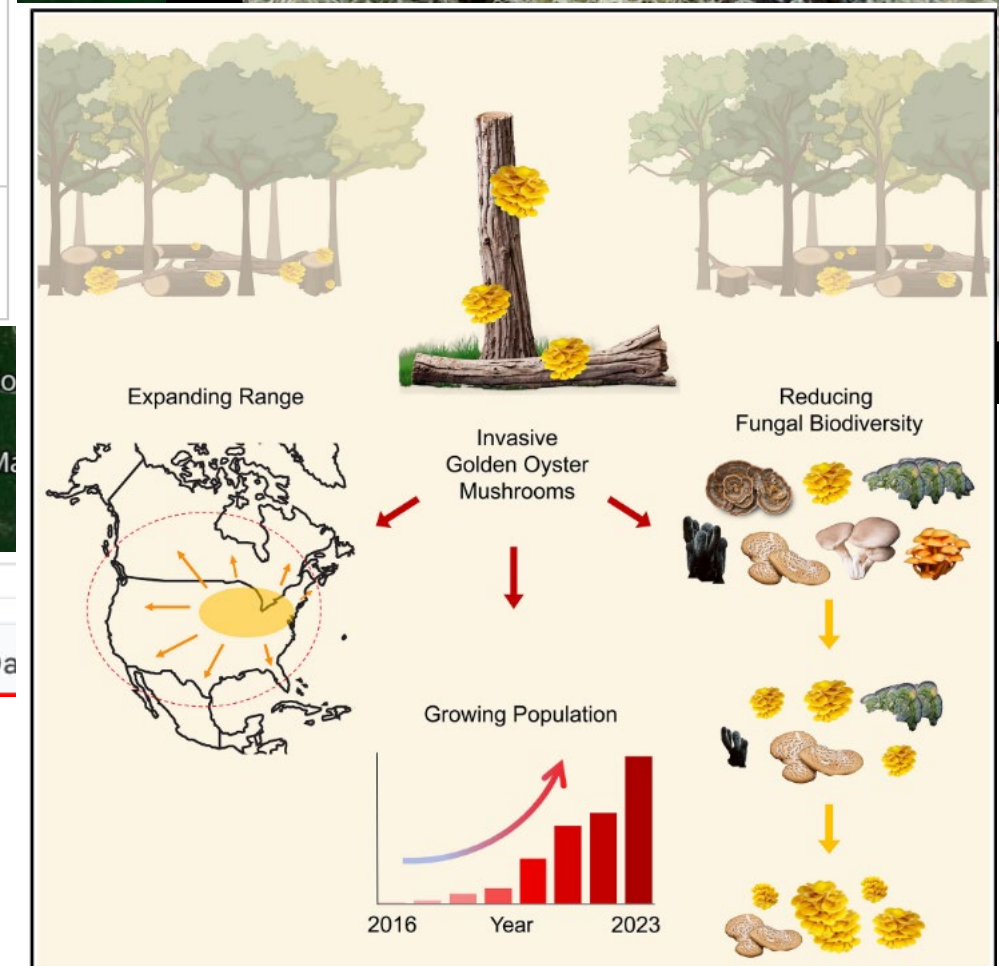
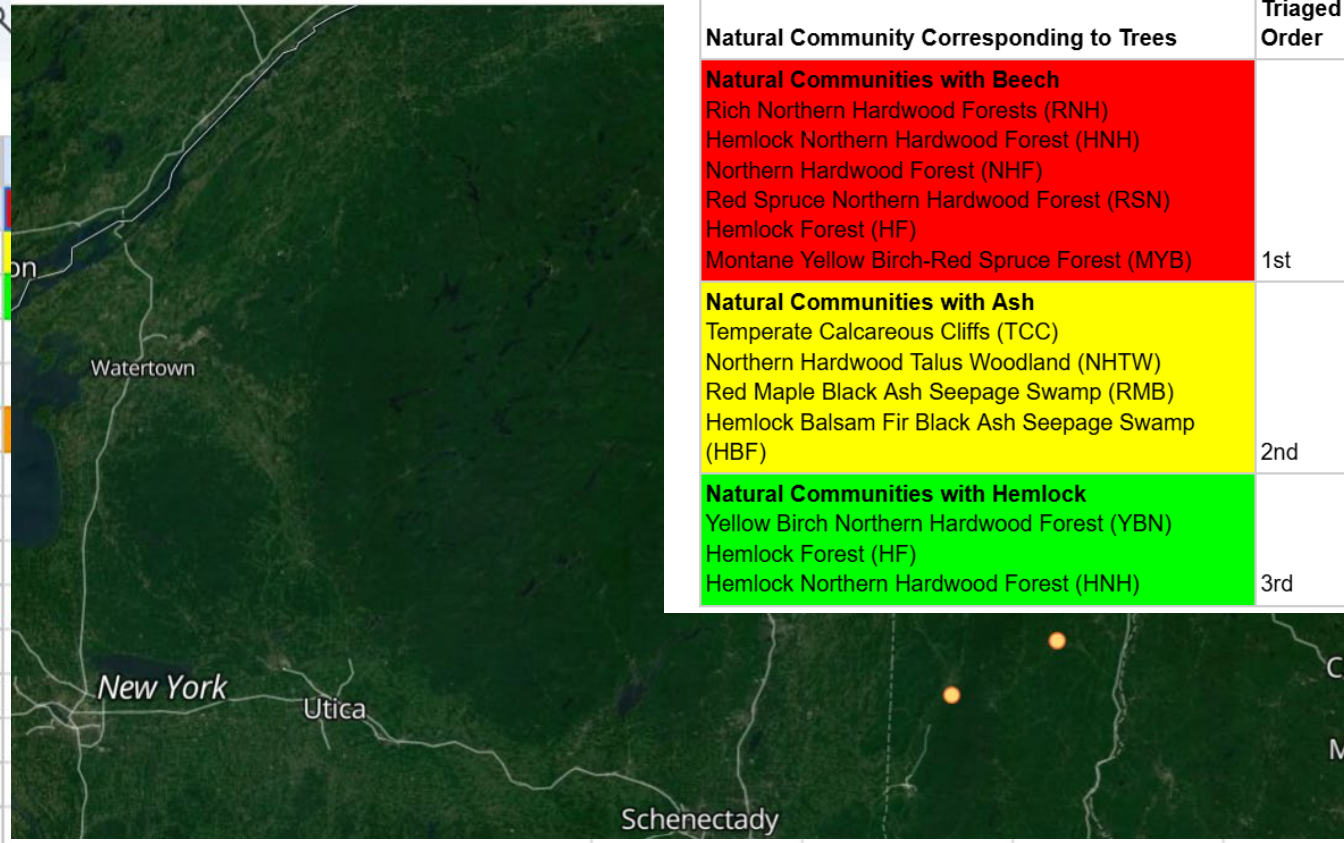
- Forest and woodlands
- Northern Hardwood forests
- Spruce-Fir, Northern, Oak-Pine
- Open Uplands
- Upland Slopes
- Outcrops & Upland Meadows
- Cliffs & Talus

Wetland natural communities

- Forested Wetlands
- Floodplain forests
- Hardwood swamps
- Softwood swamps
- Seeps & Vernal Pools
- Open & Shrub Wetlands
- Open Peatlands
- Marshes & Sedge Meadows
- Wet Shores
- Shrubs & Swamps

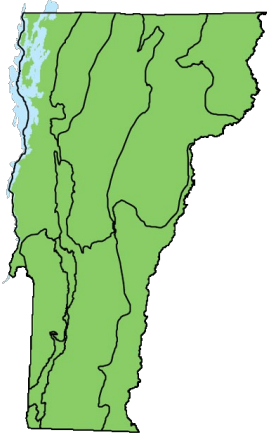
Table 2. Triaged order of NCs based on tree composition and corr

Natural Community Corresponding to Trees	Triaged Order
Natural Communities with Beech Rich Northern Hardwood Forests (RNH) Hemlock Northern Hardwood Forest (HMH) Northern Hardwood Forest (NHF) Red Spruce Northern Hardwood Forest (RSN) Hemlock Forest (HF) Montane Yellow Birch-Red Spruce Forest (MYB)	1st
Natural Communities with Ash Temperate Calcareous Cliffs (TCC) Northern Hardwood Talus Woodland (NHTW) Red Maple Black Ash Seepage Swamp (RMB) Hemlock Balsam Fir Black Ash Seepage Swamp (HBF)	2nd
Natural Communities with Hemlock Yellow Birch Northern Hardwood Forest (YBN) Hemlock Forest (HF) Hemlock Northern Hardwood Forest (HMH)	3rd



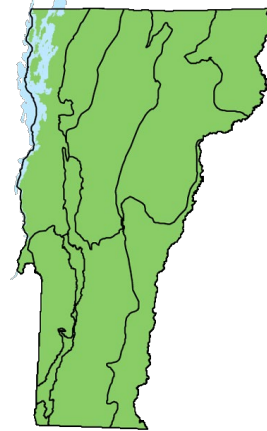
- Bioindicators
- Warning about ‘invasive’ fungi (Veerabahu et al. 2025)

Assessment and Review of Existing Species: Natural Communities



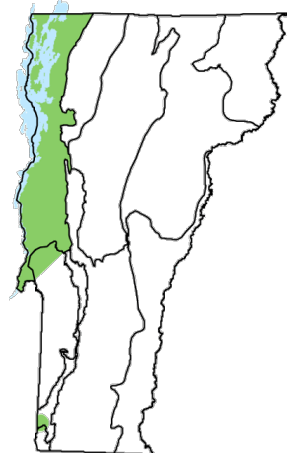
Gifford Woods State Park

- Northern hardwood forest
- 35 Fungi
 - 29 genera
 - 26 species



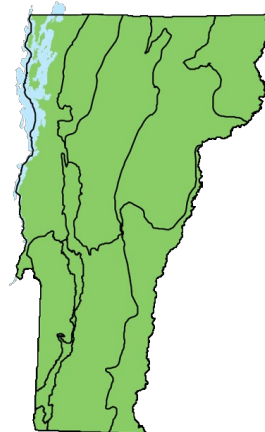
Woodbury Mountain Wilderness Preserve

- Rich northern hardwood forest & Northern hardwood forest
- 76 Fungi
 - 57 Genera
 - 41 Species



William Woods

- Mesic clayplain forest
 - 65 Fungi
 - 43 genera
 - 47 species



Coolidge State Forest

- Northern hardwood forest & Hemlock northern hardwood
- 46 Fungi
 - 39 genera
 - 43 species

3. Conservation & Outreach

- Keep ESC informed about RTE fungi and our work
- Maintain the state's database of known fungi
- Submit fungi data to other databases
- Propose T&E listings for fungi when appropriate
- Public outreach and education

1 *Caloboletus peckii*
Peck's Bolete
Habitat: Hardwood forest, mycorrhizal
Location: NH, VT, Appalachian Mtns

2 *Boletus purpureorubellus*
Purple-Red Bolete
Habitat: Marshlands, occ. in moss
Location: Known in NJ, Mid-Atlantic

3 *Butyriboletus billiaeae*
Billie's Bolete
Habitat: Pitch-pine scrub forest, mycorrhizal w/ hardwoods
Location: MA (Cape Cod), NY, NJ

4 *Entoloma flavoviride*
Yellowish-green Entoloma
Habitat: Wet soils in swamps, associate w/ hardwoods
Location: ON, QC, VT, NH, ME

5 *Clavulinopsis appalachiensis*
Appalachian Spindle Coral
Habitat: Leaf litter in mixed woods, rotten hardwood logs
Location: Appalachians to ON, NS

6 *Tricholoma grave*
Heavy Trich
Habitat: Mycorrhizal w/ hardwoods (Oak, Beech) & Hemlock
Location: New England, QC

7 *Tricholoma apium*
Celery Trich
Habitat: Sandy, lichen-dominated forests, mycorrhizal w/ conifers
Location: Northern US, NF

8 *Volvariella surrecta*
Piggyback Pinkgill
Habitat: Forested mountains on decaying *Sitocypa* spp.
Location: NY, CT, PA

9 *Amanita ristichii*
Sam's Amanita
Habitat: Suburban fragmented forest
Location: NH, ME, SE Canada

10 *Psathyrella epimyces*
Parasitic Psathyrella
Habitat: Parasite of *Coprinus* spp.
Location: SE Canada, VT, NH, ME

11 *Calliderma indigoferum*
Indigo Blue Entoloma
Habitat: NJ Pine barrens
Location: NJ, ME?

12 *Underwoodia columnaris*
Fluted Stalk Fungus
Habitat: On soil under hardwoods, & mixed woods
Location: MD to VA, MI to NY & VT

13 *Echinodontium ballouii*
Atlantic White-Cedar Conk
Habitat: On Atlantic White Cedar
Location: Atlantic coast, ME to GA

14 *Helvella palustris*
Swamp Elf-in Saddle
Habitat: Mixed forest swamps, usually in moss on rotten logs
Location: MI, NY

15 *Dendrocollybia racemosa*
Branched Sharklet
Habitat: Mixed & Beech woods, Parasite of *Lactarius* & *Russula* spp.
Location: North-east (NH, ON)

16 *Pseudofistulina radicata*
Roiling Tube-pore Polypore
Habitat: Hardwood logs, stumps, roots
Location: PA, NY

17 *Hodophilus peckianus*
Peck's False Waxy Cap
Habitat: Forested hardwood swamps
Location: Scattered, East US & CAN

18 *Wynnea Sparassoides*
Stalked Cauliflower Fungus
Habitat: On soil or under leaf litter, mixed woods
Location: NJ, MD, PA, OH, CT

19 *Hypocrepopsis rhododendri*
Hazel Fingers
Habitat: Wet, rainy forests, associate of Hazel trees
Location: Atlantic coast

20 *Squamanita umbonata*
Fibercap Strangler
Habitat: Hardwood forests, parasitic on *Inocybaceae*.
Location: Northeastern U.S.

The Northeast
Rare Fungi Challenge
20 rare, under-documented, or potentially threatened macrofungi species of Northeastern North America





About

Education

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Biodiversity University

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Vermont Master Naturalist

Visiting Teacher-Naturalist Program

COMMUNITY SCIENCE

Amphibian Conservation

Owl Banding

Songbird Research

Winter Bird Count

Fungi of Vermont Program

ONLINE LEARNING

Online Courses

Virtual Nature Walks

The North Branch River

Online Bird Banding Station

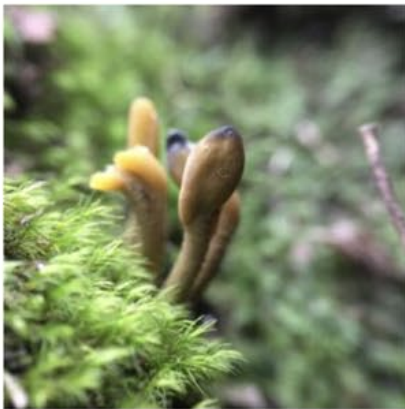
Click each tab to expand

☞ **Getting Started – Joining the Fungi of Vermont Program**

☞ **1. Good: Recording Observations – Take Photos & Upload to iNaturalist**

☞ **2. Better: Recording Observations – Adding Notes & Special Features**

☞ **3. Best: Preserving Voucher Specimens**



iNaturalist Observations

- Photos are uploaded to the app
- ID's are suggested by software
- 3 Confirmations yield a 'Research Grade' Status
- All fungi observations made within Vermont contribute to the community science initiative

The screenshot shows the iNaturalist website interface. At the top, there is a search bar and navigation links: Explore, Your Observations, Community, Identify, and More. A green 'Upload' button is visible. The main content area features a large image of blue-green fungi with the text 'Fungi Of Vermont' overlaid. To the right of the image is an 'About' section with a 'Leave' button and a user count of 102. The 'About' text describes the project as a collection of macro fungi within Vermont, USA, and notes that all observations are automatically added to the project. Below the text are links for 'Read More', 'Your Membership', 'Edit Project', and 'Project Journal'. At the bottom of the page, there is a statistics bar with the following data: Overview, 82,268 OBSERVATIONS, 1,526 SPECIES, 2,392 IDENTIFIERS, 7,693 OBSERVERS, and a 'Stats' button.

The screenshot shows the mobile app interface for a specific observation. At the top, the time is 11:27 and there are icons for signal strength, Wi-Fi, and battery. Below this is a 'Details' header with a 'Cancel' button. A row of four photos of purple and white mushrooms is shown, with the first one selected as 'Default'. Below the photos is the species name 'Laccaria ochropurpurea' and its common name 'Purple-and-White Deceiver'. A description follows: 'Growing from soil in mixed hardwood forest (sugar maple, beech, eastern white pine, eastern hemlock)'. Below the description are several metadata fields: '8/29/23, 17:46 -04:00', 'Putnam Rd, Montpelier, VT, US' (with coordinates: Lat: 44.304, Long: -72.492, Acc: 8724 m), 'Geoprivacy Open', 'Captive / Cultivated No', and 'Projects'. At the bottom of the screen is a large green 'SAVE' button.

References & Acknowledgements

- Kuhar F, Furci G, Drechsler-Santos ER, Pfister DH (2018) Delimitation of Funga as a valid term for the diversity of fungal communities: the Fauna, Flora & Funga proposal (FF&F). IMA Fungus 9:A71–A74. <https://doi.org/10.1007/BF03449441>
- Thompson EH ER Sorenson & Zaino, RJ (2019) A Guide to the Natural Communities of Vermont: Wetland, Woodland, Wildland, 2nd edn. Chelsea Green Publishing, White River Junction VT
- Veerabahu A, Banik MT, Lindner DL, et al (2025) Invasive golden oyster mushrooms are disrupting native fungal communities as they spread throughout North America. Curr Biol 35:3994-4002.e4. <https://doi.org/10.1016/j.cub.2025.06.049>



Questions?

