

Hardwick Ecological Inventory Executive Summary

28 March 2024

***The full Hardwick Ecological Inventory Report is available digitally on the town website: hardwickvt.gov → government → Committees & Boards → Hardwick Conservation Commission**

In 2023 the Hardwick Conservation Commission and Town of Hardwick initiated a town-wide ecological, or natural resources, inventory. Local ecological consultant Matt Peters was retained to conduct the work. The goals of the study are to provide information supporting municipal land use planning, in particular, to enhance knowledge and understanding of some of the most ecologically significant places in Hardwick, and to help residents better enjoy and steward their place. The project helps the Hardwick Conservation Commission, established in 2019, fulfill their mission to “establish community responsibility for Hardwick’s natural resources”. Funding came from an award of American Rescue Plan Act (ARPA) funds from the Town of Hardwick. Substantial volunteer work by Hardwick Conservation Commission members and other community members was essential to this effort. I greatly thank Commission members, participating landowners, and town officials. The study began in early 2023 and ended in April 2024 with field studies during summer and fall of 2023.

The study process involved gathering and analyzing existing geographic and ecological data, maps, and imagery to map and describe forest blocks, and identify and prioritize the best sites for field studies, in a process known as landscape analysis. Conservation Commission members then contacted owners of priority properties to obtain permission for field studies, which only proceeded where permission was granted. Field studies focused on identifying natural communities of state and local significance, and other significant and sensitive features.

Other aspects of the project emphasized public education and engagement. These included a public kick-off presentation at the town office that provided an opportunity to incorporate local knowledge, as well as a concluding presentation of project findings. Two public field walks were well attended at sites of diverse ecological interest. One trip explored Cooper Brook and the nearby toe slopes of Buffalo Mountain from the Atkins Field, while the other explored the Lamoille River floodplain forests below the falls in East Hardwick. Site visits also often involved landowners providing opportunities for mutual knowledge sharing.

The landscape analysis yielded 38 forest blocks with potentially ecologically significant features. Also known as habitat blocks, the forest blocks encompass most of the larger areas of natural habitat in Hardwick, providing valuable perspectives for land use planning and habitat connectivity. These blocks total about 16,218 acres or about 65% of Hardwick, with the remainder of Hardwick’s nearly 25,000 acres being in some form of highly human-altered land use. Though a few blocks are less than 100 acres or more than 1,000 acres, most are a few hundred acres in extent (range 22 to 2,162 acres). Blocks of greatest importance for large-scale habitat connectivity and wildlife movement, including Buffalo and Judevine Mountain blocks, are briefly highlighted. More extensive description is provided for blocks that had field study.

Twenty-six of the forest blocks were prioritized for their potential to contain ecologically significant features and became the focus of landowner permissions and field inventory. Among these higher priority forest blocks, there were about 170 parcels of particular interest with 145 different ownerships. Conservation Commission members and others used a combination of phone, email, in

person, and postal mail outreach to seek permission for field work. Of the 145 ownerships, 39 granted permission (including municipal lands), 19 denied permission, and 87 did not respond or could not be contacted. Only the properties with landowner permission or public access were considered for field studies.

During the summer and fall of 2023 I conducted rapid ecological assessment fieldwork at 15 forest blocks where permission was obtained, including 32 properties in parts of most higher priority blocks. Many additional properties for which permission was obtained went unvisited due to time constraints. These provide ample opportunities for additional follow-up work and doubtless contain additional features of ecological significance. Field studies resulted in documentation of numerous new features of state and/or local ecological significance, such as exemplary natural communities and rare species, including features at every visited block. When combined with pre-existing data 18 of the blocks now have documented features of state or local ecological significance. The remaining twenty blocks have received little if any field study and many have strong potential for additional significant features.

Wetlands are abundantly and widely scattered across the Hardwick landscape, contributing disproportionately to biodiversity and habitat values, as well as to ecosystem services benefiting humans, such as water purification and flood mitigation. Compilation of existing state wetland maps with wetland natural communities mapped during this study, reveals that wetlands span around 1,356 acres or 5.4% of Hardwick. Of these, 1,128 acres (4.5% of Hardwick) are currently mapped by the Vermont Significant Wetlands Inventory and protected as significant under the state Wetland Rules; unmapped wetlands are also protected if they provide similar functions and values to mapped VSWI wetlands. Updated wetland mapping with substantially improved accuracy and comprehensiveness is currently being developed by the Vermont Department of Environmental Conservation's (VT DEC) Wetlands Program and should be available in 2025.

Natural communities are interacting assemblages of organisms, their physical environment, and the natural processes that affect them, making them excellent tools for understanding, managing, and conserving important aspects of our natural heritage. Out of Vermont's 120 currently recognized natural community types and variants about 32 are found in Hardwick, including 22 wetland types and 10 upland types. Eighteen of these are considered rare to uncommon at the state level, including 15 wetland and 3 upland types.

As a result of this study, the number of known natural community types of state-level significance in Hardwick increased from 1 to 8, and the number of State-Significant natural community sites or 'occurrences' increased from 1 to 14. Twenty-five additional locally-significant occurrences of 12 more natural community types were also documented, for a total of 39 state and/or locally significant occurrences of 20 natural community types. These include 17 wetland and 3 upland community types and are widely dispersed throughout the town. Natural community highlights from this study include an unusual abundance and quality of uncommon Northern White Cedar Swamp and Northern White Cedar Seepage Forest natural communities, several rare Boreal Floodplain Forest areas and other rare and uncommon riverside communities, and a large Northern Hardwood Talus Woodland on Buffalo Mountain.

Rare and uncommon plants and animals are unique and important parts of Hardwick's natural heritage. Prior to this study, the Hardwick landscape was known to support 6 total occurrences of 5 rare or uncommon species, with no state-listed Threatened or Endangered species. As a result of

this study, including compiling sensitive species (rare, Threatened, Endangered, and uncommon) from sources other than Vermont's Natural Heritage Inventory, there are now about 77 documented occurrences of 47 known rare or uncommon species (28 rare and 19 uncommon species) documented in some fashion. Two new state-Threatened plant species were found, Bog Wintergreen (*Pyrola asarifolia*) and Marsh Horsetail (*Equisetum palustre*), though the latter is proposed for delisting. Among these 47 sensitive species there are 23 vascular ('higher') plants, 16 nonvascular plants (mosses & liverworts), 5 invertebrate animals, and 3 vertebrate animals. About half (24) of these sensitive species are primarily associated with wetlands and aquatic features, underscoring the importance of these areas for biodiversity.

Thirty-three of the 47 rare and uncommon species were seen during this study, while others are based on records dating back as much as a century to 1924. Other highlights among newly documented rare species include the discovery of the tiny Four-Toothed moss (*Tetradontium brownianum*) in talus on Buffalo Mountain. Newly found in Vermont at several sites in 2023, this cryptic moss was only historically known from New England. Hardwick boasts New England's only currently known populations of regionally rare Grove Hawthorn (*Crataegus lucorum*), known from early successional habitats near the Lamoille River. Many of the rare and uncommon plants are associated with calcareous or enriched habitats that can at least partially be attributed to underlying calcareous Waits River Formation bedrock.

Finally, generalized management recommendations are presented to enhance stewardship of the many significant features found during this ecological inventory, and additional suggestions for follow-up work are outlined.

As revealed through this study, Hardwick hosts myriad unique and ecologically important natural features, from vast forest blocks of Northern Hardwood Forest to the tiniest rare mosses. Through improved knowledge provided here the Hardwick community can continue to wisely use, manage, and conserve and celebrate this diverse and exciting natural heritage.



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