

# Proposed Mt. Mansfield Science and Stewardship Center

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## Introduction

Several organizations have partnered to establish a vision for a new hub of mountain science and stewardship in the Mount Mansfield Summit Station, a 64ft x 40ft building located on a forested ridgeline in the Green Mountains of northern Vermont (Figure 1). Initiated by the Vermont Center for Ecostudies and the University of Vermont (UVM), the collaboration also involves the Forest Ecosystem Monitoring Cooperative (FEMC), the Green Mountain Club, and the Vermont Department of Forests, Parks, and Recreation. Together, these organizations envision a community of scholars, educators, and natural resource managers working alongside students and visitors to understand and sustain mountain ecosystems. The Mount Mansfield Science and Stewardship Center will serve this community by facilitating investigations of natural and human-induced change in a remote, living laboratory.

## Mission

The Mount Mansfield Science and Stewardship Center's mission is to catalyze collaborative science and stewardship for healthy mountains, watersheds, and communities. The foundation for this work consists of: a long-term scientific record that spans air, forest, soil, water, and wildlife; a tradition of information sharing and networking; and a commitment to science-based natural resource policy and management



Figure 1. Located on Vermont's highest mountain, the Summit Station offers ready access to montane fir-spruce forest, large alpine and talus communities, as well as lower-slope northern hardwoods. The building is surrounded by a UVM Natural Area (400 acres) and Mount Mansfield State Forest (44,444 acres). Monitoring and research are encouraged on both properties. Photo credit: Rick Paradis

## Goals

- Build knowledge of mountain ecosystems and changes affecting mountain flora and fauna.
- Advance understanding of relationships among mountains, streams, and lakes.
- Provide place-based education and outreach on mountain ecology, conservation issues, and stewardship.
- Develop, implement, and demonstrate management actions that lead to improved conservation of mountain environments.
- Provide a platform for scholarship and instruction in fields that address social dimensions of mountain environments, such as engineering, human health, economics, education, and the humanities.
- Foster connections among UVM schools and programs and between the University and the Vermont State College system.

## Foundation

Mount Mansfield is an exceptional site to do research. The mountain is the State's highest peak, standing at 4,393ft. It contains about 200 of the 275 acres of tundra in Vermont. The toll road, going up to the forested ridgeline of the mountain, provides easy access to the high-elevation environment.

Between 29,000 and 45,000 people pass by the Mount Mansfield Summit Station each year, bringing high visibility to the research while offering an exceptional educational opportunity for the public.

Ecological and meteorological monitoring has been taking place on Mt. Mansfield for decades. Table 1 provides the start year for some of the current types of monitoring that are still taking place on and around the mountain. Figure 2 shows the geographical distribution of these monitoring sites.

**Table 1.** Mount Mansfield has been the subject of scientific study for over 170 years. The Forest Ecosystem Monitoring Cooperative, a collaboration between UVM, the US Forest Service, and the New England and New York state natural resource agencies, has coordinated and sponsored standardized monitoring of air, forest, soil, water, and wildlife since 1991.

Monitoring Target	Start Year
Weather	1955
Precipitation chemistry	1980
Ambient air quality	1986
Forest health	1991
Avian demographics	1991
Amphibian & stream invert population	1991
Plant phenology	1992
Hydrology and water quality	2001
Soil moisture and climate	2000
Soil chemistry and tree nutrition	2002
Alpine plant communities	2004
Mercury flux	2004

## Guiding Principles and Practices

- Integration of research, education, and stewardship is needed to sustain ecosystems and their services to society.
- Strategic collaboration increases the impact of science and conservation by aligning resources, skills, and knowledge.
- Standardized, long-term monitoring and short-term experimentation play essential and complementary roles in science and stewardship. Together, they provide a vital record of the past, reveal ecological patterns and processes, and form a basis for projecting future conditions under different scenarios.
- Science, stewardship, and education must adapt as conditions change and techniques improve.
- Ecological and economic sustainability are fundamental to implementing responsible science, stewardship, and education programs.
- Cooperative and proficient information management creates valuable opportunities for researchers, educators, and natural resource managers.
- Place-based science, stewardship, and education offer unique advantages over other approaches to building and applying knowledge.

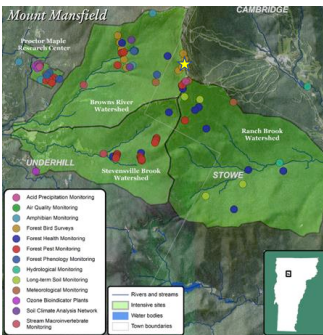


Figure 2. The FEMC has supported long-term monitoring and multi-disciplinary research on Mount Mansfield since 1991. The yellow star indicates the location of the Summit Station, the proposed home of the Mount Mansfield Science and Stewardship Center.

## Collaborative Research

There is an opportunity to develop integrative, hypothesis-driven research projects that capitalize on existing long-term datasets on and around Mt. Mansfield.

- Currently, there are a wide variety of research studies already taking place on the mountain. This includes but is not limited to:
- Ongoing monitoring of the Bicknell's Thrush, a rare bird that depends on alpine habitat in the northeast by the Vermont Center for Ecostudies.
  - An ongoing 20+ year paired watershed hydrology research study managed by Dr. Beverley Wemple at UVM and Dr. Jamie Shanley with the US Geological Survey.
  - The Vermont Forest Ecosystem Management Demonstration Project that is managed by Dr. Bill Keeton at UVM.

There are many opportunities to build upon existing monitoring and research networks on and around the mountain and connect these to regional and global networks. One example of this already in development focuses on building a regional network of mountain observatories for global change monitoring and research.

Key personnel within the Atmospheric Sciences Research Station on Whiteface Mountain in New York and the Mt. Washington Observatory have been convening to discuss the opportunity to collaborate with the proposed Mt. Mansfield Science and Stewardship Center. The group has been establishing connections with UVM,

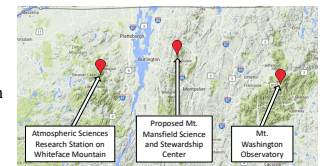


Figure 3. The Proposed Mt. Mansfield Science and Stewardship Center in relation to other mountain observatories in the northeast. A potential regional network of mountain observatories is currently being explored with these other field stations.

the National Mesonet Program, the American Association of State Climatologists, and the National Weather Service to identify potential areas of collaboration. The first opportunity identified would be to deploy temperature/relative humidity sensors at different elevational gradients on each mountain. This would provide the opportunity to enhance modeling

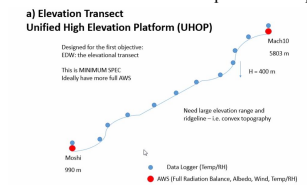


Figure 4. An example of a potential elevational transect model developed by Dr. Nick Pepin at the University of Portsmouth in the United Kingdom.

of thermal profiles that would benefit regional weather forecasting and satisfy the requirements of a newly forming international monitoring program called the Unified High Elevation Platform (UHOP, see Figure 4). The model is being developed by Dr. Nick Pepin and the Global Network of Mountain Observatories.

UHOP aims to have a consistent global model to monitor mountain environments to enhance climate simulation models, which currently perform poorly in mountainous environments.