

Report of the Proposed Mount Mansfield Science and Stewardship Center

based on the

External Review Team Visit to the University of Vermont and Mount Mansfield
18-21 April 2016

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Site visit to the proposed Mount Mansfield Science and Stewardship Center on 21 April 2016



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Jeff Brown received his Bachelors of Science in Business Services from the University of Maryland, University College. He has been the Director of the University of California, Berkeley - Central Sierra Field Research Stations since 2001 and is resident at the Sagehen Creek Field Station. Jeff is a two-time recipient of the UC Berkeley Chancellor's Outstanding Staff Award (COSA) and an Excellence In Management (EIM) awardee. Jeff serves as the chair of the Organization of Biological Field Stations (OBFS), Global Network of Mountain Observatories (GNOMO) ad hoc committee and serves on the OBFS Human Diversity and Art@FSML's committees.

Faerthen Felix has been the Assistant Manager of the University of California's Sagehen Creek Field Station since 2001. She is a two-time recipient of the UC Berkeley Chancellor's Outstanding Staff Award (COSA). Felix serves as the Chair, and is the founder of the Art@FSMLs Committee of the Organization of Biological Field Stations.

Brian Kloeppel received his Ph.D. in forest ecology from the University of Wisconsin-Madison in 1998. He was the Site Director for the Long-Term Ecological Research Program at Coweeta Hydrologic Laboratory in North Carolina from 1995 to 2008. He is a Professor in the Department of Geosciences and Natural Resources and the Dean of the Graduate School and Research at Western Carolina University. He is a former President of the Organization of Biological Field Stations and is also a Science Advisor to Highlands Biological Station.

Stacy McNulty is the Associate Director of the Adirondack Ecological Center, a field station of the State University of New York College of Environmental Science and Forestry. She holds an M.S. in environmental and forest biology from SUNY ESF and has conducted research and teaching activities at AEC since 2000. She has published over two dozen studies on forest and wetland ecology, wildlife conservation and management, phenology, and climate change. She currently serves OBFS as secretary and has held positions including OBFS Member-at-Large and Chair of the Human Diversity Committee.

William Schuster received his Ph.D. in biology from the University of Colorado in 1989. He has been the Executive Director of Black Rock Forest Consortium since 1992 and is a past President of the Organization of Biological Field Stations. He has championed the role of field stations and the use of science to guide conservation decisions including control of deer populations, response to eastern hemlock decline, and restoration of native trout populations. He authored the forest ecology chapter in a recent book on the New York-New Jersey Highlands and has been author on more than 50 peer-reviewed research papers in ecology, ecosystem management, and environmental change.

<p><u>Monday, April 18</u></p> <p>Northeast Mountain Science Conference: Scoping Science and Stewardship Opportunities</p> <p><i>Presentations:</i> Invited expert presentations on topics, including: alpine climate, forest ecotones, mountain watersheds, sensor networks, mountain biodiversity, ecological economics, visitor use and carrying capacity, alpine stewardship, outdoor education, science and policy integration.</p> <p><i>Discussion and Outcome:</i> Discussion leaders synthesized ideas from presenters and other participants into a set of interdisciplinary research opportunities that reflect regional interests. A multi-voting system produced five project ideas for further development into mini-proposals.</p>
<p><u>Tuesday, April 19</u></p> <p>Northeast Mountain Science Conference: Planning Collaborative Science and Stewardship</p> <p><i>Proposal Development:</i> Facilitated breakout groups met to produce detailed outlines of five projects that could be integrated into research, education, and conservation programs at sites throughout the Northeast, including the Mount Mansfield Science and Stewardship Center.</p> <p><i>Proposal Presentations:</i> A representative of each group shared its project proposal with all other participants and collected input for the next stage of proposal development. Detailed project outlines formed the basis for the Mount Mansfield Science and Stewardship research program.</p>
<p><u>Wednesday, April 20</u></p> <p>OBFS Review: Information Sharing and Site Visit</p> <p><i>Briefing:</i> Mansfield Center cooperators briefed the review team on the draft strategic plan and supporting documents (Program, Business, Facilities, and Data Management Plans).</p> <p><i>Orientation to the Vermont Monitoring Cooperative:</i> Hosts presented the major findings, data sets, and networks that provide a foundation for the Center's research program.</p> <p><i>Interviews:</i> Reviewers interviewed the Mansfield Center's core constituents.</p> <p><i>Site Visit:</i> Mansfield Center cooperators led a visit to the mountain's ridgeline and Summit Station via chairlift and snowcat.</p>
<p><u>Thursday, April 21</u></p> <p>OBFS Review: Evaluation and Recommendations</p> <p><i>SWOT Analysis:</i> Kloeppel led a discussion among cooperators and reviewers regarding strengths, weaknesses, opportunities, and threats pertaining to the strategic plan's elements.</p> <p><i>Documentation of Findings:</i> The OBFS review team drafted its assessment of the Center.</p>

I. Executive Summary

The potential to create the Mount Mansfield Science and Stewardship Center is an exciting opportunity. In a time of rapid environmental change, field stations are increasingly important platforms for research, education, and outreach about the environment (National Research Council 2014). Costanza (2014) indicates that the value of ecosystems services parallels total global domestic production and that degradation of ecosystem services costs trillions of dollars per year. The logistical support offered by field stations to scientists and educators facilitates discovery as well as invaluable outreach opportunities; thus, field stations are essential educational and research platforms for addressing environmental challenges (Billick et al. 2013). As the importance of field stations to society grows, universities lacking such facilities will be at a significant competitive disadvantage for both recruitment and research. The absence of a field station at UVM is striking given the institution is among the nation's premier small universities.

A field station also aligns strongly with UVM's culture. All of the faculty and students with whom we visited identified the ability to support overnight experiences in a unique natural environment as something the university should be doing. This is not surprising, given UVM's focus on a liberal education and the environment and the type of faculty and student body the institution attracts. Such a facility also offers opportunities for service learning, a UVM priority.

The Mount Mansfield location offers opportunities for the creation of a field station. A summit facility would enhance a variety of existing research. Furthermore, field research tends to be self-catalyzing. Because of the value of long-term research, as well as the importance of knowledge about the existing environment, new research projects greatly benefit from past and ongoing research such as that conducted by UVM and Vermont Monitoring Cooperative. Located at the highest point in Vermont, it is a natural location for studies that take advantage of elevational gradients to detect, predict, and adapt to climate change. Furthermore, the potential for overnight housing in support of education and research in an alpine environment would make this facility unique not just regionally, but for the continent.

Should UVM decide to move forward with the concept, we offer a series of recommendations that might help in creating a productive and financially viable center.

1. **Length of lease.** UVM should request a long lease from Stowe Mountain Resort. Forty years is a minimum timeframe; 99+ years would be ideal.
2. **Toll road proceeds.** UVM should request that some of the proceeds from the toll road be shared with the university to cover the costs of operating. The presence of public bathrooms as well as interpretation will reduce the Stowe Mountain Resort's cost of operation and improve the quality of the visitor experience, which will increase visitation and overall revenue.

3. **Environmental analysis.** Before agreeing to terms with Stowe, UVM should conduct a thorough environmental analysis of legacy issues at the site, including reviewing whether there are any issues associated with PCB's, asbestos, and lead.
4. **Building cost.** Collectively the review team has substantial experience building facilities in remote locations. We found the cost estimates to be quite high and the rationale for the costs too vague. UVM should obtain independent cost estimates, reviewing construction costs for comparable structures as well as consulting with general contractors working in the area. If the construction costs continue to be unusually high, the factors driving the high costs should be made very clear.
5. **Design of building.** While the current architectural design provides a useful conceptual review to identify how much space is available for different functions, we recommend spending more time on improving the design and public traffic flow. This includes focusing in on identifying programmatic needs (e.g., how much space is allocated to research, education, and outreach), as well as simple design features such as whether there are sufficient public bathrooms, whether the bathrooms are accessible from the outside, whether the field lab should be better integrated with the public spaces, and whether the wet lab should be moved further away from the public spaces. In addition, the effective design of outside spaces such as picnic tables and public areas where the public could relax without disrupting classes or research in progress would be optimal.
6. **Public outreach and stewardship.** While research and education should be the primary focus of the site, public outreach and stewardship will also have to be a top priority. This site is heavily visited by the public and is culturally important. If handled well, outreach will raise UVM's profile, help the center financially, and provide incredible opportunities for science interpretation. Both the staffing and building design should reflect the importance of outreach and stewardship.
7. **Stakeholder engagement.** We encourage UVM to develop formal mechanisms by which to engage stakeholders. This will foster long-term support for the facility, provide opportunities for outreach, and general political and financial support for the facility. As part of stakeholder engagement, UVM should consider creating partnering opportunities for other colleges and universities.
8. **Overnight capacity.** One of the unique opportunities is to provide overnight housing on a mountain top so we recommend that UVM consider providing enough overnight housing for a class of 15- to 20 students. The site use plan should be developed to ensure that recreational use around the facility does not negatively impact the area.
9. **Staffing.** A facility with expected high student and public use will require adequate personnel capacity to manage the physical, information, and user group needs.

Governance

The Mount Mansfield team requested specific information about governance. The review team attempted to include this information throughout the document. If there are additional needs or questions, we encourage further engagement with the review team specifically, and the Organization of Biological Field Stations (OBFS) generally. The review team also recommends the following publications:

Billick, I., I. Babb, B. Kloeppel, J. C. Leong, J. Hodder, J. Sanders, and H. Swain. 2013. Field Stations and Marine Laboratories of the Future: A Strategic Vision. National Association of Marine Laboratories and Organization of Biological Field Stations. Available at <http://www.obfs.org/fsml-future>.

National Research Council. 2014. "Enhancing the Value and Sustainability of Field Stations and Marine Laboratories in the 21st Century". Committee on Value and Sustainability of Biological Field Stations, Marine Laboratories, and Nature Reserves in 21st Century Science, Education, and Public Outreach. Board on Life Sciences, Division on Earth and Life Studies. National Research Council of the National Academies. Available at <http://www.nap.edu/catalog/18806/enhancing-the-value-and-sustainability-of-field-stations-and-marine-laboratories-in-the-21st-century>

II. Programming

Mount Mansfield is the highest point in Vermont, hosting a rare alpine zone and a persistent and productive research tradition examining the biota and hydrology of this zone. Mount Mansfield lies strategically between the high altitude observatories at Mount Washington, NH and Whiteface Mountain, NY, providing potential line-of-sight connectivity between these assets, and the possibility of linkage into a regional observatory network to address landscape-scale hydrology, ecology, and climate questions. The Mount Mansfield Science and Stewardship Center could provide the only high-elevation overnight housing available at this suite of research sites.

For these reasons alone, Mount Mansfield is a natural candidate location for a field research station that could connect, coordinate and expand the tradition of regional field observation, monitoring, research and education.

However, in speaking with UVM students, UVM and other regional college faculty, local agency and NGO representatives, it quickly becomes clear that Mount Mansfield is more than just a quality field research site: it is a place that holds special status in the culture of Vermont and the wider northeastern US. The review committee repeatedly heard words like “special”, “sacred”, and even “spiritual”. There was a strong expressed desire that a Mount Mansfield field station should also complement and/or provide stewardship and outreach functions, given the proposed site’s heavy public use and cultural importance. Operationally, there are strong potential partnerships and alternate funding sources associated with these functions that would otherwise be unavailable to research and university education at other field sites where limited or no public access occurs.

A Mount Mansfield research facility also offers the possibility of advertised campus presence and connection of the university to the community, which currently benefits directly without realizing it (through recreation) and indirectly (via the social benefits of research and education) from the use of UVM land.

Question from the UVM Team: What are some successful models from other field stations?

A successful partner model for Mount Mansfield Science and Stewardship Center to consider is that of the [Valentine Eastern Sierra Reserves](#) in the southern Sierra Nevada Mountains of California. VESR has a strong connection to the Mammoth Mountain Ski Area, which provides some direct material support to the field stations. More importantly, however, the resort management works to connect the station to the broader, non-science community and to specific sympathetic financial supporters.

The Rocky Mountain Biological Laboratory (RMBL) and the Black Rock Forest Consortium are entrepreneurial and innovative models that might provide ideas for financial sustainability. These two field stations are not embedded in a university. Black Rock is a nonprofit supported by a consortium of schools. Member institutions provide consistent annual support supplemented by fundraising. RMBL is also a nonprofit funded by the fees it receives from students and scientists as well as donations. Given the relentless cost-cutting happening at many universities and local governments in this era, planning to diversify revenue streams by optimizing fees for services, fundraising, and partnership revenue streams would be wise, even if UVM is currently willing to provide financial support.

II.1. Research

The site of the proposed field station is a major recreation destination, lying immediately adjacent to the historic ridge-top Long Trail, and within walking/driving distance above the iconic Stowe Mountain Resort. The proposed site is a popular location for hiking, backcountry skiing, and general mountain visitation, hosting roughly 50,000 visitors a year who arrive by auto, in a gondola that runs during the summer months, and on foot via several hiking trails.”. This dense use suggests the possibility for a strong expanded research emphasis on emerging socio-ecological and land management issues like recreation impacts, mitigation and stewardship strategies.

One major challenge for field stations is data management. Mount Mansfield Science and Stewardship Center is extremely well-positioned in this regard due to their relationship with the Vermont Monitoring Cooperative. The VMC is an effort that would be the envy of any field station, offering a well-designed and integrated metadata and data management system for open-source sharing and long-term protection of this resource. However, the VMC long-term funding model is tenuous. The field station should consider working proactively with VMC to find a sustainable financial model that might include expanding fee for service to other field stations.

The issue of data provenance is gaining greater importance as research continues to move to larger scales, and data are aggregated and manipulated to create products to answer global questions. VMC’s model of unrestrained access is admirable, but perhaps at odds with the current and foreseeable funding environment. Being able to track data usage is becoming critical as these large aggregation and modeling uses replace traditional research publications. A question to ponder is: What is your metric to measure research impact and justify your investment when no one can explain who is using your data and for what purpose? This is a thorny issue without a clear answer, but it deserves serious consideration.

Question from UVM Team: How do other field stations recruit and screen independent datasets, collected on site, for central storage and management?

The University of California Natural Reserve System (UCNRS) is developing Digital Object Identifiers (DOIs) for field station assets, including datasets, to improve tracking of provenance and publication. Many of these California stations also work closely with campus museums and libraries, who are experts in this area. Researchers at Sagehen Creek Field Station and others have explored data watermarking.

The UCNRS Reserve Asset Management System (RAMS) collects project metadata as part of reserve use applications.

UC Berkeley's Sagehen Creek Field Station many others use citizen science and collaborative data platforms like [iNaturalist](#), [Symbiota](#) and [eMammal](#) to share field, collections, and camera trap data with researchers and the public, via aggregating databases, like GBIF, Calflora, BISON, etc. These public efforts should be considered a serious and important complement to museum collections, and they provide data at scale that cannot be obtained any other way.

II.2. Education

College Level

The proposed education program for UVM and other college students includes important component of hands-on experience and is central to the university's identity. The program plan draft proposal from April 2016 shows a high degree of thoughtful development and a strong alignment to the university's mission.

We heard from faculty, students and partners that having a field station would provide collaborative, interdisciplinary opportunities that--while an expressed value--do not currently exist at UVM. Foremost, the potential for immersion of students into current and future research on the mountain is very high. The proposed center at Mount Mansfield would strengthen connections between students by providing a place for on-site learning and bonding. A collaborative learning community has been shown to aid retention of students, especially those under-represented in science.

The field station could promote interdisciplinary academic experiences not only between STEM fields, but also linkages between field science and arts and humanities (AH). Students in particular were enthusiastic about the possibility of linking the arts with scientific/outdoor activities on Mount Mansfield – “untapped” was the word used to describe this. An example is holding a writing class on the summit where students learn about the ecology of the alpine system and then create works based on their experience. Another suggestion was to involve the Ecological Design and Interpretive/Environmental Education students in facility planning and assessment.

Beyond broader impacts functions like illustration and outreach, we encourage the field station operation to consider the potential of AH to contribute to fundamental discovery and social policy. Arts, including humanities, have well-documented capacity to increase the creativity and problem-solving ability of scientists¹, while also offering fundamental pattern detection and discovery that generates raw material for science². Engaging artists early in the scientific process can provide public emotional engagement to abstract socio-ecological issues related to climate change and rising human population.

Pre K-12 Level

Most field stations have found that creating strong ties to local pre K-12 education has many benefits, including:

- Improved science test scores;
- Increased participation in science;
- Bonds that significantly improve working relationships and overall program perception within the community.

It is worth restating that the sensitive nature of the Mount Mansfield alpine site and the relatively small size of the available interior and exterior spaces at the summit will require a careful plan and thoughtful management of intensive preK-12 use.

We did not have opportunity to speak with teachers or primary/secondary education administrators. It is unclear what level of support exists from this sector, though all with whom we spoke indicated a strong interest in engaging schoolchildren with the unique educational opportunities available on Mount Mansfield.

Question from the UVM Team: How do we incentivize use of the facility as an instructional resource?

To be successful, institutionalizing the field station program into university curricula and research programs will be key. Among students and faculty at UVM, there is a broadly-recognized need for field techniques classes/experiences. Working with UVM administrators to create mandatory field experiences within curriculum requirements would drive use to this facility (and others).

Faculty expressed some frustration with their inability to offer longer and more impactful science labs and field visits because these do not fit into the class schedule – such experiences require sufficient time to drive to a site, collect data, and return to campus. This issue may be resolved by having access to a facility with overnight housing. Mount Mansfield could also house programs such as the weeklong ski management class held at Stowe, where students

¹ [R. Root-Bernstein, M. Root-Bernstein, 2013. The Art and Craft of Science. Educational Leadership, Feb 2013: 16-21](#)

² [“The Art of Scientific and Technological Innovations”](#), Robert Root-Bernstein. Science Blogs, 2011

currently travel daily from Burlington. There will be need for planned transportation to the site from main campus.

The Mountain Studies Certificate program offering could be a recruitment tool for UVM. Students felt the certificate was a viable program offering and would appeal to undergraduates; some noted a program of this nature should be connected to a means for graduate research funding. Some existing programs, such as the fish and wildlife and forestry summer camps, could be supported by the Mount Mansfield field station.

There is a business aspect to planning the center; intra-campus education and research opportunities would be strengthened by including David Kaufman, John Abbott and others of the of the Parks, Recreation & Tourism Program.

The faculty who represented the College of Agriculture and Life Science indicated some interest in a field station. Each suggested that at least some colleagues in geology, plant and soil science, and other departments would offer classes and/or do research at Mount Mansfield. These faculty currently do not access such facilities locally, if at all.

Faculty could be recruited with explicit program development.

Interestingly, none of the faculty mentioned interest in collaboration with Vermont Monitoring Cooperative. Mount Mansfield is a potential opportunity to strengthen further partnerships between UVM and VMC. The team views this collaboration as critical; a center might act as a bridge between faculty and VMC.

II.3. Public Outreach

The public sector is a key audience of the Mount Mansfield Center. Every group with whom we spoke emphasized the opportunity to show citizens cutting-edge, exciting, ongoing scientific research in place is an incredible asset. A mountaintop educational facility on Mount Mansfield will enable:

1. UVM to train students to be strong leaders in and communicators of environmental science;
2. People of all ages to build upon on-site experiences to become more aware of ecologically-sensitive principles, perhaps leading to positive attitude and behavior changes [cite?];
3. People to better understand the connections between the environment, economy and society.

Mount Mansfield, with its high degree of existing access, could create a significant opportunity for people of all abilities to experience the high montane environment and to appreciate and learn about these systems and science in general. There is excellent capacity for inclusion of people with physical disabilities (driving the toll road during the summer; riding the Stowe ski lift in winter). For all people, the potential to introduce people of all economic, ethnic, and

other demographics to the outdoors would be a way for UVM to increase diversity of scientists and natural resource professionals, as well as development of citizens who support conservation and recreation in and enjoyment of montane systems.

The heavy public use on site also suggests the strong possibility of citizen science participation that would complement the existing research portfolio and build community engagement. Possibilities discussed by meeting participants included landscape-scale snow depth sampling by backcountry skiers, eMammal volunteer-maintained camera traps, and iNaturalist as a platform for geo-referenced biota presence and distribution observations. iNaturalist already has a small, but dynamic user group in Vermont, which could be engaged and leveraged with little effort.

II.4. Professional and Agency Training; Policy and Management

Vermont agency representatives indicated broad support for the Mount Mansfield Center, but also highlighted the resource managers' need to tie research to management directives, a relationship that is often complex or not well-defined.

There was not a strong interest in training agency professional staff on site, as these activities are held elsewhere and the supposition was that an overnight facility was not necessary for this function. Agency staff identified a clear need for graduate student/researcher housing.

One possibility is for the Green Mountain Club to train their summit caretakers at Mount Mansfield - currently there is a half-day training. Overnight accommodations might facilitate GMC steward or other staff training.

II.5. Integration of Science and Stewardship

Question from the UVM Team: How else could the Mansfield Center approach integration of science and stewardship?

- Given the physical limitations on the number of people that could be hosted onsite, UVM might consider utilizing other facilities near Mount Mansfield besides the summit:
 - a. Smuggler's Notch Visitor Center – a site for immediate potential operation;
 - b. Vermont Ski Dorm – though significant rehabilitation would be required
- Work with partner agencies, educators, and sponsors to identify their needs before designing programs and then asking for buy-in.
- Creating community empathy for the science that supports management decisions is crucial, yet agencies frequently do a poor job of this. In providing this service, Mount Mansfield Center outreach programs could help “grease the skids” for stewardship.

III. Facilities and Infrastructure

The University of Vermont (UVM) owns and manages 400 acres of mountain forest and alpine tundra along the iconic ridge of Mount Mansfield. This property is comprised of two parcels with a small (20 acre) inholding owned by the Mount Mansfield Mountain Company, the holding company for the adjacent Stowe Mountain Resort that separates these two parcels. All of these are embedded within and surrounded by approximately 40,000 acres of public land. UVM does not own any physical infrastructure and manages the land as the Mount Mansfield Natural Area. There are currently several communication tower sites under lease from UVM within both of these parcels.

On a clear day one can clearly see both Mount Washington in New Hampshire to the East and Whiteface Mountain in New York to the West providing visual validation to its location as potential partner in a network of regional mountain observatories. There is also clear line of sight to the UVM Campus in Burlington, VT that supports the campus' "Mountain Top to Lake Bottom" research gradient.

The Mount Mansfield Company has a vacant 64 x 40 foot building at the upper terminus of the Mount Mansfield Toll Road. This structure could serve as both a place to connect with the public (50,000 total visitors access the mountain by way of the toll road, gondola, and hiking trails) and accommodation with basic working space to serve both researchers and students from a variety of entities. This building, in its current form, is unusable, but with renovation could provide the accommodation and public interface needed to meet its intended goal. While renovating the current structure is not the ideal solution, it is most likely the only strategy that would survive the extensive regulatory process needed to build such a facility in this location. There is interest by the Mount Mansfield Company to lease this structure to UVM for an extended period of time with leasehold improvements borne by UVM. Though not perfect, the solution offered is viable.

In addition to the need for extensive renovation of the structure proper there is also the need to install new sewer and water to serve the renovated building as the current supplies do not and will not meet current Vermont codes. There is more than ample electric service, telephone in place and close proximity to large amounts of internet bandwidth.

There is also no real bathroom facility in the parking lot of the terminus of the Toll Road. Two seasonal porta-potties are installed by the Mount Mansfield Corp during the time of year that the Toll Road is open to the public (roughly May through October). A renovated structure, if open to the public, would in effect become the *de facto* public toilet for the Toll Road and other users who access the location by other means.

Preliminary costing and architectural designs developed and shared to date have served a great tool for further focusing what the Mount Mansfield Center might look like. With this information, several factors should be considered:

1. **Conduct structural analysis and PCB/asbestos/lead/environmental assessments.** These pollutants would be expected on this site, based on the age of the building and its historic use. These analyses will help provide a better foundation for developing accurate costing for this project and in minimizing contingency costs.
2. **Further refine expected and future use of the facility to inform design of that structure.** Constraints from existing footprint size and competing uses exist. Further focusing will better inform the design team. Should public space be included, consideration and design for the potentially high number of public users of these bathrooms needs to be incorporated. Outside public access versus access from inside the building might be considered. European mountain huts provide many of the same functions as high-elevation field station housing, and might provide useful design models and concepts.
3. **Current budget for the renovation of the existing structure for all three options seems very high** compared to experiences by field stations also located in remote locations.
4. **Create a site plan for how the space outside of the structure will be used.** We did not see or hear how the area outside of the structure would be used by both day and overnight users. Should campfires be allowed? Hammocks? Tenting? How will children and groups safely occupy themselves during the night? How can bonding within groups be encouraged? How will interactions between disparate groups be managed? Group management considerations should be incorporated throughout planning and design.
5. **Rerouting the Long Trail** might be needed to minimize potential conflict with extending the front of the building. Work with interested parties to a) determine if the reroute is needed and b) if so, work to locate an acceptable route.

IV. Business Plan

The OBFS review team was presented with an April 2016 Draft Business Plan for the Mount Mansfield Science and Stewardship Center. It states “the business plan enables project leaders to proceed with planning and partnership-building by establishing an administrative framework and financial basis for developing programs and facilities.” In our review of this draft business plan, we were asked to provide comments directed by a few guiding questions:

- Are staffing levels adequate for the start-up phase?
- Are revenue and expense projections realistic? How could they be improved?
- What revenue opportunities and expense categories are not accounted for?
- What revenue sources could complement or substitute for lease royalties in establishing a stable funding base?
- What opportunities exist to reduce costs?

The staffing model builds to a level over four years of 1.75 FTE’s spread among four staff positions: A director (0.1 FTE), assistant director (1.0 FTE), data manager (0.15 FTE, shared with the Vermont Monitoring Cooperative), and caretaker (0.5 FTE). This is a low level of staffing compared with most other field stations around the country. For example, the SUNY ESF Adirondack Ecological Center, which operates a public interpretive center among its campus facilities, has a director (1.0 FTE), associate director of education and outreach (1.0 FTE), associate director of research (0.3 FTE), guest services manager (1.0 FTE), several ecologists, foresters, educators and seasonal interns, three facilities staff and additional support personnel. It’s notable that the AEC has a very large campus, is several hours from the main institution, and supports a breadth of programs by multiple institutions; despite these differences, the Mount Mansfield staffing plan requires careful consideration to attract and retain high-caliber staff.

Certainly at Mount Mansfield, on-site staffing need is reduced by the strictly seasonal nature of station operations and access, which is primarily late May through early-October (though several stakeholder groups voiced interest in winter access). This level of paid staffing may be adequate if additional administrative and facilities support (office/business management and facilities management) is provided by UVM campus and/or if other collaborators contribute significantly to staffing, particularly for the education and stewardship programming.

In terms of function and duties, such a station needs at a minimum a visible leader with excellent communications skills, responsible for program and personnel management; one highly competent full-time staff person whose sole responsibility is day-to-day function and success of the station; office/business management support; facilities management; and data management. In the case of the Mount Mansfield station’s program and goals, staffing will

need to also address outreach/education, coordination of research, oversight of usage, and fundraising. It is noted that the stated director's responsibilities include budgeting, fundraising, and partner communications, and that the assistant manager is tasked with program delivery, operations, and facilities management. However, the review team is concerned that it may not prove possible to accomplish all of these well with the proposed level of staffing.

Regarding other items on the expense side- be sure to plan for escalating benefits expenses, insurance costs and safety/emergency preparedness, maintenance costs that take into account HEAVY restroom use, some kind of travel budget, and possibly a line of small grant support as seed funding for research projects.

Any realistic financial model for the site will involve some investment by UVM. We note that the indirect and intangible value of the site will most likely benefit UVM, often in ways that can be difficult to track. The high level of visibility and cultural importance of this site alone may justify a high level of university investment.

There are opportunities for income generation. An academic consortium model should be considered. Other regional colleges and universities expressed interest in using the facility once it is built. From a programmatic perspective, serving multiple institutions helps field stations get to a scale that takes full advantages of their resources and that puts them on a sustainable basis. Even universities much larger than UVM can struggle to fully utilize and fund a field station. Additionally, community and state support might be easier to generate if the facility is perceived as supporting a range of Vermont and perhaps regional institutions.

Member institutions can be an important source of revenue. For example, Black Rock Forest Consortium has 22 academic member institutions each of which pay \$16,000 – \$24,000 per year primarily for use of the BRF field station. For the highly seasonal and possibly lower level use of the Mount Mansfield station, the per-institution costs should be less than this. However, the benefits to state education and development of increasingly supportive relationships would be substantial and these partners may also benefit from advertising/branding opportunities.

A potentially important second source of income is the toll road. More than 50,000 total visitors access the mountain by way of the toll road, gondola, and hiking trails and arrive at the doorstep of the facility seeking both bathrooms and information. The toll revenue should provide an important and dependable source of funding for at least two reasons. If the public are provided with the services that they want, not just basic facilities such as bathrooms but also high quality programming, they should pay for the cost. Out-of-state visitors and tourists tend to be price insensitive, so there may be ways to segment fees to visitor audiences in order to avoid pricing out the local community, whose support will be critical in multiple contexts. This should be a win-win for UVM and Stowe Mountain Resort. Improved facilities and programming will heighten demand for visitation, generating more revenue through increased

visitation and/or the ability to charge more, but it should also reduce management costs (e.g., no need to maintain port-a-potties).

Lease royalties from the telecommunications towers are an unusual and potentially outstanding opportunity to help sustain the station's operations. If an agreement can be negotiated it would be desirable to agree upon a guaranteed amount/length of time because fluctuations or early termination could result in detrimental year-to-year fluctuations.

Fees for services provided to students and scientists is also another potential source of income. It should be noted that many OBFS stations generate only modest income from fees and grant overhead. As a fee schedule is developed, the Mount Mansfield team should consider prioritizing building use and demand for the facility, as well as combining fellowships/scholarships as part of the fee structure plan. Doing so will allow UVM to capture revenue from users that are well-supported, and for whom the services are more than worth it, while avoiding pricing out scientists and students that would benefit from working at the site, but which have limited funds.

It is unlikely that retail sales would be important for the site. To generate any significant revenues, sales would have to approach a scale the site is unlikely to support. For example, RMBL operates a Visitor's Center/Store. The physical facility is similar in size to the entire Mansfield Center. It hosts about 15,000 visitors/year and grosses about \$70,000. It loses money, but is operated because of the value of reaching and managing the public. The challenges of operating a seasonal retail operation on a cost effective basis should not be underestimated. Any approach to retail sales should probably be managed with an eye to maximizing the value of interacting the public, while minimizing monetary losses.

The location, not just the fact that it is a significant cultural site with high visitation but also because it is embedded in a relatively affluent community, provides significant fundraising opportunities. Many field stations have benefitted from the development of a "Friends of ..." organization, either informal or as a separate 501(c)3. Beneficiaries, neighbors, program alumni, and corporations and foundations who like to fund beneficial environmental causes should have mechanisms to do so for the Mount Mansfield station. Many field stations have found at least one annual fundraising event, featuring scientists and/or fun learning activities or special outdoor recreation opportunities, to provide additional and dependable source of annual operating support. It takes time to build these programs, but the long-term results could benefit not just UVM, but the Mount Mansfield Center.

If UVM initiates a capital campaign to fund renovation of the buildings, it should consider an endowment component to the fundraising campaign. This would help build stable operating support and provide a platform for future fundraising.

The best opportunities for reducing costs may prove to be donated or contributed services. Because there will be overlap and collaboration between the programs of so many institutions (Vermont Monitoring Cooperative, Vermont Center for Ecostudies, Vt. Dept. of Forests, Parks and Recreation, Stowe Mountain Resort, Green Mountain Club, state colleges, etc.) it may be efficient or desirable for some of these organizations to provide contributory services.

The Steering Committee also discussed a number of items we thought worth sharing.

1. Consider starting the field station program immediately, using the office space and ski dorm at the bottom of the ski hill, rather than waiting for a facility on the mountain;
2. It is critical to articulate the value of being on top of the mountain, because it is more difficult, more expensive, and more logistically challenging than other options. That said, an iconic, wild site can provide transformative experiences for students;
3. Because of the sensitive nature of the site, broad stakeholder participation is important. Consider forming a stakeholder advisory committee including the main players, including Stowe and GMC. This committee would need to be a meaningful committee that is actively involved in providing input. Consequently, the staffing and time needed to do it right should not be underestimated.
4. Put together an organizational chart to define roles and figure out what skill sets you need;
5. At least one core member of your team should be tied to and embedded in the local community;
6. The five board member functions needed are: Work, Wisdom, Wealth, Window Dressing, Networking;
7. In the past, some field stations have been seen as the “territory” of individual faculty members. To avoid turf issues, engaging meaningfully with multiple academic colleges, departments, and faculty is advised.

Appendix A. SWOT Analysis: * = key items

Strengths

- *Mount Mansfield is a special place for stakeholders

- *Mount Mansfield's collaborative academic, federal, state, and non-governmental organization collaborative partnerships

- *Existing mission fit of the Mount Mansfield Science and Stewardship Center

- *Demand / need / uniqueness of the Mount Mansfield Science and Stewardship Center

Strong diverse partnerships

Scientific background and knowledge exists for the Mount Mansfield Science and Stewardship Center

Easy access to a remote location at the top of Mount Mansfield

Existing database structure in the Vermont Monitoring Cooperative (VMC)

Permit and access to research sites exists

Known stewardship history of the Mount Mansfield site

Site fills "gap" in student and faculty educational and research opportunities

There are existing planning documents and summaries of related discussions for the Mount Mansfield Science and Stewardship Center

State political support

Good internet access to the Mount Mansfield Science and Stewardship Center

There is stable AC power delivery to the building site

Dan Lambert has been a wonderful organizing focal point for the project as it has evolved

Weaknesses

- *The existing building

Site access during the shoulder season when the snow is gone and the road is impassable

Tenuous funding outlook for operating funds in the initial 0 to 5 year time frame

Constraints on the building envelope / template

Proposed building renovation / construction / site preparation costs are extremely high per square foot

Proposed staffing is too low

Current design limitations with available space / more flexibility for usage is known

There will likely only be one phase of renovation/construction only so no flexibility with future expansion repurposing

Dan Lambert may not be with the project through all phases depending upon current and future funding support

Opportunities

*The UVM brand alignment with the Mount Mansfield Science and Stewardship Center is extremely high

*Large number of annual visitors (~50,000 per year) is a great opportunity for visibility

CASX Rental Income could be increased or made to be a part of the baseline budget supporting the station

The toll road to the site has an annual variable fee and therefore could be increased to support additional services such as flush toilets and an interpretive center

There is an existing advanced understanding of the site science at the Mount Mansfield Science and Stewardship Center

There is a high potential to generate an income stream from ~50,000 visitors per year

What is the purpose of the building?

Existing building foundation allows for future renovation and repurposing

The potential linkage with the UVM Provost Office would provide greater visibility and buy-in across UM

The Stowe Mountain Resort could become an even bigger partner and supporter of the Mount Mansfield Science and Stewardship Center

Interdisciplinary work within the collaborative group is an opportunity to further strengthen the group

Dan Lambert could become an even more integral part of the project with the addition of future funding

Threats

- *The non-ownership of property could be a deal breaker for the Mount Mansfield Science and Stewardship Center if the owner / lease manager changes or the policies regarding the relationship changes

- *Overuse of the site could further damage the ecology / stability of the site reducing its value as a research location

- *Success of the project leads to increased capacity/priority issues and overload of the site / facility

There are known and unknown adversaries to the Mount Mansfield Science and Stewardship Center

The Green Mountain Club may not be a supporter of the Mount Mansfield Science and Stewardship Center

There are unknown radiation concerns due to nearby towers/communications facilities

What is the appropriate administrative level of leadership for the Mount Mansfield Science and Stewardship Center: department, school, college, provost, university, collaborative group?

The timeline may be too long to maintain stable leadership or too short to raise the funding needed for the facilities and programming

The fragility of habitat may not tolerate heavy site usage

There is a potential of asbestos and/or lead paint in building leading to expensive abatement or safety concerns.

Mountain ecosystems are a low priority as compared to coastal ecosystems for site enhancement and visibility

Community approval of the Mount Mansfield Science and Stewardship Center and its programming of seven surrounding communities may not exist

If Dan Lambert is not involved with the project, the daily and weekly push to move the project forward may not exist