APPENDIX D

Archeological Precontact Site Sensitivity Analysis
For the Vermont Department of Forests, Parks and Recreation

Camel's Hump Management Area

Submitted to:

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Archeological Precontact Site Sensitivity Analysis for the Camel's Hump Management Area

Introduction

State-owned lands within Vermont represent extremely valuable conservation areas with respect to cultural resources, particularly precontact period archeological sites, or those sites attributable to indigenous Native Americans that date to before Europeans arrived in the early 1600's. While hundreds of these sites already are known within these publicly held parcels, thousands more Native American archeological sites remain undiscovered. The known sites and the as-yet-undiscovered sites located in forests, parks and recreation areas represent a priceless endowment, the protection of which helps meet the long range goals of cultural resource management that are shared by the Vermont Division for Historic Preservation and the scientific community. Over the long-term, as development of Vermont's privately held lands continues, state-owned archeological sites and state-owned lands that have the high potential to contain such sites will become increasingly valuable repositories of archeological information. One of the main goals of the present project is to help ensure the continued preservation of these resources by increasing awareness among land managers about the contexts in which buried archeological sites are most likely to exist and to help provide broad based assessments of archeological sensitivity that can be used to guide land use practices.

In most cases, precontact period archeological sites lie buried in the ground, unless they have been exposed through disturbance such as erosion or historic cultivation, or they are represented by quarries or other above ground features. Precontact archeological sites in Vermont are generally found within two basic natural contexts: depositional, as in floodplains or at the base of slopes where sites can be deeply buried by natural processes; and non-depositional as in lakesides or upland locations where very little sediment accumulates over time and archeological deposits thousands of years old can be found very close to the ground surface. Whether buried deeply or only by several centimeters of sediment, precontact archeological sites are extremely difficult to identify through visual inspection of the landscape. This is in contrast to other cultural resources such as historic archeological sites whose stone foundations or other above ground features often make them more obvious. Due to their 'invisibility', the identification of precontact archeological sites often requires surveying techniques that include sub-surface excavation.

Archeological surveying through excavation is labor intensive, time consuming and expensive. As a result, when assessing whether or not a given parcel contains sites or simply has the potential to contain sites, archeologists do as much as possible beforehand to focus their investigation and try to predict which natural areas that have the highest potential to contain sites. Using sets of predictive criteria derived mainly from knowledge where known sites occur, archeologists can evaluate the landscape, whether the goal of a given study is to actually identify sites or to predict where they are most likely to occur. Based on decades of archeological research in Vermont and the environmental setting of thousands of precontact sites, the Vermont Division for Historic Preservation (VDHP) established an Environmental Predictive model for Locating Archeological Sites to guide archeological research in the state.

The VDHP's predictive model has been applied to hundreds of areas across the state and found to be a reliable way of predicting which locations are most likely to contain significant archeological resources. To date, the application of the VDHP predictive model has been almost entirely field based. That is, it has been used almost exclusively by archeologists assessing landscapes in person, in the field as opposed to remotely using paper maps or digital data.

The geographic analysis presented here represents the first ever attempt to graphically depict areas of archeological sensitivity on a state-wide scale. This geographical Information System (GIS) developed jointly by the University of Vermont Consulting Archeology Program (UVM CAP), and its consultant Earth Analytic, Inc., using the VDHP's predictive model for identifying precontact archeological sites. The present analysis applies the VDHP's sensitivity criteria to all lands under the jurisdiction of the State of Vermont's Agency of Natural Resources (ANR). The main goal of this analysis was to identify and rank areas of archeological sensitivity within each ANR management district, in order to improve the ANR's understanding and management of potentially significant precontact archeological resources within these lands.

The predictive model used by the VDHP was approved by the Vermont Advisory Council on Historic Preservation on May 23, 2002. Following the VDHP's *Guidelines for Conducting Archeology for Vermont*, the goal of the predictive model is to 'identify areas with a high potential for containing significant precontact Native American residential sites' (Peebles 2002). Significant prehistoric sites contain multiple categories of data that can address several research topics important in understanding Vermont's prehistory. This GIS, as it has been developed, does this by placing a numeric value on the nearness of any given land parcel or project area to numerous natural features that are known, through experience, to be likely locations for prehistoric Native American sites. The bulk of the natural features used to differentiate the landscape in terms of archeological sensitivity are water related and include, nearness to a river or permanent stream, nearness to falls or rapids, a lake, pond, or wetland, etc. Another major category of archeological sensitivity is related to dominant landforms, such as, presence of an elevated, level landform, nearness to a rockshelter, prehistoric quarry or source of workable stone, or natural travel corridor. Finally the presence of a high density of known sites in a particular area also contributes to the overall sensitivity score. The closer a given area is to natural features that would have attracted Native Americans, the higher the sensitivity score. Presently, the VDHP uses an overall score of 32 or over, to indicate an area of archeological sensitivity. It is acknowledged in the *Guidelines* that the predictive model is only a coarse guide highlighting potential site areas.

Using the VDHP predictive model, the GIS presented here ranks areas of archeological sensitivity based on sensitivity scores. In doing so it confidently identifies areas of very high sensitivity that likely would require additional work if endangered by modern usages, as well as those of very low sensitivity that would not likely require a site visit before being discounted in terms of archeological potential. However, those areas that score in between these two extremes fall within a 'grey zone'. Given the inherent difficulty in fully assessing areas remotely, these areas would likely require additional investigation, whether in the form of a site visit or consultation with a district manager who may be familiar with the area or a combination of the two.

For this GIS, we consider areas of high archeological sensitivity to be those areas that score above 32 points. These areas will require Phase I site identification surveys unless specific circumstances dictate otherwise (e.g. ground trothing contradicts sensitivity map). Areas of medium sensitive score between 20-32 points, low sensitivity score between 10-20 points, whereas areas of very low sensitivity score between 0-10 points. Medium and low sensitivity areas are questionable, and will require a site visit to identify minor sensitive features and to determine whether or not a Phase I site visit identification survey is needed. Areas with very low sensitivity are unlikely to be sensitive, and in most cases will not require further work.

In constructing this GIS using the VDHP sensitivity criteria and scoring system, the most up to date geographic information was used. As more accurate information becomes available for any and all parcels, the sensitivity model will be updated. One limiting factor in terms of available data relates to topographic elevations. For this study, 30m grids were used, given that statewide this represents the best resolution available. To more accurately determine an area's archeological sensitivity remotely, however, digital elevation data of a higher resolution is necessary. Problems of interpreting sensitivity on paper occur, for instance, with elevation changes smaller than 30m (98ft), with archeologically sensitive areas such as minor tributaries of brooks, streams, rivers, seasonal drainages, and low-level variations in landform, since they are not indicated on the currently available data layers. These minor details are very important in developing a sensitivity model that better reflects the reality of the distribution of archeological sites in Vermont, since we have observed in archeological studies throughout the state, that these minor variables are positively correlated to prehistoric Native American occupation.

Following the VDHP's predictive model, areas throughout the state with slopes greater than 15° receive a negative sensitivity score of -35. Although we recognize that the current resolution of slope data masks subtle differences in slope, such as where small terraces and other habitable areas may be located, we have kept slope in the overall sensitivity equation as a negative factor, since without it everything would appear to be sensitive. When higher resolution data becomes available we may be able to customize the slope data for each parcel, identifying the small terraces within these sloped areas, which may be significant. In addition, better resolution data will allow us to incorporate significant sites with steep slopes, such as quarry sites.

As a result of likely improvements in technology and available data, this GIS is a draft, and will be updated as higher resolution data become available, and when the state's site location database is complete. The site location database will produce a GIS layer of all known sites, which can be weighed and added to the overall sensitivity equation. While this database has not been completed for this initial Phase of the ANR Site Sensitivity Analysis, it should be completed by the deadline of the Phase II and could be incorporated into the model for that Phase, and for any Phase I updates.

Camel's Hump Management Area

An area's sensitivity in this GIS is heavily influenced by its proximity to water. As such, the largest area of archeological sensitivity in the Camel's Hump Management Unit is located in

the north along the banks of the Winooski River. Additional high sensitive areas include those around the small mountain lakes, and their tributaries, like that at the head of Cobb Brook in the south, those near the headwater of Gleason Brook, just north of Camel's Hump, and around Gillette Pond in the northwest. As mentioned above, the steep mountain slopes throughout the area have minimized the amount of overall archeological sensitivity, and has circumscribed sensitivity to those areas immediately bordering bodies of water and their associated tributaries. Therefore, those areas that score medium and low sensitivity in the model may require a site inspection to determine the true nature of these areas, since it is possible that archeologically sensitive areas are not brought into focus by the resolution of the data.

One shortcoming of ecologically based predictive models is the inability to incorporate an ideological basis for human behavior. Early historic accounts in Vermont, and elsewhere, often describe the veneration for natural landforms by Native Americans. In Vermont, for instance, Abenaki creation stories are intimately tied to descriptions of the natural surroundings, and account for the existence of Rock Dunder, Split Rock, and the lower falls of Otter Creek, to name a few (Haviland and Power 1994). As a result, it is likely that prominent mountain peaks, such as Camel's Hump itself, and other geological features within the Camel's Hump Management Area were of ideological importance to Native Americans. However, it is very difficult to quantify the ideological motivations in human behavior, and therefore these variables are left out of this, and most, predictive models. Nonetheless, background research may be able to shed light on the significance of such geological features, and should be taken into consideration, even though such landforms may not score high in this predictive model.

Historic Cultural Resources

There are no historic properties located within the Camel's Hump Management Unit on either the National or State Registers. [Update: after the writing of this report, the Preston/Lafreniere 1820 home at the base of Honey Hollow was added to the Historic register].

Archaeological Precontact Site Sensitivity Analysis and GIS Mapping for the Vermont Agency of Natural Resources

ESSEX DISTRICT

Camels Hump State Forest

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Archaeological Precontact Site Sensitivity Analysis and GIS Mapping for the Camels Hump State Forest, Buels Gore, Chittenden County, Vermont

Introduction

The archaeological analysis presented here ranks areas within Camels Hump State Forest based on their potential to contain precontact period archaeological sites. Precontact period sites are locations with evidence of Native American settlement and/or resource exploitation that dates to before the arrival of Europeans, or between roughly 9,000 B.C. and A.D. 1600. While it is impossible to predict exactly where these sites are on the landscape and, where present, which of these sites are the most significant, this analysis attempts to characterize the areas that have the highest potential to contain such sites. The ultimate goal of this analysis is to provide land managers with generalized sensitivity information that will help lead to the continued preservation of non-renewable cultural resources on state-owned lands.

This analysis is preliminary because of the limitations imposed by the available datasets used in the Geographic Information System (GIS) model (e.g., the low resolution digital elevation data), the inability of this or any computer model to account for all variables that may have influenced the way humans used the landscape, and because the accuracy of the sensitivity maps have not been evaluated in the field through visual inspection or subsurface testing. These maps can and should be revised whenever new data becomes available, whether that new information comes in the form of more accurate base maps, addition of new sensitivity criteria to the computer model, or first hand inspection of specific parcels. As a result of the preliminary nature of the maps that are included, the boundaries of sensitive areas should be viewed as rough estimates that can be used to guide land use practices in broad terms.

In these maps, archaeological sensitivity is depicted by the presence of one or more overlapping factors, or types of archaeological sensitivity (i.e. proximity to water, etc.). The more overlapping factors within a given area result in a larger area of archaeological sensitivity. However, the presence of a single sensitivity factor is enough to warrant an archaeological review. In this way, the model should be used as a guide to identify areas that would require a more detailed analysis, which may include a site inspection. The sensitivity factors used here are based on the Vermont Division for Historic Preservation's paper-based "Environmental Predictive Model for Locating Precontact Archaeological Sites". Please refer to the background sections and their appendices (on file with District Managers) for a more detailed discussion of the overall sensitivity project and specific details of the GIS analysis.

Table 1. Key to the scoring of areas with precontact archaeological sensitivity within Camels Hump State Forest.

Factor	Sensitivity Type	Application
1	Drainage	areas within 180 m of all streams = value of 1, beyond 180 m = value of 0
2	Waterbody	areas within 180 m of waterbody = value of 1, beyond 180 m = value of 0
3	Wetland	areas within 180 m of wetland = value of 1, beyond 180 m = value of 0
4	Stream Waterbody Confluence	areas within 180 m of confluence = value of 1, beyond 180 m = value of 0
5	Head of Draw	areas within 180 m of head of draw = value of 1, beyond 180 m = value of 0
6	Stream-Stream Confluence	areas within 180 m of confluence = value of 1, beyond 180 m = value of 0
7	Waterfalls	areas within 180 m of waterfalls = value of 1, beyond 180 m = value of 0
8	Paleo Lake Soils	areas within 180 m of these soils = value of 1, beyond 180 m = value of 0
9	Kame Terrace or Glacial Outwash Soils	presence of soils = value of 1, all other areas = value of 0
10	Floodplain Soils	presence of soils = value of 1, all other areas = value of 0
11	Level Terrance	slopes ≤ 8% = value of 32, slopes > 8% = value of 0

Camels Hump State Forest

In the current GIS study, an area's archaeological sensitivity is heavily influenced by its proximity to water. The Camels Hump State Forest encompasses 2,250 acres, which encompass most of the southern slopes of Molly Stark Mountain, the northern slopes of Stark Mountain, and the saddle connecting the two (Figure 1). Stave Brook bisects the state forest before joining the Huntington River, which forms some of the western boundary of the forest. No precontact Native American or historic period Euroamerican sites are known from within the state forest. The archaeological sensitivity within Camels Hump State Forest is associated with seven overlapping sensitivity factors, which include drainage, waterbody, wetland, stream-waterbody confluence, head-of-draw, Paleosols, and floodplain (see Figure 1). Limited level terrain occurs along the extreme western margin of the forest, parallel to the Huntington River.

One shortcoming of this ecologically based predictive model is its inability to incorporate ideologically based stimuli for human behavior. Although waterfalls and natural springs are incorporated into the model, which are known to have been aspects of the landscape that were imbued with ideological importance, these are relatively rare in Vermont. Early historic accounts in Vermont, and elsewhere, often describe the veneration for natural landforms by Native Americans. In Vermont, for instance, Abenaki creation stories are intimately tied to descriptions of the natural surroundings, and account for the existence of Rock Dunder, Split Rock, and the lower falls of Otter Creek, to name a few (Haviland and Power 1994). However, it is very difficult to quantify the ideological motivations in human behavior, and therefore these variables are left out of this, and most, predictive models. Nonetheless, background research may be able to shed light on the significance of such geological features, and should be taken into consideration, even though such landforms may not score high in this predictive model.

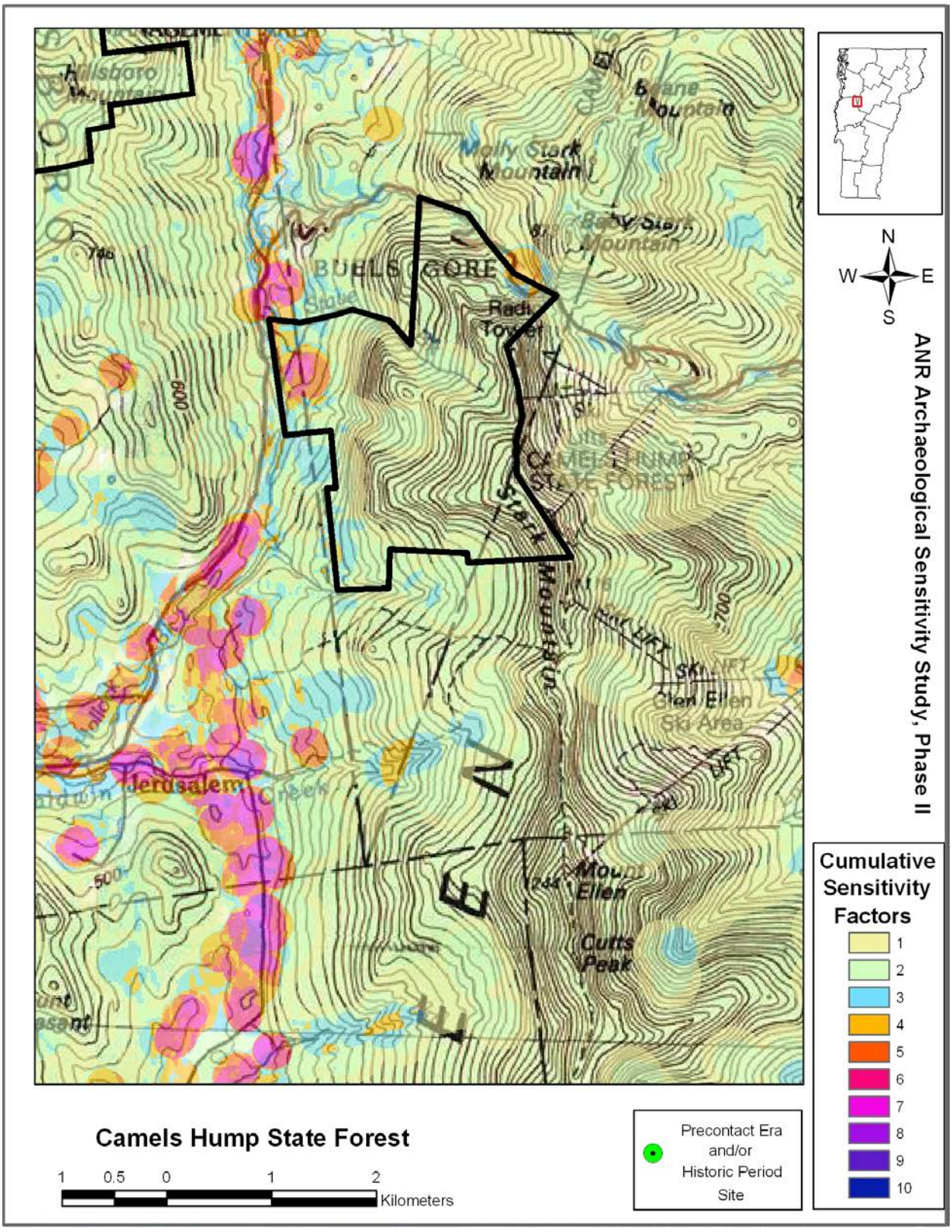

Figure 1. Map showing the archaeological sensitive areas within the Camels Hump State Forest, Chittenden County, Vermont.

Potential Indicators of Archaeological Sensitivity

A list of expected site types in Vermont, their characteristics and typical locations was created by Peter Thomas for the Vermont Historic Preservation Plan. The site type list is used here as a guide, for district managers to better understand the types of precontact archaeological resources that they may encounter within their districts. The site type list is summarized below in Table 2. Camels Hump State Forest is mostly comprised of slope from two mountains. Such steep slope is typically not sensitive for precontact Native American sites. Level terraces along the Huntington River in the western extreme of the state forest is the most likely location for precontact Native American sites. Considering the upland environment of the state forest, any sites existing within it, along the Huntington River, likely will be small camp sites or specialized activity sites. The GIS model does not factor in areas with outcrops of high quality quartzite or rhyolite, which may have been visited by precontact era Native Americans for tool stone. It is possible that exposures of knappable stone exist within the limits of the state forest. As a result, district managers should consider all level, dry landforms, especially those adjacent to the Huntington River, as well as any exposures of quartzite that might have been quarried, as containing areas of precontact Native American occupation.

Table 2. List of expected site types in Vermont, their characteristics, and expected locations.

Site Type	Characteristics	Location
Large Base Camp	May contain numerous areas of artifact concentrations 5-10 m in diameter, evidence of more permanent habitation: remains of hearths, thousands of stone tools, and cover areas of several acres or more.	Large river valleys with high densities of food resources and productive soils for horticulture/agriculture.
Small Residential Camps	One or more areas of artifact concentrations 5-10 m in diameter, with low to moderate densities of stone tools. Evidence of more short-term seasonal habitation	Open air sites on level terraces adjacent to rivers, streams, and wetlands. Some may occur in rock shelters.
Bedrock Quarries	Modified outcrops of high quality (fine grained) quartzite or chert. Large quantity of flaking debris and stone tools in various stages of production on talus.	Where outcrops of high quality quartzite and chert are exposed, on both vertical faces and level exposures.
Quarry Workshops	Large quantities of early stage lithic reduction debris, little long term occupation debris.	On level areas near bedrock quarries.
Kill Sites	Specific tools associated with the killing and preparation of game.	Anywhere.
Burial Sites	Where cremations and inhumations are found, unique religious, nonutilitarian goods found.	Extremely rare, probably associated with large base camps or in specific environments (e.g. gravel knolls near wetlands).
Find Spots	Isolated tools and debitage	Anywhere.

Historic Cultural Resources

There are no properties within the Camels Hump State Forest listed on the National or State Registers of Historic Places. Historic occupation of the town of Buel's Gore, which contains Camels Hump State Forest, was never large, and a formal town has never existed within Buel's Gore. The houses associated with the principal farms of the township are listed on the State Register, but they are not located within the limits of the state forest. Both the 1869 Beers Atlas (Figure 2) and the historic USGS map (Figure 3) indicated no structures within the limits of the state forest. Nonetheless, ANR personnel should record all stone foundations, cellar holes, wells, etc, that they encountered within the state forest.

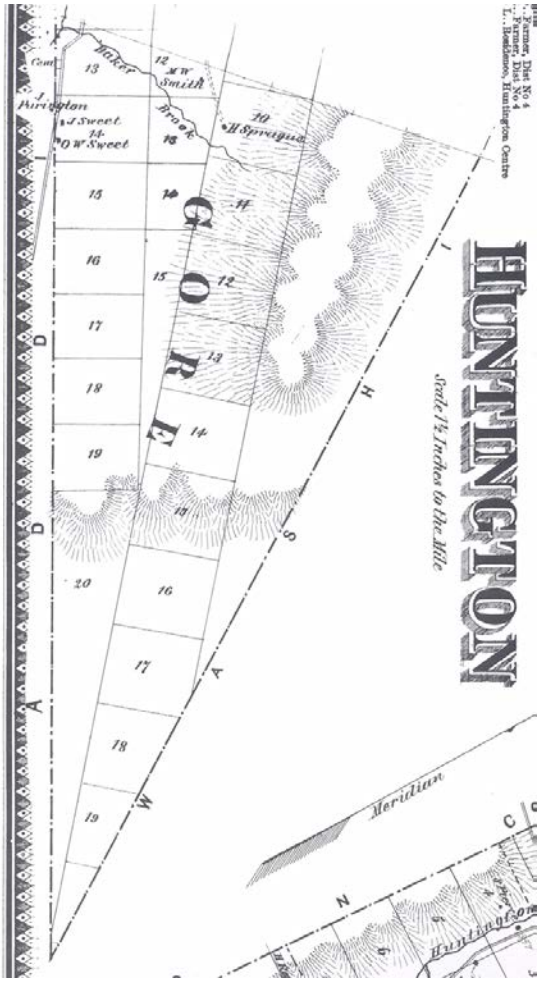

Figure 2. Historic 1869 Beers Atlas of the Camels Hump State Forest area, Chittenden County, Vermont.

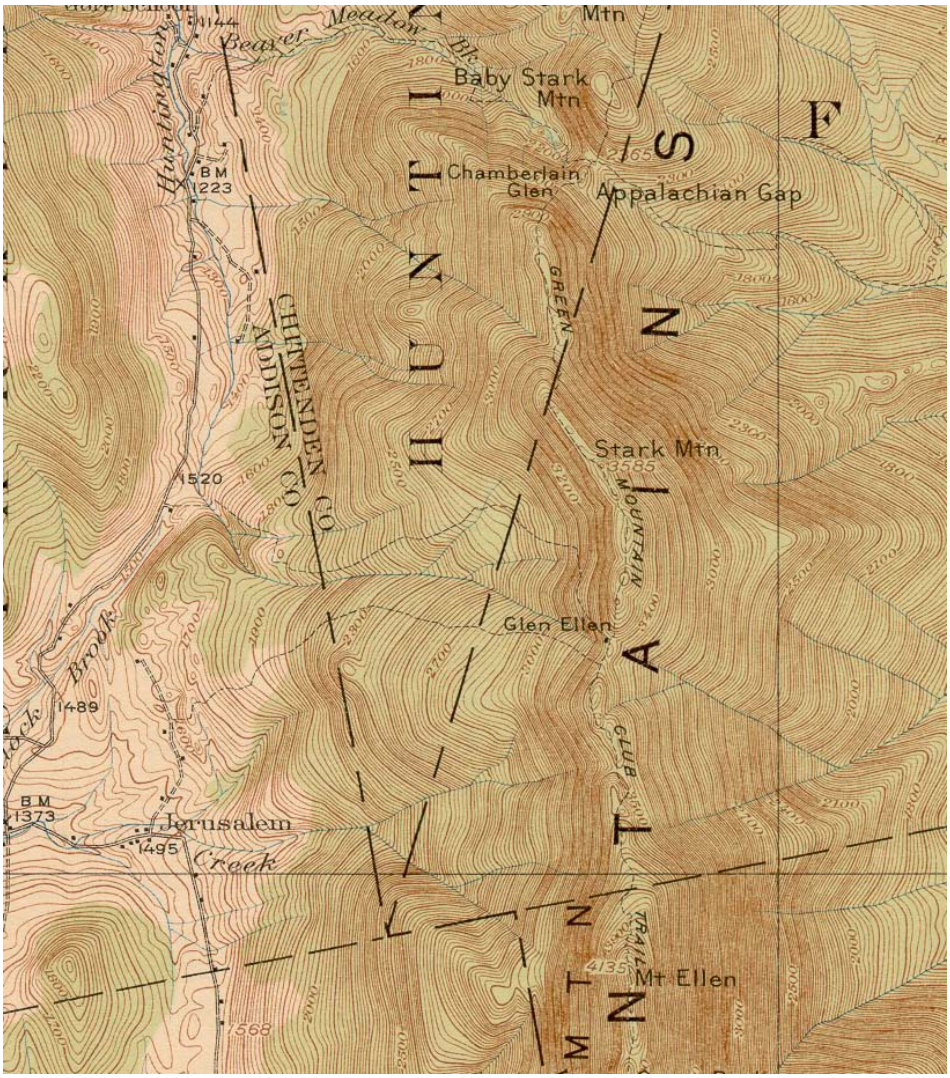

Figure 3. Historic 1921 USGS map of the Camels Hump State Forest area, Chittenden County, Vermont.

Conclusions and Recommendations

Precontact era Native American archaeological sensitivity was identified within the Camels Hump State Forest, primarily clustered along its western boundary along the Huntington River. Considering that most of the state forest is slope, any level and dry, elevated landform along the Huntington River is archaeologically sensitive. Good stone sources of quartzite may exist within the state forest, and may have been exploited by precontact Native Americans. Therefore, quartzite exposures in areas of steep slope also are archaeologically sensitive. Although little historic period occupation is known from the township, it is always possible that historic remains exist within the state forest. For these reasons, ANR personnel should take into account all historic features, such as stone foundations, cellar holes, fence lines, etc., that they encountered within the state forest. If these structures can be mapped and described, determining their significance may not require a site visit. However, sites visits are preferable in situation of identified historic period resources of unknown vintage.