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CULTURAL LANDSCAPE HISTORY  
SARATOGA NATIONAL HISTORICAL PARK

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## I. Introduction

The purpose of this report is to analyze land-use history of key sections of the Saratoga National Historical Park and existing vegetation and successional patterns. This information will be used to refine the existing Historic Base Map and will support development of a cultural landscape management plan. The refinement of the Historic Base Map is necessary because previous examinations of the existing base map have indicated some uncertainties and possible inaccuracies in it.

In 1987 a report by Nancy Gordon on the vegetative cover of the park raised questions about the extent of clearing in 1777.<sup>1</sup> Gordon's research indicated that not only had less land been cleared for farms before the encampment than indicated by the existing Historic Base Map, but also that less was cleared during the encampments. If corroborated, these observations would require major revision of the Historic Base Map. In 1989, Susan Schrepfer, historian, and Emily Russell, ecologist, considered the evidence used in constructing the Historic Base Map and that used by Gordon, and concluded that while the base map needed some revisions, the changes were essentially in details; the overall concept and documentation were sound.<sup>2</sup> These two reviews, however, made several recommendations for further study needed to correct details in the base map.

In response to these studies, this project will consist of a detailed examination of key resource areas in the park to provide the basis for a revision of parts of the Historic Base Map. This revised base map will then be used as the basis for developing a cultural landscape treatment/management plan.

The objectives of this project are thus: 1) historical analysis of key areas through archival research, 2) field analysis of selected areas in the park to analyze existing vegetation patterns, especially in terms of potential regeneration of forests, and 3) preparation of a series of period landscape maps over the last two centuries, in GIS format, based on the historical analysis. This series of maps and the results of the field analysis will be used subsequently in the development of the cultural landscape management/treatment plan.

<sup>1</sup> N. M. Gordon, *The Saratoga Battlefield: a Vegetative History*, 15 March 1987. Report on file at Saratoga National Historical Park

<sup>2</sup> Susan Schrepfer, *Analysis of Saratoga National Historical Park Base Map, 1989*, Report to National Park Service, North Atlantic Regional Office; E. W. B. Russell, *Saratoga National Historical Park. Critical Review of Historical Base Map*, Report on file at Saratoga NHP, 1989

## II. Rationale

Present-day landscapes result from the interactions over time of natural and cultural features of the land and species availability. "Natural" is used here in contrast to "cultural," or human-caused, not because humans are unnatural but rather because to understand their effects on the landscape requires a different approach to the study of landscape change. The natural physical factors, such as climate, soils, and topography, set limits on the possible establishment of species. For example, species of saturated habitats will not be present on dry sites and those of warm climates will not be present if the temperatures drop below their tolerance limits. Superimposed on these natural factors are cultural influences, such as agricultural activities and species introductions, which have changed greatly over time as human populations and their activities have changed. Species availability results both from biological evolution and migration and from human introductions. By integrating these aspects of landscape development, we can better understand the causes of current patterns of vegetation, as well as better predict future changes.

In the context of Saratoga National Historical Park, such a study will also allow us better to understand, interpret and manage the current landscape by integrating the consequences of past land-use into long-term management of the vegetation. For example, even if it does appear possible to recreate the land cover of 1777, there will be many years when the current scene will reflect more directly activities between 1777 and the present. Explaining the development of these features will provide a way for the visitor to relate the current land patterns to the critical period of history. In addition, if any past land-use activities or management decisions appear to be deleterious to the regeneration of vegetation appropriate to the battlefield conditions, corrective measures can be implemented. Any vegetation of special importance in interpretation, for example current forested areas that may resemble the 18th century forests, can be identified and used for interpretation.

The development of the current landscape can be divided into three major phases. First is the time from before earliest European settlement to October, 1777, when the original patterns of land allocation and clearing overlaid on primeval forest patterns and clearing directly related to the 1777 encampments shaped the actual battlefield conditions. Second is the major period of land clearance, which lasted from about 1782 to 1880, when the overall agricultural patterns were established. Third is from about 1925 to the present, when patterns of land abandonment and park development interacted with natural cover and agricultural patterns to produce the present landscape.

Several factors are of considerable importance in determining the present landscape in addition to these three major categories of activities (early land allocation, agriculture, park development). Some of these are incidental to the major patterns, some external to them, and some directly related. First, the soils of the Park, in

general, are poorly drained, so for farm establishment a pattern of drainage ditches and banks were built in several areas. These continue to have an influence on the drainage and the structure of the landscape. Second, part of the land of the Park was used for sand-mining in the early 20th century, leaving distinctive marks on the land at least for a while. Third, trees have been planted in several parts of the Park, producing stands that differ in composition and structure from naturally-regenerated forest stands. Fourth, insect pests, diseases and other species have been introduced, having differing impacts at different times in the history of the Park, some of which continue to the present day, such as the effects of the Dutch elm disease and the spread of knapweed (*Centaurea jacea*). Finally, the Park is influenced by the general conditions in the region, such as the building of the Champlain Canal which provided ready access to markets for such products as sand and widespread field abandonment in the 20th century accompanied by increasing density of white-tail deer.

Three main criteria determined the choice of key areas of focus for this study (Figure 1): 1) critical areas of the Park for the battle, one in the area of the American encampment and one in the British area, 2) a variety of land-uses on the upland areas and 3) fairly good documentation of prior land ownership. The data are presented as a series of maps of land cover at different time periods, along with interpretive text. The basis for identifying the land cover types and features are given in a legend for each map. This is not the last word on these topics; more information is constantly coming to the fore. To accommodate revisions and provide for various types of spatial data analysis, the system used to create the basic maps is the Geographic Information System, GRASS. GIS-GRASS will allow for modifications to the maps in the future as appropriate, as well as for innovative comparisons across time periods.

### III. Historical Research

#### A. Methods

General histories of New York State and of agriculture provided a framework within which to place the history of land-use in the park. Primary research included both site-specific research and more general research on customs and developments in the region at large. Site-specific information was traced both backwards, from the most recent land-ownership records back into the historical record and forwards, from information available about the battlefield site at the time of the battle. We used a combination of deed records, Revolutionary War Damage claims, probate records and wills, diaries and letters, and historic surveys and maps to trace development to about 1850. Federal Agricultural Census returns provided information on agriculture on specific farms from 1850-1880. Aerial photography, especially photos from 1927, 1948 and 1991 indicated land-use at those times, supplemented by other maps, aerial photographs and descriptions of the land, stored at the park. Records kept by the park, since its inception in 1939, provided another source of information, especially descriptions of land at the time of purchase by the Park and early

management decisions. Records kept in the Saratoga, Albany and Washington County clerks' offices, as well as local historical societies and records kept at the New York State Library's Rare Books and Manuscripts room in Albany were searched. Oral interviews with older local citizens added insights to 20th century land-uses and family histories.

The GIS-GRASS mapping of the key areas in 1777, 1850, 1927, 1948 and 1991 was done by on-screen digitizing using a scanned digitized copy of the 1948 aerial photograph as background. The digitized copy of the photograph was first rectified to the Park's digitized GRASS base map. The cover was first mapped for 1948 using the photograph as background. To provide comparability from one date to the next, allowing for possible errors in precise location of lines, each subsequent map was made by copying the 1948 map in vector form and revising (and renaming) it to reflect the cover of each of the different target dates. For 1927 and 1991, the locations of features were estimated by comparison of the aerial photographs for these dates with the 1948 background photograph. Most patterns from 1927 were still visible by 1948, and patterns in 1991 followed many of the earlier ones. Historical records and field study indicated that land cover in about 1850 could be extrapolated from the 1927 cover. Maps made at the time of the Battle compared with present-day topography provided the data for the 1777 map.

The surficial geology was traced onto USGS 7.5 topographic sheets from manuscript maps at the New York State Geological Survey, Albany, NY. (The Park lies at the corners of four USGS quadrangles, Schuylerville, Quaker Springs, Schaghticoke and Mechanicville.) Because most of the surficial geological contacts corresponded with contour intervals, the data were transferred to GRASS by onscreen digitizing using a scanned digitized composite topographic map of the whole park as background. This composite map is on file at Saratoga National Historical Park.

These procedures have produced a suite of maps which are internally consistent and which can be used to compare the cover over time. While their accuracy is not completely reliable, because of slight inconsistencies in rectifying the maps, inaccuracies inherent in the process of transferring data by on-screen digitizing, and problems of comparing vegetation in aerial photographs from different time periods, any discrepancies noted in further studies can easily be incorporated into them, and as they are they provide an invaluable resource for studying changes in the landscape over time and the effects of these changes on the current landscape.

## B. Land Allocation and Farm Locations to 1777

1. Allotment of land. Seventeenth century English policy required that land that was to be granted as a patent be purchased from the Indians, so on 26 July, 1683, Cornelius Van Dyck, Jan Jansen Bleecker, Peter Philipsun Schuyler and Johannes Mendel purchased from the Mohawks the land that would become the "Saratoga Patent." On 15 April, 1685, New York State Governor Thomas Dongan (1682-1688) granted

this land to Van Dyke, Bleecker, Kirck Wessels, Johannes Arundel, Robert Livingston, David Schuyler and Pieter Schuyler. This patent for "arable land of Saratoga" included a tract 22 miles long and 12 miles east to west, bisected by the Hudson River (about 170,000 acres).<sup>3</sup> The governor of the states granted patents such as this as favors, subject to a low rent to the colony.<sup>4</sup> Governor Edward Hyde, Viscount Cornbury (1702-1708) reissued this patent on Oct. 29, 1708, to many of the same patentees: Peter Schuyler, Robert Livingston, Jan Jansen Bleecker, Johannes Schuyler, Cornelius Van Dyck and Dirck Wessels. The land was at that time divided into 7 allotments. The allotments that included Stillwater, in which Saratoga National Historical Park is located, went to Peter Schuyler and Jan Jansen Bleecker.<sup>5</sup> It does not appear that any of the land was occupied (officially) at this time.

The survey of the patent which divided it into lots of appropriate size for leasing was made in 1750 by John R. Bleecker, and modified somewhat over the next 17 years by further surveys (Figure 2). A map of the patent published in 1767 included two compass readings, one from 1757 and the other from 1767, indicating continued surveying. The surveys divided the Patent into lots by straight lines, approximately evenly spaced along the river, but not parallel because they were approximately at right angles to the curving path of the Hudson River. This caused the lots to narrow somewhat away from the river (Figure 2). The Park lies within Lots #13-17. The areas on which this study focuses are located in Lot #16 in the British area, allotted to John Schuyler, and Lot #14 and possibly 15 in the American area, allotted to Cornelius Van Dyke (Figures 1 and 2).

The earliest leases of land within the patents were for land in the floodplain of the Hudson River,<sup>6</sup> where the soil was fertile and close to the river for shipping. These are shown clearly on the maps of the battlefield.<sup>7</sup> We are concerned here more with the upland, where there appear from the contemporary maps and reports to have been scattered small farms by 1777.<sup>8</sup> Two additional observations can be made about farm locations by comparing the battlefield maps with the patent and surficial geological maps (Figures 2, 3 and 4). First,

<sup>3</sup> State Library Report, Hist. Bulletin 9, Early Records of City and County of Albany vol. 2, deeds 3&4 - 1678-1704. 1916; Col. N. Y., Vol. II, p. 96 (notes by William Ward)

<sup>4</sup> U. S. Hedrick, A History of Agriculture in the State of New York, New York State Agricultural Society, Albany, NY, 1933. Pp. 43-49

<sup>5</sup> State Library Report, Hist. Bulletin 9, Early Records of City and County of Albany vol. 2, deeds 3&4 - 1678-1704. 1916; Col. N. Y., Vol. II, p. 96 (notes by William Ward)

<sup>6</sup> J. B. Welling, They Were Here Too, Vol. I, 1760-1841, 1974 (found at Washington County Historical Society, Fort Edward, NY) (Linda White)

<sup>7</sup> W. C. Wilkinson, "...encampment [army] ..Sep. 1777. Manuscript Map; W. C. Wilkinson, "The Encampment & Position of the Army under His Excy. Lt. Gl. Burgoyne at Swords and Freeman's Farms on Hudsons River near Stillwater, 1777. Manuscript Map. Copies seen at Saratoga National Historical Park

<sup>8</sup> Russell, op. cit.; W. C. Wilkinson, op. cit.

edges of cleared fields do not seem at this point to have borne any clear relationship to the locations of the patent lines. Secondly, at least some farms seem to have been located preferentially on soils derived from till, deposits of rock from the last glacial advance. Most of the Park lies on deposits of sands and clays from a lake that existed during the last glacial advance, with some outcrops of shale bedrock. The shale is generally overlain here by very thin soils, while the sands and clays are in general either very poorly drained or excessively drained (dune sands). It is possible that the deposits of till, though rockier than the lake deposits were more easily cultivated because of better soil moisture conditions.

The Patentees leased the land to colonists, generally on long leases for 1-3 lives and often for the lives of children as well, rather than selling it. In Lot #16 at least 7 leases were made by 1777 (Table 1). While one Simeon Barber did not get a lease until 1782, he was "warned to resist [sic] committing unlawful acts on Schuyler property to which he has no interest or right to" in 1774<sup>9</sup> and in 1775 he owed cash to John Schuyler for "sundries" purchased in December 1774, so it is likely that he was living in the vicinity at this time.<sup>10</sup> It is certainly possible that he was clearing land on the Schuyler patent illegally at that time.

2. Field clearing. Most of the cleared areas by 1777 were small, generally only 10-15 acres, and some were only recently cleared.<sup>11</sup> Some had been abandoned, generally by Loyalists. Lt. Wilkinson's manuscript maps clearly indicate at least one field with dead trees, presumably girdled.<sup>12</sup> Crops included wheat, Indian corn and potatoes. Farther south John Neilson had leased land on Lot #14 and was farming it by 1777 and Killean deRidder leased 50 acres in Dec. 24, 1772.<sup>13</sup> He apparently leased 100 acres in lot#15 in 1785 and his will made in Feb. 1772 mentions 350 acres. Whether the deRidder land was cleared is uncertain, as neither the Killean deRidder nor Killean Vandenburg, an heir, had real property listed in the tax rolls of 1789 (Table 2).

Claims for war damages provide more information about the state of clearing in 1777. In March 1778, John Nealson [sic] claimed "Two Tuns Standing Grass used as Pasture...forty Bushels of Potatoes Taken by the Solders [sic]...fifteen pounds Worth of Pasture" and 354 rods

<sup>9</sup> Land Records Lot #16, Saratoga Patent, Schuyler Papers, New York Public Library, "1767-1780 Minor and Uncalendared Letters." Also available at Saratoga National Historical Park. (notes by Steven Strach)

<sup>10</sup> Land Records Lot #16, Saratoga Patent, Schuyler Papers, New York Public Library, "Ledger 1774-1775." (notes by Steven Strach). Also available at Saratoga National Historical Park.

<sup>11</sup> Russell, op. cit.

Wilkinson, op. cit.

<sup>13</sup> Kilaen de Ridder deed in possession of Mrs Munger; Will of Kilaen de Ridder in possession of Clifton Post ?, drawn Albany, NY, Feb. 26, 1772; Indenture to Killaen (sic) de Ridder, 1785, Neilson papers, Saratoga NHP Archives (notes from William Ward)

fence "Taken and Burnt" by the army.<sup>14</sup> According to productivity rates from 1880 census data this may have been about 1 acre of potatoes.<sup>15</sup> The length of fence tells us little about the size of the area(s) fenced in, but, regardless, almost a mile of fence is a lot, and as fence at that time was used to fence livestock out of cropland it also indicates that Neilson had more than an acre of potatoes planted and also that he had livestock, probably even more than the one or two pairs of oxen that tradition says he used for hauling provisions during the time of the encampment in 1777,<sup>16</sup> and/or that his neighbors did.

Loyalist Claims made on the Freeman property (Leggett in Figure 1) claimed that John Freeman had lived on his farm for 11 years and had cleared 50-60 acres and built a house and barn. He had left on his farm 13 sheep, and some hogs and young cattle which the British had bought. This claim was modified somewhat in a claim by John Freeman's son-in-law Lewis Mosher who claimed that of the 100 acre lease he had cleared 20 acres and had a house. He also claimed 13 sheep and some hogs and wheat. This second claim, made on the same day, 17 March, 1788, seems a more reasonable amount of land cleared than the first, since the earliest post-war descriptions of this field estimate it to be 70-80 rods by 30 rods, or about 14-15 acres.<sup>17</sup> A more complete but conflicting list is found in Burleigh (Table 2).<sup>18</sup> The two claims agree on no particulars, so it does not seem appropriate to take them very seriously as evidence, except that there is little doubt that there was land cleared and an active farm established by 1777.

In conclusion, while it appears that the pace of land leasing in the area had been rapid in the 10 years or so before the Revolutionary War broke out, only scattered clearing probably had taken place on some of the leased land on the uplands, possibly one clearing of 10-15 acres per farm. The number of cleared fields corresponds well with the number of leases entered for Lot #16 and the sizes of the farms shown on the patent map of 1767 and described in some leases (Table 1).<sup>19</sup> From evidence in the war maps, contemporary accounts, and the few war damage claims that have been found in the area, these farms included partially cleared fields with tree stumps still standing,

<sup>14</sup> copy at Saratoga National Historical Park archives

<sup>15</sup> U.S. Agricultural Census Returns for New York State, 1850, on microfilm at New York State Library - Rare Book and Manuscripts Collection

<sup>16</sup> Interview with Mrs. Earl Hayner, Town of Stillwater historian, recorded by Sam Neilson, Nov. 24, 1946. P. 4. Copy at Saratoga National Historical Park

<sup>17</sup> Snell, Charles W., A Report on the Ground Cover a Saratoga National Historical Park, October 8, 1777. 1949; Loyalist Claims, Bureau of Archives, Canada, #448 and 419

H.C. Burleigh, The Freemans of Freeman's Farm, pp. 7-8, n.p., n.d. on file at Saratoga National Historical Park

<sup>19</sup> E.g., Indenture between Philip Schuyler and John Freeman, 2 August, 1768, Farm #3, 170 acres. Reel #10, Schuyler Papers, Saratoga National Historical Park

elds planted with crops such as wheat, corn and potatoes, and grazing animals, especially sheep. Field boundaries were not oriented according to the patent lines (Figure 4), nor, does it appear, were the early roads.

3. **Forest composition.** Little more evidence of forest composition has come to light since 1989. It seems clear that most of the area was forested, with forests of various densities depending on the soil and topography.<sup>20</sup> An indenture to Killean deRidder in 1785 for 100 acres in Lot #15, adjoining the property leased by Chatfield, included "white pine and pitch pine saw logs with liberty to cut, fell and carry the same away".<sup>21</sup> The indenture also included as boundary markers a "white maple" - probably Acer saccharum or A. saccharinum - and a basswood (Tilia americana). These are both likely to be found in the local deciduous forest. White pine (Pinus strobus) and pitch pine (Pinus rigida) have different habitats, white pine indicating local secondary forest succession after a disturbance and pitch pine overly well drained soil, such as is found on dune sands. It does not appear from the surficial geological map that there are dune sands in the vicinity of the deRidder land, but the inclusion of both kinds of pine may have been a general inclusion on such indentures and not indicate specifications of one piece of property.

4. **Encampments.** Additional clearing also occurred during the British and American encampments. The Americans had probably cleared part of their camp and fortified areas by September 17. The British clearing occurred between that date and October 7. General Burgoyne's standing orders for setting up camp required the "Removal of such Obstructions as might prevent the ready forming of the Troops to receive, or advance on the Enemy - It is not necessary to cut the large Trees for that Purpose, except where they may afford shelter for the Enemy".<sup>22</sup> This was to be done well in front of the lines of encampment. The areas cleared in front of the British headquarters on Lt. Wilkinson's maps show scattered trees remaining, so it seems that they probably did not cut down all of the large trees even in this area.<sup>23</sup> Not all large trees were left, however, since many were used in building the fortifications. A more accurate depiction of the scene than that provided by the Historic Base Map would include cleared fields, most surrounded by worm fences, and most of the area cleared for the encampment with many scattered trees remaining. It also appears unlikely that so much of the American area was completely cleared as shown on the Historic Base Map. It, too, most likely included only 10-15 acre cleared fields surrounded by areas cleared by the army by cutting the smaller trees and brush, but leaving many large trees standing. This area is, of course, shown completely blank

<sup>20</sup> Russell, op. cit.

Neilson Papers, Saratoga National Historical Park archives  
 Lt. Col. George F. G. Stanley, ed., For Want of a Horse, being A  
 Journal of the Campaigns against the Americans in 1776 and 1777  
 conducted from Canada, by an officer who served with Lt. Gen.  
 Burgoyne, Sackville, NB: The Tribune Press Ltd., 1961

<sup>23</sup> See also Gordon, op. cit.

the Wilkinson maps, but that in no way indicates lack of forest cover.

### C. A Time of Forest Clearing: 1782-1850

1. **Land leasing.** Immediately after the War, the pace of land leasing picked up, as new leases were issued and older ones reassigned, probably to those who were ready actually to move onto the land (or were already there illegally), as illustrated by the data from Lot #16 (Table 1). The local tax rolls in 1789 accord well with the leases indicated in Table 1, with 8 and possibly 10 of the 12 leases accounted for (Table 3). Neilson and deRidder also appeared on the tax rolls, though Deridder and at least one heir, Vandenburg, did not list any real property. The Freeman farm Loyalist claims suggest the possibility of a rough value of 1 L/developed acre (Table 2). If this is so, the farms listed in Table 3 which had real property average value of L21, may have had about 20 acres cleared apiece. This is a quite speculative estimate, but it seems unlikely that the cleared land was worth less than 1 L/acre, and if buildings were also considered in real property the average cleared acreage would be even less. It appears, then, that while land occupation was proceeding quickly at this time, clearing may still have been a fairly slow process.

2. **A glimpse into farm activities: 1800-1830.** Inventories of s made as part of determining the value of property in the probate o. wills provides further evidence of farm activities. Four of these for the area of the Park have been found, dating from 1802-1828 (Tables 4-7). The Elias Hewit property inventory made October, 1802 may be the Van Buren Sarle property considered in this study (Figure 1). His 32 sheep, 11 cows of various ages, 1 horse and 5 swine compare favorably to the values in the 1850 and 1860 agricultural censuses of 6 and 7 cows, 22 and 37 sheep, 3 and 5 horses, and 11 and 10 swine, respectively for Edward and Edwin Hewitt. It would seem that these numbers would have required similar pasture and winter forage. However, the 1850 and 1860 censuses included 572 and 753 bushels of grain and potatoes, while Hewit's will of 28 April, 1802 included only some wheat and Rye that had been sowed. It seems odd that not more grain in the barn was included in the inventory by October. Other inventories from the same area a few years later did refer to grain either in the ground or in the "chamber" - I assume that means barn or manger.

Samuel Rogers' inventory of 21 February, 1823 (Table 5) included comparable numbers of livestock (with the exception of fewer swine, perhaps accounted for by the "3 Casks of Pork and beef"), but was much more explicit about grain and hay both in the ground and stored. The diversity of the farm at that time was indicated by the inclusion of cider and flaxseed. John McBride's farm (Table 6), in Lot #17, was h more limited according to the inventory, including only one cow, heifer, 7 hogs and a little corn stored. William Leggett's farm le 7) (Figure 1) was more comparable to Samuel Rogers and Elias Hewit's in livestock, and included in May, 1828 an unspecified amount of "wheat on the ground."

3. Vegetative cover in the 1820's. Estimates of the amount of land cleared in Stillwater in the 1820's range from "about 1/2" to 60%.<sup>24</sup> In 1824, Spafford described the timber along the Hudson River as oak, walnut, maple, etc., while the western part of Stillwater had considerable pine where the soil was of sand or light sandy loam. In 1819, the "heights" in the Freeman Farm area (Leggett on Figure 1) were still mainly forested, though more cleared than in 1777.<sup>25</sup> It is not clear just what "heights" were meant, as the Freeman farm consists of only gently sloping land. The author may have been looking at the knolls to the west, where there are scattered pines today, since he also indicated that the trees were mainly pine. The lack of dune sand in this area may indicate that these were successional white pines, that may have grown since the British encampment. On the other hand, in 1794, Strickland had described the hills along the banks of the Hudson near Bemus's [sic] heights as wooded to their bases and back 1/2 to 1 1/2 miles, beyond that the land was "tolerably open".<sup>26</sup>

4. Population and land clearance. General statistics for the region also indicate the pace of clearing and settlement both regionally in Saratoga County and locally in Stillwater. Of nineteen towns in Saratoga County in 1860, 10 had been incorporated between 1775 and 1800, four from 1800 to 1805, four from 1816-1820 and one in 1828. In other words, the political subdivision of the county had essentially occurred by 1805, with another spurt after the War of 1812.<sup>27</sup> In 1820 the population of Stillwater was 2821, with 498 farmers on 16,456 acres of improved land, which supported 2091 cattle, 555 horses, 4225 sheep. They also produced 16,322 yards of cloth.<sup>28</sup> The averages from these data of 33 acres, 4 cows, 1 horse and 10 sheep per farm correspond with the data from the few inventories that were found for the area and are 50% higher than estimates for 1790. The most numerous farm animal was generally the sheep, possibly because it produced an easily shippable product, wool, and thus provided a ready cash crop. The importance of wool to the local economy was indicated by the 2 fulling mills, 9 carding machines and 1 cotton and woolen factory in Stillwater in 1820.<sup>29</sup>

The slow rate of land clearance may be indicated by population estimates of the area. These estimates are complicated by the creation of part of Easton from Stillwater in 1789 and part of Malta in 1802. Since we do not know the population of the parts that were

<sup>24</sup> J. Macauley, *Natural, Statistical and Civil History of the State of New-York*, n.p., 1829, Vol. 2, p. 15; H. G. Spafford, *Gazetteer of New York*, Albany, NY, B. D. Packard, 1824

<sup>25</sup> W. L. Stone, *Visits to the Saratoga Battle-Grounds, 1780-1880*, Port Washington, NY, Kennikat Press, 1896

<sup>26</sup> William Strickland, *Journal of a Tour in the United States of America, 1794-1795*, edited by J. E. Strickland, Waterford, NY, The New York Historical Society, 1971. p. 151

<sup>27</sup> J. H. French, *Gazetteer of the State of New York*, Syracuse, NY, R. P. Smith, 1860. pp. 592-593

<sup>28</sup> Spafford, *op. cit.*

<sup>29</sup> *Ibid.*

split off from Stillwater, we cannot correct census figures before 1802 to account for changes due to political subdivision rather than changes in numbers of residents. However, the geographical base for census figures after 1802 was constant, so the figures after that date are roughly comparable (within the accuracy of Federal census tallies). These show that the population of Stillwater in 1820 was 2,821, it subsequently decreased to 2,601 by 1830, increased slightly to 2,730 by 1840, to 2,967 by 1850 and to 3,238 by 1860. The State Census for the town in 1858 was 3,963,<sup>30</sup> which is 22% more than the Federal Census. This obviously indicates undercounting in the Federal Census (or overcounting by the State). The number of farmers in 1840, according to the Federal Census, was 601, which was up from 498 in 1820,<sup>31</sup> suggesting that families continued to open new farms.

At the same time that land clearance, as indicated by descriptions and population figures, was proceeding slowly, saw mill owners were complaining about a lack of wood.<sup>32</sup> Reconciliation of these two apparently contradictory trends may have been related to the political scene, namely the War of 1812. The war apparently not only siphoned off many able-bodied men for soldiers, but also required large amounts of charcoal for industrial products, especially the major ship-building for this largely naval war.<sup>33</sup> Thus the shortage of timber for the sawmills may not have been caused by clearing for farms, rather may at least have been due in part to cutting for production of charcoal. Regardless, cutting wood for fuel or saw timber gave a farm-owner some profit from the early phases of establishing a farm, and in the long run would have made the arduous task of clearing timber for fields less of a burden, paving the way for the rapid growth in population after 1830. There is some evidence also that the weather conditions were particularly unfavorable during the late 18th and early 19th centuries, culminating in the summer freezes of 1816.<sup>34</sup>

5. **Maximum deforestation.** Between 1830 and 1870 farmers cleared most of the remaining forests in the area, so that by 1870 most farms in the area of Saratoga National Historical Park were close to 90% "improved".<sup>35</sup> The patterns of agricultural land use of the late 19th century have left an indelible imprint on the surface of the land. Clearing apparently extended to property lines, which in the case of many east-west lines corresponded with the original 1750 patent lines. Locations of these patent lines were still clearly visible in patterns of hedges, reforested stands, ditches, and other indications of

<sup>30</sup> French, op. cit. p. 594

<sup>31</sup> Spafford, op. cit.

<sup>32</sup> Federal Industrial Census, 1820, on microfilm at New York State Library - Rare Book and Manuscripts Collection

<sup>33</sup> Hedrick, op. cit., p.102; J. K. Mahon, *The War of 1812*, Gainesville, FL, University of Florida Press, 1972. p. 101

<sup>34</sup> Hedrick p. 102

<sup>35</sup> U.S. Agricultural Census returns, 1870

property lines in 1948 (Figures 1 and 7). Roads built by 1856 were also in general unchanged by 1948.<sup>36</sup>

The scarcity of deer and other wildlife by the middle of the 19th century suggests the settled nature of the area.<sup>37</sup> Hunting and destruction of habitat had taken their toll on these animals. Even pigs no longer roamed wild,<sup>38</sup> probably because there was little forest for forage and too many farms where they could wreak destruction on crops. Pigs were being fed the skimmed milk left from butter and cheese-making.

6. Ditches, banks and fences. Ditches and associated banks dug along property lines in the 19th century remain today. Stone fences were also constructed during this time along property lines. Both of these were permanent structures, built only when decisions had been made of permanent field edges. As compared with a fence, especially a worm fence, they were not easily movable. It is likely that 18th century farmers in this area where stones were not so common as to be a serious impediment to plowing used fences that could be moved as clearing progressed. In the Battlefield area, stones were not generally a major problem with establishing plowed fields because most of the soil had developed from clay and sand deposits from a glacial lake. Stone fences are most common in the areas built on till, generally built of rocks found locally.

These stone fences were substantial structures, according to some mid-19th century descriptions. Estimates of the cost of building stone walls 2'3" wide at the bottom, 1' wide at the top and 4' high in 1865 was \$1.50/rod, compared with \$1.00/rod for a worm fence. The farmer in Dutchess County who provided this estimate concluded that the "wall [was] considered cheapest and most efficient in retaining stock".<sup>39</sup> Another farmer, from Ontario County, New York, built his stone walls 2' high with 2 more feet of posts and boards. These walls were also 2 1/2' wide at the bottom. He found that the stone and board cost about \$1.00/rod except "drawing stone, which I count as nothing, as it removes them from the fields".<sup>40</sup> The same year in "A Treatise on Practical Husbandry" Winslow Watson recommended stone walls on property lines or on lines "you do not want to change".<sup>41</sup> A "Manual of Agriculture" published in 1862 made a similar

<sup>36</sup> S. Geil, Map of Saratoga Co. New York from actual surveys. E. A. Balach Publisher, Philadelphia. Entered according to act of Congress in the Year 1856 by Robert Pearsall Smith in the Clerk's Office of the District Court of the Eastern District of Pennsylvania, 1856. Original at Saratoga National Historical Park, compared with 1948 aerial photograph.

<sup>37</sup> J. MacCauley, The Natural, Statistical and Civil History of the State of New York, Albany. V. I., pp. 446-449

<sup>38</sup> Hedrick, p. 375

<sup>39</sup> Transactions New York Agricultural Society 14:119. 1865. Farmer G. W. Coffin, Amenia, Dutchess County

<sup>40</sup> Ibid., p. 97

<sup>41</sup> W. C. Watson, A Treatise on Practical Husbandry, Transactions New York State Agricultural Society 14, 1865. Pp. 242-243

recommendation, that "useless and unnecessary fences involve a positive loss".<sup>42</sup> It is unlikely that farmers constructed such fences in this region before the mid-19th century when farms were cleared to the property lines.

The extensive and distinctive ditches, often with banks as well, also probably date from this period when permanent boundaries were established. Although at least many probably served for drainage, as they were deep enough and at least some ended at the tops of ravines, the field drains which should be associated with such drainage systems have generally not been found. The only one to have been identified clearly at the Park consists of wooden drain pipes which were found during excavation of the Burdyll farm in the southern part of the park.<sup>43</sup> Field drains were usually dug parallel to each other 25 to 30' apart and 2-3' deep. Before the use of tiles, they were often filled partly with stones or brush covered with earth. Tile drains (those with tile pipes in them) were expected to last about 50 years, and others probably less. These field drains conducted water to the collecting drains which carried the water away from the fields.<sup>44</sup> If they were filled with brush it would be expected that they might eventually sink down as the brush decayed, leaving more or less parallel depressions in the ground.

The ditch and bank along "Wilbur's Road" (along the northern edge of Lot #16) most likely served to drain that road. One on the northern edge of the "British Woods" along the Wilbur/Pettinos property line and one more or less north-south through the Wilbur property both end in a ravine and may have served as drainage channels. A right angle juxtaposition of wall and ditch in the Van Buren Sarle farm area suggests that the wall acted as a fence, while the ditch was functioning for drainage. Regardless of the function of these ditches, their clear alignment with modern property and field boundaries as well as 19th century roads indicates that they were constructed in the 19th century, probably before the middle of the century.<sup>45</sup>

7. A glimpse into farm activities: 1850-1880. The Federal Agricultural Census Records give us an intimate glimpse into the mixed farming from 1850-1880. These records provide data from actual returns for individual farms, so we may see what crops each farm raised. While they depended on the accuracy and honesty of the farmers making the entries, and are thus probably not completely accurate, comparing returns for all of the farms under study as well as others nearby, provides a composite picture of agriculture during

<sup>42</sup> G. B. Emerson and C. L. Flint, *Manual of Agriculture for the School, the Farm, and the Fireside*, Boston, Swan, Brewer & Tileston, 1862. P.244

<sup>43</sup> Linda Smith, personal communication; D.R. Starbuck, reports on excavations, 1986, 1987 (not seen)

<sup>44</sup> Hedrick, op.cit., p. 350; Emerson and Flint, op. cit., p.138-140

<sup>45</sup> Some of these banks and ditches resemble fortifications that may date from 1777. It might be worthwhile to look in the region outside the park for similar features, to compare those which are certainly not fortifications with questionable ones at the park.

this period. These returns are listed by farmer only, organized into towns, so identification depends on knowing who owned which farms at which times. Some farms were omitted from some years. For the 7 farms under study, only one could be clearly identified for each of the four censuses. We have no evidence whether this is because of change in ownership or rental or because some farms were simply missed in the censuses. The data for 1880 are the most complete, giving a detailed breakdown of land-use, acreage in different crops (rather than just production), and information on additional crops. These data were found for 3 of the farms under study.

A summary of the major crops is given in Table 8.<sup>46</sup> All seven farms had horses, cows and swine, and most had sheep. The "Gannon" farm had the most sheep by a large margin, and continued this emphasis on sheep farming until well into the 19th century.<sup>47</sup> Oats were by far the most popular grain, followed by Indian corn, rye and wheat, in that order. Insect pests, especially the Hessian fly and a midge, probably accounted for the very small amount of wheat reported, which was increasing slightly toward the end of this period. These two insects had destroyed the wheat crop in eastern New York in the decade 1830-1840. While the Hessian fly had been around since the Revolutionary War, the midge had been introduced in the 1820's and made wheat-growing very difficult until means to combat the pests were found later in the century.<sup>48</sup> Three of these farms reported very low yields for wheat - 7, 20, and 16 bushels/acre. Rye also produced little, giving 3, 10, and 6 bushels/acre. Oats and Indian corn were most productive and most planted. The figures also show considerable differences in productivity among the farms, with very low productivity especially for the Pettinos farm. Most yields were comparable to those listed in a contemporary farm manual.<sup>49</sup>

The 1880 census data also included an estimate of acreage of orchards and woodland. The orchard acreages that appear on the 1927 aerial photograph correspond approximately with those listed in 1880, suggesting that the orchards seen on the 1927 air photo were there already in 1880, and by extrapolation also in 1850, as most farms listed orchard produce in 1850-1870. The acreage listed as "tilled" in 1880 included "fallow and grass in rotation (whether pasture or meadow)."<sup>50</sup> "Permanent meadows" and "permanent pastures" were included in another category, which was usually small and often just accounted for by orchards. This suggests that little land was set aside just for pasture, so that in a rotation of crops, grass and pasture we cannot at any time indicate just where crop fields would have been as opposed to pasture.

<sup>46</sup> Agricultural Census Data, op. cit.

<sup>47</sup> R. E. Appleman, Recommendations on development policy and work program, Saratoga National Historical Park, August 15, 1939 (on file at Saratoga National Historical Park)

<sup>48</sup> Hedrick, p. 332

<sup>49</sup> Emerson and Flint, pp. 160-175

<sup>50</sup> Defined in this way in the census records

Other products of interest included honey, cordwood, hops, peas, beans, and buckwheat as well as "market" produce, probably vegetable crops. At least the Leggett farm also had a vineyard in 1880, though the acreage was too small to list. Overall, the farms seem to have compared well with what was described as a "complete farm" of the period, including woodland, pasture land, meadow or grass land, arable land, an orchard, a garden spot, and space for roads.<sup>51</sup> While sheep seem to have been the livestock of choice in the 18th century, a century later they had been relegated to a somewhat less prominent position on most farms. Overall, however, the list of stock and crops for the late 19th century was remarkably similar to the few lists that have been found for the early part of the century. Individual fields were still about 3-12 acres, with most in the 3-7 acre range. It is interesting to note that the farm with the fewest animals in 1880 ("Pettinos") also had the lowest yields. Fertilizer still came mainly from livestock, so there was a close correspondence between availability of livestock for manure and productivity.

A description of the battlefield in 1878, which attempted to indicate the locations of entrenchments, provides a good picture of land clearing.<sup>52</sup> Starting near the barns associated with the Pettinos farm, the author of this essay walked west through fields north of the farm road, then through the woods and "along the brow of a hill from which the timber [had] been recently cut (after crossing a spur of the ravine)" and then reached the Freeman farm orchard. Even at that time, when the forest had only recently been cut he had trouble locating evidence of the entrenchments. He also noted that Mr. Larrington (Pettinos farm) had cleared some woods in 1864 and "leveled the [military] works". Other forest on the edge of a ravine had recently been cut. The picture that he presented corresponds well with what the other documents suggest about the pace of clearing, and its continuation well into the middle of the 19th century.

The probable locations of orchards, woodlots and fields for the targeted farms is indicated in Figure 5. The map is a composite of information found in two maps, 1856 and 1866 maps of Stillwater,<sup>53</sup> property deed searches for the targetted farms to indicate ownership, 1850-1880 Federal Agricultural Census records, Transactions of the New York Agricultural Society Volume 14 (1865), Hedrick (1933), and Emerson and Flint (1862). The last three sources suggest what was likely for a farm of the period, and the first four are site specific. It was assumed that orchards present in 1850 were in the same places as those seen in the 1927 aerial photograph. Woodlots similarly were assumed to be in the same locations as deciduous stands on the appropriate farms in 1927. Roads could be traced from the maps, which also provided suggestions of land ownership. It is difficult to find the requisite woodland area for the Leggett farm, listed as 21 acres of woodlot in 1880. The "Pettinos" and "P.H. Gilgallon" farms extended farther to the east than I have mapped, extending down the steep slope

Emerson and Flint, p. 1

<sup>2</sup> H. Nickerson, *The Turning Point of the Revolution Or Burgoyne in America*, Boston, MA, Houghton Mifflin Company, 1928. P. 307

<sup>53</sup> Both on file at Saratoga National Historical Park

o the Hudson River floodplain and their orchards were in the eastern parts of the properties. The Gannon farm listed 39 acres "unimproved" in 1860, which is more than I could locate on the map. The farm at that time included 248 acres, however, so extended well beyond the boundary I have been able to establish. Perhaps it extended well to the south and included the woodland along the Middle Ravine, which is steep and probably not easily cultivated. The overall picture of this time period, however, is of cleared land with orchards near the farmsites and scattered woodlots. Undeveloped land was generally on sites that were too steep to cultivate easily, though the undeveloped woodland across the Wilbur, Pettinos, and P.H. Gilgallon properties (the "British Woods") cannot be explained in this way. It is, however, located on the generally not very fertile sand deposits (Figure 3).

#### D. A Predominantly Rural Landscape: 1880-1927

1. **The rise of a grazing economy.** Mixed farming continued through this period. The farmers on the Gannon farm continued to concentrate on sheep-raising, keeping that farm open.<sup>54</sup> To the east, the aerial photograph shows forest beginning to encroach on fields along streams and hedgerows, forming linear patches of forest land within the matrix of cultivated fields. After about 1860 the demand for wool had declined and the demand for cheese and butter began to increase in the northeast in general. By 1900 production of milk itself began to rise in importance with improved technology for preservation and transportation.<sup>55</sup> It is likely that some of the fields were converted to permanent pasture during this time period. In Saratoga County as a whole there was a decrease in the acreage and production of all crops from 1879-1909, except for "hay and forage." The major crop by 1919 was hay, usually a timothy/clover mix. Oats were the major grain, used mainly as a nurse crop when seeding to perennial hay. Most hay was fed to the stock on the farm rather than being sold off the farm. Corn grown for grain and silage was also mainly fed on the farm. Other crops were rye, buckwheat, and wheat, with wheat still the least important. Potato culture had become less important by 1919.<sup>56</sup> In general, however, farmers in the region did not keep permanent pasture clear of brush, nor did they care for their woodlots, indicating a decline of agriculture in the area.

2. **Sand-mining.** Valuable surficial deposits provided another resource of value in the early 20th century. In 1917 the Pettinos Brothers of New York City and later of Philadelphia acquired the farm referred to as Pettinos. Pettinos Brothers was a sand-mining company,

<sup>54</sup> 1927 aerial photograph; Appleman 1939, op. cit.

<sup>55</sup> P. W. Bidwell and J. I. Falconer, *History of Agriculture in the Northern United States, 1620-1860*, Carnegie Institution of Washington, Washington, D.C., 1925. Pp. 405-410, 424-430; H. G. Schmidt, *Agriculture in New Jersey, a Three-Hundred Year-History*, Rutgers University Press, New Brunswick, NJ, 1973. Pp. 155-156

<sup>56</sup> E. T. Maxon and J. H. Bromley, *Soil Survey of Saratoga County, New York*, USDA, Washington, D.C., Government Printing Office, 1919. Pp. 8-10

which acquired the land for its molding sand, rather than as a farm per se. It seems from the 1880 Agricultural Census that it had not been very productive as a farm, anyway. Molding sand, used in foundries for casting metal was found in the northern part of what is now Saratoga National Historical Park, below 300' elevation. The deposits were generally surficial, only 8-9" deep, rarely as much as a few feet. They were usually overlain only by soil, though they could be overlain dune sand, and they in turn overlaid clay or "sharp gray sand".<sup>57</sup> Consisting of fine sand with some lake clay, they were ideal for casting brass. Because molding sands were not very common, they were in very great demand where they were found.<sup>58</sup> Their value may be indicated by noting that in 1948 molding sand was worth \$2.04/short ton, while the next most valuable sand, structural sand, was worth only \$0.76/short ton.<sup>59</sup> This part of the Park thus had value not only as farmland but for this mineral deposit as well.

The Pettinos Brothers and another company which mined but did not own land, the Whitehead Mining Company, mined deposits in the same general area (Figure 6). Traces of old docks, narrow-gauge railroad tracks, and debris from sifting the sand remain in two places on the banks of the Hudson River just east of the park indicate that the two companies built separate loading platforms, suggesting the value of the resource.

To mine the sand, the sod and topsoil were removed from a strip about 3 feet wide. The sand was then mined from this trench. Sod and topsoil from the next strip were placed in the first trench, and so on across the deposit.<sup>60</sup> While this procedure did replace the soil which the mining disturbed, it also lowered the level of the land surface and changed the drainage by both lowering the level and by altering the subsoil. These activities would also have obscured or even obliterated any archeological remains from the time of the battles.

The soils in these areas are described as Oakville very fine sandy loam, well-drained, formed in deltas or stream terraces.<sup>61</sup> Field probing of the soils indicates that the sandy subsoil in the British Woods, where there is much superficial disturbance of the ground, is similar to that in the areas where it is fairly certain that sand-mining took place (Figure 6). It is much finer than the sandy subsoil farther south or north in the Coville sand area (Figure

<sup>57</sup> C. A. Hartnagel, and J. G. Broughton, *The Mining and Quarry Industries of New York State, 1937-1948*, New York State Museum Bulletin Number 343, Albany, The University of the State of New York, 1951. P. 97

<sup>58</sup> H. P. Cushing, and R. Ruedemann, *Geology of Saratoga Springs and Vicinity*, New York State Museum Bulletin No. 169, Albany, The University of the State of New York. 1914, p. 148; Hartnagel and Broughton, op. cit., p. 97.

<sup>59</sup> J. A. Graham, *The Mineral Industries of New York State, 1949-1950*, New York State Museum and Science Service Circular 41, Albany, The University of the State of New York Press, 1955. P.48

<sup>60</sup> Hartnagel and Boughton, op. cit., p. 97

<sup>61</sup> Saratoga National Historical Park, dominant soil types

3). If this area was mined for sand, it is unlikely that neat linear trenches would have been dug, because of the trees that were certainly there in the 1920's. The value of the sand may have made it worth mining in an unorthodox way, but may not have made cutting down large trees profitable. Such a procedure would fit well with the pollen analysis of the site as well, which indicates that the mounds were made after agriculture was well established in the area.<sup>62</sup> Coring for pollen analysis also revealed a charcoal layer just under the dirt mound that was sampled. This charcoal layer was found generally at a depth of about 15-20 cm in the woods, and may have resulted from burning the brush prior to digging for sand. This seems to be the most likely explanation for the irregular topography here.

3. Flora. In 1915, a botanist, Stewart H. Burnham, described the Saratoga Battlefield. He first mentioned the monuments marking historic locations, then described some of the more noteworthy species that he noticed in his three visits to the battlefield (Table 9). He described the same patterns of vegetation that were described elsewhere, with wooded ravines to the east and pastures on the more level upland. He found several rare species which do not now seem to be present, matrimony vine (Lycium halimifolium), a milkwort (Polygala verticillata), a vetch (Vicia sativa) and spearscale (Atriplex patula). One of these, matrimony vine, is a native of southern Europe which was cultivated in old gardens and described by Burnham only in abandoned house foundations in the area.<sup>63</sup> Three species he described as rare grew in fields, and may have become extinct because of changes in land-use. The loss of the orchid, Habenaria hookeri, and the pinesap, Monotropa hypopitys, are more difficult to explain, since there is more habitat now than there was then for these woodland species. The Habenaria may have fallen victim to collecting, but it is not likely that the pinesap would have attracted many collectors. Neither was common even in 1915. A shrub which he did not mention was Cornus racemosa, gray dogwood, a very common and conspicuous member of the successional stands today. Two shrubs which he did find but which are absent today are Kalmia angustifolia and Rhododendron canescens. It is unlikely that the conspicuous evergreen Kalmia has been missed in recent botanizing, so it seems to have been extirpated. Rhododendron canescens was probably misidentified in 1915, as it is characteristic of coastal plains south of Delaware.<sup>64</sup> There is, however, nothing else in the 1988 list that could be easily confused with this species. The conspicuous and rare flora has thus changed considerably since 1915. Possible reasons would include changing regional and local land-use, random extinctions without recolonization, collection, and changing patterns of herbivory.

<sup>62</sup> G. K. Kelso, Exploratory pollen analysis of two cores from the British Old Woods, Saratoga National Historical Park, Draft report to National Park Service, North Atlantic Regional Office, n.d. (1990)

<sup>63</sup> H. A. Gleason, The New Britton and Brown Illustrated Flora of the Northeastern United States and adjacent Canada, Hafner Press, New York, 1952. Vol. 3, pp. 202-203

<sup>64</sup> Henry A. Gleason and Arthur Cronquist, Manual of Vascular Plants of Northeastern United States and Adjacent Canada, D. Van Nostrand Company, New York, 1963. p. 525

4. Early park development. In 1923 a group of local citizens formed the Saratoga Battlefield Association to begin acquiring farmland for a park commemorating the Battle of Saratoga. By 1926 they had acquired the Leggett and Wilbur farms (Figure 1) and the Gannon Farm just southwest of the Leggett property. Interest in the Battlefield had also led to the construction of monuments at strategic points along the roads, to commemorate specific events at the time of the encampments and battle, the most notable of which were a monument to unknown soldiers erected by the Daughters of the American Revolution; the Kosciusko Monument erected by Polish Americans to recognize the Americans' military engineer; and the Tim Murphy Munument erected by the Ancient Order of Hibernians.<sup>65</sup> A guidebook published in 1930 descibed the various monuments.<sup>66</sup> Interest in the area as the site of the battlefield had never dwindled, though farming had assuredly obscured much of the evidence of that time.

In 1926 the State of New York began buying land to form a state park. By 1928 they had purchased the Leggett and Gannon farms from the Battlefield Association as well as the A. Sarle (southwest of Leggett) and Neilson farms, for a total of 655 acres and in 1929 appropriated the M. Gilgallon farm and others.<sup>67</sup> To accomodate visitors to the park, the state constructed two picnic sites and a camping area and built restrooms and other structures, including a revolutionary war blockhouse and a New England farmhouse in the area east of the Neilson farm buildings. They also planted trees around the "cemetary plot" and 3,000 (pine) trees "in the neighborhood of the great ravine,"<sup>68</sup> although there is no evidence of these trees in the 1948 air photo.

In 1938 the United States Congress created the Saratoga National Historical Park, as one of the earliest of the nation's historic parks.<sup>69</sup> The Federal Government acquired the State Park lands and began acquisition of more land to include key properties associated with the battleground. Surveys of properties to be acquired as well as maps of the ground, including vegetation and other features provide us with a fairly clear picture of the vegetation of about 1939. Because this corresponds closely to the land-use patterns on an aerial photograph from 1927, I have drawn a composite map of the vegetation at this time, just before major changes in land use dictated by the

<sup>65</sup> Appleman, photographs 5-8

<sup>66</sup> D. E. Sprague, Descriptive Guisde of the Battlefield of Saratoga, Ballston Spa, NY, Batttlefield Publishing Co., Inc., 1930; Other information is available on the monuments from Judith Quinn, Daughters of the American Revolution and files compiled by Richard Beresford, Saratoga National Historical Park

<sup>67</sup> State of New York, Conservation Commission, Seventeenth Annual Report. For the Year 1927. Legislative Document No. 38, Albany, J. B. Lyon Company, 1928. P. 38; "To Buy More Farms for Battlefield Park," The Schuylerville Standard, February 14, 1929. P. 1

<sup>68</sup> Saratoga, Report of the Engineer Office in New York, July 27, 1928 (on file at Saratoga National Historical Park); deed searches for the relevant farms

<sup>69</sup> Gordon, op. cit.

requirements of the park rather than by farmers' own needs and interests (Figure 6). The beginnings of land abandonment caused by deterioration of farm prosperity in the early 20th century were evident on the land in the invasion of trees and shrubs by this time.

E. Early Development of Saratoga National Historical Park:  
1939-1949

1. First recommendations. In August, 1939, Roy Edgar Appleman submitted the first detailed survey and report on the park property, "Recommendations on development policy and work program, Saratoga National Historical Park."<sup>70</sup> He found little evidence on the ground of earthworks related to the battle, interpreting most of the mounds and ditches as the result of more recent agricultural activities, although he was convinced of the authenticity of some earthworks in the "British Woods."

Appleman made several recommendations for interpretive development of the Park landscape. First, he recommended that the area be kept in agriculture, or at least open, so that visitors would be able to see clearly the lay of the land, which would be obscured by allowing reforestation. He estimated that of the 1429 acres of State Park land, only 30 were currently forested, 50 were early successional forest, and about 200 were early shrubby succession. Cutting of hay on about 600 acres and grazing of 200 sheep by Mr. Gannon, caretaker of the state park, kept most of the rest open. He recommended maintaining this pattern, as well as establishing vista points and a new road system, along what he thought were historic road alignments in large part, and including re-routing State Highway 4 which cut through the Park. In the interest of establishing a historic scene appropriate to 1777, he recommended removing all internal field lines, including stone walls, wire fences, and shrubs and small trees along field boundaries, because he believed that these lines did not date from the time of the battle. He also recommended that many buildings which were not present in 1777 and those built by the State also should be removed. His recommendations regarding the overall land cover clearly reveal his attitude - "All the park land should be readily accessible to hikers without serious danger of damage to clothes."<sup>71</sup>

2. Early implementation. The Civilian Conservation Corps (CCC), camped at the Park from Oct. 1939 to June 30, 1941, carried out several of Appleman's recommendations. Records indicate that they removed 5 miles of stone fences and 5.5 miles of old wire fence lines and "artificial hedgerows". In addition they reported removing "200 acres of decadent orchard trees not a part of the historical scene."<sup>72</sup> It is unlikely that there were 200 acres of orchards in the park, but

<sup>70</sup> Appleman, op. cit.

<sup>71</sup> Ibid., p. 10

<sup>72</sup> Appleman, pp. 9-13; Letter from A. W. Kresse, Project Supervisor, CCC, to Saratoga National Historical Park, June 30, 1941 (on file at Saratoga National Historical Park)

they effectively obliterated all of the existing orchards, probably 200 trees rather than 200 acres. They also razed buildings that were not part of the 1777 battle scene, and began archeological excavations. A five acre nursery of "desirable plant materials" was established, though the location is not apparent. They also removed the state picnic areas and repaired road construction scars from abortive road-building attempts by the state. Fifty acres of white pines were treated for infected leaders. It is interesting that there were at least 50 acres of successional pine forest established by that time<sup>73</sup>.

The continued interest of the park in work programs are indicated by later proposals, that were not carried out. These included more obliteration of fence rows, stone fences, and orchards and the eradication of exotic plants on 150 acres. This latter was sometimes listed as eradication of poison weeds.<sup>74</sup> These proposals seem rather arbitrary, since there appear to have been no orchards left<sup>75</sup> and no specific identifications are made of the plants to be eradicated. Because no other CCC camps used the property, no action was taken immediately on these "wish lists".

3. Revised recommendations. By 1944, the idea of leaving most of the land open had been rejected, and replaced by the objective of "the accurate reconstruction of the scene as it was at the time of the action."<sup>76</sup> In 1947, park historian Richard J. Koke issued a "Report on the Reforestation Program for Saratoga National Historical Park," based on the "Plan for Restoring Forest Cover" drawn up by park Superintendent Warren F. Hamilton and Ranger Clarence Callender in May, 1947, revised from Appleman's earlier report.<sup>77</sup> The revised recommendations included "[allowing] the greater part of the open area to revert back to its historic state, except where it might interfere with purposes of interpretation."<sup>78</sup> Clear areas would include farm fields of 1777, the area in front of the American and British lines, which should be cleared of timber if necessary, and the areas of the American and British camps. Forest should be allowed to grow back to the edges of the fields to present conditions as they had been at the time of the battles.

<sup>73</sup> "CCC Work accomplishments under the supervision of the National Park Service, October 1939-June 30, 1941, Saratoga National Historical Park, NP-2, Stillwater, New York (on file at Saratoga NHP)

<sup>74</sup> "Proposed Work Program", Saratoga National Historical Park, April 1, 1941-June 30, 1943; same, for July 1, 1941 - June 30, 1942 (on file at Saratoga NHP)

<sup>75</sup> 1948 aerial photograph

<sup>76</sup> W. F. Hamilton, Superintendent, Saratoga National Historical Park, Proposed Archeological Program for Saratoga National Historical Park (written after Ehrich's work), Sept. 1944. P. 1

<sup>77</sup> R. J. Koke, Historian, A Report on the Reforestation Program for Saratoga National Historical Park, Sept. 1, 1947. On file at Saratoga National Historical Park. P. 1

<sup>78</sup> Koke, op. cit., p. 2

Beginning (or possibly continuing) the debate over the validity of the putative entrenchments in the British Woods, Koke was of the opinion that they were probably part of a more recent drainage system. Historical documents and archeological study should be used to uncover the actual locations of all of historic sites so that an accurate plan could be drawn up. Natural secondary succession since purchase of the land by the state was allowing scrub and forest to regenerate at the Park in some areas where the plans called for open fields.. Koke suggested allowing local residents to use some of these areas as hay fields to keep them open. The assumption was made that where fields were abandoned natural secondary succession would produce forests appropriate to reconstructing the 18th century scene.

Two years later, Koke's successor as park historian, Charles Snell, presented the Park with a "Report on the Ground Cover at Saratoga National Historical Park, October 8, 1777" based on maps produced by General Burgoyne's surveyor, Lt. Wilkinson and documentary evidence of the ground cover at the time of the battle.<sup>79</sup> He accompanied his report with two maps, one of the ground cover on Sept. 19, 1777, the day after the first battle on the site, before the British encampment, and the other of Oct. 8, 1777, the day after the the critical battle. The park management has since used his map of the ground cover on October 8, 1777 in their efforts to recreate those conditions. Abandoning Appleman's recommendation to keep the land open, the Park decided that the best way to recreate the scene was to allow forest to regrow in places where it had been in 1777, providing vista cuttings where necessary to allow an overview of the sites, as also recommended by Koke.

The map of vegetation in 1948 (Figure 7) provides an indication of early stages of forest succession, after removal of many fence rows, but before the forest had obliterated many of the 19th century field lines and before construction of the tour road in the 1960's, which cut across the 19th century roads and probably also features from the 18th century. Most scrub and forest regeneration at this time was in areas slated to be reforested.

#### F. Further Development of Saratoga National Historical Park: 1950-1991

This period saw the implementation of the Historic Base Map based on Charles Snell's work, building of the tour road in the 1960's, and construction of the visitor center. In addition, regional patterns of land abandonment led to increases in populations of white-tail deer, which appear to have begun to influence the vegetation of the park. Archeological excavations, led to clearing of the understory, including small trees in part of the British Woods, eliminating an entire age-class of trees in the woods (effectively repeating what appears to have happened earlier in the 1920's as part of sand-mining

<sup>79</sup> C. W. Snell, A Report on the Ground Cover at Saratoga National Historical Park, October 8, 1777, Report to National Park Service, July 25, 1949. File #834, Historical Research File, Saratoga National Historical Park

in 1964-1965

operations). Maneuvers of the U.S. Army in 1938-1939 may have caused some land disturbance, but it is not evident on the ground today.

The map of the vegetation in 1991 (Figure 8) shows the overall pattern of forest and cleared area proposed in the 1949 Historic Base map. Work on implementing the plan proposed by the base map appear to have been well under way by about 1952, when a draft of a report, "Interpretive Section of Development outline, Saratoga NHP," stated that "[i]t should be noted here that some progress has been made in marking and clearing of historic fields, in accordance with the vegetative cover map for Saragoga NHP. The J. Barber field, scene of the opening engagement in the second battle, already has been outlined and cleared, and the outline of the Freeman Field [Leggett farm in Figure 1] is in the process of being checked for conformity with the vegetative cover map (NHP-Sar 2046)."<sup>80</sup>

The section of the British Woods found on the former Wilbur property, shown on the Historic Base Map as cleared in 1777, was cut down in the 1950's and has since been maintained as a mowed field. From park correspondence it appears likely that this section was harvested sometime after 1954 when the park found that a local paper mill could use hardwoods and thus provided a market for the lumber.<sup>81</sup>

Several other activities are recorded by aerial photographs from the 1960's and 1970's. While the overall pattern of change was the reversion of open farmland to scrub and young forest and the destruction of remaining 19th century structures, superimposed on this pattern was a variety of activities with more local effects. In a field northwest of the British Woods, on the site of the Wilbur farm, there appears to have been a pine plantation which was planted after 1948 and subsequently harvested. In the same vicinity, construction of the tour road in the late 1960's involved scraping soil for fill, leaving obvious construction scars. These and other sites affected by construction are in many places now much wetter than they were in the past. Construction of the road also directly obstructed drainage in places.

#### IV. Field Studies

In order to predict future changes in the vegetation, it is necessary to conduct field analysis of regeneration in currently revegetating stands. Analysis of the successional trends in these areas, related to prior land use and age of the forest (or scrub/forest), will suggest the potential for natural regeneration as it is influenced by different types of past land-use as well as by different patterns of abandonment and different soils.

<sup>80</sup> Portion of report found in miscellaneous correspondence file at Saratoga National Historical Park

<sup>81</sup> Memorandum from Saratoga National Historical Park Superintendent, I. J. Ellsworth, August 18, 1954, To Regional Director, Region one, Subject: Summary, visit of forester Wilbur L. Savage, in miscellaneous correspondence file at Saratoga National Historical Park

## A. Methods

For the analysis, I chose three stands which were fields in 1927 and are now reforesting, but currently have different vegetation, in order to indicate the range of patterns of reforestation (Table 10). All are located on level to only slightly rolling terrain, with no more than 30 feet (9 meters) (and generally less) relief.

Site 1 is a forested stand just west of the British Woods (Figure 1). This stand appears in the 1927 aerial photograph to have been an open field, and calculations of forest area on the Wilbur farm indicate that it was probably not forested in 1880 either. It may be the stand that Nickerson said had been cleared in 1864.<sup>82</sup> The stand was darker and more fine-grained than the rest of the contiguous forest in the 1948 aerial photograph. Hamilton in 1944 described it as a "very thick stand of young poplar and birch".<sup>83</sup> Soils here are sandy loam. The western part of this stand is on a steep slope and the narrow floodplain at the base of the slope.

Site 2 is located on the Leggett and Gannon farms (Figure 1). It appears an open field in the 1927 aerial photograph and in 1948 appears still to have been open, probably as permanent pasture grazed by sheep. The 1988 vegetation map of the Park described it as hardwood brush in the west and pine in the east. While the relief is only about 10 feet (3 m), very slight differences in elevation correspond with a change from fairly well-drained to poorly drained soil with glei conditions at about 6 in. (15 cm).

Site 3 is located on the Neilson and V. B. Sarle farms (Figure 1). It was open field in the 1927 and 1948 aerial photographs. It has the smooth texture of an arable field in the 1948 photograph. The 1988 vegetation map described the area as dogwood scrub, pine and elm. As with Site 2, this one includes several areas of slightly lower elevation which have poorer drainage.

The aim of management of these three sites is to regenerate forest vegetation which resembles forests that were there in 1777. To study the potential success of reforestation, one needs a measure of the species and densities of trees that have become established and the younger reproduction. For this analysis counts of trees and saplings were made in random plots on the three sites. To indicate the potential for future regeneration, in several plots the occurrence of tree seedlings was also noted. As part of the regeneration of forest vegetation, herbaceous and shrub species are also part of the plant communities, so species presence for these was noted also in several subplots.

Specifically, random points generated by GIS-GRASS were superimposed on a map of each site. A strip or square area within the site, including 15 or so points was chosen, to include the maximum range of variation, generally across farm lines or different

<sup>82</sup> Nickerson, *op. cit.*, p. 307

<sup>83</sup> Hamilton, *op. cit.*, p. 21

vegetation as mapped in 1988. The points were located in the field approximately by pacing from known, easily located points. At each point a 20m x 20m plot was laid out for sampling. All trees, >5 cm dbh, were tallied in 5 cm size classes and all saplings were counted, <5 cm dbh, >2m tall. In several plots a subplot 5m x5m was used to sample tree seedlings, shrubs and herbaceous species.

## B. Results

The data are summarized by stand in Tables 11-13. These include the importance value  $[(\% \text{density} + \% \text{basal area})/2]$  for each species in each plot, total number of tree stems/ha, total basal area/ha, saplings/ha and the averages and standard deviations for each of these composite values. Average importance values given for each species are for the plots in which that species was present. The plot arrangement in Tables 11-13 puts those plots that were most similar together. Tables 14-16 list seedling, shrub and herbaceous species present in 5m x 5m subplots. The original data sheets will be left on file at Saratoga National Historical Park.

## C. Discussion

The density and composition of trees in the stands indicate the processes of natural regeneration that have been occurring up to the present, while the density and composition of saplings and tree seedlings indicate potential changes. There is considerable variability both between the sites and on different plots within each site. Overall, the density of trees falls within the range found in successional stands in other parks in the mid-Atlantic region.<sup>84</sup> As in stand types at Hopewell Furnace National Historic Site in Pennsylvania dominated by yellow poplar (*Liriodendron tulipifera*) and/or red maple (*Acer rubrum*), the density of saplings was consistently less than that of tree stems. Tree seedlings were nowhere very common.

Because of the great difference in species composition between site #1 and sites #2 and 3, I will discuss Site #1 separately. While it is clear that Site #1 differs from the other two in soil and age, some similarities which are of interest in considering the future of secondary succession in general at the Park will be considered in the conclusion.

1. Site 1. Successional development to the present is characterized by the loss of the birch, probably gray birch (*Betula populifolia*), described by Hamilton in 1944. Dead gray birch trees abound on the forest floor. Poplars, both big-leaved poplar (*Populus grandidentata*) and quaking aspen (*Populus tremuloides*) continue to be important trees at this site, though as with gray birch, there are

<sup>84</sup> E. W. B. Russell and A. E. Schuyler, Vegetation and flora of Hopewell Furnace National Historic Site, Eastern Pennsylvania, *Bartonia* 54:124-143. 1988; E. W. B. Russell, Jockey Hollow: Observations and hypotheses with reference to succession in the forest vegetation, Report to Morristown National Historical Park, 1989.

many dead stems on the ground. All of the poplar trees counted were greater than 25 cm dbh, and there were no saplings, so it is clear that these early successional species are not replacing themselves.

Red maple trees were represented in all size classes, from sapling to greater than 30 cm dbh, as well as having some seedlings, indicating that this well-established species will continue to be important in this forest in the future. White ash (Fraxinus americana) was well-represented in the sapling layer, but uncommon as a small tree, with most stems less than 10 cm dbh and none greater than 20, indicating that it is likely to become more important in the future.

White pine dominated two plots at this site, one on a slope to the west and the other on the floodplain at the base of this slope. On close examination of the 1948 aerial photograph it appears that this part of the stand grew back after 1948, not before as I had thought when laying out the sampling sites. These plots are also located on clay soils which lie under the sand. These two compounding factors probably account for the difference in composition, and the greater similarity to sites 2 and 3 than to the rest of site 1..

There were only 14% as many saplings as trees at this site. While such low numbers of saplings have been found elsewhere in successional stands,<sup>85</sup> it does not augur well for the successful replacement of the tree stems as they die. There were also few seedlings.

One of the most interesting characteristics of this stand is that the herbaceous species include several which were present in the contiguous old growth stand (see Figures 5 and 6), but in none of the 12 plots surveyed at Sites 2 and 3. These plants include species such as hog peanut (Amphicarpa bracteata), wild lily-of-the-valley (Maianthemum canadense), partridge berry (Mitchella repens), and starflower (Trientalis borealis) that are generally found only in woods.<sup>86</sup>

2. Sites 2 and 3. In most plots, either white pine or American elm dominated in the tree layer of both of these sites, depending on slight (less than a meter) changes in elevation and drainage, with elm on the wetter sites and pine on the drier ones. The soils were clay with some coarse sand and are mottled (indicating permanent waterlogging) at less than 30 cm even in pine-dominated plots. Stem density was generally lower in those plots dominated by elm, with an average less than half that of the site as a whole. The diversity between plots within a site indicated by the very high standard deviations for both density and average basal area. While Site 2 was fairly well stocked with stems, they were generally small (note low basal area). Although Site 3 is much more sparsely stocked, except for the one plot dominated by quaking aspen, the total basal area was about the same as at Site 2. Regeneration to the present has produced

<sup>85</sup> Russell and Schuyler 1988, op. cit.

<sup>86</sup> Gleason and Cronquist, op. cit.

distinctly different stands at these two sites in terms of density and size of stems, even though they are on similar soils and slopes.

The one plot at the Neilson site that was dominated by aspen had both density and basal area/ha about equal to the average of the British Woods site. Poplar spreads clonally, so the patches of poplar in these areas were probably clones from one tree that got established there and whose root spread prevented the growth of other species.

The American elm which was so important on these sites in the low areas is subject to heavy mortality due to the Dutch elm disease. The stream corridor forests shown on the 1927 and 1948 maps were probably composed mostly of American elms. They did not show well on the 1991 map because they had been enveloped by the other successional forests and many of the trees had died. Many of the elm trees counted in this survey did not appear healthy, so continued mortality can be expected, further decreasing the stocking.

Sapling density at these sites was comparable to that at Site 1, about 100/ha, though the high standard deviation indicates the wide variation among plots. At Site 2 the most important species among the saplings was white pine. Since the category "sapling" was determined by size alone, and not age, it is not possible to determine from these data whether these were young trees which will eventually contribute to the tree cover or were decadent, slow-growing older trees, which will probably not continue to thrive. In several plots there was one very large pine tree, surrounded by numerous smaller ones, suggesting that the large tree became established a while in the past and has produced seedling reproduction. We found only one pine seedling, indicating that there was little or no current pine seedling reproduction, however. White ash (Fraxinus americana) dominated the sapling layer at Site 3, as at Site 1, and was also important as a seedling at all three sites. It and red maple were the species that appeared to have the best chance of replacing the existing trees in the future, though ash usually flourishes in younger successional stands.

Herbaceous species at Sites 2 and 3 were mostly those characteristic of open fields, whether they were found under pines or under elms. There was very little overlap between the herbaceous species here and on site 1. Shrubs were more similar among the stands, with four species, including gray dogwood present in all. Gray dogwood dominated the young Neilson stand, but existed as small, depauperate stems in both the others, generally under the pines. It appears that gray dogwood provided the first dense cover on these successional fields, but was soon shaded out by the trees that grew in its thickets, repressing the gray dogwood which persisted only as root sprouts.

3. Summary. There seem to be two pathways of succession illustrated by these successional studies. One, found at Site 1, occurs on better-drained, sandy upland, near old growth forest, and was perhaps initiated by clonal growth of poplar. In such a situation, forest herbs invaded the successional stand, and a mixed

forest stand developed. The future regeneration of this site appears to be red maple and white ash, although there are few saplings and seedlings for replacement of the trees.

The second pattern, found at Sites 2 and 3, is more widespread at the park and seems to have proceeded from a shrub thicket, dominated by gray dogwood and in some cases various species of viburnum, to scattered white pine in dryer sites and elm in wetter ones. Elm seems also to have gotten a start as a stream corridor species. The trees did not develop great density quickly, especially in areas of poor drainage. The trees eventually shaded out the shrubs, but the invasion of forest herbs was slow, perhaps due to lack of nearby seed sources.

The difference between these two sites may be in part due to the pattern of abandonment. On the 1948 aerial photograph Site 2 appears rougher in texture than Site 3, and historical documents indicate that Site 2 was grazed at that time, and probably not plowed. It may be that this pattern of gradual abandonment allowed a few scattered pine trees to develop, which then served as seed sources for later regeneration, whereas when Site 3 was abandoned the only seed sources were on the hillside to the east (Figure 7), so fewer stems became established. In addition, the longer period of cultivation at site 3 probably left poorer nutrient conditions when it was abandoned.

Hedge rows may have provided seed sources for some of the trees other than pine and elm, which have easily-distributed, wind-blown seeds, but there was little evidence of species differences due to date of field abandonment. Patches of poplar, also a wind-distributed species, may have exerted significant influence on succession locally. There is no evidence that gray dogwood inhibited tree regeneration, since its sprouts were very common even under the older pines. Deer browse did not appear to have prevented regeneration, although it is not possible from this study to assess the possible contribution of deer browse to the low density at Site 3 or to the generally low density of saplings and seedlings. There is no evidence of successful regeneration of the expected forest trees such as oaks, or possibly pitch pine, but such regeneration often does not occur until the pine stands become decadent.<sup>87</sup> It appears that white ash may replace the dying elms, but that, too, cannot confidently be determined at this time.

## V. Conclusion

Past land-use has exerted a strong influence on the landscape of Saratoga National Historical Park. For example, steep slopes or sites on poor soil may have been cut over for timber or mined for sand, but they were usually not farmed and so support the oldest forest stands (e.g., British Woods). On the other hand, economic and political considerations dictated in large part the rates of both land clearance

<sup>87</sup> R. K. Peet and N. L. Christensen, Competition and tree death, *BioScience* 37:586-595. 1987

and abandonment, as well as field patterns. Abandonment of fields before 1950, beginning in the early 20th century, occurred gradually as tilled land was converted to permanent, usually neglected, pasture. After 1950, however, agricultural abandonment was dictated by concepts of memorialization of the battlefield as a park, and occurred at an unprecedented rate. Comparing Figures 7 and 8 reveals a decrease in diversity and an increase in size of patches of distinctly different kinds of land-cover from 1948 to 1991. Within the patches in 1991 there is considerable subtle variation, as seen in the field surveys at Sites 2 and 3. The interior of these large patches is farther away from seed sources found in adjoining hedges or older forests, which may affect forest regeneration, especially as trees propagated by windblown seeds, such as pine and elm, die. There is little evidence of potential for replacement by species such as oaks or hickories which have animal-dispersed propagules. These extensive, fairly open, stands also provide ideal cover for deer, whose trails crisscross the areas. It is certainly likely that they, too, have an effect on regeneration of trees.

Changes in drainage have also been occurring since 1777 at least. The massive clearing and habitation of the area in September and October, 1777, during a rainy period, must have accelerated headward erosion in the steep-sided ravines in the park. The tendency of the soils to slump on the banks of these ravines has continued also to widen them. In the 19th century, building of ditches and banks altered drainage in open fields, adding to water entering the ravines. Mining for molding sand in the early 20th century also altered drainage locally. Finally, in the latter part of the 20th century road-building by the National Park Service has further altered the drainage. Agriculture has most likely also depleted the soil of nutrients. All of these changes have altered the conditions of regeneration for forest vegetation, generally decreasing the area of well-drained soil on which good forest stands flourish.

Descriptions of the battlefield area in the 18th century include pines, generally pitch pines, but also probably white pines. Pitch pines are common in the county on dune sands, which occur in the northeastern corner of the park. These are not the sands used for molding sand, but the drainage in this area has also been modified in the last two centuries by ditching. Such drainage modification may have made conditions inappropriate for pitch pine regeneration. That pitch pine is not presently regenerating on these may be also just due to the successional pathways in pitch pine/scrub oak areas. Some areas in Albany which were most likely pitch pine before they were used for agriculture, also have not yet reverted to pitch pine.<sup>88</sup> It is interesting that one of the oak species listed in 1915, Quercus marilandica, is typical of pitch pine stands in the area. It thus seems likely that such stands did exist at the park, but also unlikely that they will regenerate soon on their own.

<sup>88</sup> Robert Zaremba, The Nature Conservancy, New York Regional Office, Albany. Personal communication

In summary, it is clear that past land use, especially patterns agricultural use and abandonment, memorial modifications to the park landscape, and alterations in drainage from various types of land-use have been major factors in altering the potential for natural forest regeneration. With existing information, we cannot predict future vegetational succession with any assurance. The Park cannot just expect to regain 18th century types of forest just by abandoning agricultural practices on the land.

## VI. Recommendations for management

The research for this project which carried out some of the suggestions for further study made by Russell and Schrepfer has led to several suggestions with regard to refining the existing Historic Base Map and to developing a cultural landscape management plan. These suggestions are best considered in the context of the landscape as it appeared at different critical periods in the Park's development, especially as they relate to modifications in the 1777 land cover.

### A. The 1777 Landscape

1. **Patent lines.** The 1750 patent lines were a part of the 1777 landscape, even if they were not evident on the Wilkinson maps, as they had dictated land allocation to that time. Locations of some of them are still clearly visible at the Park, especially in the Hudson River floodplain and in remnants of Wilbur Road. The rest can still be found. The continuity from 1777 to the present can be well represented by marking these lines. It is remarkable locations of lines surveyed in 1750 were clearly visible 200 years later in the 1948 aerial photograph.

2. **Areas cleared by British.** Wilkinson maps and details of how to clear for an encampment indicate that most of the area cleared by the British (and probably also by the Americans) should not be completely devoid of trees. Many of the large trees were most likely left standing. Figure 4 incorporates this suggestion in the difference between "open fields" and "cleared for field of fire" in the British section of the battlefield. X

3. **Farm fields.** The evidence found for the existence of cleared farm fields is very strong, including Wilkinson's maps, contemporary diaries and letters, and land indentures. It does not seem, however, that these fields were more than 10-15 acres. The sizes of the fields in the study area should, therefore, be reduced, as indicated. X

4. **The American lines.** The extensive cleared land in the area of the American encampment and fortifications is probably also inappropriate. This is, of course, left open, appearing clear, in Wilkinson's maps, because it was "terra incognita." As indicated by Neilson's war damages claim, he undoubtedly had a farm, which was cleared. The amounts claimed do not, however, suggest that it was probably more than the 10-15, or possibly 20, acres that most farms in the area were. While there is no evidence that the Americans did not

cut down all the trees in the area, it is hard to see why they would have done so, except where the trees were in front of their lines of fortifications or where they were needed for building the fortifications.

5. "British Woods". This is the best and most accessible area which represents the kind of forest that the Americans and British had to contend with between their lines as well as where they set up their camps. Field research has indicated that it is unlikely to obtain a well established forest such as this in a few decades or probably even a century by natural forest regeneration. This forest should, therefore, be maintained as a forest and interpreted as the kind of forest that existed there in 1777. While these woods may be in a location that the British cleared during the encampment of 1777, the interpretive potential of this site is much higher as it is than it would be if it were cleared. X

Further research at this site is desirable. Two structures at the edges of the woods, probably old house sites, are unidentified, and the pattern and functions of old roads is unclear. We have not yet clearly located the 18th century road through this area. Further research is also recommended on the use of this woodlot before it was mined for sand, and why it was left uncut.

6. Other 18th century fields and roads. These can be located on the ground and fairly precise coordinates determined by using a Geographical Positioning System. This information can be incorporated in the GIS map of the Park and the historic maps included with this report. Where appropriate, they can also be marked on the ground for visitor information.

7. Overall revisions to the Historic Base Map. It does not seem appropriate to make more than these fairly minor revisions to the Historic Base Map. The precise locations, sizes and shapes of the fields can only be approximated. An attempt to overlay the Wilkinson maps on a recent topographic map or on the 1991 or 1948 aerial photographs indicated that distortions of scale and angle in the Wilkinson maps are such that the coincidence between the 18th and 20th century maps is only very approximate.

## B. The Nineteenth Century Landscape

1. Overview. A diorama or at least a drawing depicting the scene in the mid- to late-19th century should be displayed for visitors, to show how the battlefield was used after the War, and also what the intermediate conditions were that have led to the current landscape. The remains of many of these sites, which have been altered beyond easy recognition by 20th century activities by the State, the CCC and the National Park Service, should also be interpreted.

2. A 19th century farm. An interpretive diorama or drawing should also be displayed illustrating the diversity of farming in the region. The best approach would be to use one farm, such as the Wilbur

farm, to show the diversity of small fields and livestock, and the overall pattern of field, farm, orchard and woodlot, based on actual data in the U. S. Agricultural Census.

#### C. The Twentieth Century Landscape

I recommend interpreting the changing concepts of what a historical park should look like, or how a historic scene should be commemorated, showing it as the evolution of ideas, with the most current being the culmination. It should start with the various monuments, both small and large, erected before the area was a park, along roads, commemorating specific locations. Then the State Park days, with the Blockhouse, New England Farmhouse and picnic and camping areas, as well as destruction of old farmhouses and barns. Next would be the early days of the National Park, with obliteration of all post-1777 structures, followed by the design and construction of the tour road with inadequate research on possible harm to the resources. Finally, recent efforts to be as authentic as possible, including efforts to manage introduced weeds such as knapweed.

#### D. Archival recommendations

Cataloguing of records at the Park should continue more rapidly. Search, access and retrieval of the archival records is currently slow and cumbersome because of inadequate cataloguing and organization. Acquisition of original documents of archival quality copies, of critical documents such as patent surveys and 18th century maps, should be done as soon as possible.

### VII. Recommendations for future research

#### A. Spatial expansion of research.

Detailed research in this project focused on approximately one-fourth of the Park. Land-use history should be traced in the same way for the rest of the Park, to produce a composite picture of changing land-use. This would provide the basis for more complete interpretation of the landscape, from 1777 to the present, as well as establishing a solid basis for the cultural landscape management plan. For example, historical and field research indicate that the Chatfield farm should be relocated to the knoll to the west of the current location.

In addition, the locations of historic structures should be included on the maps for the entire Park. Erosion and encroaching vegetation are obscuring the remains of many of these so it is critical to locate them precisely as soon as possible. More research on the development of the mills in the Great Ravine, which were most likely very influential in the patterns of pre-1777 land allocation,

would be very useful for determining a more accurate reconstruction of these patterns.<sup>89</sup>

#### B. Forest regeneration.

Field research for this project revealed consistently low potential for natural regeneration of forest stands where fields have been abandoned. Further research on forest regeneration at the Park is needed to clarify the future direction of vegetation succession and requirements for active management. The deer exclosure research will suggest some possibilities of problems related to deer browse. Research on the relationship of gray dogwood tree reproduction should also be continued. Permanent sampling plots should be set up within the exclosure areas and probably elsewhere as well to obtain comparative results. The difference between stands sites 2 and 3 in tree density may be in part due to the process of abandonment.

#### C. Conclusions.

This research will provide park managers with information necessary to decide whether there are measures needed to alter the patterns of regeneration, whether they are feasible, and how much area must be actively managed. These recommendations would form a part of a revised Cultural Landscape Treatment/Management Plan which will result from reconsideration of the management decisions made in the 1940's and 1950's and currently being implemented. This project and the projected research are an integral part of this reconsideration.

#### Acknowledgments

All of the staff at Saratoga National Historical Park have been tremendously helpful, especially Resource Management Specialist James Schaberl, Rangers Linda White and William Ward, Park Historian Paul Okey and Superintendent Douglas Linsay. National Park Service, North Atlantic Regional Office Personnel, especially Nora Mitchell, Richard Hsu, Nigel Shaw and Brian Underwood were also most helpful. The field assistance of Cheryl Urbanczyk and Nora Mitchell was greatly appreciated. Many others including Donald Cadwell of the New York Geological Survey and the staff at the New York State Library's Rare Books and Manuscript Room were also very accomodating. I especially thank Jim Gasprich of Rutgers University's Remote Sensing Laboratory for his patience in guiding the GIS-GRASS mapping portion of this project and Felix Kienast for his advice on historic mapping using GIS.

<sup>89</sup> S. B. Kim, Landlord and Tenant in Colonial New York. Manorial Society, 1664-1775, Chapel Hill, NC, The University of North Carolina Press, 1978. P. 165

Table 1. Land Records Lot 16, Saratoga Patent<sup>1</sup>

Name	length of lease	date	farm #	Reassignments
Freeman, John	3 lives	1768	3	Leggett, (probably <1789)
Anderson, William	life plus	1769		
Coulter, George	3 lives	1770		John V(Mc?)Henry, 1799 Charles Bennett, 1804
Marshal, Micajah	life plus	1771		John Bostwick, 1789
McBride, John	life plus	1771		
McCarthy, John	in fee annual	1775	2	
Mead, William	for life	1782		
Cooper Samuel	life plus	1782		
Barber, Joshua	life plus	1782		
*Barber, Simeon	life plus	1782	5	James McBride, 1782
Cooper, William	life plus	1782		
Green, Increase	life	1783	6	Ephraim Woodworth, 1796

\*1774 - warned to resist [sic] committing unlawful acts on Schuyler property to which he had no interest or right to 1775. He also owed cash to Schuyler for "sundries" purchased Dec. 1774.<sup>2</sup>

<sup>1</sup> Notes taken by Steven Strach

<sup>2</sup> In Schuyler Papers "1767-1780 Minor and Uncalandered (?) Letters"

Table 2: Claims for losses to John Freeman's Farm, made 1788

	L	S	P
195 acres, 60 acres under improvement with ...log house and barn	200		
15 acres of wheat and rye	20		
6 acres of Indian corn	12		
4 acres of oats	4		
half an acres of close	1		
half an acre of potatoes	2		
13 store sheep at 10 shillings each	6	10	
15 store hogs	18		
4 two year old cattle	12		
3 spring calves	2	8	
10 tun of hay	20		
set of farming tools	5		
1 large iron pot	1	10	
2 small iron pots		16	
1 frying pan		8	
(this is the Mosher claim)			
150 acres of land	150		
2 yoke of oxen	10		
1 horse	11		
one ox cart	5		
one waggon	9	7	6
four cows	12		
three three-year-old heifers	6		
38 sheep	9	10	
Ten hogs	10		
Two chains	3		
one stay nd harness	4		
three hows		15	
2 axes		10	
one bed and bedding	5		
one gun	1		
15 bushels of wheat sown	15		
10 acres of corn	25		
(This is the Thomas Freeman (son of John) claim)			

Table 3. Tax rolls in 1789. These rolls are incomplete. Listed here are names which also appear as lessees of Lot 16 (Table 1)<sup>92</sup>

Name	VALUE	
	Real prop L	Personal Prop L
McBride, James	6	4
McBride, John	6	3
Barber, Joshua	10	1
Cooper, William	20	6
Anderson, William	16	6
Cooper, Samuel	20	12

Individuals who may have been on Lot #16 are

Carty, John	25	4 (probably John McCarthy
Widow Green	13	(widow of Increase Green?)
Woodworth, Ephraim	25	10 (May have been on land before
Woodworth, Ephraim	40	10 officially leasing it)
Leggett, Thomas	15	(lived in New York)
Leggett, Gabriel	30	12
Leggett, Isac [sic]	35	18

Names listed in Table 1 who would have leased land in 1789, but are not in the tax rolls are William Mead, Micajah Marshall, John Bostwick, George Coulter. Mead, Marshall and Bostwick, but not Coulter, are on 1790 U.S. Census for Stillwater.

Others who are on the Tax rolls and are probably in my southern area

Neilson, John	30	15
DeRidder, Killeen		20
Vandenburg		5

<sup>92</sup> N. B. Sylvester, History of Saratoga County, New York, Philadelphia, Everts and Ensign, 1878. P. 294

Table 4. Inventory of the estate of Elias Hewit, deceased 9 October, 1802

2 Two-year old Stears	\$10
26 sheep	32.50
6 Two year-old Stears	45
1 Horse	70
3 Calves	3.50
5 Swine	13.10
Wearing apparel	15
1 Hay knife	1
1 Sikle and ?	1
1 Chain	2.25
6 Sheep	7.50
three notes -	\$249.50

Will made 28 April, 1802 mentioned 3 Milch Cows and some wheat and Rye that had been sowed

Table 5. Inventory of the estate of Samuel Rogers, deceased 21  
February, 1823

3 Milch Cows	\$50
1 Three years ould heifer	13
3 two years ould heifers	24
1 yearling heifer	3
1 Mare with Fold	50
15 Sheep with two lambs	32
1 harrow	1.50
1 Lumber Sleigh	3.50?
1 Cutter	12.50
1 Small Waggon and harness	22.50
1 plow and Iron Whipple tree	2.00
1 Coors hitch	1.00?
hay in the barn	65
harnes and whipple trees	7.00?
1 lumber Chain and ax	1.75
2 Wheels small and larg and Real	5.00?
Ould Casks and barrels	3.00
1 Chiar press (?)	1.50
Siths and Snaths and pitch fork	1.50
? leather	1.25
peas	2.50
Grain in the Ground	25
Grain in the Chamber of all kinds	15.50
Flaxseed and satt[?]	.75
3 Casks of Pork and beef	18
Cyder and Casks	4
Potatoes	1.50
2 hogs	5
Kitchen furniture	20
[continues with other furniture	

Table 6. Inventory of the estate of John McBride, deceased April 18, 1827

1 waggon	\$24	
1 cow	14	
7 hogs	21	
1 plough	1	
1 grindstone	2	
1 large kettle	2.50	
1 heifer	5	
1 bedd	3	
1 little wheel	.50	
corn in the Chaimber [?sic]	\$10	
1 framing [?sic] mill		.50
1 dungfork	.12	

also a sum of money in the Chansellors hands supposed to be about one hundred dollars balance above the sale of the farm  
(inventory located in Ballston Spa)

The McBride farm in Great Lot #17 was 97.5 acres @L7/acre (date? - this is time of a subdivision of the "unincumbered [sic] lands of the Estate of the late John Livinston Esquire deceased"

Table 7. Inventory of the estate of William Leggett, deceased May 16,  
1828

Wheat on the ground  
1 yoke of oxen  
38 sheep  
1 h(ead) of cattle  
2 horses

Table 3. Agricultural Census Records, 1950-1880

Key to farm names (Figure 1):

- 1=Van Buren Sarle
- 2=Gannon
- 3=Leggett
- 4=Neilson
- 5=Wilbur
- 6=Pettinos
- 7=F. H. Gilgallon

Farm#,yr	acres improved	horses	milk cows	other cattle	sheep	swine	wheat bu	rye bu	corn bu	oats bu	Potatoes bu	poultry
1,1850	124	3	3	3	22	11	12	160	100			
1,1860	100	5	5	2	37	10	13	120	50	300	250	
2,1850	166	3	4	5	287	7	0	150	300	500	75	
2,1860	209	6	6	13	165	9	40	125	150	300	1600	
3,1850	149	4	25	4	0	32	0	60	150	150	0	
3,1860	148	5	5	7	91	6	98	130	100	580	600	
3,1880	149	3	7	11	21	4	20	19	490	600	157	50
4,1850	96	5	6	6	0	16	0	150	200	400	100	
4,1860	96	3	9	4	0	10	50	0	125	500	400	
5,1850	82	2	2	0	0	11	0	0	200	300	300	
5,1860	88	4	6	5	21	6	0	0	150	600	500	
5,1870	88	3	5	1	19	1	8	87	130	300	450	
5,1880	93	4	5	7	13	3	20	100	200	250	1100	68
6,1870	100	2	3	2	0	2	0	100	30	250	412	
6,1880	94	2	3	7	0	4	16	50	100	360	258	18
7,1870	141	3	4	1	0	2	0	80	75	800	0	
average	120	4	5	5	42	8	17	53	159	413	413	45
std. dev.	38	1	5	3	72	7	24	52	102	171	392	19

Table 9: Flora included in 1915 list (Burnham, Stewart H. 1915. A visit to the Saratoga battlefield. American Botanist 21:19-21.

\**Mentha gentilis*  
 \**Lycium halimifolium* ("about an old house bottom, ... only ... recorded twice elsewhere in the Lake George Flora, in similar situations)  
*Polygala verticillata* (described as at the northern limit of its distribution in the Hudson Valley)  
 \**Gerardia tenuifolia* (only collected elsewhere across the river at Hudson Falls)  
*Asplenium Trichomanes*  
*Aspidium marginale* (= *Dryopteris marginale*)  
*Polygonum vulgare*  
*Thymus Serpyllum* (abundant to the point of weediness)  
*Cirsium arvense*  
*Vicia sativa* ("rare in the flora", but found along the road near the "new Freeman farm" (Gannon on Figure 1)  
 \**Atriplex patula* (usually rare but growing abundantly on an open wooded hilltop along the eastern margin of the Battlefield)

*Pinus strobus*  
*etula populifolia*  
*astanea sativa* (= *C. dentata*)  
*Quercus alba*  
*Q. coccinea*  
 \**Q. macrocarpa*  
*Q. rubra*  
*Q. velutina*  
*Acer rubrum*  
*A. saccharum*  
*Myrica asplenifolia*  
*Corylus americana*  
*C. rostrata* (= *C. cornuta*)  
*Sassafras variifolium* (= *S. albidum*)  
*Hamamelis virginiana*  
*Rhus glabra*  
 \**Cornus circinata* (= *C. rugosa*)  
*Lyonia ligustrina*  
 \**Kalmia angustifolia*  
 \**Rhododendron canescens*  
*Viburnum lentago*  
*Epipactis pubescens* (= *Goodyera pubescens*)  
*Habenaria Hookeri*  
 \**Monotropa hypopitys*  
 (These last three represented by only a few plants associated with "more common herbaceous sylvan species")

= not on R. Stalter, "A check list of the vascular flora, Saratoga National Historical Park, Saratoga County, New York," on file at Saratoga National Historical Park, 1991.

Table 10. Characteristics of sites used for field analysis. Site numbers correspond with those shown on Figure 1. Historic vegetation was deduced from aerial photographs as used for Figures 6 and 7 and the 1939 vegetative cover map used also for Figure 6. Current vegetation is from vegetation map, 1988 at Saratoga National Historical Park and field observations.

Site	Historic Vegetation 1927	Vegetation 1948	Current Vegetation	surficial geol	altitude* (feet)
1	field	young forest	red maple/poplar	Coveville sand	200-230
2	field (pasture)	field	brush/pine	Albany clay	260-270
3	field (arable)	field	brush w/scattered trees	Albany clay	250-260

\*from U.S. Geological Survey 7.5 topographic maps

Table 11a. Vegetation Sampling Site #1. IV vs plot

species/plot	21.0	20.0	19.0	18.0	15.0	16.0	17.0	average
Acer rubrum	3.3		25.2	49.5	60.0	66.1	73.5	46.3
Acer saccharum		15.6						15.6
Betula lenta		3.4	17.0	4.0			2.0	6.6
Ostrya virginiana			2.3					2.3
Fraxinus americana			6.2	3.0	1.9		9.0	5.0
Pinus strobus	26.7	75.1	2.3	18.4		14.5		41.3
Populus grandidentata			24.3					24.3
Populus tremuloides			23.0	25.1	38.1	19.3	10.4	23.2
Fernus serotina		5.9					5.1	5.5
density (stems/ha)	425.0	600.0	700.0	950.0	725.0	625.0	750.0	682.1
basal area (m2/ha)	383.0	365.0	310.0	275.0	220.0	340.0	298.0	313.0
saplings/ha	175.0	0.0	50.0	225.0	75.0	175.0	25.0	104.0

(\* standard deviation)

Table 11b. Sampling Site #1. Sapling Summary

Species	total	%
Acer rubrum, n	13.0	54.2
Carya sp.	2.0	8.3
Fraxinus americana, n	12.0	50.0
Pinus strobus	2.0	8.3

Table 12a. Vegetation Sampling Site #2, IV vs plot

species/plot	3.0	13.0	14.0	5.0	6.0	4.0	7.0	3.0	9.0	10.0	11.0	12.0	2.0	1.0	average
Acer rubrum	5.7						5.7								5.7
Crataegus sp.				31.6											31.6
Fraxinus americana	2.3				1.4		2.8								2.2
Pinus strobus	14.0	30.3	58.0	16.3	47.7	67.9	79.0	77.3	100.0	92.3	96.7	100.0	97.7	96.7	69.6
Populus tremuloides	45.4				45.4			20.1		7.7					29.6
Prunus serotina				42.0	5.5	1.5	2.3	2.0							10.9
Salix. sp.				9.0											9.0
Ulmus americana	33.7	69.7	42.0			30.5	9.7				3.3		2.3	3.3	30.6 std*
density (stems/ha)	750.0	100.0	150.0	225.0	1075.0	1250.0	475.0	1000.0	575.0	900.0	500.0	175.0	1375.0	1375.0	708.9 443.7
basal area (m <sup>2</sup> /ha)	92.0	42.0	62.0	44.0	255.0	252.0	433.0	199.0	154.0	150.0	187.0	68.0	210.0	481.0	187.8 130.7
saplings/ha	75.0	50.0	25.0	0.0	200.0	175.0	25.0	150.0	125.0	0.0	75.0	25.0	300.0	275.0	107.0 96.1

Table 12b. Vegetation Sampling Site #2. sapling summary

Species	N	%
Acer rubrum	1.0	1.7
Amelanchier canadensis	1.0	1.7
Fraxinus americana	1.0	1.7
Pinus strobus	46.0	76.7
Populus tremuloides	2.0	3.3
Prunus virginiana	4.0	6.7
Ulmus americana	5.0	8.3

Table 13a. Vegetation Sampling Site #3. IV vs plot

species/plot #	1A	4A	10A	2A	3A	9A	7A	8A	5A	6A average		
Acer rubrum								49.0		49.0		
Crataegus sp.	13.5	14.7			17.5					16.1		
Fraxinus americana	4.4	4.1	35.1	31.3	11.9	5.5	22.0	8.8		17.0		
Pinus strobus	76.9	69.7	56.3		26.6		16.0			42.2		
Populus tremuloides						94.5				94.5		
Prunus serotina	5.3	3.5		68.7	38.5		7.4			29.5		
Prunus virginiana					5.5					5.5		
Pyrus malus			3.6							3.6		
Quercus bicolor		7.9	5.0							6.5		
Ulmus americana							54.6	42.2	100.0	100.0	74.2	std*
Density (stems/ha)	300.0	475.0	375.0	150.0	250.0	625.0	325.0	200.0	100.0	25.0	282.5	170.3
basal area (m <sup>2</sup> /ha)	260.0	336.0	184.0	24.0	107.0	136.0	85.0	60.0	22.0	1.0	121.5	104.2
saplings/ha	25.0	0.0	300.0	250.0	0.0	150.0	75.0	50.0	75.0	75.0	100.0	97.5

(\* standard deviation)

Table 13b. Vegetation Sampling Site #3. Sapling Summary

Species	N	%
Amelanchier canadensis	3.0	7.5
Crataegus sp.	1.0	2.5
Fraxinus americana	24.0	60.0
Populus tremuloides	2.0	5.0
Prunus serotina	4.0	10.0
Prunus virginiana	3.0	7.5
Ulmus americana	3.0	7.5

Table 14. Vegetation Sampling Site #1. Tree Seedlings, Shrubs and Herbs

Plot#	15	20
Tree Seedlings		
<i>Acer rubrum</i>	x	
<i>Amelanchier canadensis</i>	x	
<i>Fraxinus americana</i>	x	x
<i>Populus tremuloides</i>	x	
<i>Prunus serotina</i>		x
<i>Quercus</i> sp.	x	
Shrubs		
<i>Cornus racemosa</i>		x
<i>Hamamelis virginiana</i>	x	
<i>Lindera benzoin</i>	x	
<i>Parthenocissus quinquefolia</i>	x	x
<i>Rhamnus</i>		x
<i>Rubus</i> sp.	x	x
<i>Smilax herbacea</i>	x	
<i>ccinium angustifolium</i>	x	
<i>urnum lentago</i>	x	
Herbs		
<i>Amphicarpa bracteata</i>		x
<i>Aralia nudicaulis</i>	x	
<i>Arisaema triophyllum</i>	x	x
<i>Carex</i> sp.		x
<i>Fragaria canadensis</i>		x
<i>Galium</i> sp.		x
<i>Lysimachia</i> sp.	x	
<i>Maianthemum canadense</i>	x	
<i>Medeola virginiana</i>	x	
<i>Mitchella repens</i>	x	
<i>Orcoclea sensibilis</i>	x	x
<i>Osmunda cinnamomea</i>	x	
<i>Osmunda regalis</i>	x	
<i>Renunculus</i> sp.		x
<i>Solidago</i> sp.	x	x
<i>Symlocos</i> sp. foetidus		x
<i>Thelypteris noveboracensis</i>	x	
<i>Trientalis borealis</i>	x	
<i>Trifolium sessifolium</i>	x	
<i>Veronica officinalis</i>		x
<i>Vicia</i> sp.		x
<i>sp.</i>	x	



Poaceae spp.	X	X	X	X		X	X	X
Polygonum sagittatum		X	X		X			
Potentilla recta				X	X	X	X	X
Potentilla simplex	X	X						
Ranunculus scleratus							X	
Ranunculus sp.			X		X			X
Solidago sp.	X	X		X	X	X		X
Taraxacum officinale		X		X				
Veronica officinale					X	X	X	
Veronica serpyllifolia		X						
Vicia carolineana		X						
Viola sp.		X	X	X	X			

Table 16. Vegetation Sampling Site #3. Tree Seedlings, Shrubs and Herbs

Plot	1A	2A	3A	4A	7A
Tree Seedlings					
<i>Acer negundo</i>			x		
<i>Acer rubrum</i>			x		
<i>Carya</i> sp.			x		
<i>Fraxinus americana</i>	x	x	x	x	x
<i>Pinus strobus</i>			x		
<i>Prunus serotina</i>			x		
<i>Quercus</i> sp (red)	x				
Shrubs					
<i>Cornus racemosa</i>	x	x	x	x	x
<i>Lonicera</i> sp.	x	x	x		x
<i>Parthenocissus virginiana</i>		x	x		x
<i>Rhamnus</i> sp.		x	x		
<i>Rubus</i> sp.	x		x	x	
<i>Sarcocodendron radicans</i>	x				
<i>Viburnum dentatum</i>					x
<i>Viburnum lentago</i>	x				
<i>Viburnum recognitum</i>		x			
<i>Vitis</i> sp.	x	x	x	x	
Herbs					
<i>Anemone virginiana</i>			x	x	
<i>Arisaema triphyllum</i>			x		
<i>Athyrium filix-femina</i>	x				
<i>Carex</i> spp.	x		x		x
<i>Dryopteris marginalis</i>			x		
<i>Fragaria canadensis</i>			x	x	
<i>Galium asprellum</i>	x				x
<i>Galium mollugo</i>	x				
<i>Galium</i> sp.				x	
<i>Geranium maculatum</i>	x				
<i>Hieracium</i> sp.					x
<i>Hypericum perforatum</i>				x	
<i>Impatiens pallida</i>			x		
<i>Oxycoccus sensibilis</i>	x				
<i>Oxalis europaea</i>			x	x	x
<i>Penstemon digitalis</i>			x		
<i>Ranunculus</i> spp.	x		x	x	x
<i>Polygonum virginianum</i>	x				
<i>Polygonum latifolium</i>	x		x	x	x
<i>Polygonum sp.</i>	x			x	x
<i>Urtica officinalis</i>	x		x	x	
unknown, probably comp.	x				

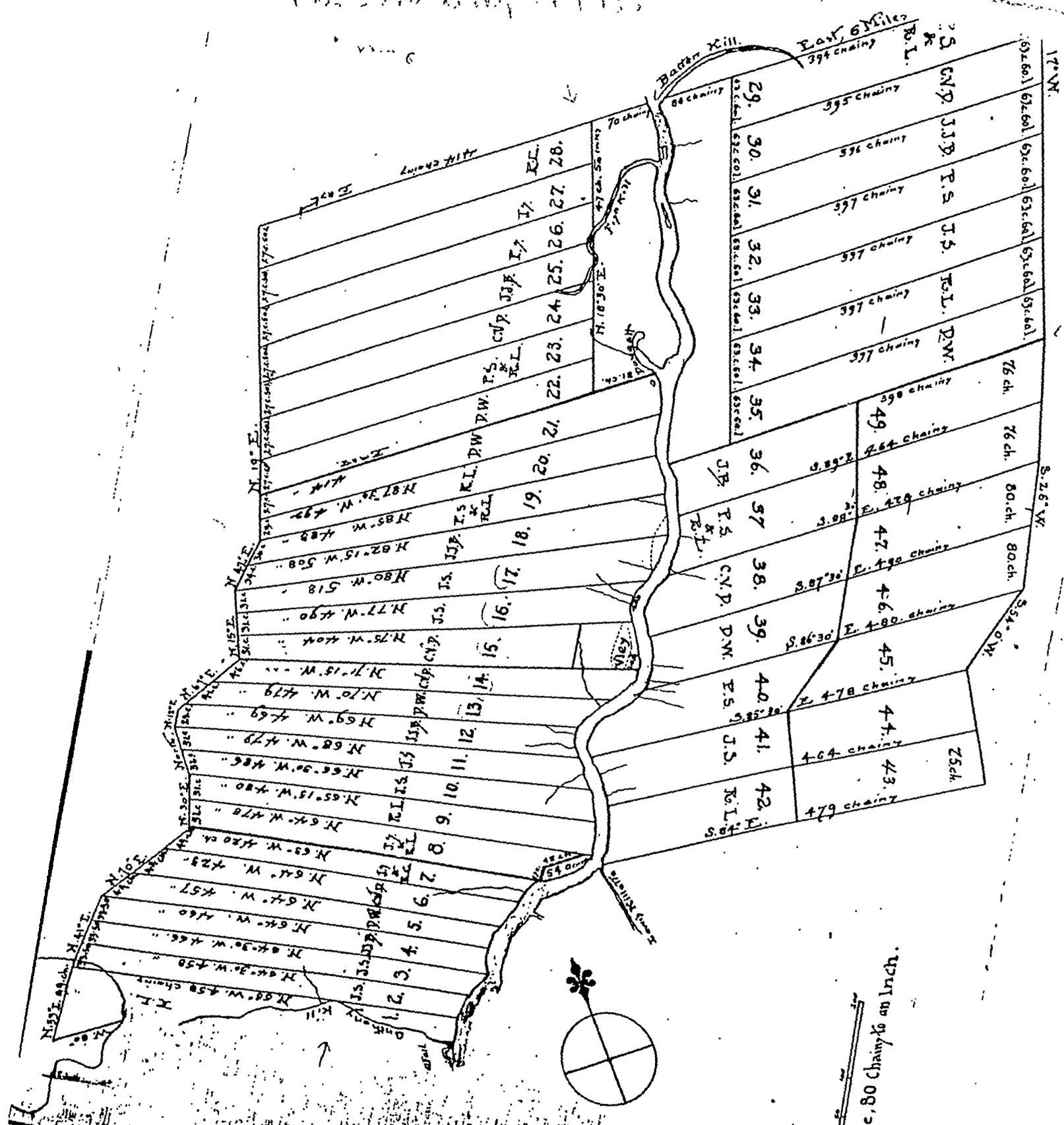
## Figure Captions

- Figure 1. Base Map for this report, indicating farm names used for key areas, locations of patent lines, and locations of vegetational sampling sites. Names for farms are names of those who sold the farm to the State of New York, The Saratoga Battlefield Association or the Federal Government.
- Figure 2. Patent Division of 1750. Saratoga National Historical Park is located in Lots 13-17.
- Figure 3. Surficial Geology. The surficial geology was traced onto USGS 7.5 topographic sheets from manuscript maps at the New York State Geological Survey, Albany, NY. and then digitized on-screen using a composite topographic map as background. (See text for further details.)
- Figure 4. Land Cover in 1777. The manuscript maps drawn by Lt. Wilkins were compared with the stream channels and other topographic features to derive this map. A photoreduced version of " encampment [army] .. Sep. 1777" was overlaid on the topographic maps and on the 1948 aerial photograph to further estimate the locations and sizes of the fields. Considerable distortion in directions made it necessary to rotate the map to fit to either of the background maps, so this is clearly only an approximation of the locations of these sites. The sizes, however, seem to be to scale, given comparison with topographic features.
- Figure 5. Land Cover in 1850. Orchards, home sites and woodlots were drawn here where they were in the 1927 aerial photograph, because the numbers and sizes appear to accord well with the information in the 1850-1880 Agricultural Censuses. Farms and roads were also indicated on the map of Stillwater drawn in 1856 by Geil.
- Figure 6. Land Cover in 1927. The 1927 aerial photograph (a composite of many detailed photos) and a map of the vegetative cover of the park done in 1939 provided the basic information for this map. Sand mining was located by historical documents indicating that these were the appropriate sites, soil analysis, and the appearance on the photo of odd, regular marks that seem to have been made by the mining. There is also evidence of the rails leading from the eastern mining site to a dock on the river. Deposits of molding sand were also described for these farms in surveys of the properties to be acquired by the Federal Government in the 1930's. The difference between "old woods" and "young woods" was made on the basis of the likely location of old woodlots from 1850 and notations on the 1939 cover map. "Scrub" was described as "brush" on the 1939 map.

Figure 7. Land Cover in 1948. This map is a direct interpretation of the 1948 aerial photograph. "Scrub" was located by the roughness of the texture on the photo and notations provided in surveys of the farms to be bought by the Federal government, in which the amount of arable land was indicated. Differences in texture of forested sites led to the differences among these categories.

Figure 8. Land Cover in 1991. Data from 1991 aerial photographs of the site were transferred to the appropriate places using the 1948 photo as background, as well as an overlay of current roads and park boundaries. Ages of forests were estimated based on their presence in 1948 and their current appearance.

Don't know the date



Scale, 80 Chains to an Inch.

1750

A

16+19 JS  
14+17 C.V.S.  
3 D.W.

A Map of  
the subdivisi  
by John R. Bl

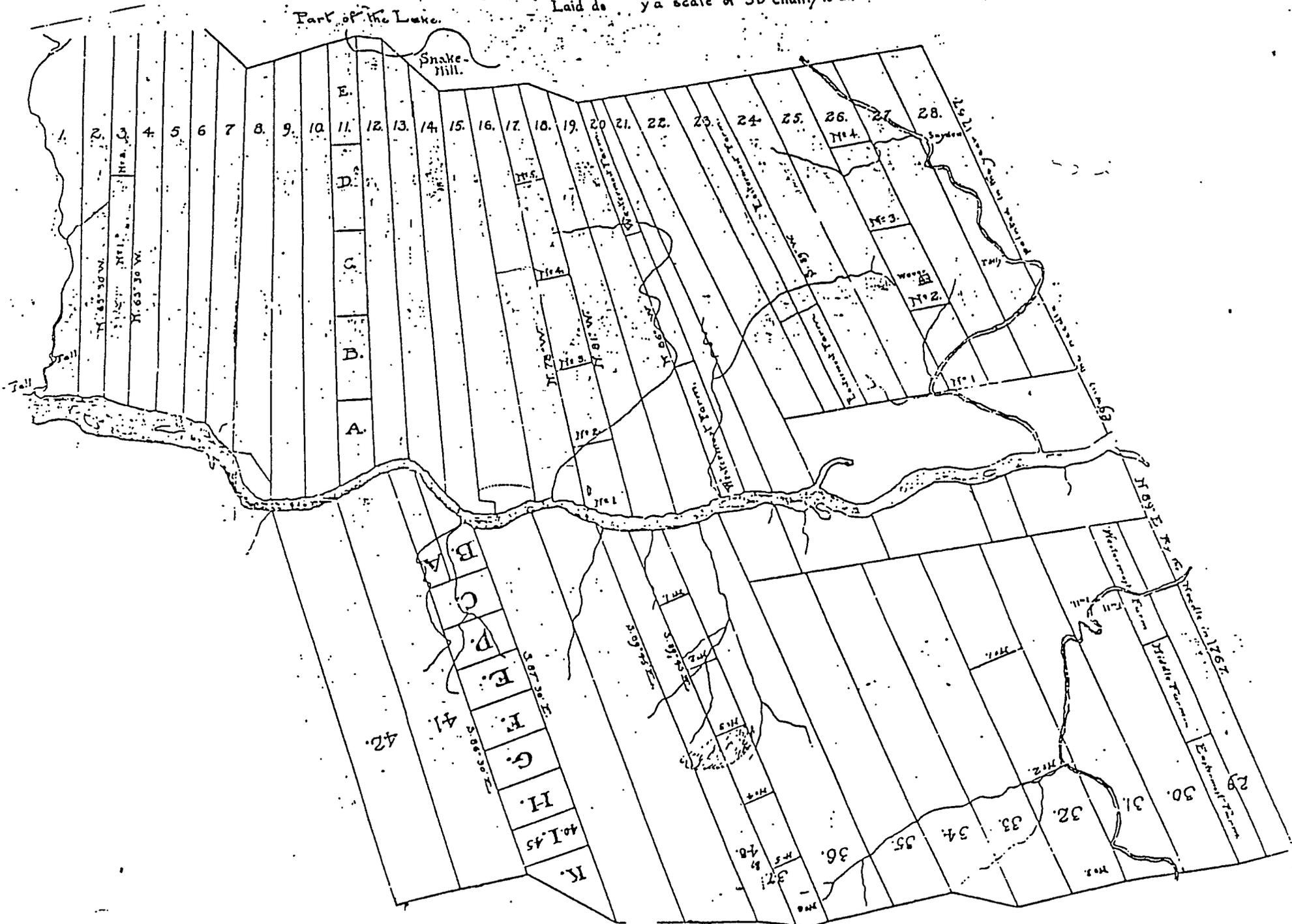
Laid do

atoga patent as laid in 1767,  
Margaret Livingstons & Bayard's Lot  
1767.

at a scale of 50 chains to an inch.

Part of the Lake.

Snake  
Mill.



1767