

The History, Management, and Ecology of The Leadmine Mountain and Heins Farm Conservation Properties



Submitted By:

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Submitted on:

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Degree of Bachelor of Science

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Submitted to:

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I. Abstract

The Leadmine Mountain and Heins Farm conservation properties make up over 900 acres of land in Sturbridge, Massachusetts, and are managed by the town Conservation Commission. The Commission has a goal of introducing features onto these properties to educate the public on the history, management, and ecology of the land. However, with no specific information on what to include, this project was able to provide a compilation of information to serve as a basis for development of effective educational strategies.

II. Acknowledgements

Our team would like to thank the following individuals for their support and guidance through the development of this project:

- **Rebecca Gendreau** and **the Sturbridge Conservation Commission** for sponsoring our project and providing resources and connections to effectively meet our objectives.
- **Dave Barnicle**, **Bob Briere**, and **Tom Chamberland**, for answering to the best of their ability any questions we had about the properties researched, as well as connecting us to additional resources we would not have otherwise had access to.
- Professors **Creighton Peet** and **Thomas Balistreri**, our project advisors, who provided invaluable guidance and advice throughout the development of this project.

III. Authorship

This report was written by Mark Forte, Edie Hudson, Jonathan Landay, and Matthew Stevens.

Mark Forte - Mark was the primary author of the following sections: Introduction (1) and Varying Ecosystems and Life (4.2) and created Figure 4.2.1 (Endangered Species of Sturbridge) and Tables 4.2.1 (Birds of Sturbridge) and 4.2.2 (Mammals of Sturbridge), edited the Tom Chamberland interview highlights and created Table C.3.1. He also took the lead on the scheduling and questioning of the Tom Chamberland interview and managed attempting to schedule the Cheryl Heins interview. He also helped with the general editing and formatting of the draft.

Edie Hudson - Edie was the primary author of the Reflections and Recommendations section of this report (Section 5). She also contributed towards the Interview Protocols and Highlights section (Appendix B). In the interview with Tom Chamberland, she took the notes that are included in Appendix B. She took the lead in conducting the structured multimedia interview with Bob Briere and received relevant information from him via email which can be found in Appendix B. She also included relevant pictures and figures. In addition to these sections, she contributed to general overall editing of the report.

Jonathan Landay - Jonathan was the primary author of the following sections: Executive Summary (I), Bibliography, the summary and notes of the Dave Barnicle interview, the interview protocols that would have been used for Cheryl Heins interview, and developing interview questions for Dave Barnicle and Tom Chamberland. He also co-Authored Appendix C.1

(Supplemental Nipmuc Information) with Matthew Stevens and contributed greatly to in-text citations throughout the report, and general editing.

Matthew Stevens - Matthew was the primary author of the following sections: Abstract (II), History of the Land and its Uses (3.1, 3.2), Development and Acquisition as Conservation Lands (4.1), Appendix C (Supplemental Information Archive), and Appendix A (Sponsor Description). He also contributed greatly to the addition of the photos, figures, and their descriptions included in this report, including the creation figure 3.1.1, a historical timeline graphic. In addition, he took the lead on our interview with Dave Barnicle, regarding both logistics and questioning. He also contributed to overall editing of the report.

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IV. Executive Summary

The Leadmine Mountain and Heins Farm properties have a long history in the town of Sturbridge. While the properties contain significant history, as well as a wide variety of ecosystems, flora, and fauna, the relevant information had not been assembled together in one place. Furthermore, along the trails on the properties, there is very little information about their features and significance. This project served as a means of gathering information about the history, ecology, and land management of the properties so that the Sturbridge Conservation Commission can design and implement educational strategies to inform the public.

The primary means of gathering information for this project was archival research, searching articles, the websites of the communities relating to the properties, as well as the archives the town of Sturbridge already had on the subject. To fill in the gaps left by the archival research, trail experts and historians were contacted and interviewed. This information was then compiled with the archival research to create a full picture.

Originally, these properties were occupied and used by the Nipmuc Native American tribe until John Winthrop purchased the land in 1684 to mine the graphite found there. Until the 1830s Sturbridge was the only operating location in America for mining graphite. The mines shifted hands a few times until 1910 when the property went under the ownership of the Old Sturbridge Village. In the early 1930s, Josh and Leah Liberman opened up Camp Robinson Crusoe on the eastern end of the Leadmine property. The summer camp operated from 1932 through 1969, where for eight weeks in the summer each year campers could partake in traditional camping activities like boating and sports, but also horseback riding, and towards the end of the camps time in operation even lessons on how to use and program computers. The

camp ultimately went bankrupt before the summer of 1970, and needed to close down permanently. Some old remnants of the camp are still visible along the trails on the Leadmine Mountain property.

The Heins Farm property was sold to the conservation commission in 2007. Before that it was primarily used for farming, which is why the property contains large areas with open fields. The property includes a segment of the Worcester-Stafford Turnpike, a major toll road for commercial travel which opened in 1810. In 1835, the toll road closed, and the land slowly reverted back to forest now that it was no longer under constant use.

The ecosystems of the two properties are very similar due to their proximity. Both properties have been developed as public conservation lands, however only on the Leadmine property is hunting permitted. The properties are home to 413 species labelled as concerned under the Massachusetts Endangered Species Act, 102 of which are invertebrates, and 256 are plants. Furthermore, there are an additional 62 species that the Massachusetts Conservation Committee considers endangered, but that are not formally considered as such under Massachusetts law. These properties both have protections in place for perpetuity, to protect these and all other native species.

Our primary recommendation is to continue research on topics such as the history of the Nipmuc people of Sturbridge/Central Massachusetts, what the Arbutus Park was and what the old cabin on the Heins Farm property was used for and by whom. The history of the Nipmuc people is mainly told through oral history, which our team did not have the time to retrieve. Arbutus Park was located in the site that became used by Camp Robinson Crusoe, and very little is known about it by local historians. The story behind the old cabin on the Heins farm property currently has not been uncovered either. In addition, we recommend that the Conservation

Commission explore the best ways to share the information we have assembled about these properties with the public.

1. Introduction

The Leadmine Mountain and Heins Farm properties have a long history in the town of Sturbridge. Originally, the “lead” mine was actually a graphite mine used by the Nipmuc people and then by the precursor to the Dixon Ticonderoga company (Trustees of Reservations, n.d.). Heins Farm was a farm owned by the Heins family since at least the 1800’s (Information Bravo, 2010). Both properties were eventually acquired by the Town of Sturbridge and converted into conservation and nature preserves with walking and hiking trails (D. Barnacle, personal communication, 2020).

Currently, the Sturbridge Trails Committee manages 6000 acres of open space split among many properties (Trek Sturbridge, 2019). The committee is interested in producing educational materials for guests who walk the trails. This could include such things as brochures, educational signs on the trails, interactive QR codes, or recreations of historical features that used to be on the trails. The creation of these features requires a significant amount of information about the usage, history and ecology of the land.

The goal of this project was to provide a compilation of information regarding the history, ecology, and management of the Leadmine Mountain and Heins Farm Conservation properties in Sturbridge, Massachusetts, so that the Sturbridge Conservation Commission would have the information they need to design future educational features about the two properties.

2. Methods

The purpose of this project was to provide a compilation of information regarding the history, ecology, and management of the Leadmine Mountain and Heins Farm Conservation properties in Sturbridge, Massachusetts, so that the Sturbridge Conservation Commission would have the information they need to design future educational features for the two properties. We compiled information using two methods: archival research and interviews.

2.1 - Archival Research

The majority of our research came from archival research. The types of archives we used include:

- Scholarly, peer reviewed papers
- Local blogs
- Historical and contemporary published books
- Documents published by the Sturbridge Trails Committee
- Documents published by local and state governments and agencies
- Documents published by groups associated with the properties

These archives were able to provide information for most of what this report covers.

2.2 - Interviews

Written sources did not cover all of the information required by this project. Specific information about the properties was gathered through interviews. We held interviews with two people with expert knowledge of the properties. These members were:

- Dave Barnicle: a member of the Conservation Commission and property expert.
- Tom Chamberland: another member of the Conservation Commission and property expert.

These methods combined were able to give us enough information to complete this project. For more information on interview protocols used as well as results from said interviews, see Appendix B.

3. History of the Land and its Uses and Owners

The first step in the development of educational information about properties like this is to identify what information would need to be conveyed. To accomplish this, in-depth archival research and interviews with experts were completed to yield a large range of information on the Leadmine Mountain and Heins Farm properties. Subjects touched upon included historical information pertaining to the people and land usage, as well as more current information on the ecology and development of the properties as public conservation lands.

Timeline

History of Land Ownership on Lead Mine & Heins Farm

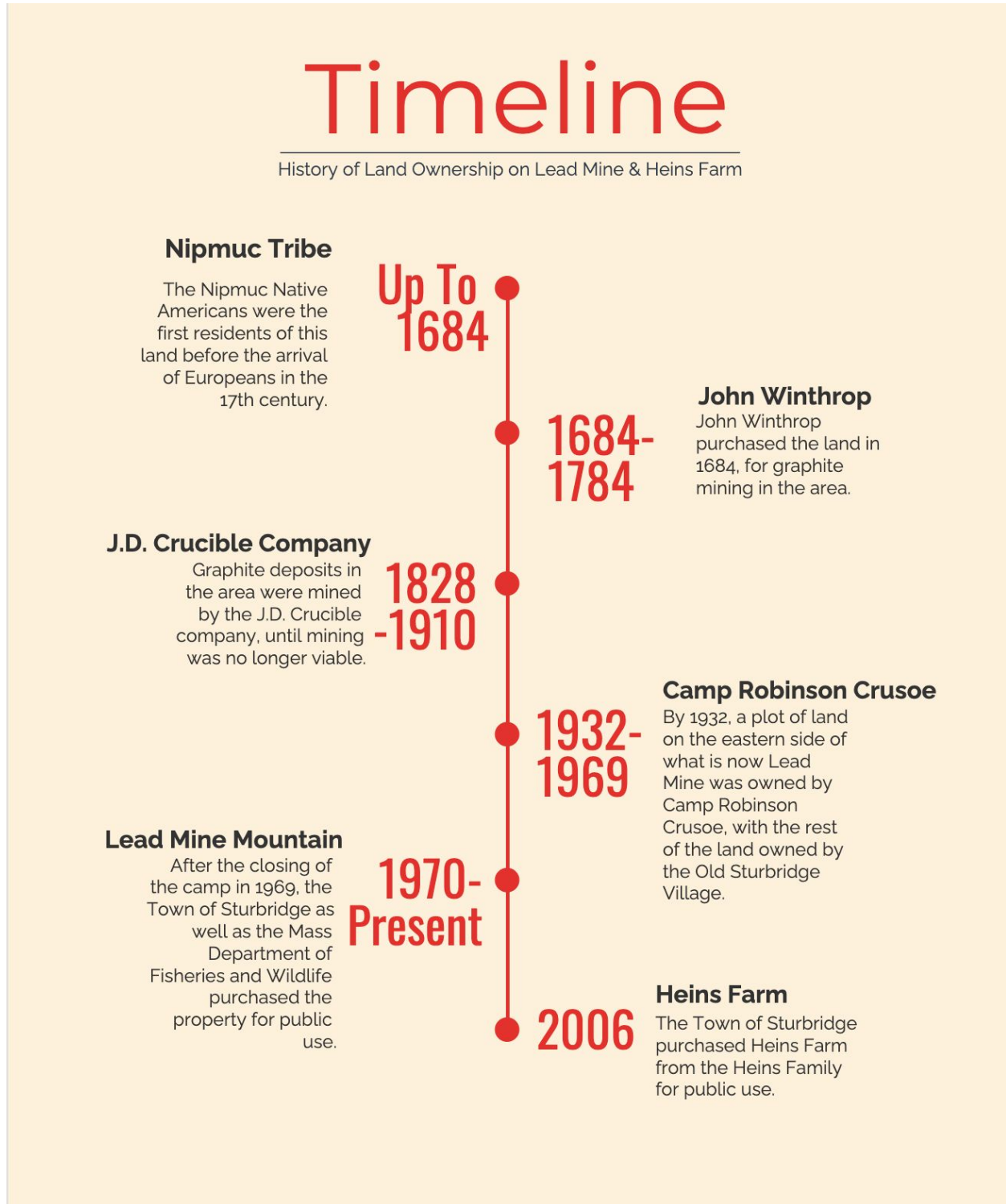


Figure 3.1.1 - Historical Timeline - This timeline shows a brief description of important historical events on the properties in chronological order.

3.1 - Leadmine Mountain

The land that the Leadmine Mountain and Heins Farm properties currently exist on has changed hands many times throughout its history. The first inhabitants of this land were the Nipmuc Native Americans, who were the native people of central Massachusetts, as shown in Figure 3.1.2.



Figure 3.1.2 - Nipmuc Territory Map - This map depicts the different Native American tribal in what is now Massachusetts, Rhode Island, Connecticut, and parts of Long Island (Nipmuc Nation.org, 2020)

As natives of the area, the Nipmuc were inhabitants of Sturbridge long before any European settlers made their way to New England (Trustees of Reservations, 2020). The Nipmuc people utilized the land for subsistence farming, hunting, and gathering to support their lifestyle,

which centered around respect and reverence for nature and the land they lived on (see Appendix B for more information on the Nipmuc people). They were also known to utilize the graphite found in the hills of modern day Leadmine Mountain. Although graphite has been used for many purposes, the Nipmuc people of the area generally utilized it to make ceremonial paints and dyes, when mixed with other materials. The Nipmuc continued to live in this area undisturbed until the arrival of settlers and miners in the 17th century. John Winthrop Jr., son of the first governor of the Massachusetts Bay Colony, purchased the land currently in and around the current Leadmine Mountain property from the Nipmuc. He, along with the miners working there, were the first white, non-native residents of the Sturbridge area, until the arrival of farming families in 1710 (Team_Dilemma, 2020). Up through the 1830s, the only operating location in the United States for harvesting graphite was Sturbridge, where it forms veins in gneiss, or metamorphic rock with a banded or foliated structure, about a foot in width. Along with the rich deposits of graphite, Winthrop also believed there to be significant amounts of lead and iron. The mines (see Figure 3.1.3) stayed in operation as well as in the hands of the Winthrop family until their closing in 1784, due to increased difficulty and danger extracting minerals, along with the financial troubles this brought.



Figure 3.1.3 - Graphite Mine - Situated on the Tantiusques property run by The Trustees of Reservations, directly adjacent to the Leadmine Mountain property, this old graphite mine shaft still exists, barred off for the safety of visitors and protection of the historic mine.

The ownership of the land after the closing of the Winthrop mine in 1784 is uncertain, until its purchase in 1828 by a Boston merchant named Frederick Tudor (Trustees of Reservations, 2020). Tudor was known as the "Ice King", due to the fortune he had made cutting ice near Boston and shipping it around the world (geocaching.com, 2020). Colonel David Wight

III, who lived on the land now belonging to the Old Sturbridge Village, was his local agent and a man named Guy Scott was the mine foreman. For years, graphite was successfully mined and sold for a good profit. He employed Captain Joseph Dixon and his son who would later found the J.D. Crucible Company of New Jersey, famous manufacturer of pencils, lubricants, crucibles, and other common graphite products. Graphite from the Sturbridge mine was also shipped to Concord, Massachusetts, to John Thoreau and his son, Henry David Thoreau, who ran a pencil manufacturing facility. It is likely that this business connection existed due to Walden Pond being a source for Tudor's ice business, as well as being the famous body of water that Henry David Thoreau lived on and wrote his famous work *Walden*. Although successful for many years, later attempts to mine the area failed due to depletion of resources and dangerous conditions, and, by 1910, all mining operations had ceased.

In the late 1890s, around 450 acres of land currently part of the property was purchased by Francis L. Chapin, a Southbridge resident, converted the land into an outdoor retreat location known as Arbutus Park, although little else is known about its uses or purpose (Sturbridge Conservation Commission, n.d.). This land was later sold in 1912 to the Grand Trunk Railroad Company. Their intentions were to construct a rail line between Palmer, Massachusetts, and Providence, Rhode Island. This, however, was abandoned due to the start of World War I. Following the closing of the mines in 1910, most of the remaining property was under the ownership of the Old Sturbridge Village. However, in the early nineteen thirties, a summer camp operated on the eastern side of the property, along modern day interstate 84. Camp Robinson Crusoe (2014), as it was called, was founded by Josh and Leah Liberman and operated from 1932 through 1969 in Sturbridge (Camp Robinson Crusoe, 2014). However, from the summer of 1929 through 1931, the camp was located on a peninsula on Bailey Island, in Casco Bay, just

south of Brunswick, Maine. A small island just off the shore was called "Robinson Crusoe Island" by the campers. This was the origin of the name Camp Robinson Crusoe, which stuck when the land in Sturbridge was purchased in 1932. For its time, Camp Robinson Crusoe was extremely innovative. It was coed, and non-competitive, dispensing with traditional activities like "color wars". It was quite democratic and allowed a lot of space for individual activities. Each group voted on a group activity for the morning, and then campers were free to sample various individual activities in the afternoon. It was not possible to attend for only a portion of the summer; campers had to enroll for the full eight weeks. There was a large array of activities campers could take part in, including traditional camp activities such as swimming, boating, arts and crafts, and sports. But there were also some special areas that campers were able to experience, such as horseback riding, regular trips to the Old Sturbridge Village, and, in the camp's final years, lessons on how to use and program computers, including field trips to MIT (see more information about Camp Robinson Crusoe in appendix C, as well as historical maps and photographs in appendix D). Camp Robinson Crusoe ran steadily through to 1969, when it went bankrupt shortly before opening again for the summer of 1970.



Figure 3.1.4 - CRC Main House - Shown here is the main house, which had a greenhouse attached, utilized for dining. This photograph is from 1938 (Camp Robinson Crusoe, 2014).



Figure 3.1.5 - Aerial View of CRC Lakes - This aerial photograph shows the lakes formed by the Hamant Brook damming, dubbed the swimming lake (right) and the boating lake (left). (Camp Robinson Crusoe, 2014)



Figure 3.1.6 - CRC Swimming Lake - Officially named Pickerel Pond, the swimming lake was utilized for the swimming education and other activities of the camp. (Camp Robinson Crusoe, 2014)



Figure 3.1.7 - CRC Boating Lake - Officially named Mallard Pond, the boating lake was utilized for boating education and other activities at the camp. This image was taken from one of the dams. (Camp Robinson Crusoe, 2014)

3.2 - Heins Farm

The Heins Farm property was in the hands of the Heins family for a long time, hence the name. Before its purchase by the Conservation Commission in 2007, the land was used primarily for farming, resulting in the landscape made up of mostly open fields used to grow crops in the past. A notable feature of the area is a segment of the Worcester-Stafford Turnpike, which still exists on the northwest side of the property. By way of stagecoach on the turnpike, the trip from Hartford to Worcester took roughly 12 hours (Information Bravo, 2010). Although only in operation for about 25 years at the beginning of the 19th century, it had a lasting impact on Sturbridge and the surrounding areas. When it opened in 1810, the turnpike was one of a few such toll roads built by private investors with the hopes of opening up more business opportunities (Tanguay, 2010). This thoroughway was used primarily for commercial travel. Travellers along the turnpike would have been charged 25 cents per coach, along with 4 cents for each extra man and horse. However these fees were waived for churchgoers, members of the military, or those travelling to mills and manufacturing sites. These tolls were paid at tollhouses along the road, approximately 10 miles apart, where horses were also changed. These 10-mile stretches were known as stages, hence the name stagecoach. There was one such tollhouse in Sturbridge, which is now known as the Publick House, a favored dining and lodging destination in town. At the time of the turnpike's creation, Sturbridge was a small town, consisting of only 46 buildings, but it began to prosper as travellers frequented establishments such as the Publick House. Because of the turnpike's presence, professions such as innkeepers, saddlers, and blacksmiths became increasingly popular. Although such toll roads were popular in Massachusetts in the early nineteenth century, by mid-century, they were in decline, due to

factors such as challenging topography and the rise of the railroads. When the turnpike was abandoned in 1835, the cleared land was reverted to forest.



Figure 3.2.1 - Worcester Stafford Turnpike Sign - This sign can be found along the Stafford Turnpike loop in Heins Farm. It denotes the start of the section of trail where the turnpike ran through during the early 19th century. The sign reads: "Crossing this property is probably the longest remaining section of any 19th century turnpike in Massachusetts. Completed in 1810, the Worcester-Stafford Turnpike was part of a growing network of privately-financed toll roads which helped knit together a growing nation.

Turnpikes generally created commercial traffic, and the trip from Worcester to Hartford took about 12 hours, with horse changes at ten-mile intervals at inns like the Publick House. By joining the town to the larger world, in this case primarily Worcester and Hartford and their consumers, the road encouraged local manufacturing and market farming, and helped end the isolation of a rural community.”



Figure 3.2.2 - Worcester Stafford Turnpike Path - This image was taken along what was once the Stafford-Worcester Turnpike, looking southwest.

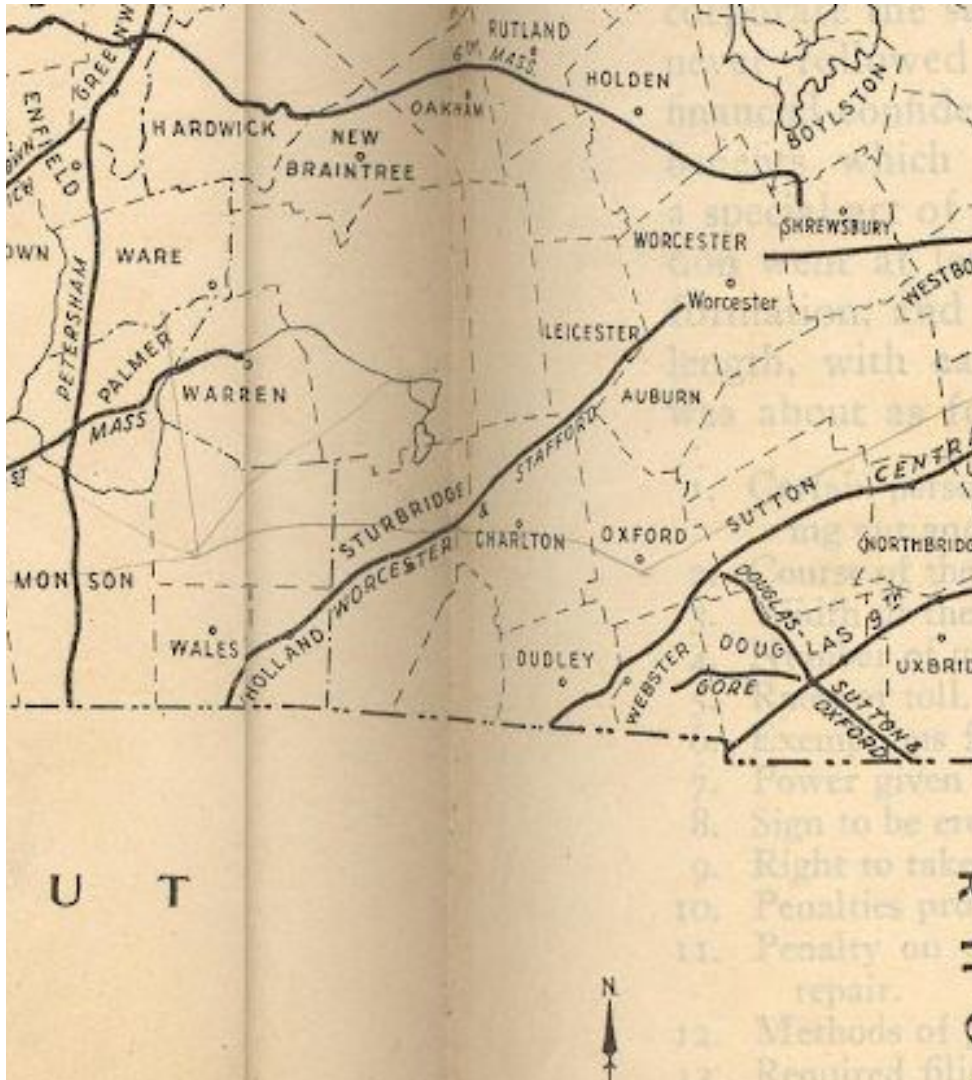


Figure 3.2.3 - Worcester Stafford Turnpike Map (Cropped) - Shown above is a section of a 19th century turnpike map, showing the Worcester Stafford Turnpike running through Sturbridge, on the southern border of Massachusetts. See appendix C for the full map. From 1919 map of turnpikes in Massachusetts, by F.J. Wood, 1919, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:19th_century_turnpikes_Massachusetts.jpg) CC BY-SA 2.0).

Another point of interest on the Heins Farm property is the presence of an old hunting cabin on the property, adjacent to the wetlands on the north side (See appendix D). Although an interesting site along the duly named cabin loop trail, it has been deemed unsafe due to the poor condition of its construction as well as the presence of lead paint and asbestos, both known to cause health problems. The cabin is set to be torn down in the fall of 2020 (D. Barnicle, personal communication, 2020).

4. Development and Ecology

Although rich, the history of these properties is only part of the story. The same methods of archival research and expert interviews were employed to gather information on the acquisition and development of the properties as protected public land, as well as the current ecology.

4.1 - Development and Acquisition as Conservation Lands

When Camp Robinson Crusoe was operational, there were a number of lakes on the property, all adjacent to each other, that are now dried up and non-existent. These lakes were there due to the damming of Hamant Brook, a tributary of the Quinebaug River, which runs through Leadmine Mountain. The first of three dams was constructed at some point between 1795 and 1831, for the creation of a saw mill (Sturbridge Conservation Commission, n.d.). The other two dams were created between then and the founding of Camp Robinson Crusoe, the lower, or northernmost dam being created as a byproduct of a failed railroad project in the early 20th century. Because the dams were removed in recent years, the brook has been able to return to its original course, resulting in the disappearance of these old ponds. The 2017 restoration of

the stream was important for the revival of original ecosystems in the area and protection of different fish species, such as the Eastern Brook Trout, from climate change. Removing the dams allowed the free flow of water throughout the Quinebaug River watershed, which encompasses Sturbridge and surrounding towns. The “blue lagoon”, pictured in Figure 4.1.1, is the only one of these bodies of water left on the property, though the brook still flows along its original course.



Figure 4.1.1 - Blue Lagoon - Now known as the “blue lagoon”, this pond was once part of Camp Robinson Crusoe, and is the only remaining body of water after the removal of the Hamant Brook dams. It was formed through the excavation of land in that spot during the construction of interstate 84, directly to the east of the pond. Its unique color comes from the purer spring water that fills the pond, both reflecting the sky in a special way, as well as the presence of algae in the water giving it a deep color. (Camp Robinson Crusoe, 2014)



Figure 4.1.2 - Hamant Brook Changes - Pictured above are aerial views of the Hamant Brook before and after the removal of the dams in 2017, taken in 2007 (left) and 2020 (right), respectively. The swimming and boating lakes seen in figures 3.1.6 and 3.1.7 can be identified in the left photo, whereas the recent, post dam removal photo shows the brook back to its natural course (Camp Robinson Crusoe, 2014; Google Maps, 2020).

Around the time of the camp’s closing, the Old Sturbridge Village had run into financial troubles (Dave Barnicle Interview, see Appendix B). This was alarming to many town officials, as, without many other large businesses or attractions, the Old Sturbridge Village was what attracted many of the town’s visitors, invigorating the town economy. In order to provide extra funds to OSV, the town planned to purchase much of their land as protected conservation

properties. A special town fund was created to fund a portion of the seven million dollar purchase, while the rest was paid by the Massachusetts Division of Fisheries and Wildlife. Thus, the Leadmine Mountain property was designated a conservation land in Sturbridge, with special restrictions and permissions due to the partnership with Fish and Wildlife. For example, fishing and hunting are both allowed on the Leadmine Mountain property, but not on others such as Heins Farm.

The acquisition of Heins Farm was more straightforward. As a way of acquiring new properties, the Sturbridge Conservation Commission seeks out plots of land going up for sale in town (Dave Barnicle Interview, see Appendix B). They then offer to buy the land in place of a business or developer, on the condition that the land be protected and set up as a conservation property. This is the process that was used in the purchase of Heins Farm. When the Heins family posted the land for sale in 2007, the Conservation Commission was able to purchase it using town allocated funds on the condition it be protected.

Today, both Heins Farm and Leadmine Mountain are developed as public conservation lands. Leadmine Mountain now takes up 880 acres, while Heins Farm makes up only 84 acres (Dave Barnicle Interview, see Appendix B). Both of these properties currently feature many miles of walking trails that provide easy access for visitors to see the vast amount of protected land, varying from wide, handicapped accessible paths to steep, rugged hiking trails traversing the more remote areas of the properties.

4.2 - Varying Ecosystems and Life

The Sturbridge Trails properties are home to a wide variety of plants and animals. Much of their area consists of forests however, Heins Farm is unique being mostly grasslands and shrublands due to it previously being clear-cut for farming. The forests contain mostly mixed-hardwood, deciduous and evergreen trees such as White Pine, Red Maple, Northern Red Oak, and Hemlock (Mass Audubon, n.d.). Leadmine Mountain has a larger amount of evergreen because of its varied terrain. Some parts of these properties need to be protected in order to preserve the original inhabitants. Both properties feature wetlands, a type of protected land. They are diverse ecosystems that, in these properties, are home to a large amount of Red Oak as well as many aquatic and semi-aquatic animals. Both properties also feature indigenous medicinal plants. These plants can be used as natural medication for a variety of ailments [See Appendix C.3 for more details] (Prindle, 1994). Although they are home to many protected species now, the properties were not always a safe spot for local life. Originally, after Heins Farm was sold, the lands were infested with two types of invasive plants, Oriental Bittersweet and Honeysuckle (Trek Sturbridge, 2019). These plants, having no natural predators in the area, spread rapidly and outcompeted other, native plants. The Town of Sturbridge cleared these invasive plants out and created an Early Successional Habitat, a habitat endangered in Massachusetts. The land is now maintained to allow various species of local plants, birds and mammals to inhabit it.

In addition to a diverse array of plant life, both properties are home to a wide variety of birds, mammals, reptiles, amphibians, and fish. There are many types of bird native to Sturbridge (Mass Audubon, n.d.). Some are more commonly seen and some more rare. Some are only seen during certain seasons while some are seen all year round. Table 4.2.1, below, shows the most

common types of birds in Sturbridge and the seasons when they are found. Most birds are either here year-round or only for the spring and summer while a few birds are only here for the fall and winter.

Table 4.2.1: Species of birds commonly found in Sturbridge, MA divided into sections based on the season they are found.

Birds of Sturbridge		
Fall and Winter	All Year	Spring And Summer
American Tree Sparrows	American Goldfinches	American Robins
Dark-eyed Juncos	Black-capped Chickadees	Baltimore Orioles
Tufted Titmice	Carolina Wrens	Blue Jays
White-throated Sparrows	Cedar Waxwings	Brown-headed Cowbirds
	Eastern Bluebirds	Chipping Sparrows
	European Starlings	Common Grackles
	Mourning Doves	Downy Woodpeckers
	Northern Cardinals	Eastern Phoebe
	Northern Mockingbirds	Great Blue Herons
	White-breasted Nuthatches	Red-winged Blackbirds

The properties are home to many aquatic and semi-aquatic animals. This includes 21 different types of frogs and salamanders, 10 types of turtles and 14 types of snakes. They are also home to beaver and several types of fish such as large and smallmouth bass, as well as a few species of freshwater trout in the newly restored Hamant Brook. Many mammals also call the Leadmine and Heins Farm properties home. Like the birds, some are more easily found, and some are rarer. The table below shows the species of mammals typically found in Sturbridge and their rarity.

Table 4.2.2 - Mammals of Sturbridge - This shows types of mammals that can be found in Sturbridge and if they are commonly seen or rare (Mass Audubon, n.d.).

Common	Rare
Bats	Bears
Beavers	Bobcats
Chipmunks	Fisher cats
Rabbits	Moose
Coyotes	
Deer	
Foxes	
Moles	
Opossums	
Porcupines	
Raccoons	
Skunks	
Squirrels	
Woodchuck	

Unfortunately, there are many species of both plants and animals that are either endangered or close to it (Town of Sturbridge, 2012). Figure 4.2.1 shows the different taxonomic groups and how many species in it are listed as concerned. MESA is the Massachusetts Endangered Species Act, so all of the MESA listed species are officially recognized as endangered while the others are recognized to be endangered by the Massachusetts Conservation Committee, but not by Massachusetts law. Sturbridge, and the Leadmine and Heins Farm properties are home to several of these endangered and concerned species as shown in Table 4.2.3.

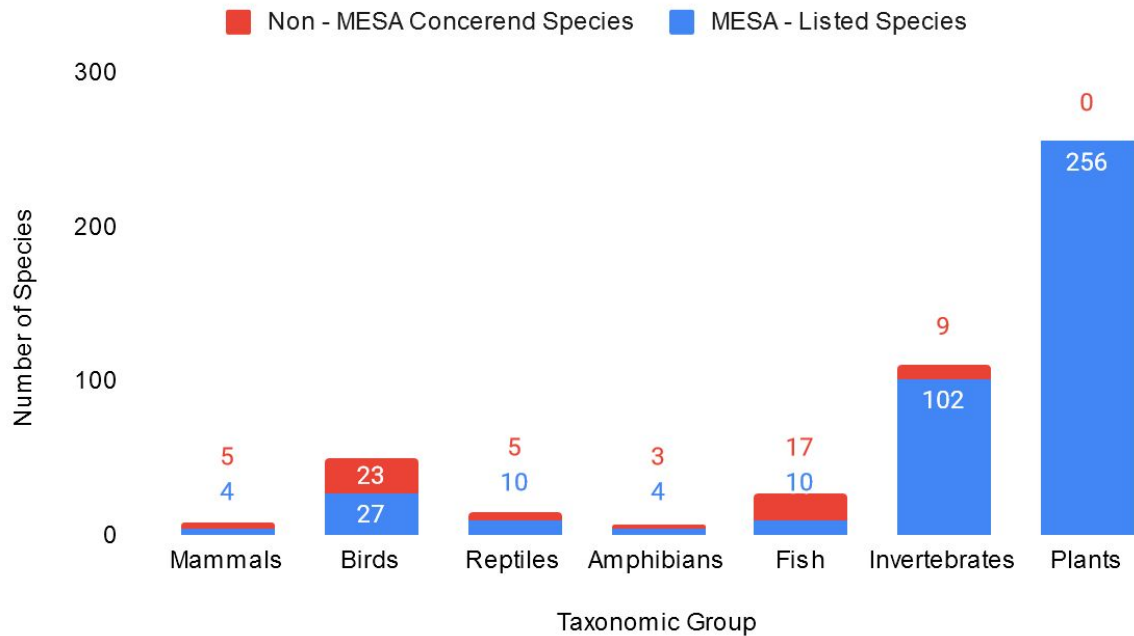


Figure 4.2.1 - Endangered Species of Massachusetts - This shows the number of species in each taxonomic group that are officially endangered under the Massachusetts Endangered Species Act [in Blue] and species that are considered endangered by the Massachusetts Conservation Committee [in Red] (Town of Sturbridge, 2012).

Table 4.2.3 - Endangered Species of Sturbridge - This table lists the endangered species in Sturbridge and their taxonomic group (Town of Sturbridge, 2012).

Species	Taxonomic Group
Creepers	Mussel
Triangle Floater	Mussel
Marbled Salamander	Amphibian
Four-Toed Salamander	Amphibian
Bridle Shiner	Fish
Eastern Ribbon Snake	Reptile
Spotted Turtle	Reptile
Water Shrew	Mammal
Climbing Fumitory	Plant
Slender Cottongrass	Plant
Dwarf Bulrush	Plant
Drooping Speargrass	Plant
Bristly Buttercup	Plant

In a quickly developing world, protected pieces of land such as Leadmine Mountain and Heins Farm are important because they are havens for plants and animals to live as wild as possible.

5. Reflections & Recommendations

In this section we will provide our personal thoughts regarding the information we have compiled. In the recommendations below, we will go on to give possible options for how to continue this project.

Reflections

Following our research, we have a deeper understanding of the rich history and biological/geological features that the Leadmine and Heins farm properties located in the town of

Sturbridge, MA have to offer, as well as the impact they have on the area. Occupying what was once the Native American land of the Nipmuc tribe, Sturbridge has a history extended back long before European settlers arrived. Our team has come across very little information on the Nipmuc people and what they did in Sturbridge, but we believe that their story is an extremely important one that should be told to those who visit these properties. With this being said, there are also other smaller areas of information that could be covered more in depth than we have been able to do with our research.

Recommendations

The Sturbridge Conservation Commission asked our team to carry out this research in the seven weeks that we had available. They are looking to turn certain properties located in Sturbridge, Massachusetts, into educational walkthroughs since the land is so rich in history. However, the information was not readily available which has hindered this process. We set out to provide as much information on historical, ecological and management aspects of the Leadmine Mountain and Heins Farm Conservation properties as possible. This information is provided in this report, and based on this research we have the following recommendations.

We recommend that the Conservation Commission of the town of Sturbridge continue our research by making necessary additions to the information we have gathered before looking into how the educational materials could be implemented. Based on the information we have gathered over the course of seven weeks, we have concluded that there are a few different ways our research could be added to so that the story of this land is told and portrayed properly. We have also included a few secondary recommendations for the town to consider.

Recommendation One: History of the Nipmuc People

Recommendation one pertains to the history of the Nipmuc People. As mentioned in section 3, the first inhabitants of this land were the Nipmuc Native Americans, who were the native people of central Massachusetts. This land that we have been researching rightfully belongs to the Nipmuc people so we believe that it is important that their story is told correctly and in full. Nipmuc history is primarily passed on orally, so it was difficult for us to surface much more than general details on the Nipmuc people of Sturbridge. A majority of what we were able to find documented includes general information on where the Nipmucs inhabited, economic and social conditions and the ultimate end to their status as a state ward (see section 3 and Appendix C.1). Based on our observations, we recommend that another group who succeeds us, continue more in depth research pertaining to the Nipmuc people and how they once utilized the land. Since continuing this research would require directly speaking with the Nipmucs, we have provided a couple of feasible methods for going about this.

One way to give the Nipmucs a chance to share their story is through creating a focus group consisting of Nipmucs who are familiar with this specific piece of land in Sturbridge. This focus group could meet however many times necessary in order to retrieve as much relevant information as possible. Another viable option would be to conduct a series of interviews with one or multiple Nipmuc people. This method would be beneficial due to the fact that interviews tend to be personal which poses the opportunity to receive more detailed insight from the interviewee. Each of these methods are practical and it will ultimately be up to the next project group to decide which is more efficient for them.

SWOT Analysis for Recommendation One

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none">• Will give the Nipmuc people proper recognition• Opens the eyes of visitors who did not know much about the Nipmucs• Shows compassion and understanding towards the Nipmucs in the area	<ul style="list-style-type: none">• Finding a solid group willing to meet regularly	<ul style="list-style-type: none">• An opportunity to create immersive educational features on the properties for visitors• Gives the Nipmuc people full reign to control the narrative of their true story	<ul style="list-style-type: none">• Any ethical dilemmas that arise with a focus group or interview



Figure 5.1.1: Old Cabin on Heins Farm: On the Cabin Loop Trail on the Heins Farm Property, this old cabin with unknown origins can be found.

Recommendation Number 2: Heins Farm Property - Cabin Loop Trail

Our next recommendation is focused on the Heins Farm property. If you refer to section 3.1, it is evident that our research on the Heins Farm property is centered around the Worcester-Stafford Turnpike that once ran through the farm. We know what happened to the property prior to the purchase by the conservation commission in 2007, however, there are some gaps in our research that could be filled.

We know that before the property was purchased, it was used as farming land by the Heins family which is clear due to the name as well as the large open fields on the property. There are some specifics we believe could be beneficial to include in any educational materials. Details such as how the Heins Family acquired the land, any historical/significant changes the property has undergone, any unique features, etc could be valuable. Cheryl Heins was the contact referred to us by Rebecca Gendreau of the Sturbridge Conservation Commission. Unfortunately we were not able to work out a time to meet with her and ask these vital questions regarding the property. She would be a reliable person to be in contact with in order to fill in these missing details.

Another feature on the property that has little to no information documented is the old cabin found on the Cabin Loop trail. This trail peaked our interest because of the old cabin landmark pictured in figure 5.1.1. However, from what we were able to find, there is nothing known about it besides it possibly being an old hunting cabin. From what we understand, the cabin will be taken down due to safety issues, but then the relevance of the trail's name will not be too clear to new visitors. Our Suggestion would be to have future groups do further research to see what information can be excavated through more archival research and interviews. Once the cabin is gone, it could possibly be replaced with an interactive prop or a showcase of some

original items found inside that can be turned into an educational/seating area. This would be a way to engage visitors into an immersive learning experience regarding the backstory of this cabin.



Figure 5.1.2: Old Postcard of Arbutus Park: An old postcard of the area known as Arbutus Park, before it was taken over by Camp Robinson Crusoe. Photographed in the postcard is an old horse drawn carriage.

Recommendation Number Three: Arbutus Park

Arbutus Park is another aspect of the properties that has the least amount of known information available. In our interview with Tom Chamberland, we discussed the park and he shared what he knew which was also sparse. The only tangible information that we were able to put together was that Camp Robinson Crusoe was built on the site that was once Arbutus Park. Also, Tom shared his knowledge that the park was named after the arbutus flower, also known as the mayflower. The photograph in figure 5.1.2 is from a postcard of what the park looked like before Camp Robinson Crusoe took over in 1932.

Our team believes that through additional archival research and interviews, more information on this park could be extracted. Having information on this park could greatly benefit the educational experience of the Leadmine Property especially since there is a trail that memorializes it.

SWOT Analysis for Recommendations Two and Three

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none">• Creates a more immersive learning experience for visitors• Contributes to increasing the educational atmosphere of the properties	<ul style="list-style-type: none">• Limited space	<ul style="list-style-type: none">• Share interesting information that is not easily available• Adding different types of attractions could attract more visitors to the properties	<ul style="list-style-type: none">• The funds needed to make these potential additions to the trails



Additional Recommendations

These recommendations are ideas that we came up with for the Conservation Commission to consider in the meantime. As a disclaimer, the following recommendations are additional thoughts and are not ideas we included background information on.

To begin with, we recommend that the Conservation Commission and other relevant stakeholders consider what the most effective ways to present the information we have collected could be. With only seven weeks to work on this project, we could not cover methods of implementation, which could be a whole project on its own. We talked to Rebecca Gendreau about this, and she mentioned that the idea of creating an app that could connect information about the trails to a visitors phone was being considered. We believe that this would be a great start. Another idea we had was possibly re-creating historic scenes for a more immersive learning experience as well. For example, being able to physically see a ceremonial Nipmuc painting or ceremony using graphite decorations would be an intriguing feature.

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Appendix A - Sponsor Description

The sponsor of this project is the Town of Sturbridge Conservation Commission. The Commission's main objective is the administration of the Massachusetts Wetland Protection Act, the Rivers Protection Act, and the Town of Sturbridge Wetland Bylaws, Regulations and Policies (Sturbridge Conservation Commission, 2011). The purpose of these regulations is to provide protection to the wetland lands, adjoining water sources, and surrounding land, known as buffer zones, in Sturbridge. To do this, they monitor and review activities jurisdictional to the Commission through their permit application process. The Commission is responsible for approving projects and proposals that could have an impact on wetlands and the surrounding environment, as well as acquiring and planning for the development of new open space. Our contact was Rebecca Gendreau, Conservation Agent at the Commission.

Appendix B - Interview Protocols and Highlights

IRB Verbal Consent Form

Informed Consent Agreement for Participation in a Research Study to be Stated Before Each Interview

Investigators: Mark Forte, Edie Hudson, Jonathan Landay, Matthew Stevens

Contact Information:

Mark Forte - mjforte@wpi.edu - 203-598-4418

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Matthew Stevens - mtstevens@wpi.edu - 781-879-7898

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Creighton Peet - cpeet@wpi.edu

Thomas Balistrieri - tjbalistrieri@wpi.edu

Title of Research Study: Sturbridge Trails Interactive Qualifying Project

Sponsor: Sturbridge Conservation Commission

Sponsor Liaison: Rebecca Gendreau

Introduction

You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study:

The purpose of this study is to identify and collect information about the people, history, and general information pertaining to the Heins Farm and Leadmine Mountain conservation properties in Sturbridge, Massachusetts. This information can be used for future projects involving the development of educational features in these properties.

Procedures to be followed:

To identify this information, the study will utilize archival research and interviews with experts on the land and its history. Historians, former landowners, and trail developers will be interviewed to include more specific information about these two properties that archival research cannot yield.

Risks to study participants:

Please bring it to an investigator's attention if you do not feel comfortable having your

name used in our written report.

Benefits to research participants and others:

This interview will provide useful information on the properties owned by the town of Sturbridge for historical and ecological/environmental educational purposes. This information will be given to the Sturbridge Conservation Commission and will be utilized for future endeavours.

Record keeping and confidentiality:

“Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.”

For more information about this research or about the rights of research participants, or in case of research-related injury, contact any of the above contacts in contact information.

Your participation in this research is voluntary.

Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the research at any time they see fit.

Dave Barnicle - Member of Conservation Commission/Property Expert

1. Can you tell us a bit about the trails committee and what they do to develop and maintain trails in Sturbridge?
2. Camp Robinson Crusoe operated in Sturbridge from 1932 through 1969. What was it like during that time?
3. How has the area where the camp was located changed since its closing, and what has the conservation commission and/or the trails committee done to improve or develop the area?
4. Can you tell us a bit about the acquisition of both the Heins farm property and the Leadmine Mountain property?
5. What can you tell us about the history of the Heins Farm property? Specifically, we are interested in learning more about the old hunting cabin that is set to be torn down this fall.
6. What do you want people new to the area to know about the Leadmine Mountain and Hines Farm Properties?
7. Can you tell us, as a long time Sturbridge resident, how these properties (Leadmine Mountain and Heins Farm) have changed over time, for better or for worse?

Dave Barnicle Interview Highlights

Dave Barnicle, the town historian has been living in Sturbridge for 40 years, and before coming to Sturbridge worked on the conservation committee for Natick. He has worked on the conservation commission in Sturbridge for over 25 years, and helped with enforcement of the Weather Protection Act.

A proposal was passed to add a levy where money is put into a fund called The Community Preservation Act. Mr. Heins was one of the first people who sold their land to it, and allowed his land to be developed. Protection of that land was inviolable, and for perpetuity.

The Camp Robinson Crusoe and Leadmine properties were originally bought by Old Sturbridge Village and were left in their state without much work being done. As time passed, Old Sturbridge Village ran into financial difficulties, and needed to sell the properties to the town to survive. The town and state jointly paid for the properties to put in perpetuity protections on them, as well as a permission for hunting on those properties, unlike the Heins Farm property.

Camp Robinson Crusoe's property was still owned by Old Sturbridge Village during the time of its operation; however, there was very little done aside from just formal ownership. There were plans to convert Leadmine property into a women's Golf Course, however the funding was never actually realized, and the plans fell through.

Bob Briere - Town Historian

1. How have the appearances of animal and plant species on the Leadmine and Heins Properties changed over the years?
2. Do you know anything about the old cabin on the Heins Farm Property?
3. Is there any information as to what the history of the Stafford-Turnpike loop trail is known for?
4. Camp Robinson Crusoe operated in Sturbridge from 1932 through 1969, what was the camp like before it went bankrupt and was forced to close?
5. What were the aftereffects of the closure of the camp?

-
6. In your opinion as a historian, what are the most significant historical events or time frames important to this land?
 7. From your perspective, how have you seen the area change over time and how may it have affected the surrounding community or use of the land?

Bob Briere's Answers

The first three questions David Barnicle would know who has the answers. Or the Conservation Commission agent. My knowledge was more about the camp itself and I worked with Bruce on all the interviews of former campers.

I believe you would find a lot more from the documentary, about what the camp was like. Those interviews were with people who lived it. When it closed, the land was purchased by Old Sturbridge Village. There were negotiations between OSV and the Ladies Golf Association to build a golf course there. Neighbors objections were about fertilizers on the course that might enter their wells, and this may have been the downfall of the idea. So, the land lay dormant until a conversation I had with the OSV President about the Town of Sturbridge purchasing it (they had said through the media I believe the land was for sale). She felt the town could not afford it; however, the town through the Town Administrator pursued the idea and eventually, along with the Mass Fisheries and Wildlife Department, agreed to jointly purchase the property.

During this time period the buildings due to age and neglect decayed beyond salvage. Also, Fisheries and Wildlife wanted no buildings on the property (including restrooms) so all were torn down. They also wanted it for fishermen interested in one species of trout and as a result the dams were removed and the three beautiful ponds on the property went back to being

part of Hamant Brook. I could go on for a while about what I thought of this idea but it is probably not what you are looking for.

What were the aftereffects? I can tell you that all the former campers who knew of what took place were saddened by it. Their teenage lives were at "Camp Robinson Crusoe". The ponds were part of their experience of becoming adults. Joshua Lieberman, a social worker, opened this camp partly to socialize boys and girls to help them become good adults and how to get along together in real life. Quite a few became social workers in real life because of this experience. Again, you will hear this in the documentary.

As far as Sturbridge is concerned, most people do not care. Trail lovers however do find this great. That committee has put tons of hours into this project. As a historian, I guess most do NOT like change. It was open to anyone who wished to attend although this was not publicized so the majority of citizens never knew or understood what was taking place on the property. There were those, back when, who thought it was a nudist camp and wanted nothing to do with it. I am not sure they ever did learn how far from the truth that thought was.

The biggest historical event for Sturbridge was the celebration of the Town's bi-centennial in 1939 when the land was used to put on a pageant about the town's history. There was a great turnout of people for that, both as spectators and as participants. Many folks today do not know the Meeting House at the Village has had two other locations in the town prior to 1959 when the village bought it.

Your last question has more to do with the town as a town than about the CRC land. WE started out as a farming community, then when industries came we could be considered an industrial community, and now it is known as a Tourist type of community. Most of that comes with the advent of OSV in 1947 when it first opened. Personally, I really think we, as a town,

were better off back then. Slower paced and lots more friendly between residents. Go to Town Meetings, look around and where once upon a time you pretty much knew everyone in attendance by name and now look around and wonder "who are these people?".

Information to note about Camp Robinson Crusoe: Camp Robinson Crusoe has NEVER been on Leadmine Mountain. Viewed from a distance you can see that. Old maps and old histories mention the mountain. Example: Look at the "Street Atlas METRO WORCESTER Central Massachusetts" copyright 2001. It shows what an old map, possibly from the late 1800s, shows the correct location as we old natives know it to be at. In the late 1940s a forest fire burned for close to a week on LEADMINE MOUNTAIN and the fire location was nowhere near Camp Robinson Crusoe. A copy of the Southbridge News back then tells of the fire.

Tom Chamberland - Trails Committee Member/Property Expert

1. Can you tell us a bit about the trails committee and what they do to develop and maintain trails in Sturbridge?
2. Camp Robinson Crusoe operated in Sturbridge from 1932 through 1969. What was it like during that time?
3. How has the area where the camp was located changed since its closing, and what has the conservation commission and/or the trails committee done to improve or develop the area?
4. Can you tell us a bit about the acquisition of both the heins farm property and the Leadmine Mountain property,

-
5. What can you tell us about the history of the Heins Farm property? Specifically, we are interested in learning more about the old hunting cabin that is set to be torn down this fall.
 6. What do you want people new to the area to know about the Leadmine Mountain and Hines Farm Properties?
 7. Can you tell us, as a long time Sturbridge resident, how these properties (Leadmine Mountain and Heins Farm) have changed over time, for better or for worse?
 8. We understand that the U.S. Army Corps of Engineers had a part to play in the development of the Leadmine Mountain property. As a lifelong resident of Sturbridge and a former part of the Corps, can you tell us a bit about that operation, and, if you yourself were involved, can you tell us about your experience working with that?

Tom Chamberland Interview Highlights

The Trails committee got its initial start in the 90s. It started the initial discussion on core property trying to reclaim the old rail bed. The selectmen appointed a 3 person regional grand trunk trail committee. Town adopted the Community Preservation Act and acquired open space lands. In an effort to manage properties, the public lands advisory committee was formed. Leadmine was acquired in partnership with the department of Fish and Wildlife. Dams had been removed. Committee was formed with 5 members and 5 associate members. Heins Farm, river lands, Plimpton were all part of the trails committee work. To help guide, they thought the town should come up with a masterplan to help provide guidance to trail development. In 2012 the plan was published, and it has been used since. A concern with the plan is the vision of having

enough trail space to come up with 50 miles of trails/experiences. Goal is to make trails an economic source for the town. At 33 miles.

Army Corps of Engineers: Back in the late 60s/ early 70s, Craig Lyman did a college thesis on repurposing Grand Trunk Rail beds and turning it into a source of income by making it a rail trail. People weren't on board with him and didn't think it would work. In 2000 his plan came to life. Money, grants, advisory grants, and state funding all came together in about 2 or 3 years to get the trail built. Grand Trunk Trail Blazers formed in the 90s wanted citizen involvement to help get the rail trail up and running. About 10 years ago, the organization changed its name to Friends of Titanic Rail Trail. Proposed 66 mile railbed. Pat McGarra of Sturbridge has been involved for years.

Community Preservation Act allows for historic preservation and supports low income housing. The town acquired about 2000 acres of open space protection and utilized historic preservation and other smaller projects. Without these acts, Leadmine and Heins Farm would not exist. Leadmine was a 4 mile acquisition bought from OSV at a time when they needed the money in order to re-envision themselves. Jim Donahue is a leader there. As a park ranger, he learned everything he could about trails, management, administration, etc. Over 10-15 years Tom did as much as he could with courses and conferences to learn everything he could about trails. Reroute, relocate and build new trails. Give people experiences of topography. Leadmine has really unique topography and geology. Heins has the open fields and historical Stafford turnpike.

Tom suggests we should watch CRC doc. Part of agreement with wildlife preservation, most of the camp buildings were taken down. Mr. Lieberman had a camp in Maine and moved camp to the CRC site. Interstate 84 being built and financial problems were key reasons to the camp closing. OSV interprets 1790-1840 in New England. Before Mr. Lieberman purchased it

for his camp, it was known as Arbutus Park. Had a trolley line to the park which dammed up Hamman Brook and created a pond. Postcard of horse drawn carriage going over the bridge (look for it). Got its name from an arbutus plant (mayflower). Not too much info on it. Hamant Brook

Appendix C - Supplemental Research

C.1 - Supplemental Nipmuc Information

The people the English referred to as Nipmuc, or “fresh water people” occupied the interior portion of what is now Massachusetts and parts of Rhode Island and Connecticut (Nipmuc Nation.org, 2020). The present-day boundaries of the original homelands included all of central Massachusetts from the New Hampshire/Vermont borders and south of the Merrimack Valley southerly to include Tolland and Windham counties in Connecticut and the NW portion of Rhode Island. To the east, the homelands included the Natick/Sudbury area going west to include the Connecticut River Valley.

The people lived in scattered villages throughout the area including Wabaquasset, Quinnebaug, Quaboag, Pocumtuc, Agawam, Squawking, and Wachusett (Nipmuc Nation.org, 2020). Their economic and subsistence cycles consisted of hunting, gathering, planting, and harvesting in their seasons. These villages were linked together by kinship ties, trade alliances, and common enemies. They lived in wetus, which could be moved to other encampments. Often thought of as wanderers, they were instead careful planners and good stewards of the land upon which they lived.

The path to the loss of the Nipmuc’s official tribal status started in 1861 with John Milton Earle’s 136 page *Earle Report* (Earle, 1861). John Milton Earle was a Worcester politician who was also the state commissioner for Indian Affairs. In his report, he tracked the economic and social conditions of all Indians in Massachusetts, as well as their race. He also detailed the process by which Massachusetts Indians can be made citizens, when they no longer were considered autonomous tribes, and when they lost their protection from taxes as a state protected

ward in exchange for citizenship in Massachusetts. In 2004, the Office of Federal Acknowledgement of the Bureau of Indian Affairs declared the Nipmuc Indians no longer an official tribe, revoking their claim to nationhood due to intermixing of blood with Africans primarily, but also white blood, causing the tribe to be considered prevalently not Indian, and leading to forced assimilation into society (Thee, 2006). Having lost their status as a state ward, they were no longer immune to taxation; however, instead they gained citizenship, and no longer being wards of the state, they gained the rights to travel, vote, and sue the government.

C.2 - Supplemental Camp Robinson Crusoe Information

Described as Creative Camping, Camp Robinson Crusoe was aimed at breaking away from traditional summer camp structures, offering a unique experience of more freedom and choice as well as out of the ordinary activities such as horseback riding, regular visits to the Old Sturbridge Village, and classes on using and programming computers (Camp Robinson Crusoe, 2014). Although not explicitly a Jewish camp, many of its campers came from Jewish families in New York City, giving children the opportunity to experience the outdoors.

The living situation was also non-traditional. Older campers would live in conditions labelled “primitive”, in that the campers would reside in tents as opposed to cabins, pump their own well water, cut their own wood for their kitchen wood stove, and cooked all their own meals (Camp Robinson Crusoe, 2014). These primitive campsite areas were clustered around the smallest of the three man made lakes on the camp property, on the northern side.

Josh and Leah's two children, Robert and Nancy, both worked as associate directors at the camp. Nancy's husband Nils Frederiksen also became an associate director. All photos of Josh and Leah together were provided by their granddaughter, Ditte Frederiksen McNeil. Robert ("Bob"), who changed his last name to "Hill", continued to operate the camp after Josh retired.

C.3 - Indigenous Medicinal Plants

The Nipmuc people used certain plants for their medicinal properties. The table below (Table C.3.1) shows common plants found in the area and their medical use.

Table C.3.1: Indigenous Medicinal Plants: Common plants and their medical use by Native Americans (Prindle, 1994)

Plant	Use
American Beech	The bark can be steeped in salt water to make a poison ivy lotion
American Elderberry	Can be used as an astringent, a diuretic, a laxative and promotes sweating. The inner bark can be used as a painkiller and the crushed leaves can be used as an insect repellent
Ash	The sap was used to treat cancerous growths. The leaves, bark and seeds can be made into antiseptics and diuretics.
Basswood	The leaves can be made into a tonic to treat the symptoms of common colds
Bedstraw	Can be made into a tea that was used to cure urinary tract disorders
Bindweed	The roots, stems and leaves can be used as a laxative
Birch	Can be made into a medicine to treat stomach pain
Bloodroot	The juice can be used to treat sore throats
Blue Flag	The plant was used to treat sores and bruising
Bracken Fern	The root was used to treat worms, stomach cramps, diarrhea, burns, sores and as an astringent.
Butterfly Weed	The root can be used to treat sores and encourage sweating.

Plant (cont.)	Use (cont.)
Cattail	The pollen was used as an astringent and a hemostatic. The root was used to treat infections, blisters, stings and was used as a toothpaste. The starch of the leaves was used as an antiseptic, a coagulant and to numb
Common Wood Sorrel	The leaves were used to treat nausea, mouth sores and sore throats
Daisy Fleabane	The plant can be made into a tea that acts as a diuretic and treats digestive ailments
Dogbane	The leaves can be used to treat rheumatism and wounds
Green False Hellebore	The roots were used to treat snakebites
Goldenrod	The leaves were used to treat intestinal and urinary disorders
Indian Pipe	The plant was used as an eye lotion
Juniper	The stems were used to treat stomach aches and colds. The berries were used to stop bleeding and as a diuretic.
Milkweed	The roots were used to treat kidney and bowel disorders. The sap can be used to treat warts and poison ivy.
Nettle	The roots and leaves were used to treat symptoms of rheumatism
Oak	The bark was used as an astringent and to treat diarrhea.
Partridge Berry	The berries were used to help with childbirth pains
Pipsissewa	The leaves were used to dissolve kidney stones.
Red Trillium	The leaves were used to treat insect bites and skin irritations
Skunk Cabbage	The root was used to treat lung ailments

Plant (cont.)	Use (cont.)
Slippery Elm	The bark was used to treat sore throats
Trembling Aspen	The bark was boiled into a syrup used to treat coughs
Wild Geranium	The plant was used as an astringent
Wild Sarsaparilla	The roots were used to encourage sweating
Willow	The bark and leaves were used as a painkiller
Wintergreen	The leaves were made into a tea that was used to treat rheumatism
Witch Hazel	The bark, leaves and twigs were used as a very effective astringent
Yarrow	The plant was used as an astringent, salve, and pain killer

Appendix D - Image Archive

D.1 - Maps

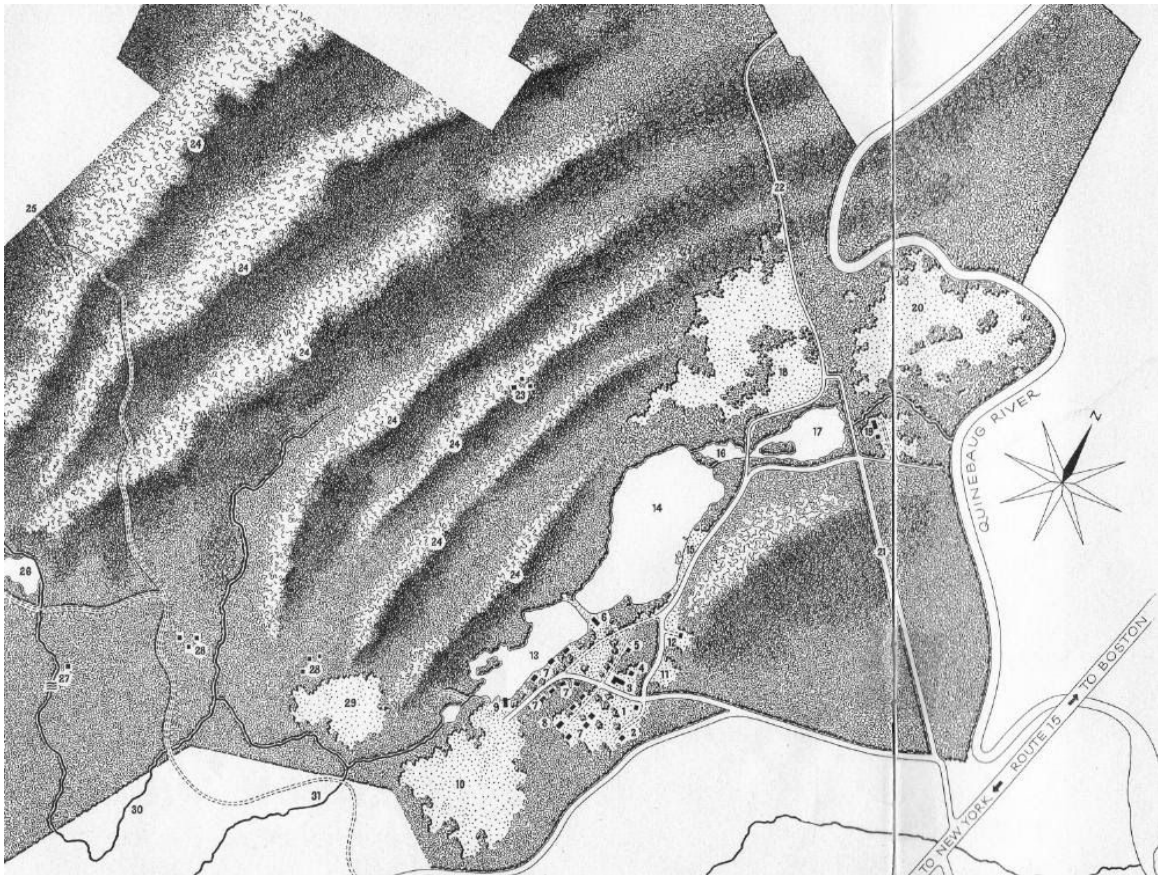


Figure D.1.1 - CRC Brochure Map - This map was included in a brochure for Camp Robinson Crusoe, and features numbered locations, with an accompanying legend to identify buildings and locations. See below for the said legend (Camp Robinson Crusoe, 2014).

Legend:

- | | | | |
|----------------------------------|-----------------------------|--------------------------------|-----------------------------|
| <i>1. Camp office</i> | <i>9. Nature Laboratory</i> | <i>17. Squantum pond</i> | <i>25. To Leadmine</i> |
| <i>2. Campers' post office</i> | <i>10. Athletic field</i> | <i>18. Squantum field</i> | <i>Mountain</i> |
| <i>3. Main house / dining</i> | <i>11. Parking</i> | <i>19. Primitive camp</i> | <i>26. Grist Mill pond</i> |
| <i>room</i> | <i>12. Lumber yard</i> | <i>20. Canoe landing field</i> | <i>27. Grist Mill Falls</i> |
| <i>4. Infirmary</i> | <i>13. Mallard pond</i> | <i>21. To Old Sturbridge</i> | <i>28. Colonial mill</i> |
| <i>5. Staff house / Canteen</i> | <i>14. Pickerel pond</i> | <i>Village</i> | <i>village</i> |
| <i>6. Arts & crafts shop</i> | <i>15. Swimming beach</i> | <i>22. To Old Sturbridge</i> | <i>29. Settlers' field</i> |
| <i>7. Campers' cabins</i> | <i>16. Trout pond</i> | <i>Village</i> | <i>30. Cannon brook</i> |
| <i>8. Recreation hall</i> | | <i>23. Old Pogus Village</i> | <i>31. Hamant brook</i> |
| | | <i>24. Seven ridges</i> | |

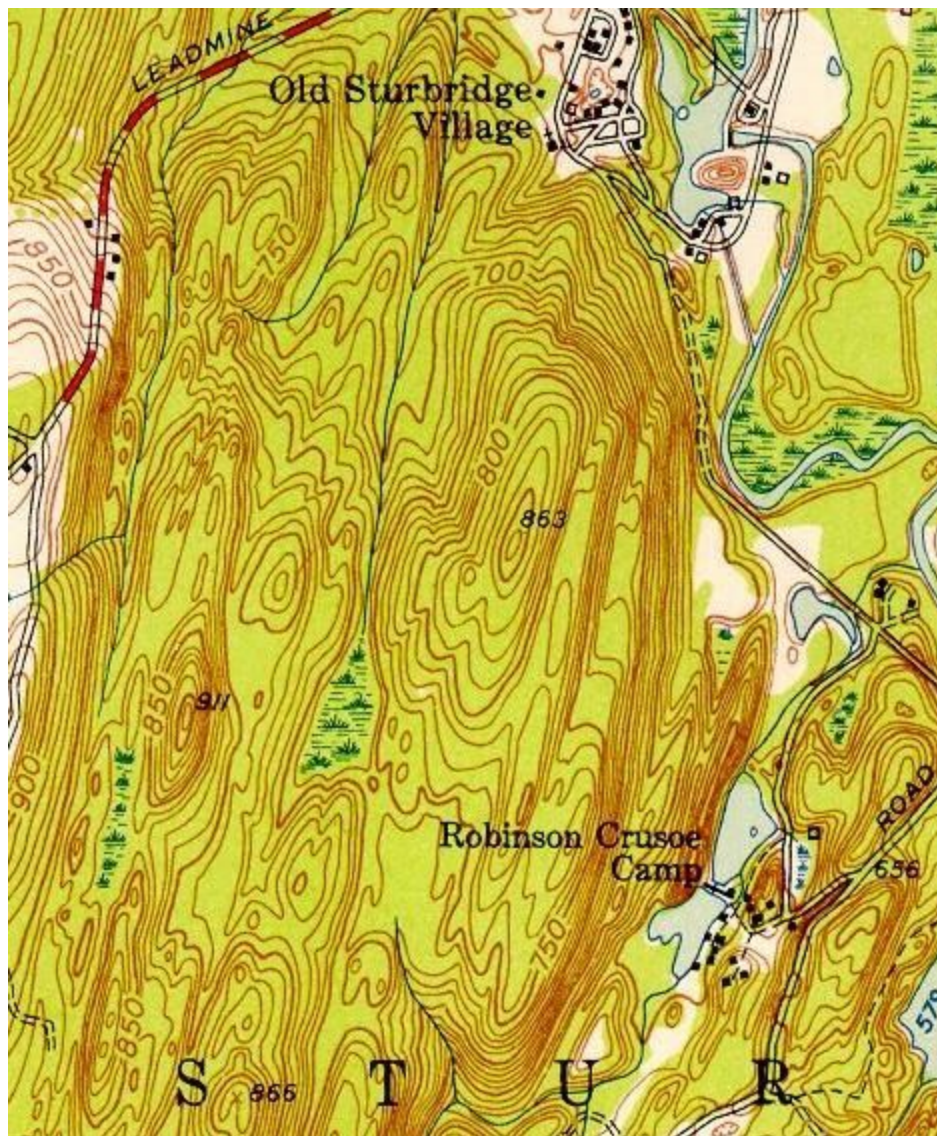


Figure D.1.2 - CRC Topographical Map - Shown above is a topographical map of the current Leadmine Mountain property. Seen here before it's purchase, the Old Sturbridge Village and its relation to Camp Robinson Crusoe can be seen (Camp Robinson Crusoe, 2014).

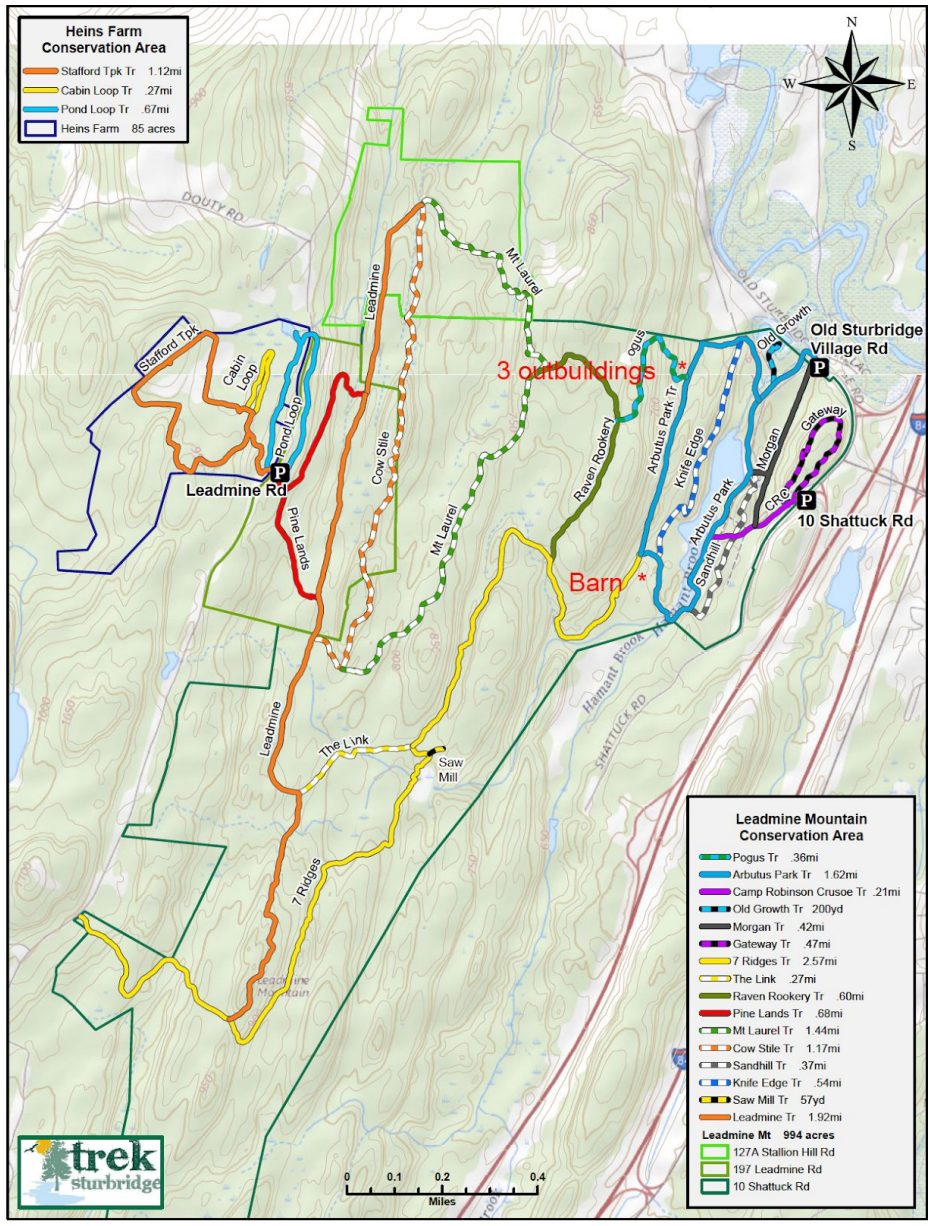


Figure D.1.3 - Leadmine Mountain & Heins Farm Trail Map - This modern brochure map shows the trail system of both the Leadmine Mountain property as well as the Heins Farm property. Highlighted are locations of remaining Camp Robinson Crusoe structures shown in Figures D.3.1 and D.3.2.

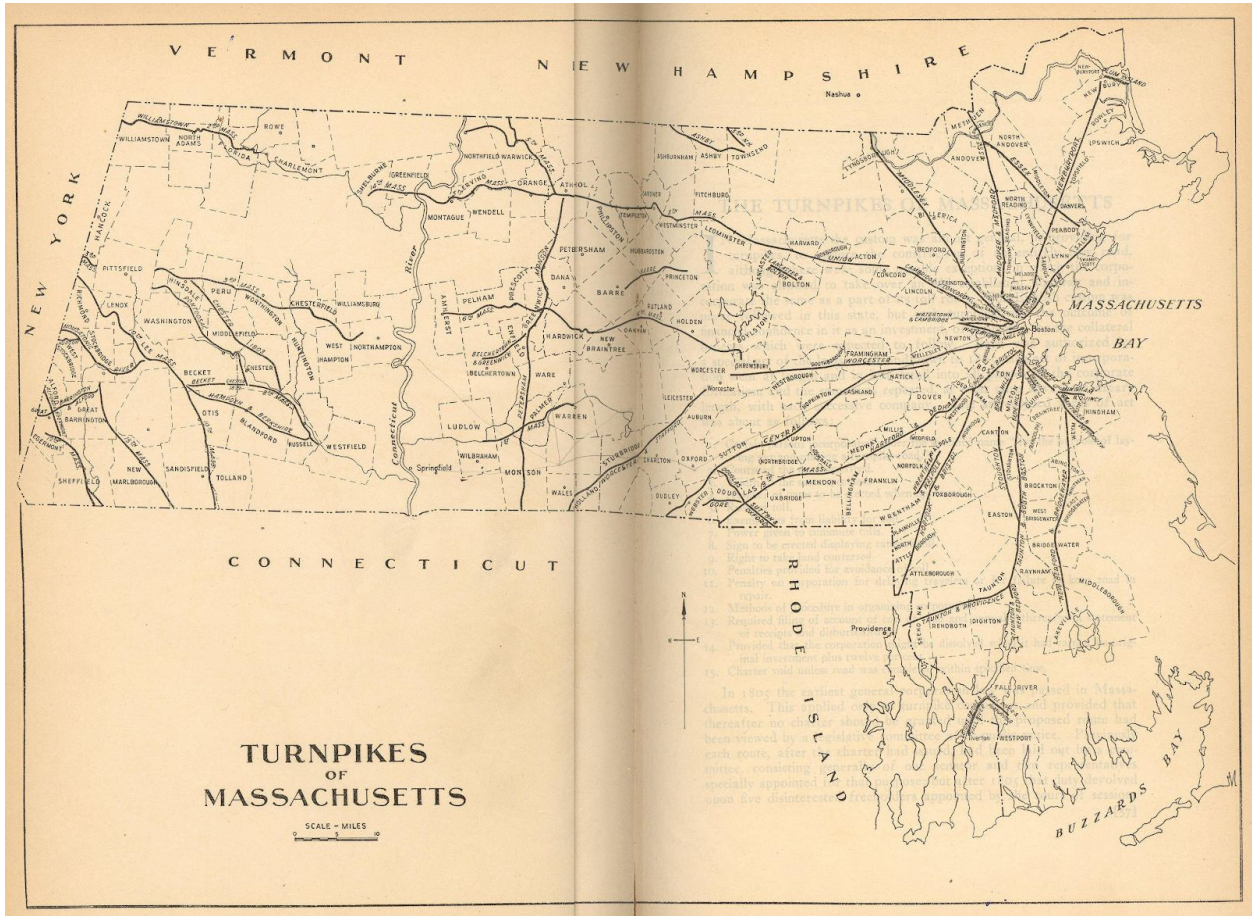


Figure D.1.4 - Worcester Stafford Turnpike Map - This map shows the network of toll roads in Massachusetts in the early 1800s. From 1919 map of turnpikes in Massachusetts, by F.J. Wood, 1919, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:19th_century_turnpikes_Massachusetts.jpg) CC BY-SA 2.0.

D.2 - Camp Robinson Crusoe Historic Photos



Figure D.2.1 - CRC Postcard (Boating Lake) - This is a postcard from Camp Robinson Crusoe featuring the cabins situated along the boating lake. Year unknown (Camp Robinson Crusoe, 2014)



Figure D.2.2 - CRC Postcard (Rec Field) - This postcard shows an image of one of the ball fields along with a building known as the “rec hall”. Year unknown (Camp Robinson Crusoe, 2014).



Figure D.2.3 - Swimming Lake (Closeup) - A closer view of the swimming lake shown in figure 5 (Camp Robinson Crusoe, 2014).



Figure D.2.4 - Boat to Robinson Crusoe Island - This photo from the original camp in Maine shows campers taking a boat to Robinson Crusoe Island, the camp's namesake (Camp Robinson Crusoe, 2014).

D.3 - Historical Structures



Figure D.3.1 - CRC Barn - This barn from the time of Camp Robinson Crusoe still stands on the Leadmine property, and features animal stalls and storage areas, for occasional horseback riding in the camp's later years.



Figure D.3.2 - CRC Outbuilding (Exterior) - This structure is situated on a hill with another like it along with an outhouse. Although mostly collapsed, there are beds inside, signifying its use as sleeping quarters during the time of Camp Robinson Crusoe.



Figure D.3.3 - CRC Outbuilding (Interior) - Pictured above is a structure similar to that in figure 21, although not yet collapsed. As stated above, bed frames can be seen inside.



Figure D.3.4 - Heins Farm Cabin - This cabin, namesake for the Cabin Loop Trail on the Heins Farm property, is set to be torn down in the autumn of 2020, due to its poor condition and the use of hazardous materials in its construction (Dave Barnicle Interview, see appendix A).

D.4 - Ecological Identification Photographs

A. Birds



Figure D.4.1 - American Goldfinch - An American Goldfinch, a common Massachusetts Bird during all parts of the year. From American Goldfinch, by Mike's Birds, 2010, Flickr (<https://www.flickr.com/photos/pazzani/4570024705/>). CC BY-SA 2.0.



Figure D.4.2 - Bluejay - A Blue Jay, another common Massachusetts bird, most commonly seen in the spring and summer months. From Blue Jay, by ScottsIm, 2019, Pixabay (<https://pixabay.com/photos/bird-bluejay-colorful-blue-pattern-4503918/>). CC BY-SA 2.0.



Figure D.4.3 - White Throated Sparrow - The White Throated Sparrow, one of the handful of bird species seen active all winter. From Zonotrichia albicollis, by Cephas, 2011, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Zonotrichia_albicollis_CTL.jpg). CC BY-SA 2.0.



Figure D.4.4 - Tufted Titmouse - Another bird active during the fall and winter, the Tufted Titmouse can be seen in all areas of Massachusetts, including Sturbridge. From Tufted Titmouse, by Jocelyn Anderson, 2016, Wikimedia Commons ([https://commons.wikimedia.org/wiki/File:Tufted_Titmouse_\(187854953\).jpeg](https://commons.wikimedia.org/wiki/File:Tufted_Titmouse_(187854953).jpeg)). CC BY-SA 2.0.



Figure D.4.5 - Eastern Bluebird - The Eastern Bluebird can generally be seen in Sturbridge year round.

From Eastern Bluebird, by Naturelady, 2018, Pixabay

(<https://pixabay.com/photos/bluebird-eastern-bluebird-bird-3456115/>). CC BY-SA 2.0.



Figure D.4.6 - Downy Woodpecker - Seen mainly in spring and summer months, the Downy Woodpecker is known for its ability to chip away at tree bark to get to insects inside. From Male Downy Woodpecker, by DaPuglet, 2018, Flickr (<https://www.flickr.com/photos/dapuglet/31956492762>). CC BY-SA 2.0.

B. Mammals



Figure D.4.7 - Coyote - Coyotes, while mostly often active at night and shy, can be common in wooded areas of Massachusetts. From Coyote, by Jitze Couperus, 2007, Flickr (<https://www.flickr.com/photos/40648743@N00/1751241022>). CC BY-SA 2.0.



Figure D.4.8 - Eastern Chipmunk - Chipmunks are extremely common mammals in all parts of New England, and can be often spotted in Sturbridge. From Eastern Chipmunk, by Oleksi Voronin, 2012, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Eastern_Chipmunk,_Ontario,_Canada.jpg). CC BY-SA 2.0.



Figure D.4.9 - Beaver - Although scarce, Beavers can be found all throughout New England, and there are signs of Beavers calling the Sturbridge properties home, such as old dams. From Beaver at Meadowbrook Pond, by Joe Mabel, 2017, Wikimedia Commons

(https://commons.wikimedia.org/wiki/File:Beaver_at_Meadowbrook_Pond,_Seattle_01.jpg). CC BY-SA 2.0.



Figure D.4.10 - Eastern Gray Squirrel - The Eastern Gray Squirrel is an extremely common mammal in central Massachusetts, seen from backyards to woodlands such as Heins Farm or Leadmine Mountain. From Eastern Grey Squirrel, by BirdPhotos.com, 2010, Wikimedia Commons

(https://commons.wikimedia.org/wiki/File:Eastern_Grey_Squirrel.jpg). CC BY-SA 2.0.



Figure D.4.11 - White Tailed Deer - The White Tailed Deer, common across many areas of the United States, can be occasionally seen in Sturbridge, although they have become increasingly rare with the increased development across the state. From White Tailed Deer Portrait, by Skeeze, 2015, Pixabay (<https://pixabay.com/photos/white-tail-deer-portrait-wildlife-902532/>). CC BY-SA 2.0.



Figure D.4.12 - American Black Bear - While once a relatively common mammal in Massachusetts, likely having a strong presence in Sturbridge during the time of the Nipmuc Native Americans and early settlers/miners, the American Black Bear is a rare sight. Today, they only are found in rural areas of the state, and on rare occasions. From Black Bear, by ArtTower, 2012, Pixabay (<https://pixabay.com/photos/black-bear-animal-black-canim-lake-50293/>). CC BY-SA 2.0.

C. Aquatic Life



Figure D.4.13 -Eastern Brook Trout - Commonly found in brooks and rivers of the eastern United States, the Eastern Brook Trout is found throughout the Hamant brook and Quinebaug river watersheds in Sturbridge. The Hamant Brook Restoration project was instrumental in maintaining the habitat for these fish. From Trout Fish Cave, by Heidimaria, n.d., Needpix

(<https://www.needpix.com/photo/148173/trout-fish-cave-blind-fish-animal>). CC BY-SA 2.0.



Figure D.4.16 - Bluegill - Also known as a Sunfish, the Bluegill is one of the most common freshwater fish in New England, found in most bodies of water. These fish have been directly observed in the Blue Lagoon, on the Leadmine Mountain property. From Lepomis microlophus, by Raver Duane, n.d., Pixnio (<https://pixnio.com/fauna-animals/fishes/lepomis-microlophus-reader-sunfish-fish>) CC BY-SA 2.0.



Figure D.4.14 - Smallmouth Bass - This fish can be found in most New England ponds and lakes. From Smallmouth Bass, by Raver Duane, n.d., Pixnio

(<https://pixnio.com/fauna-animals/fishes/bass-fishes-pictures/micropterus-dolomieu-smallmouth-bass-fish>) CC BY-SA 2.0.



Figure D.4.15 - Largemouth Bass - Like the Smallmouth, the Largemouth Bass is native to many New England bodies of water, and can be found in Sturbridge. From Largemouth Bass, by Raver Duane, n.d., Pixnio

(<https://pixnio.com/fauna-animals/fishes/bass-fishes-pictures/largemouth-bass-fish-art-work-micropterus-salmoides>) CC BY-SA 2.0.

D. Invasive Species



Figure D.4.x: Oriental Bittersweet: Oriental Bittersweet is an invasive species to Sturbridge. The Heins Farm property was infested with it when it was purchased. From Oriental Bittersweet 3, By Soap, 2017, Wikimedia Commons

(https://upload.wikimedia.org/wikipedia/commons/7/72/Oriental_bittersweet_winter_3.jpg) CC BY-SA 2.0.



Figure D.4.x: Honeysuckle: Honeysuckle is an invasive species to Sturbridge. The Heins Farm property was infested with it when it was purchased. From Honeysuckle flowers, By Bill T, 2006, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Honeysuckle_flowers.jpg) CC BY-SA 2.0.



Figure D.4.x: Garlic Mustard: Garlic Mustard is an invasive species to Sturbridge. The properties are currently dealing with a growing population of it. From Garlic Mustard close 800, By Sannse, 2004, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Garlic_Mustard_close_800.jpg) CC BY-SA 2.0.

E. Endangered Species



Figure D.4.x: Spotted Turtle: The spotted turtle is a species of turtle native to the East Coast and Great Lakes region. It is currently endangered. From Spotted turtle (Clemmys guttata) (30982178351), By U.S. Fish and Wildlife Service Northeast Region, 2015, Wikimedia Commons ([https://commons.wikimedia.org/wiki/File:Spotted_turtle_\(Clemmys_guttata\)_\(30982178351\).jpg](https://commons.wikimedia.org/wiki/File:Spotted_turtle_(Clemmys_guttata)_(30982178351).jpg)) CC BY-SA 2.0.



Figure D.4.x: Water Shrew: The water shrew is native to New England, parts of Canada and the West Coast. It is currently considered endangered in Massachusetts. From Northern water shrew with young, By U.S. Fish and Wildlife Service, 2006, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Northern_water_shrew_with_young.jpg) CC BY-SA 2.0.



Figure D.4.x: Eastern Ribbon Snake: The Eastern Ribbon Snake is a species of Garter Snake. It is considered endangered in Massachusetts. From Eastern Ribbon Snake, by Greg Schechter, 2013, Wikimedia Commons

([https://commons.wikimedia.org/wiki/File:Eastern_Ribbon_Snake_-_Flickr_-_GregTheBusker_\(2\).jpg](https://commons.wikimedia.org/wiki/File:Eastern_Ribbon_Snake_-_Flickr_-_GregTheBusker_(2).jpg))

CC BY-SA 2.0.