



Sustainability Quest for High Schoolers

Marsh-Billings-Rockefeller National Historical Park, Woodstock, Vermont

Physical Difficulty: Moderate

Special Features: Historical, Natural (forest, fields, gardens, & tracker solar panel)

Walking Difficulty: Carriage roads and trails

Duration: 1:30

Bring: Field Guide, Binoculars

To get there: From Interstate 89, take Exit 1. Follow Route 4 West about 13 miles, through Quechee and Taftsville to Woodstock. Turn right onto Route 12 North and bear right after the iron bridge, continuing 1/4 mile. Park in the Billings Farm & Museum parking lot. Use the crosswalk at Route 12 to access the National Park.

Overview:

"What we have here is a very early experiment in sustainability. It was not just about the renewal of resources but the renewal of the human spirit." Rolf Diamant, Superintendent 1998-2011

As the only park in the National Park System focused on telling the story of conservation history, Marsh- Billings-Rockefeller National Historical Park is working hard to ensure that all aspects of its current operations are contributing to a healthier and more sustainable Park. Projects like its state-of-the-art composting operation and its high efficiency Garn wood boiler heating system are just a few examples of the Park's sustainable practices. The Sustainability Quest will lead you on a personal tour of the highlights of the Park's sustainability program, starting at the Carriage Barn and heading out onto nearby trails. As you walk, rhyming clues will guide you across the landscape and toward a hidden treasure box. In the treasure box you will find a logbook in which you can sign your name and record any thoughts you would like to share (and maybe even a sketch or a little poem!). You will also be

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able to collect an impression of the hand-carved rubber stamp when you complete the Quest.

Clues:

Movement clues and will direct you around this Quest along with the map which can be found on the back page. The teaching clues will tell you facts about sustainability at the Marsh Billings Rockefeller National Historical Park.

*For thousands of years our river ran free,
The one called "Ottaquechee" by the Abenaki.
It gave fish for their pots, new soil every spring,
A watery avenue for birds on the wing.
But in 1760, after Tim Knox settled down,
Other Englishmen followed to this Woodstock town,
And dammed the river, ran sheep on the hills;
Nature's coffers they emptied, as they took their fill.
But in this gentle spot, 'tween Mount Tom and the river,
New ways of living lightly have been delivered
By Marsh, Billings, and Rockefeller -- now come see
How the Park Service is stewarding sustainably.*

Path to the National
Park from the
Billings Farm and
Museum Parking Lot



Start at the bottom of the drive leading up to the Carriage Barn Visitor Center. The Mansion should be on your left and the path to the trails on your right.



STOP #1

We love the environment that much is clear.
Away from fossil fuels is the direction we steer.
Our new implementation, though a lot we are spending,
Will surely help stop the climate problems impending.
The old HVAC system in the Carriage Barn was bad,
Fossil fuels were the only energy source we had.

By drilling through the ground and installing some pipes,
The HVAC system has become a much better type.
When the air and water is too hot or too cold, it will pump into the
ground through the pipes controlled.
The earth surrounding will provide or take heat,
Causing the temperature to regulate – that’s neat!
Geothermal is the name of the new system we’ll use,
65% of the Carriage Barn’s carbon footprint we’ll lose.

The Inside Scoop #1: A geothermal HVAC system was installed to replace the fossil fuel HVAC system. The geothermal system is implemented by drilling holes and installing pipes in the ground. A portion of our geothermal system is located just steps away from where you’re standing! In the colder months, the air is cold and the earth that surrounds the geothermal pipes heats the water that is pumped through. In the warmer months, the earth is colder and therefore the heat is absorbed into it and the water comes up cooler. The geothermal system will completely eliminate the Carriage Barn’s use of fossil fuels, as well as lower energy costs and provide sustainable heating and cooling.

MOVEMENT CLUE #1:
*To continue your Quest,
Head up the drive
And learn how three families
Helped this forest thrive!*



STOP #2

The Billings loved horses, and kept them in style.
What’s been done to their livery would make them all smile:
For the new Park chose not to do needless construction,
And instead the Carriage Barn is the Park’s introduction.
While sharing some parking with Billings Farm, ‘cross the street,
This building now works well to meet and to greet.
Here visitors see Park trees transformed into wares
Both lovely and useful, like tables and chairs.
By sustainably harvesting specified trees,
There will always be plenty to supply our needs.
Frederick Billings was up-to-date, he loved modern contraptions,
So we think he’d approve, with great satisfaction,
Of the appliances here that save energy and water.

Have you tried them at home? We think that you oughter!

The Inside Scoop #2: This building was designed for low-energy lighting and off-set heating and cooling controls. It contains, among other things, a high efficiency boiler, low-flow flush toilets and motion light detectors in the bathrooms.

MOVEMENT CLUE #2:

*Walk towards the mansion from the Visitor Center
Stay to the right and stop behind the back porch door.
The small brick building on the right is critical in the winter
Read the sign that will tell you more!*



STOP #3

To heat the mansion all year, a lot it does cost
So the park chose an alternative before more money was lost.
We looked around to identify resources at hand
And saw a fuel source growing up from the land.
Trees and wood do abound,
Perhaps we could cut some down.

A Garn wood boiler we did in install
In a little garage accessible to all.
The boiler is efficient and clean
The only exhaust from it is steam.
Alongside the Garn boiler we added another—
A pellet boiler to cut oil costs further!

It is laborious to load the boiler with wood
So use pellets as well we decided we should.
With the Garn boiler running at light
And the pellet at night,
The mansion cut its oil consumption in half
While keeping nice and warm, the staff!

The Inside Scoop #3: A Garn wood boiler has been installed in the mansion and the forest center to heat the facilities using a renewable resource. Garn wood burning boilers use a large hydronic thermal storage tank to store heat from the wood burning gasification process. The two stage gasification technology produces virtually no smoke. In 2016 a wood pellet boiler was added to help heat the mansion at night and on weekends when there was no one there to load the Garn wood

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boiler. On average it uses about 3.6 tons of pellets a month. The pellets come from Lyme Green Heat, which is a plant that the park sends some of its harvested wood to. The pellets are very dense, burning with a high combustion efficiency, producing just a fraction of the emissions of oil.

MOVEMENT CLUE #3:

As you continue straight down the path
Stop to look at the lawn and flowers—
An example of the work of our staff
Keeping it green working many hours!



STOP # 4

In 1890, the year that Frederick Billings died,
The first golf course in Woodstock did arrive.
And even up through Laurance S. Rockefeller's day,
That image of lawn perfection still held sway.
The smooth green ideal still keeps us mesmerized:
But how can lawns be kept and still let Nature thrive?
Today, here the ideal is 100% organic
Yet grubs and aphids still do panic.
For scientific measures of degree-days and rain
Combined with observation the bugs do detain.
And the Park's ingenious methods of insect pest surveillance
Even spread to try the gentle deer's patience
Using the simple weapon of Irish Spring soap,
For the garden's deer-tempting greens, there's now hope!

The Inside Scoop #4: These lawns are maintained at historic levels of beauty with minimal herbicides and pesticides through a program of Integrated Pest Management -- a combination of adequate irrigation (to prevent crabgrass), fertilization with compost, raising the height of the mower blade (to prevent broad-leaf weeds), staged treatment of infestations based on regular observation of emergence of related species (phenology), and over-seeding in the fall through small holes pierced in the lawn. Trees are mulched to maintain moisture and prevent root compaction and pruned to reduce pests through better air circulation.

MOVEMENT CLUE #4:

When you come to a fork,
Stay to the right

Until small spruce trees
Are in your sight!

 **STOP #5**

Marsh planted Lombardy poplars; Billings, Scotch Pine.
Even Laurance Rockefeller thought it just fine
To replace the native foliage with exotic.
But hopefully they all wouldn't think it unrealistic
That today the indigenous gets special attention.
And the experts agree on native plant retention.
So invasive species that move in and take over,
Just can't be allowed—they need a makeover.
Hence the Norway maple that once here grew
Has been removed by an industrious crew
And been replaced with another foreign guest,
But at least Norway spruce is a historical behest.
Mr. Billings planted Norway spruce to show it grew fast
And then farmers could turn those trees into cash.
In a historical demo, the Park's planted spruce too,
So future generations can experience what you now do.

The Inside Scoop #5: Norway maple was removed from this site because it is an invasive, non-native species that can out-compete native species and has the potential to reproduce to the extent that it takes over. This area is being replanted with Norway spruce, as a historical demonstration of forestry practices from Billings' time. Norway spruce is also non-native, but is not invasive. Elsewhere in the park, contemporary forest management for northern New England hardwoods is being practiced.



MOVEMENT CLUE #5:

Stay straight on the path
Up the hill you'll go.
Then take your first right
Find the fenced garden where hemlocks grow!



STOP # 6

This plot at one time was a vegetable garden,
Where tomatoes and peppers were set out to harden.
Before that it served as a fenced pony pasture,
Where the Rockefeller's ponies were all kept secure.
But even the tallest trees start out as babes,
And trees need special care, sun-loving or shade.
Now the hemlock hedges that rim the estate
In this nursery are given a beginning, first rate.
Tiny hemlocks are gathered from the forest right here;
Energy is saved by keeping activities near.

The Inside Scoop #6: By propagating their own supply of hemlocks needed to keep the hemlock hedges replenished, the Park not only reduces the risk of bringing in an infestation of the sap sucker bug the woolly adelgid, but also reduces fossil fuel use through eliminating transportation costs.

MOVEMENT CLUE #6:

Look on the other side of the road
And you'll see the next stop—
A narrow brown building
With a weather vane on top!



STOP #7

In the Rockefellers' time the Upper Meadow was a pasture
Where the horses were stabled in a modest structure.
The Horse Barn later became a tool shed,
Until Park managers thought they could use it instead,
If it was remodeled as a studio for the resident artist to explore
New conservation ideas in a space now sustainable to the core
The inside is refurbished with wood from the forest
Beautiful and functional to inspire the artist

A solar panel provides power, and a wood stove to heat;
It's entirely off the grid, and that you can't beat!



Pony Shed 1965

The Inside Scoop #7: The Pony Shed has been remodeled so it can be used by the Art and Conservation Stewardship resident artists, and also as a space for other park programs. A new solar panel was installed to power the building and a wood stove will heat it in the winter.

MOVEMENT CLUE #7:

Look beyond the nursery
Do you see a small shed?
It's not for tools
But to dry lumber instead!



STOP # 8

Lumber is a resource that the park produces
For all different types of uses.
From the trees it is cut, sawn and planed
And in the pony pasture it does for a short time remain.
It is important for the wood to dry quickly and flat
To ensure it doesn't stain, warp or crack
So the Vermont Youth Conservation Crew built a structure for this
A kiln that harvests energy from the sun- a source we can't miss!
Solar panels circulate fans for humidity control
To direct the moisture as off the boards it does roll.

Inside Scoop #8: Moisture content of lumber in the kiln must be carefully monitored to control the rate of drying and avoid degrading. The Park can save a great deal of money if Park projects are made from lumber sawn and dried on site instead of from purchased lumber.

MOVEMENT CLUE #8:

Crossing the field on a small path, majestic trees on both sides.
A small sign - "Junior Ranger Loop" - marks a path you take with pride
You are getting close to the end of your Quest, not much further
Turn right at the end of the Path, making your way to the Forest Center.



STOP # 9

The park needed a place to host
Students and public alike who use the Park most
A new building was created on a site
That once housed a sawmill so impact was light
An innovative structure they did design
With energy, airflow, site location, and materials in mind
Leaders in Energy Efficient Design certification
Was awarded for foresight and environmental dedication
Now in the Forest Center you can see
Examples of thought about economy, environment, and energy.
Passive and active solar, low-flow toilets and faucets, locally sourced
wood, and a garn boiler for heating

The Inside Scoop #9: The US Green Building Council has awarded its highest rating for Leadership in Energy Efficient Design to the Forest Center. This includes green building design, construction, operations and maintenance. The Forest Center is also FSC (Forest Stewardship Council) certified. To be certified by the FSC means that the forests are managed to high standards of social, environmental and economic issues.



MOVEMENT CLUE #9:

Now you must find your treasure,
Behind this building, a brown box will deliver.
To sign the book and get your stamp,
Just reach inside, no need for a ramp!



Bonus Information!

Each year in May, from 1820 on,
 All schoolchildren of Woodstock would climb up Mount Tom.
 They'd survey the village – the fine Shiretown,
 Admire Killington and Ascutney's crowns.
 Later Billings built carriage roads through the newly planted trees,
 And the people still walked to the top if they pleased.
 In his turn, Laurance S. Rockefeller kept up this tradition
 Believing that experience leads to recognition.
 Now these trails host visitors from all over the Earth,
 Cosmopolitan walkers who know the great worth
 Of honoring the land, and traditions of the past
 As they move through a landscape they know will last.

The Inside Scoop #12: Laurance Rockefeller opened his property to the public as part of his personal philosophy of sustainability that held that people come to care about places and act on their behalf through direct experience in the landscape. Community partner organizations now help the Park with the work of maintaining this extensive trail system.

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Revised in 2020 by staff at Marsh-Billings-Rockefeller NHP and Vital Communities.

Please be a good steward of the land: leave it better than you found it and pack out any trash you find.



Valley Quest is a collection of 160+ treasure hunts that share and teach the natural gems and cultural heritage of the Upper Valley with children, families, adults, and visitors. It is a program of Vital Communities, a regional nonprofit working to engage citizens, organizations, and communities in creating solutions to our region's challenges. Learn more at vitalcommunities.org.

Have a suggestion, question, comment, or idea for us? We'd love to hear from you. Reach us at valleyquest@vitalcommunities.org or 802-291-9100.