Inventory & Monitoring Division
Northeast Temperate Network

National Park Service
Marsh-Billings-Rockefeller NHP

FIGURING IT OUT

A Forest Shaped by Time, People, and Change

Long-term monitoring and natural resource inventories reveal the past, present, and possible futures of park ecosystems.

PANEL 1 THE FOUNDATION BENEATH THE FOREST

Rock, ice, water, and time built the land that supports life at Marsh-Billings-Rockefeller NHP.

Ancient seas, mountain building, glaciers, and flowing water created the bedrock, soils, and wetlands that shape the park's forests and streams today.

FROM DEEP TIME TO TODAY

1. ANCIENT OCEANS
~520–400 MILLION YEARS AGO

Sediments of sand, mud, and lime accumulated on the seafloor.

2. MOUNTAIN BUILDING
~400–250 MILLION YEARS AGO

Collision of ancient continents compressed and folded the rocks, lifting what are now the Green Mountains.

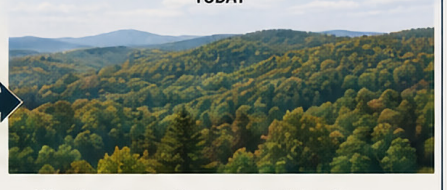
3. GLACIATION
~2.6 MILLION–12,000 YEARS AGO

Ice sheets scoured the landscape, carving valleys, rounding hills, and leaving behind tills, sand, and gravel.

4. MELTWATER & WETLANDS
~12,000 YEARS AGO–PRESENT

Meltwater filled basins and carved streams. Wetlands formed in depressions and along valley floors.

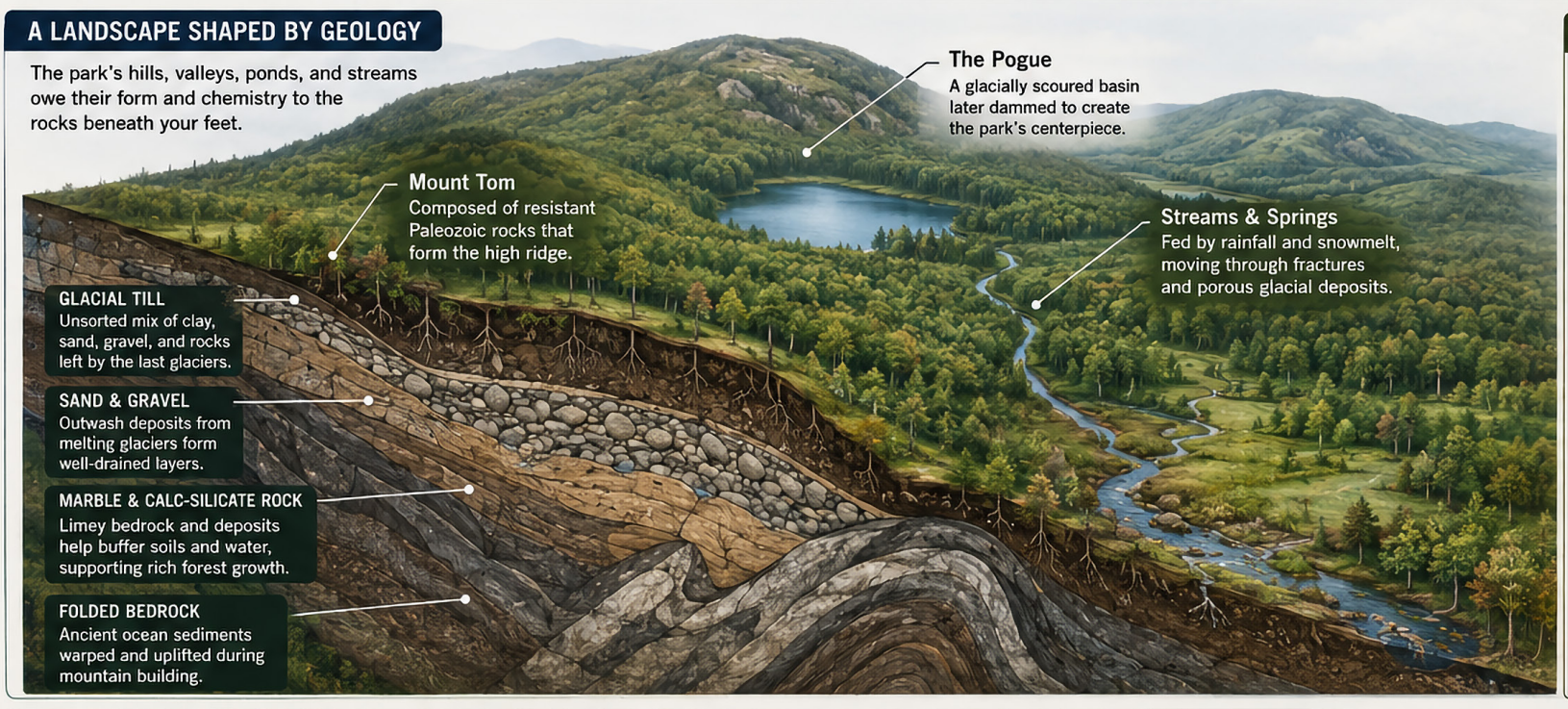
5. A LIVING LANDSCAPE
TODAY



Weathering continues to build soils. Streams flow, and life thrives on this dynamic foundation.

A LANDSCAPE SHAPED BY GEOLOGY

The park's hills, valleys, ponds, and streams owe their form and chemistry to the rocks beneath your feet.



SOILS, WATER, AND LIFE

RICH, LIMEY SOILS
Weathering of marble and other carbonate-rich rocks creates calcium-rich soils that can support sugar maple, hemlock, other native trees, and a diverse forest herb layer — where browse, worms, and disturbance allow it.

CLEAN, BUFFERED WATERS
Long-term monitoring shows generally well-buffered waters. Continued monitoring can help track nutrients, temperature, and other signs of change.

WETLANDS AND PONDS
Glacial depressions and fine-textured soils hold water, creating wetlands that store water, filter it, and support diverse plants and wildlife.

CONTINUOUS CHANGE
Erosion, weathering, and flowing water continue to shape the land—slow processes with powerful results.

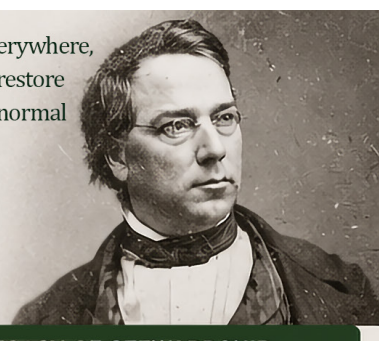
The forest and waters above reflect the foundation below.
Geology, soils, wetlands, and long-term monitoring help us understand how the park's living systems are changing.

PANEL 2 A FOREST SHAPED BY PEOPLE

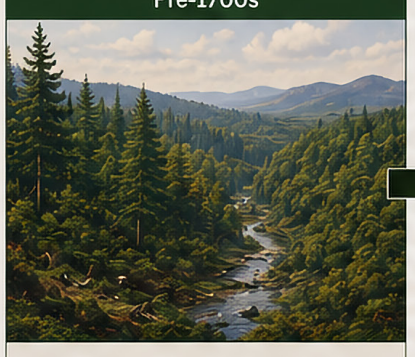
Human choices have dramatically changed this landscape.

From clearing the hills to restoring the forest, people have left a lasting imprint on the land.

"We have now felled forest enough everywhere, in many districts far too much. Let us restore this one element of material life to its normal proportions..."
– George Perkins Marsh, 1864

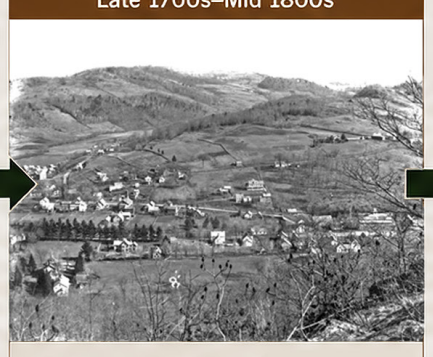


1. BEFORE EUROPEAN SETTLEMENT
Pre-1700s



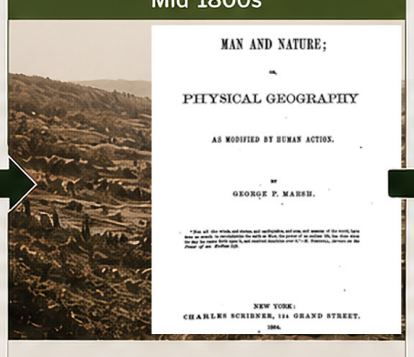
Vast forests of hemlock, pine, oak, and maple blanketed the hills. Native peoples used the land sustainably for thousands of years.

2. CLEARING THE LAND
Late 1700s–Mid 1800s



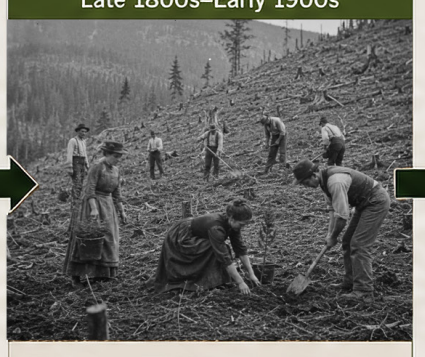
Widespread logging and farming removed forests from the hillsides. Soils eroded, streams filled with sediment, and floods became more severe.

3. RECOGNIZING THE PROBLEM
Mid 1800s



George Perkins Marsh lived here and saw firsthand how deforestation caused erosion and flooding. His book *Man and Nature* (1864) helped spark a national conservation ethic.

4. RESTORING THE FOREST
Late 1800s–Early 1900s



The Billings family began reforesting the hills. Tree planting, erosion control structures, and careful management helped the land heal.

5. A LEGACY OF STEWARDSHIP
1900s–Today

The Rockefeller family continued active stewardship — conservation, restoration, selective harvests, plantations, and roads — shaping the landscape we see today.

TOOLS OF CONSERVATION

Early conservationists relied on observation, forestry (primarily derived from European practices), and innovation to try to heal the land.

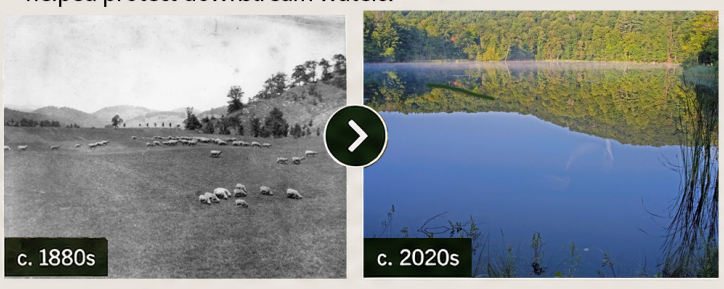
TREE PLANTING
Reforestation of cleared hillsides—using native and some non-native species—helped stabilize soils and restore forest cover.

EROSION CONTROL
Check dams, stone walls, and terraces slowed runoff, trapped sediment, and reduced flooding downstream.

FOREST STEWARDSHIP
Plantings, selective harvests, plantations, and road building reflected evolving ideas about how people should care for this forest.

A LANDSCAPE IN RECOVERY

Recovering forests stabilized slopes, reduced sediment, and helped protect downstream waters.



Today, the hills are greener, the waters are cleaner, and the land is more stable.

HUMAN INFLUENCE CONTINUES

DEER BROWSE PRESSURE
The deer population can shape which young trees and forest herbs survive.

UNDERSTORY RECOVERY
Rich soils can support diverse forest herbs, but deer, earthworms, and disturbance often suppress them.

INVASIVE SHRUB CONTROL
Long-term treatment has sharply reduced invasive shrub cover—one of MABi's clearest restoration successes.

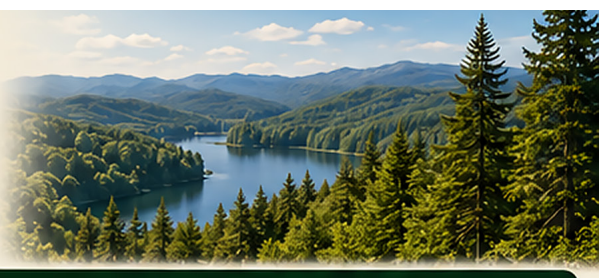
THOUGHTFUL FORESTRY
Forest management that seeks to balance dual need for timber production and protection of ecosystem processes and forest dwelling species.

PANEL 3 THE FOREST OF TOMORROW

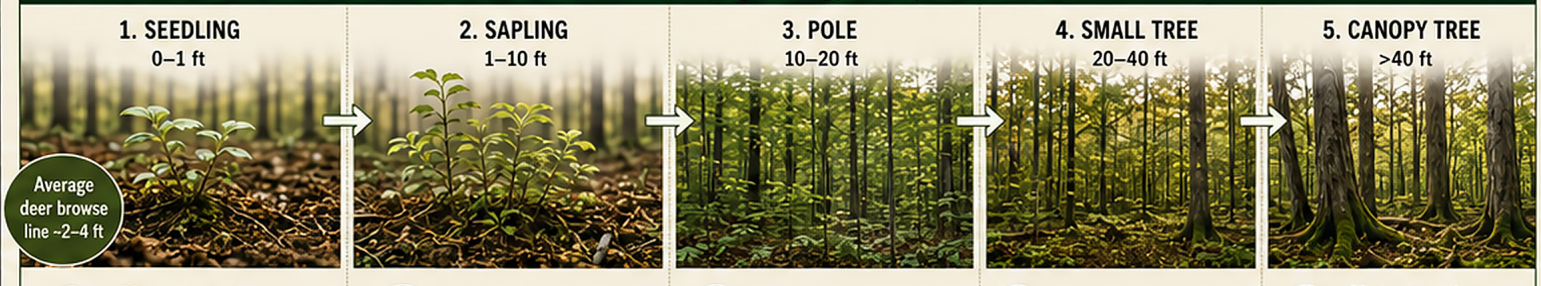
Today's forest remains mature and diverse, but the next generation—and the herb layer below—face a bottleneck.

Deer browse, earthworms, pests and pathogens, and climate stress are limiting successful regeneration—especially at the sapling stage—and suppressing the rich forest herbs these soils can support.

"The preservation of existing woods… [is] among the most obvious duties which this age owes to those that are to come after it."
— George Perkins Marsh
Man and Nature, 1864



THE REGENERATION BOTTLENECK
From seedling to canopy—many don't make it.



Many germinate, few persist.
Deer browse, earthworms, drought, and competition can limit survival.

The main bottleneck
Heavy browse keeps many preferred canopy species from recruiting upward.

Few replacements arrive
Past losses at the sapling stage reduce tomorrow's midstory.

Composition begins to shift
Species that escape browse or tolerate stress become more prominent.

Mature trees face new stress
Beech disease, emerald ash borer, storms, and climate stress affect the overstory.

WHAT WE SEE TODAY

A mature forest with emerging pressures.

STRUCTURALLY DIVERSE
Mature trees, layered canopies, and standing dead wood provide critical habitat.

SUPPORTS WILDLIFE
Forest interior birds and many other species depend on large trees and complex structure.

PROTECTED WATERSHEDS
Forests filter water, reduce erosion, and keep streams cool and clean.

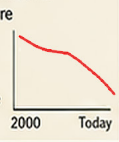
SIGNALS TO WATCH

Sugar maple: common seedlings, limited saplings

Hemlock & white pine: underrepresented in regeneration

Beech & hophornbeam: often favored where browse is high

Invasive shrubs: declining over time



Forest birds are signals, too: these species respond to changes in forest structure.

Blackburnian Warbler — Needs mature conifer and mixed forests.

Black-throated Blue Warbler — Uses dense understory.

Brown Creeper — Needs large trees and snags.

Yellow-bellied Sapsucker — Uses mature trees and wet woods.

Winter Wren — Uses moist, shaded forest.

WHY IT MATTERS

FOREST RESILIENCE

WILDLIFE HABITAT

WATER & SOILS

CARBON STORAGE

BUT THE FUTURE IS UNCERTAIN

The next forest may look different.

MORE BROWSE-RESISTANT SPECIES
Sugar maple, beech, and hophornbeam are regenerating more successfully.

FEWER CANOPY RECRUITS
Hemlock, fir, white pine, and other conifers are often underrepresented in the next generation.

SIMPLER FORESTS
Fewer species and less structural diversity can reduce resilience to future stress.

A healthy future forest starts with successful regeneration today.
Protecting soils, reducing deer impacts, and sustaining forest stewardship can help native herbs and young trees recover.

EXPLORE THE SCIENCE BEHIND THE STORY

For more than 20 years, the Northeast Temperate Network has monitored forests, birds, water quality, and other ecosystems at Marsh-Billings-Rockefeller NHP.

Visit the park's NETN webpage to explore monitoring reports, species lists, geologic history, and more.

www.nps.gov/im/netn/mabi.htm

ACADIA NP • APPALACHIAN NST • BOSTON HARBOR ISLANDS NRA • MARSH-BILLINGS-ROCKEFELLER NHP • MINUTE MAN NHP
MORRISTOWN NHP • ROOSEVELT-VANDERBILT NHS • SAINT-GAUDENS NHS • SAUGUS IRON WORKS NHS • SARATOGA NHP • WEIR FARM NHS

FIND YOUR PARK