Lehigh Gap Nature Center

Lehigh Gap DISCOVERY TOUR

SELF-GUIDED HIKING TOUR

lgnc.org | @lehighgapnaturecenter

Welcome to the Discovery Tour!

Your guide to the Lehigh Gap!

Thanks for visiting Lehigh Gap Nature Center (LGNC)! This self-guided tour will transport you back in time to discover the uniquely fascinating story of the Lehigh Gap – from over 400 million years ago to the present day. At the nine numbered stops along LGNC's LNE Trail, use this guide to learn what each site can tell us about the region's natural and cultural history.

When did people first arrive in this area? Why did the mountain look like the moon for over 50 years? How did LGNC establish the first nature center on a Superfund site? Find the answers to these questions and more as you hike through the Lehigh Gap!

LGNC is a member-supported non-profit organization that is dedicated to protecting the wildlife and enhancing the habitats of our wildlife refuge, the Kittatinny Ridge, and the Lehigh River Watershed. Please consider supporting LGNC as a member, donor, or volunteer! **Visit *lgnc.org*** to learn more about LGNC and how to get involved.

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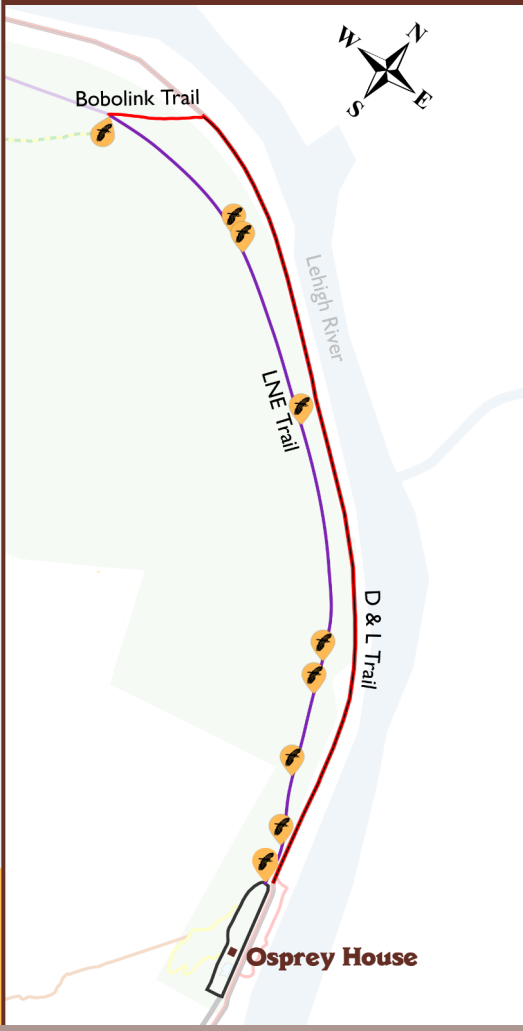
This project was funded by the **Mickley/Fravel Charitable Trust** and the **Rotary Club of Slatington**.

Getting Started

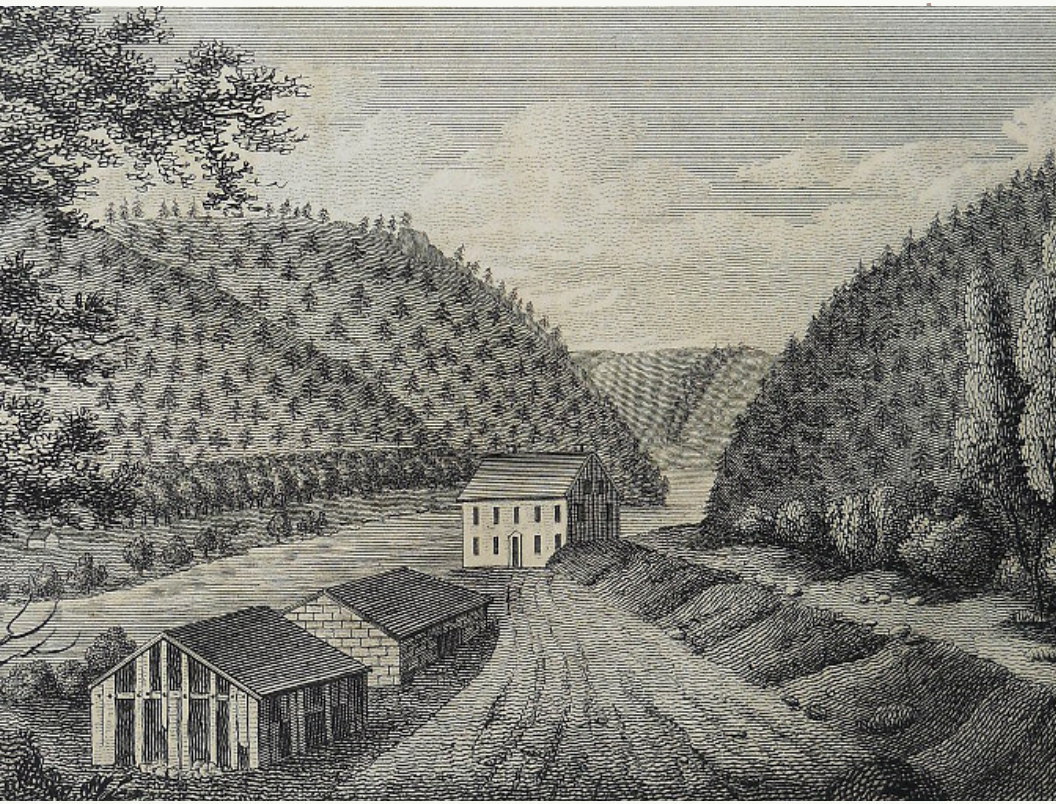
The Lehigh Gap Discovery Tour follows LGNC's LNE Trail along the route of the former Lehigh & New England (LNE) Railroad. This trail is part of the 13-mile trail network that traverses LGNC's 756-acre refuge. The **map on this page** shows the location of each stop along the trail.



Where Are We?

1

Looking around you, how many mountains do you see? Believe it or not, you are actually looking at one mountain – not two – called the **Kittatinny Ridge**. Meaning "endless mountain" in the Lenape language, the Kittatinny stretches nearly 200 miles across eastern and central Pennsylvania. Once a solid mountain, the Ridge was divided in half by the erosive forces of the Lehigh River to form what we know today as the Lehigh Gap. This is one of five major water gaps along the Ridge.



The Lehigh Gap in 1812

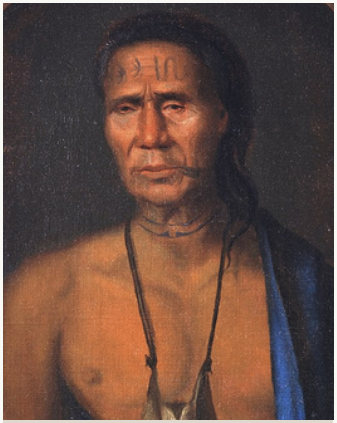
As part of the **Lehigh and Delaware watersheds**, the Lehigh Gap drains its water into the Lehigh River, which later flows into the Delaware River. This means that the health of the land in the Lehigh Gap directly impacts the health of these waterways that provide habitat for wildlife, as well as drinking water for communities to our south.

A Map of Lenapehoking

LGNC also lies at the heart of **Lenapehoking**, the traditional homeland of the Lenape People. For thousands of years prior to European contact, the Lenape People and their ancestors hunted, gathered, farmed, and traveled on the land around you. The Lenape remain the keepers of this region's Indigenous knowledge.

Prehistory and the Dawn of Industrialization

2



Lenape Chief Lapowinsa

As you begin your journey north through the Lehigh Gap on the LNE Trail, you are following in the footsteps of the earliest Indigenous inhabitants of this region, who arrived here about 13,000 years ago. At that time, the Lehigh Gap was emerging from the icy grip of our most recent Ice Age.

As a mile-tall sheet of ice receded from northeastern Pennsylvania, life gradually returned to the rugged post-glacial landscape. Among the wildlife that roamed this growing habitat were wooly mammoth, elk, and bison – important game animals for North America's earliest Indigenous hunter-gatherers, known as the Paleo-Indians. The first people to step foot in the Lehigh Gap followed these animals as they migrated into our region.

The post-glacial ecosystem (credit: Mauricio Antón)

Native Americans took stewardship of the land around you for generations before European contact. On the top of the Kittatinny Ridge (visible from Stop #9), a **vast savanna** – one of Pennsylvania's last remaining original grasslands – grows where Indigenous People once used prescribed fire to manage the ecosystem for farming and hunting. Before it was a busy highway, the **road across the river** (now known as Route 248) was a Native American foot trail called the Nescopeck Path.

Kittatinny Ridge savanna

The discovery of anthracite coal 15 miles above the Ridge in 1791 marked the beginning of the Lehigh Gap's story in the Industrial Revolution. Some signs of industry, such as the remnants of the railroads, are still visible. However, others are more easily overlooked. The area behind this sign is an **abandoned sandstone quarry**. Although this quarry likely only provided building material for local residents, it represents the Lehigh Gap's larger role as an important source of natural resources.

Just as Native Americans relied on the mountain and the river for food and materials, so too did the European settlers who first arrived here in the 1730s. Here are some examples:

- Acid-rich tree bark from the surrounding forests was used to tan leather in the small family-owned tannery of German immigrant Jacob Hailer. In operation from about 1840 to 1910, the **stone tannery** still stands at the entrance to the Osprey House parking lot.

- From 1828 to 1886, thousands of acres of forest around the Lehigh Gap were burned to produce charcoal to fuel the region's iron furnaces. **Charcoal pits** are still visible along several of LGNC's trails to this day.

- Lastly, the **road to LGNC** still bears the name of a paint mill that once produced paint from rock mined from the surrounding mountains.

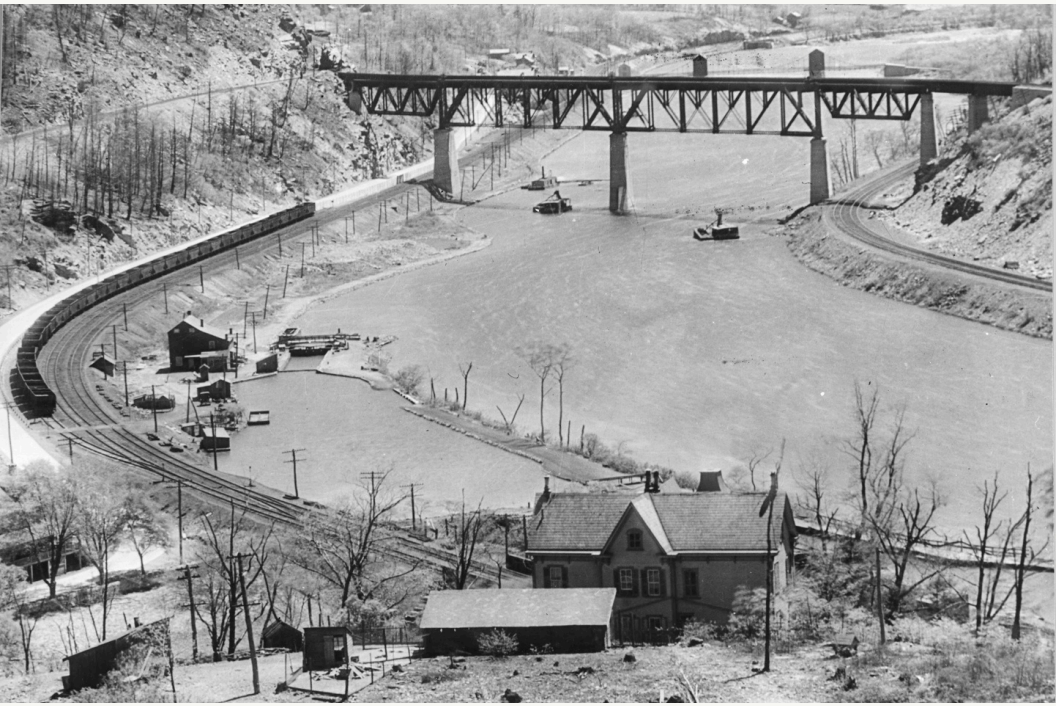
Each of these early industries was located here because of the resources the Lehigh Gap contained. A bit later, we'll take a closer look at the Gap's important role as a transportation corridor during the Industrial Revolution.

A Bird's-eye View of the Lehigh River

3

You are now standing at the center of the Lehigh Gap. Do you see any fishermen, boaters, or wildlife on the **Lehigh River** below? Nowadays, this stretch of the river is healthier than it's been since the beginning of the industrial era. But not all that long ago, the impacts of industry left the waterway toxic and lifeless.

From the 1820s through the 1960s, the Lehigh River was privately owned by the Lehigh Coal & Navigation Company, which used the waterway for coal transportation. In addition, many factories and towns dumped their industrial waste and sewage into the river and its tributaries. As a result, water quality was very poor.



Boats dredge for coal in a polluted Lehigh River.

Credit: Dave Levandusky

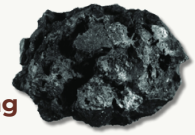
The Clean Water Act, Clean Drinking Water Act, and conservation efforts by LGNC and others have helped to restore the Lehigh River back to good health. You might even see **Common Mergansers, Bald Eagles, and Ospreys** hunting for fish! But the river's future depends on us to continue caring for the water and the land around it. How can *you* do your part to keep the Lehigh River clean for generations to come?

Beside you, next to the trail, is a **cement county line marker**. Up until this point, you have been in *Lehigh County*, named for the Lehigh River. The remainder of this tour will take place in *Carbon County*, named for the abundant *coal* that was mined and transported from this region. Composed of the remains of ancient swamp plants, anthracite coal is a carbon-rich rock that burns at a high temperature. This made it an ideal source of fuel during the Industrial Revolution.

Coal

An Epicenter of the Industrial Revolution

You probably noticed that the LNE Trail looks a bit differently at this stop. As you hiked down the stone stairs, the trail flattened out. You are now on a cement platform covered with coal, stone, and *slag*. Along the edge of the platform is an old telegraph pole in a state of disrepair. What is going on here? This is one of the **ruins of the LNE Railroad bridge** that once connected the east and the west slopes of the Lehigh Gap. Completed in 1912, this railroad transported coal from the mines to markets as far away as New England for about 50 years.

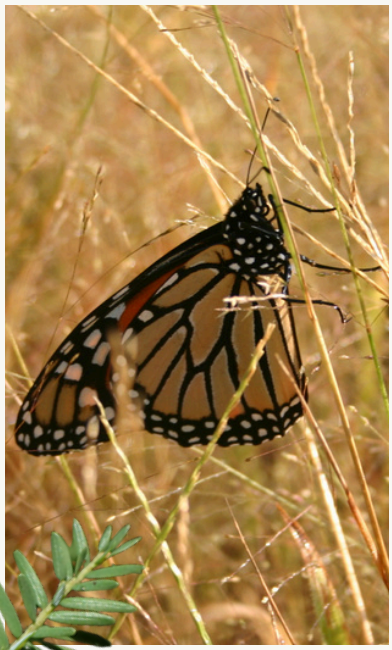


Slag

Rail workers pose near the newly-completed LNE bridge in 1911.

The LNE Railroad was actually the last and most recent addition to the Lehigh Gap's once-bustling transportation network. After anthracite was discovered in Carbon County, mining companies faced the challenge of getting the coal through the Kittatinny Ridge to factories in the Lehigh Valley, Philadelphia, and beyond. Just as in prehistoric times, the Lehigh Gap served as an important natural passageway through the mountain. Amazingly, *nearly all of the coal that powered America's Industrial Revolution* passed through the Lehigh Gap and the Schuylkill Gap further west.

First, the coal was transported on the Lehigh River by wooden rafts called *arks*. This inefficient method was replaced by the *Lehigh Navigation System* in the late 1820s, which used a combination of dams and canal to control the flow of water, allowing boats to safely navigate nearly the full length of the river. This worked well until the water froze. The construction of the Lehigh Valley and the Lehigh & Susquehanna railroads by the 1860s deemed river and canal transportation obsolete. From this vantage point and as you continue your tour, look for other signs of the railroads and canal.



Credit: Scott Keys

The Kittatinny Ridge is also an important natural corridor for wildlife. Its miles of dense Appalachian forest are home to hundreds of species year round. In addition, thousands of birds, butterflies, and other animals follow the Ridge on their annual migratory journeys. Especially keep an eye out for **migrating birds of prey** during the fall!

This lithograph from 1875 shows the rise in industry within the Lehigh Gap. Note the canal, railroads, bridge, and road. The LNE Railroad had yet to be built at this point.

If Rocks Could Talk...

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When the LNE Railroad was constructed, this section of the mountain was blasted away to create a clear, flat path for the railbed. This gives us a great look at the inside of the mountain. What do you notice about the rocks in front of you, and what does this tell us about the Earth's past?

First, note that this wall is made up of many layers. Known as **strata**, these layers consist of sediment that was deposited and compacted over millions of years to form solid *sedimentary rock*. As its name implies, this type of sedimentary rock – called *sandstone* – is made up of sand that eroded into an ancient ocean during the Silurian Period more than 400 million years ago.

But how did the sandstone make its way into the Kittatinny Ridge, now miles away from the nearest ocean? About 270 million years ago, the African and North American continental plates collided to form the *supercontinent Pangea*, pushing this sandstone out of the ocean into a chain of mountains that today includes the Appalachians. Notice how the force of this collision **bent and uplifted the layers** in this wall! These mountains were once as tall as the Andes but have since eroded down to their current height by wind, rain, ice, vegetation, and other natural forces.

The Kittatinny Ridge once towered as high as the Andes.

Do you see any other rock types in your surroundings? The **bright red rock** overlooking the town of Palmerton to your northeast (ahead and to the right) is called *mudstone*. You guessed it – that sedimentary rock is made of solidified mud! That particular type of mudstone contains iron that oxidized as the rock formed, resulting in its unique reddish hue.

The Lehigh Gap Becomes a 'Moonscape'

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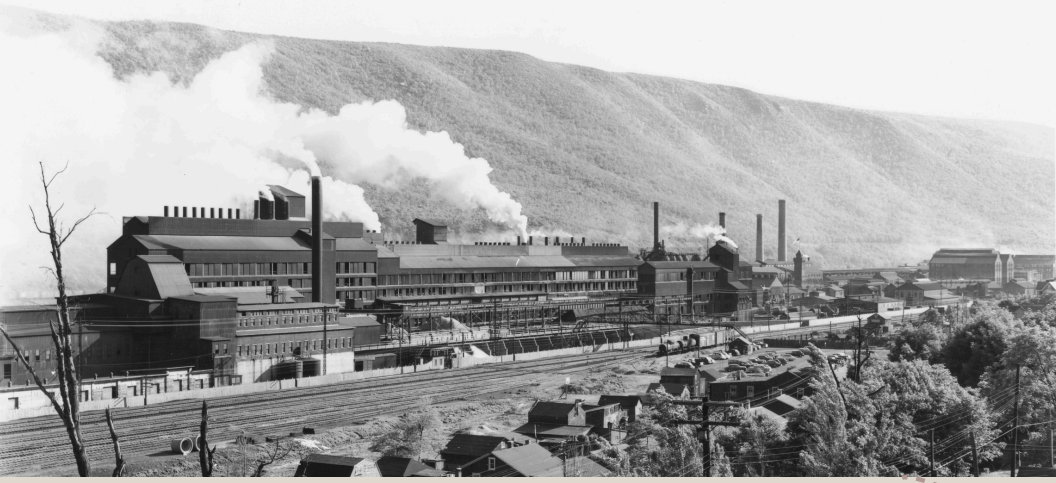
Known for its magnificent scenery, the Lehigh Gap was a popular vacation destination in the 1800s and early 1900s. The mountain was still green and full of life at that time. Yet, by the end of the 1950s, about 3,000 acres surrounding the town of Palmerton were completely devoid of vegetation, resembling a desolate lunar landscape.

The **steep, rocky slope** at this stop offers a good idea of how most of the mountain looked after the trees and soil disappeared. *What happened?*

The Lehigh Gap in 1912 (top) vs. the 1950s (bottom)



The West Plant of the New Jersey Zinc Company

In 1898, the New Jersey Zinc Company (NJZ) built a new, state-of-the-art factory across the Lehigh River north of where you now stand. Like other metals, zinc must be removed from rock through a process called *smelting* before it is usable. NJZ smelted zinc for about 80 years.

Despite NJZ's best efforts to limit its pollution, smoke from the smelting process deposited heavy metals and produced acid rain. This deadly combination killed off nearly all vegetation around the factory. Without roots holding it in place, one to two feet of topsoil washed away, leaving behind nothing but rock. The site had become so toxic that not even bacteria and fungi could survive, which prevented the dead trees from decomposing. All of this damage was done at a time when the technology to control pollution simply did not exist.

The mountain was barren and lifeless for decades.

The Town that Zinc Built

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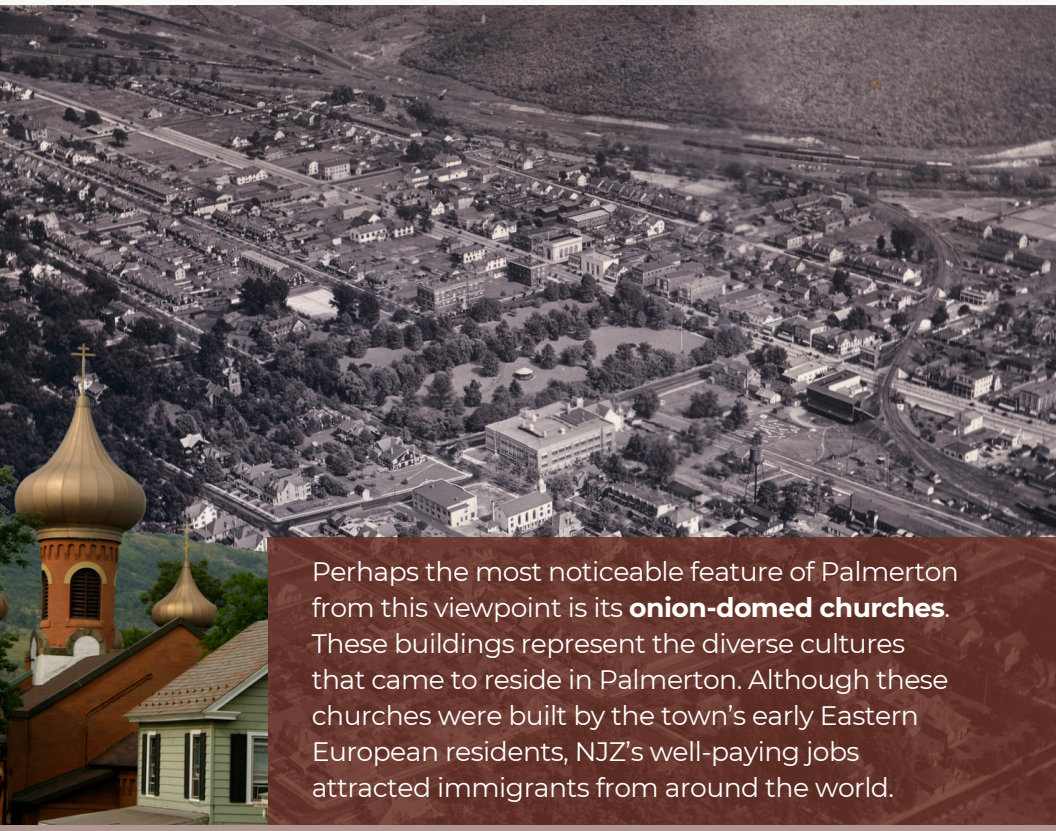
You are now overlooking the **Borough of Palmerton**. This small but vibrant community was fully planned and constructed by the New Jersey Zinc Company for its employees beginning in 1898. From the beginning, NJZ invested heavily in the education, financial security, healthcare, and general wellbeing of its employees and their families. The company paid fair wages, offered employee benefits, and even took steps to ensure that families had a source of income during the Great Depression. NJZ also built the town's schools, public park, hospital, community center, and more.



Perhaps the most noticeable feature of Palmerton from this viewpoint is its **onion-domed churches**. These buildings represent the diverse cultures that came to reside in Palmerton. Although these churches were built by the town's early Eastern European residents, NJZ's well-paying jobs attracted immigrants from around the world.

The Story of Marshall's Mansion

High above the town of Palmerton, on the peak of a blood-red hill, sits a **stately Victorian mansion.** This house was constructed in 1880 for decorated Union Civil War General Elisha Marshall and his wife, Janet Rutherford. The couple lived together for only two years, before Janet filed for divorce. The court ruled in her favor, and the General moved back to his home state of New York, where he died from war injuries a year later.

General Marshall and his abandoned mansion

Janet lived alone in the mansion for years thereafter and was known disrespectfully by locals as "the hermit on the hill." After she passed away in 1911, the house sat abandoned and slowly deteriorated. Parents, wanting to keep their children away from the dilapidated building, told stories of ghosts and ghouls lurking on the hill. Indeed, the abandoned mansion looked very much like a haunted house!

Although we cannot confirm that the house is haunted, there is a real-life spooky ending to General Marshall's story. In the year 2000, vandals mysteriously unearthed the General from his grave in New York and scattered his bones about the cemetery. When officials went to put his remains back in the ground, they noticed that something was missing. Today, Elisha is the "Headless General" – buried without his skull.

Watching Grass Grow

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Efforts to revegetate the barren mountainside around the Lehigh Gap began in 1983 with the designation of the Palmerton Zinc Pile Superfund Site. Administered by the U.S. Environmental Protection Agency, the Superfund program aims to clean up areas that have been heavily impacted by pollution. In 2002, Lehigh Gap Nature Center (LGNC) – a member-supported nonprofit organization – purchased 756 acres of land around the Lehigh Gap and immediately began working with the EPA and other partners to revegetate the polluted land within its wildlife refuge. *LGNC is the first and only nature center in the U.S. on a Superfund site!*

To meet the EPA's Superfund restoration goals, we had to:

1. Plant native vegetation
2. Stop the remaining soil from eroding off the mountainside
3. Prevent the pollution from impacting the food chain

We hypothesized that native prairie grasses might accomplish all of these goals. Not only do they tend to grow well in harsh conditions, but they also have deep (up to 15 foot long!), fibrous roots that stabilize the ground. And unlike some other native plants, they do not readily uptake heavy metals into their tissue, which protects other organisms that might eat them.

In 2003, we began testing our hypothesis. This **test plot sign** is the site of one of LGNC's earliest experiments. The purpose of these plots was to determine which 'recipe' of native grass seed and soil would grow best (if at all) on the mountain.

All of our 56 one-acre test plots grew. However, we found that a combination of 12 native prairie grass species, mushroom compost, lime, and fertilizer worked particularly well. The EPA gave LGNC the approval to plant the remainder of our refuge in 2006.

From Superfund to Super Habitat

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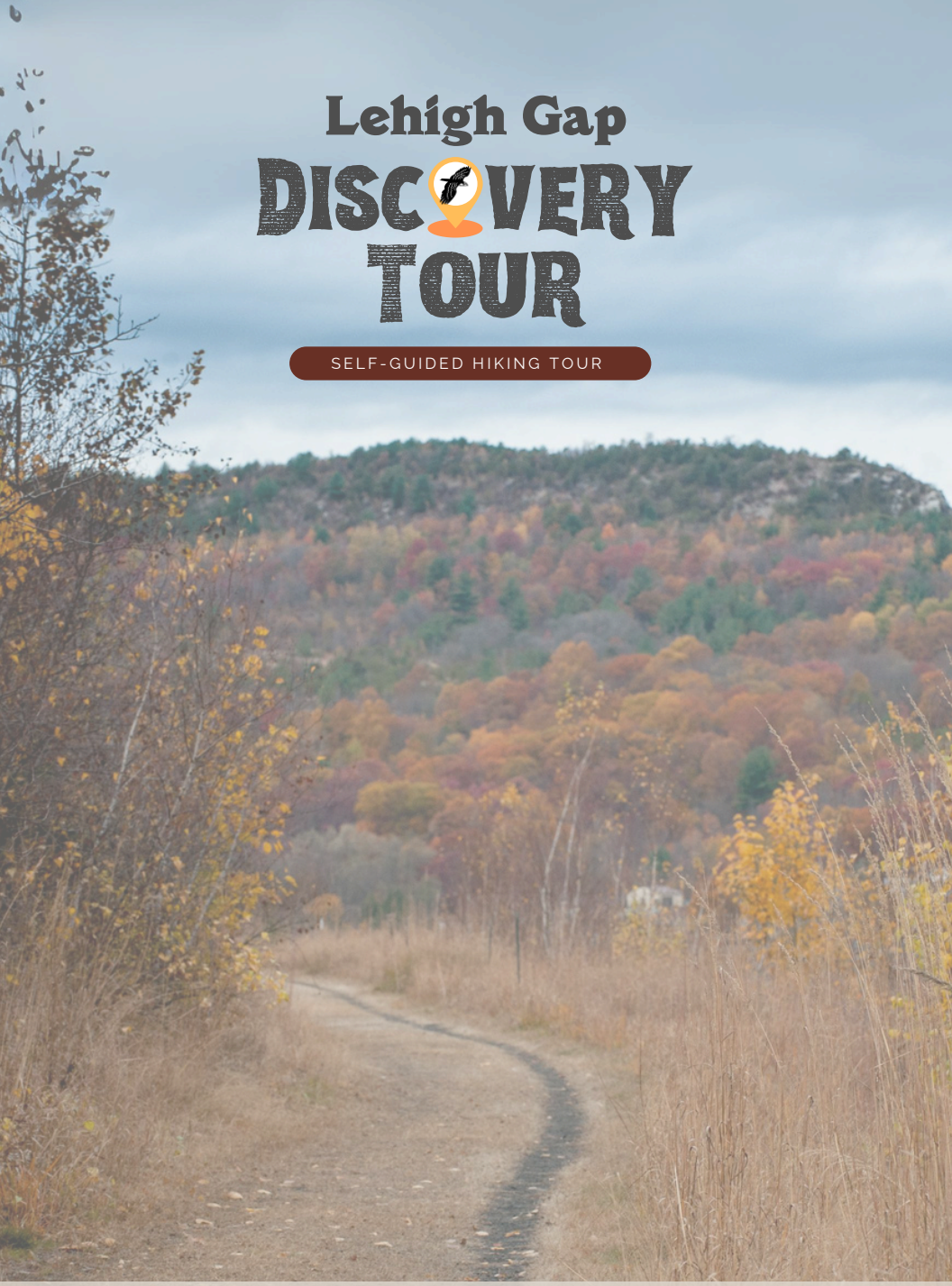
The **New Jersey Zinc Company's West Plant facility** was located directly across the river from where you now stand. On most days during the company's peak years, this location would have been covered in smoke. The factory was positioned such that the smoke was naturally drawn south through the Lehigh Gap. That's why this particular area was so badly impacted by the pollution.

So how do you plant grass on a 'moonscape'? Once the initial experiments were complete, determining how to plant the mountain was a challenge in and of itself. LGNC and its partners used two methods to spread the seed and soil – tractors with manure spreaders on the lower slopes and crop duster airplanes on the steep, upper slopes.

As you can see, the mountain is no longer barren and lifeless. This **restored grassland** is now home to hundreds of native species, including such rarities as wild bleeding heart (flowers) and Blue Grosbeak (birds). At the same time, the deep roots of the grasses hold the mountain together, and the grassland's annual cycle of growth and decomposition is locking the pollution away within growing layers of clean soil. The ecosystem is thriving.

This conservation success story was made possible by countless partners, members, and volunteers. Join LGNC in writing the next chapter of our story!

Donate or join online at *bit.ly/LGNC_Store*, or scan this QR code!



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