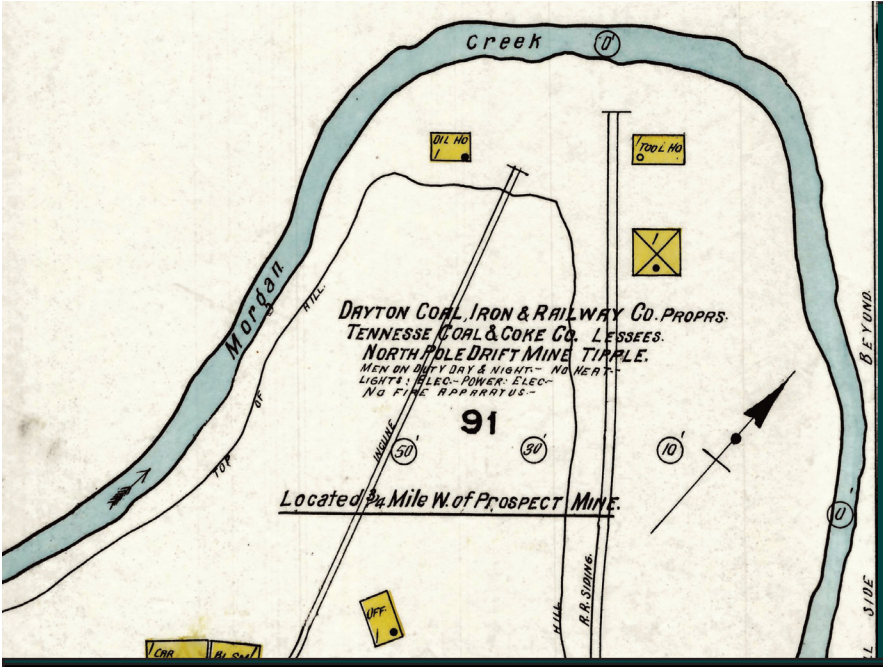





# Dayton Coal and Iron Industry Laurel-Snow State Natural Area

## Historic Resources Preservation, Maintenance and Interpretation Plan

FINAL

Prepared for

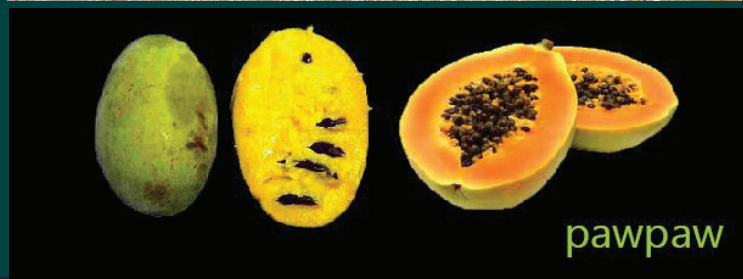
**Friends of the Cumberland Trail**

21 November 2013












The activity that is the subject of this publication has been financed in part with federal funds from the National Park Service, Department of the Interior. However, the contents and opinions do not necessarily reflect the views or policies of the Department of the Interior, nor does the mention of trade names or commercial products constitute endorsement or recommendation by the Department of the Interior. Regulations of the U. S. Department of Interior strictly prohibit unlawful discrimination in departmental Federally Assisted Programs on the basis of race, color, national origin, age or handicap. Any person who believes he or she has been discriminated against in any program, activity, or facility operated by a recipient of Federal assistance should write to: Director, Equal Opportunity Program, U. S. Department of the Interior, National Park Service, P. O. Box 37127, Washington, D. C. 20013-7127

# INTRODUCTION

Our company specializes in projects that combine cultural and natural resources planning. We've done historic preservation work, interpretive plans, projects in wildlife refuges and nature preserves, corridor plans for scenic byways and similar projects. We've worked in national parks and national forests, in Tennessee's wonderful collection of state parks and natural areas, in Main Street communities, in our largest cities and in intriguing small towns. Our favorite projects draw from both the cultural aspects of a place as well as an area's natural resources, its landscapes, ecosystems and scenic places.

With this background in mind, we were very excited to be selected to prepare the "Preservation, Maintenance and Interpretive Plan for the Dayton Coal & Iron Company Historic Resources at Laurel-Snow State Natural Area." From our first visit to the place we have been captivated by the historic ruins and structures and by the compelling beauty of the area. We've enjoyed meeting visitors and staff, and the friendly local folk who still refer to Laurel-Snow as "The Pocket." We've learned from visitor interviews and surveys that most are interested in the intriguing structures found along the trail and want to learn more about them. After reading through the extensive research our predecessors have compiled on the site, we have gained an appreciation for the pivotal significance of the Dayton Coal & Iron Company in the context of Tennessee's industrial heritage, and offer what we hope are achievable, cost-effective solutions for the preservation and interpretation of the resources.

We began our work with a review of existing literature about the site, making heavy use of the *Historic Resource Survey and Contextual Study of the Former Dayton Coal and Iron Company Properties, Rhea County, Tennessee* prepared by Alexander Archaeological Consultants, Inc. in September 2012 as well as other sources. After discussing the study with Paul Archambault, former regional historic preservation planner at the Southeast Tennessee Development District, and with William Wade, a former student and staff member at Bryan College who conducted a major survey of the DCIC site and its resources which was heavily incorporated into the *Historic Resource Survey*, the parties determined to accept the report and other materials as being substantially complete in terms of the site history and survey of resources, and that Pawpaw would conduct little additional research but concentrate on the preservation, management and interpretation issues.

Our staff began field work in early February 2013 and have made numerous multi-day visits. With our subcontractors, we evaluated most identified mine-related resources. We spent many days assessing the condition of the 199 coke ovens we were able to access in the Richland coke ovens complex. We also looked at mine-related resources along and above the main Laurel-Snow Trail on the eastern side of Richland Creek with a particular focus on how they can be stabilized, preserved and interpreted.

Based on the initial surveys, in April we proposed a number of strategies to Friends of the Cumberland Trail as a detailed outline for how we proposed to conduct our work. We wanted to ensure it would meet the specific goals and objectives of FCT for the project. In addition to the detailed scope of work, we raised a number of issues that would need to be addressed in order to provide the FCT with a realistic, achievable plan compliant with park, TDEC and other authority regulations. We received only limited feedback to our detailed proposal; accordingly, we prepared this plan based upon our own experience with similar projects, recognizing that FCT and Cumberland Trail State Scenic Trail may ask for revisions to meet specific needs. While this plan is being submitted at the end of the grant cycle period, Pawpaw is committed to providing FCT and the park with the best possible final plan that will help them begin to realize their broad vision for the site.



# ACKNOWLEDGEMENTS

We are most appreciative of the Friends of Cumberland Trail for selecting us to do this project. The chance to work with such fascinating cultural resources is rare enough, but to be able to do this work in such a dramatic setting was an extraordinary experience.

We want to thank our subcontractors for their painstaking and conscientious work. Our colleague Paul Hoffman, an experienced historic preservation contractor who has worked on major preservation projects across Tennessee and around the world, helped us analyze the Richland coke ovens and, after consultations with preservation firms and masonry contractors, provided us with realistic cost estimates for various scenarios for their stabilization, repair, rehabilitation or reconstruction. He also advised us on graffiti removal and stabilization for the DCIC dynamite shack, the sole surviving building on the site.

Our intern, Andrew Eagar, is a botany and geology student at Tennessee Technological University; he was an ideal choice to survey vegetation growing on historic mine resources along the trail, and helped us formulate strategies for removing a limited number of trees in order to ensure the long-term preservation of the features. His contributions were outstanding and it was a genuine pleasure working with him.

During the preparation of this plan, we consulted with numerous technical advisers and public lands managers regarding issues we needed to address on this project. David Lincicome, Manager of TDEC's Natural Heritage Inventory Program, Andrea Bishop, Botanist with the program, and Lisa Huff, East Tennessee Regional Manager for the Division of Natural Areas, reviewed early materials on vegetation management and mine gating, and will be helpful contacts should FCT and the park adopt any of our recommendations regarding these issues. Kristine Johnson, supervisory forester at Great Smoky Mountains National Park, and Terri Hogan, ecologist at Congaree National Park, provided invaluable suggestions for kudzu treatments. Interpretive ranger Bill Herman at Big South Fork National River and National Recreation Area gave us useful suggestions on interpreting coal mining resources based on his experiences at the park's Blue Heron coal mining community.

We received excellent suggestions for marketing the site and the historic resources from Jenni Veal, the tourism specialist for the Southeast Tennessee Tourism Association and a FCT board member, and from Dave Jones, the East Tennessee Manager for the Tennessee Department of Tourist Development.

The Tennessee Historical Commission not only awarded FCT the grant to make this project a reality, but their staff gave us beneficial feedback on the preservation issues addressed in the plan. We are much obliged to THC's supervisor of federal programs, Claudette Stager, and its National Register of Historic Places coordinator, Peggy Nickell, for making site visits and meeting with us to go over various contemplated scenarios.

We did not hesitate to call on personal friends as well. Carley Lester, a forestry educator in Washington County, helped us with visitor surveys and with vegetation removal strategies. Stephen Brown, owner of the preservation firm Republic, Inc., helped us think through some of our preservation strategies. Others gave us feedback and support.

Working with the wonderful residents of Dayton and Rhea County was a memorable experience, and we are very thankful for their support and for their generous hospitality. We'd like to give special recognition to Mr. Tom Davis, president of the Rhea County Historical and Genealogical Society, to Rhea County Historian Pat Hawkins Guffney, and to Rebecca Tucker of the Rhea County Tourism Council for working with us on interpretive scenarios that would tie the Dayton Coal & Iron Company resources at Laurel-Snow in with those surviving in Dayton, and help explain the site's interesting connection with the Scopes Trial, an event known across the nation.

Mr. John Culpepper, city manager at Chickamauga, Georgia, took time to explain how that city had taken its own decrepit coke ovens, stabilized them, and turned them into a fascinating city park. He also helped our subcontractor, Paul Hoffman, with cost estimates for some stabilization scenarios.

Our work was greatly abetted by William Wade, a former student and staff member at Bryan College who has done extensive research on the DCIC resources. He allowed us to tag along on one of his informative "history hikes" for Bryan students, and spent considerable time with us afterward helping us understand the site resources. We have also received much valuable assistance from Jaime Woodcock, an awesome historian who worked with the earlier archeological survey and who was responsible for most of the research. She is now a board member at FCT and has helped us not only better understand the significance of the site, but aided us with visitor surveys and has served as our point of contact with the Friends.

None of us who have worked on this project will ever forget Mr. Arthur Gothard, gatekeeper at Laurel-Snow, who we think of as he honorary "Mayor of the Pocket." He has greeted us on every visit, helped us with many logistical matters, told us many stories about the area, some of which were factual, all of which were entertaining. Every morning and evening he is at the site at sunrise and sunset, picking up litter along the trail, a great deal of which he reshaped into beautiful pieces of origami for us. He's a tremendous resource for Laurel-Snow, and always brightened up our day.

Our old colleague and friend Paul Archambault, former historic preservation planner at the Southeast Tennessee Development District and member of the FCT board, helped us launch the project and worked with us through the first phases. We wish him all the best in his new endeavors. His most recent successor, Melissa Mortimer, has scrambled hard to understand the project and to help us with closeout details, and we are much appreciative. Thanks also to SETDD's tourism specialist and FCT board member Jenni Veal for great advice, and to its GIS specialist Greg Davis for preparing maps or resources for an eventual National Register nomination.

Perpetually overcommitted FCT board member and volunteer extraordinaire Sally Wencel has aided us from beginning to end, reviewing our contract and our work, taking care of the paperwork and making sure we were paid. She's the sort of board member any group wants and should appreciate. Thanks Sally!

In conclusion, we want to thank the staff of Cumberland Trail State Scenic Trail who have spent so much time assisting and reviewing our work. Seasonal technician Ryan Maddux helped us with visitor surveys, and park GIS specialist James Brannon provided us with incredible maps that will help visitors understand the site. The park's hard-working south section ranger Andrew Wright has diligently reviewed our work, discussed visitor issues at the site, and has offered much worthwhile advice. Finally, we have to admit that one of the reasons we wanted to do this project was to have the experience of working with park manager Bobby Fulcher, who not only is helping the state develop its most ambitious park planning project, but who has done so much work over the last four decades preserving the music, stories and folk culture of Tennessee. The opportunity to learn from such a compelling figure has been an invaluable education.

This project has been a rich and rewarding experience; we hope our plan will help Friends of the Cumberland Trail preserve and interpret this incredible landscape to park visitors for years to come.

Richard Quin and Sherry Beard
Pawpaw Partners, natural and cultural resource planners

# PLAN SUMMARY

This plan is divided into five parts. Part I discusses vegetation removal and preservation treatments for the historic coke ovens, mine-related structures and the dynamite magazine, along with discussions about gating mine entrances and managing climbing on historic structures.

Part II outlines several different options for interpreting the historic resources to Laurel-Snow visitors, including on-site panels or guides, and off-site programs specifically crafted for young people.

The third section discusses wayfinding issues, some as basic as providing simple signs to help visitors locate the site, and multi-modal access options, ranging from a level grade trail into the site from Back Valley Road to the possibility of a Laurel-Snow Greenway connecting the unit with downtown Dayton.

Part IV offers a number of options for marketing Laurel-Snow SNA and the historic DCIC resources. This section provides valuable advice for publicizing the site and activities through various county, regional and state tourism entities, as well as cost-effective marketing tools like rack cards and displays at local festivals.

Part V summarizes visitor surveys conducted at Laurel-Snow, concentrating on visitor preferences for a variety of interpretation options.

Appendices include a database assessing the Richland coke ovens and their condition, mock-ups of possible interpretive waysides or panels, a downloadable Junior Ranger booklet for the DCIC resources at Laurel-Snow, and suggested lesson plans for use in Rhea County schools.

# DEFINED PROJECT BOUNDARIES

In the "Dayton Coal and Iron Historic Resources Preservation and Management Plan Request for Proposal" issued 30 October 2012, the Friends of the Cumberland Trail specified that the plan cover "historic resources associated with the Dayton Coal and Iron Company at Laurel Snow State Natural Area and adjacent properties (if permissible)."

After visiting the site and studying the situation carefully, Pawpaw asked in its 4 April "Proposed Action Plan" that the primary focus of the plan be concentrated on lands belonging to the state park/state natural area. Resources on private lands to the west of Richland Creek including the Nelson mine and coke ovens site owned by Mr. Richard Kinzalow, would be interpreted entirely from park lands. This would discourage visitor trespass on private land and help lessen any perceived park liability for intrusions.

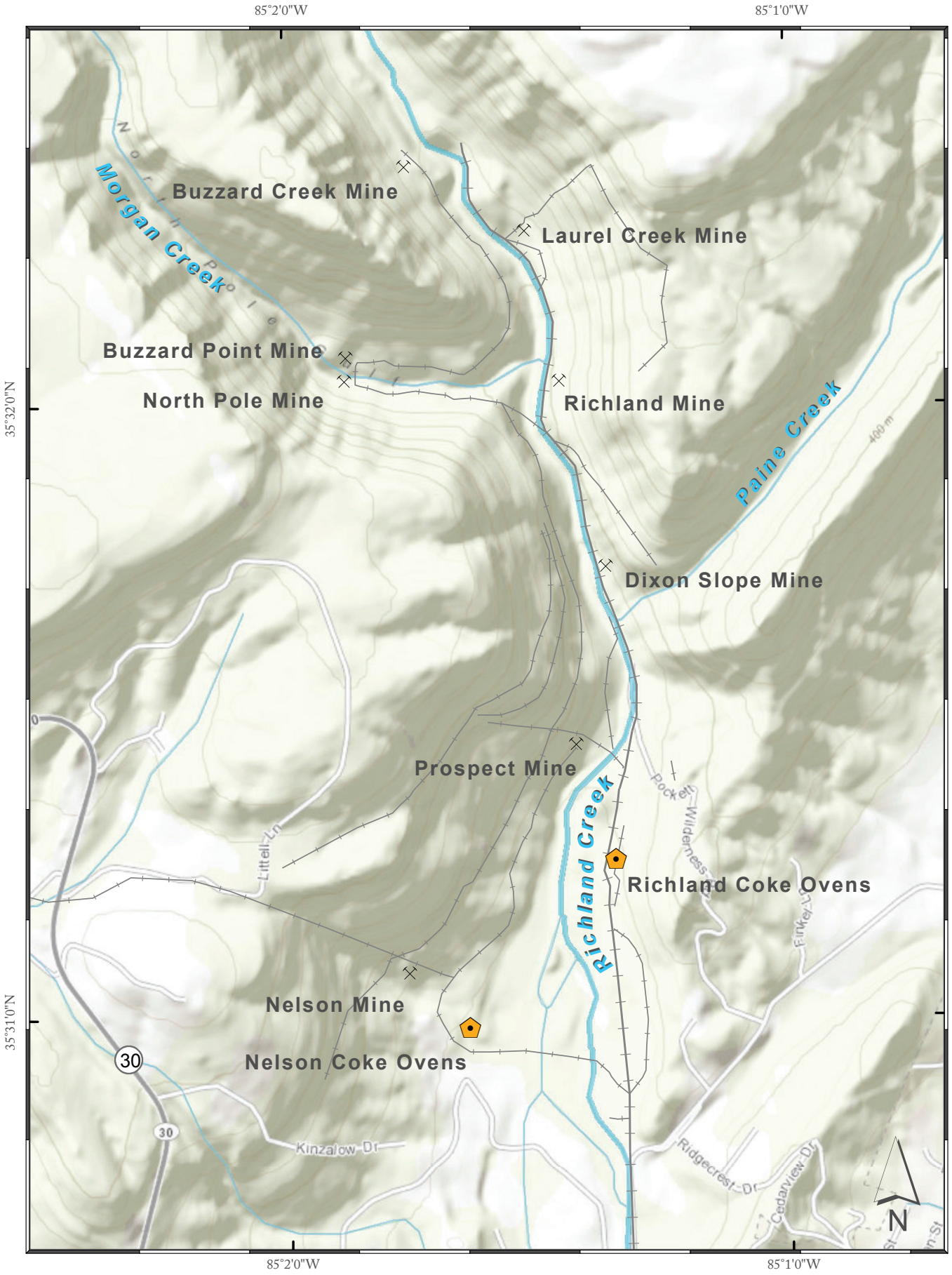
Accordingly, Pawpaw prepared interpretive panels and other media to interpret those resources from park lands. The materials discuss the historical features, but do not provide specific locational information in order to discourage trespass on private property.

Pawpaw also determined that resources on park lands west of Richland Creek, including the North Pole and Buzzard Point mines along Morgan Creek, should be interpreted from the main Laurel-Snow trail. The interpretive panels and media provided tell the story of those mines and illustrate them with maps and historic images. However, they again do not provide specific locational information. This will discourage visitors from fording the creek, possibly risking accidents or stranding, and hopefully eliminating the need for rescues or retrievals of stranded visitors.



*Although company coal and iron operations ceased nearly 85 years ago, the Dayton Coal & Iron Company remains a significant part of Rhea County's cultural identity. The historic Rhea County Courthouse, a National Historic Landmark, features a painting of the furnaces in the main corridor, and the county's Homecoming '86 commemorative quilt includes a block depicting the company's coke ovens.*






*Principal DCIC mine resources at Laurel-Snow State Natural Area discussed in this plan. Map by James Brannon, GISP, Cumberland Trail State Scenic Trail Geodatabase Manager, September 2013.*



# PART I: PRESERVATION AND MAINTENANCE



*Creekside retaining walls at the Laurel Creek Mines*



*Richland coke ovens in winter, photo taken  24 February 2013*



*Richland coke ovens in summer, photo taken  14 July 2013*

# VEGETATION MANAGEMENT

Many years have passed since the last coal was extracted from the mines on the former Dayton Coal & Iron Company properties. The once-denuded landscape has largely been reclaimed by nature, and the state natural area is now home to a mature mixed forest. Unfortunately, the resurgent vegetation is also a major threat to the historic resources associated with the industry. The landscape around the former Richland coke ovens complex is now engulfed by exotic vines that thrive on disturbed lands; other ovens are threatened by large trees that have rooted on many of the ovens. Historic mine walls and structures are threatened by tree growth. The roots weaken the joints in the masonry and as they expand, sometimes dislodge stones; mature trees are an even greater problem, as they can destroy whole sections of historic walls and structures if they topple. For the long-term preservation and maintenance of the historic DCIC resources at Laurel-Snow, the vegetative threats to the structures must be addressed. Various options and scenarios are discussed below. Of course, vegetation removal and control in a Class II state natural area will invoke consultation and determinations with various entities; this plan provides a basic framework and a number of recommendations that should help with the planning process.

***Kudzu and Honeysuckle Removal***

The Richland coke ovens area is cloaked in a heavy cover of vegetation, mostly exotic kudzu (Japanese arrowroot, *Pueraria lobata*) but also including Japanese honeysuckle (*Lonicera japonica*), another exotic. These two invasive species not only make access to the area extremely difficult except in winter when frost has killed back the vines, but they almost entirely hide the ovens, the old tipple and washer site, and others structures from view. Even worse, their root systems are causing severe damage to the ovens and other historic features.

The greatest threat is from the kudzu, which virtually strangles an area of several acres extending from Back Valley Road up to Pocket Wilderness Road (and which has crossed it in a few places). When the Pawpaw team showed photographs of the infestation to exotic plant specialists with the National Park Service, one of the NPS staff said "That is a lot of kudzu!"[1]

Kudzu, a legume in the pea family, is native to southeast China, from which it spread to Korea and southern Japan. ("Kudzu" is a variation of its Japanese name, *kuzu*). Introduced to the United States in 1876 at the Centennial Exposition in Philadelphia, it was heavily marketed in southern states as an ornamental plant to shade porches. The Soil Erosion Service also touted the plant for erosion control, and the U.S. government distributed 85 million seedlings and paid farmers $19.75 per hectare to plant it. Civilian Conservation Corps workers planted it extensively for erosion control in the 1930s. It was also promoted as a high-protein cattle feed, though it was eventually determined that cattle really didn't like it that much, and couldn't climb trees where kudzu often spread. The U.S. Department of Agriculture ceased promoting kudzu for ground cover in 1953, and in 1970 it was listed as a weed. In 1997, it was placed on the Federal Noxious Weed List. Since its introduction, it has covered more than 7.4 million acres in the southeast, and has been recorded in Nova Scotia and in all five boroughs of New York City.[2]

"The Vine that ate the South" has some beneficial uses. Bees feed on the nectar to make high-quality honey, it can be used for making paper, and the smoke from burning leaves is a good insect repellent. It's also edible, valued mostly for its starch and for jellies made from the flowers. One can sample "deep-fried kudzu" at the Dayton County Fair in August.[3] The plant also has potential for use as a biofuel. But as a rule, the plant is an extremely aggressive noxious invasive, doing enormous environmental damage by out-competing native plants, mostly by blocking their access to light, causing them to suffocate; in other cases, the sheer biomass of the rapidly growing plant (it can grow as much as four feet a day) can topple trees and other plants.

At Laurel-Snow, kudzu covers much of the area between the south end of the main parking area and Back Valley Road. The infested area completely smothers the footings for the Richland Coke Ovens washer and tipple complex and

[1]Kristine Johnson, Supervisory Forester, Great Smoky Mountains National Park, to Sherry Beard, Pawpaw Partners, email, 19 August 2013.
[2]Wikipedia.org entry for kudzu, http://en.wikipedia.org/wiki/Kudzu, retrieved 18 September 2013. [Note that the article has some errors, for instance claiming the CCC helped introduce kudzu at the Centennial Exposition when in fact the CCC was not organized until 1933.]
[3]Interview with Arthur D. Gothard, Laurel-Snow gatekeeper, August 24, 2013.

the northern two thirds of the two northern batteries of the Richland coke ovens. It also covers the slag or boney piles between the ovens and Richland Creek, and surrounds the DCIC dynamite shack in summer. Coverage in summer is so thick that the coke ovens are almost impossible to pick out by sight, and the access road through the area is virtually impassible. Kudzu is climbing and choking many mature trees in the area, and has brought down dozens onto the top of the coke ovens. During the main visitation season from spring through fall, access to the coke ovens area is almost impossible due to the thick vines clambering several feet tall and making walking extremely difficult. Only in late winter, after repeated freezes have knocked the vines back significantly, can the area be reached, seen and understood.



*Richland coke oven W-9, showing effects of plant roots on brickwork.*

In addition to totally changing the look of the surrounding landscape and hiding the structures from view, the kudzu is taking a heavy toll on the structures themselves. The kudzu is rooting in the dirt fill between the oven beehive roofs, and these roots are penetrating the firebrick liners of the roofs. The greatest damage has been in the areas between the trunnel holes in the beehive roofs (the circular openings from which the ovens were filled from tram cars run down from the coal washers to the tops of the oven batteries) and the front openings of the ovens (where the finished coke was raked out into larger rail cars in the depressed railbeds below). These openings evidently provided enough light for the kudzu (and Japanese honeysuckle that thrives along with it, see below) to take hold. As the roots penetrate these brick and expand, they weaken the brick interstices and lead to failure. Many of the oven roofs have failed in precisely the areas between the trunnel holes and the doorways, resulting in a collapse of the forward third or quarter of many of the ovens. In numerous cases, the root penetration has spread from there, resulting in total collapse of these former ovens which are now mere depressions in the battery banks.

That the kudzu (and honeysuckle) is the culprit can be determined easily enough by comparing the northern ovens in the area engulfed by kudzu with the batteries to the south which are in encroaching woods. While the trees and their rootballs are causing considerable damage to the southern ovens, many of these still have considerable sections of the front beehive walls over the entrances intact; none of the ovens in the kudzu zone retain much of the front beehive walls.

Pawpaw staff spent two weeks cutting away kudzu and honeysuckle to gain access to the surviving ovens. In many cases, roots from the vegetation are making their way through the roofs of the remaining ovens, and these can be expected to be severely damaged or lost to collapse altogether if the vegetation is not eliminated.

Unfortunately, controlling the kudzu will require an extremely expensive and long-term effort; totally eradicating it will take years of work and constant vigilance to prevent its recurrence.

Pawpaw staff consulted with Tennessee Department of Agriculture, Natural Resource Conservation Service, and with members of the multi-agency Alien Plant Working Group to get input on control measures. The following summarizes the findings.

While visible vines can be removed by mechanical means or grazing, or sprayed and killed, successful long-term eradication will require destroying the kudzu's extensive root system which can penetrate very deeply. Kudzu grows from large rhizomes that store the starch enzymes the plants feed on. Kudzu does produce roots which take up water for the plants, but these do not produce vines; they only grow from root crowns that form atop the rhizomes. Unfortunately, the rhizomes can also propagate when vine nodes contact the ground surface; they can grow to basketball size, and work their way deeper with age. It is very likely that large rhizomes (sometimes called tubers in some literature) have rooted themselves deeply in the relatively loose soil fill between the coke oven beehive walls.

Fortunately, the deep rhizomes do not have to be dug out; to control kudzu, only the rooting crowns and rooting runners need to be killed or removed. But the entire crown has to be killed or removed; if any part of it survives, the kudzu will likely grow back.

Any preservation work on the coke ovens must begin with a campaign of vegetation control. Previous preservation projects at several middle Tennessee cemeteries and historic structures have had success using a combination of a commercial herbicide and physical removal. Physical removal of vines and overgrowth is recommended where it will not impact the integrity of the structures. Preservation contractors used both chemical and physical methods successfully at the Francis Rogan house in Sumner County, using several applications of a commercial herbicide over the course of a month to kill vines covering and growing into the home. The crew then removed close-growing trees with chain saws and hand saws to open the exterior of the home for their work.

Mechanical methods dictate cutting the crowns from the roots, generally below the surface level. Cutting the vines alone will weaken the plants, but will not kill them outright. Mechanical removal often utilizes skid loaders ("bobcats") which can scrape away crowns and kill the kudzu rapidly, though such treatments will expose soil and could lead to erosion.

Controlled burning is sometimes used to clear extensive areas of kudzu vegetation. It generally does not reach the crown levels below the soil surface and thereby rarely kills the plants, but it can open up areas for subsequent mechanical treatments.

At Great Smoky Mountains National Park, the park staff have had to deal with similar sized sites in wooded areas. Their supervisory forester reported that they initially cut the vines out of trees and then treat the stumps and cut surfaces with 25% herbicide. The park uses a formulation of glyphosate approved for use near streams, likely Rodeo® or an equivalent. Late summer and early fall is the most effective time for such treatment. At Congaree National Park in South Carolina, a mostly wetland park with extensive kudzu infestations, staff are experimenting with solid plastic paneling fences that kudzu cannot cross; this strategy might be good for containment and control, but at Laurel-Snow, the kudzu needs to be eliminated.[4]

Missouri Department of Conservation has done extensive chemical testing on kudzu and other stubborn plants. They reported that Crossbow® (a mix of 2,4-D and triclophyr), Rodeo® and Roundup® all were effective on kudzu; Rodeo® is licensed for use near water. In these tests, MDC determined that a Tordon 101® mixture (2,4-D + picloram) and Tordon K® (piclirom liquid) were the most cost-effective over an eight-year period.[5]

One of the most promising treatments may be the use of grazing animals. This environmentally sensitive treatment has been used recently to clear kudzu on Missionary Ridge above Chattanooga, and in Knoxville's Williams Creek Urban Forest. Atlanta has used both sheep and goats at its Chastain Park.[6] A single goat can consume 150-200 square feet of kudzu a day. In the Knoxville park, a herd of 35 goats cleared 2.5 acres in less than two weeks.

A Virginia-based firm, "Goat Busters," (www.vagoatbusters.com) indicates its base cost for supplying goats for one week ranges from $725 to $1250 per acre,



*Goat eating kudzu at Knoxville's Fort Dickerson Park. Photo, Saul Young, Knoxville News-Sentinel, 25 July 2010.*

[4]Johnson, *op cit*; Terri Hogan, Ecologist, Congaree National Park, to Sherry Beard, Pawpaw, email, 23 August 2013.

[5]"Kudzu Control," Missouri Department of Conservation online, http://mdc.mo.gov/your-property/problem-plants-and-animals/invasive-plants/kudzu-control, retrieved 20 September 2013.

[6]Theo Emery, "In Tennessee, Goats Eat the 'Vine That Ate the South,'" *New York Times*, 5 June 2007, www.nytimes.com/2007/06/05/us/05goats.html?_r=0, retrieved 19 September 2013; Mike Blackerby, "Goat Heaven: Guard Dogs Watch Over Kudzu Eating Goats in East Knoxville," *Knoxville News-Sentinel*, 16 July 2013, www.knoxnews.com/news/2013/jul/16/goat-heaven-guard-dogs-watch-over-kudzu-eating/, retrieved 19 September 2013; "Kudzu-Eating Sheep and Goats on the Job in Atlanta," *The Florida Times-Union*, 23 May 2012, http://jacksonville.com/news/georgia/2012-05-23/story/kudzu-eating-sheep-and-goats-job-atlanta, retrieved 19 September 2013.

plus miscellaneous costs for fencing, feeding guard dogs, etc. They recommend at least two uses of the goats for any project. As the Laurel-Snow site is so densely affected, treatment over successive years might be required. Goats do need to be watched; Tallahassee, Florida discontinued using them after theirs were stolen from a site.[7] The National Park Service does not use goats in the Great Smoky Mountains National Park as they eat everything, and the NPS wants to protect non-target plants.[8]

The other major invasive plant threat, Japanese honeysuckle, is a perennial vine, though much of the growth is knocked back by winter freezes. It was introduced to the United States in the mid-1800s, chiefly as an ornamental, mostly on account of its fragrant blossoms so beloved by children who delight in tearing them apart for their single drop of sweet nectar. It was also promoted, like kudzu, for erosion control. Especially fond of disturbed lands like the coke ovens area, the plant climbs by twisting its stems around other plants and structures. Like kudzu, it has few natural enemies, and its aggressive nature allows it to out-compete many native species. Vines can kill other plants by girdling them when they twist tightly enough around them to choke off the vascular flow of nutrients through the plant, or by shading them from needed sunlight. Honeysuckle's dense roots are not only displacing native vegetation, but compounding damage to historic structures by working their way into crevices and literally tearing them apart.

Honeysuckle is more frost-resistant than kudzu, and its leaves continue to photosynthesize through much of the winter. This allows for direct application of herbicides after the more dominant kudzu loses its leaves. Still, for effective treatment, honeysuckle leaves must be healthy and green, and temperatures should be moderate enough for plant activity. National Park Service recommends chemical treatment for Japanese honeysuckle; no biological control agents are available. Recommended treatment is use of a 2.5% rate of glyphosate (Rodeo® for wetlands, Roundup® in upland areas), mixed with water and an appropriate surfactant, applying the chemical from spring until fall. Repeat treatments will likely be necessary. Alternatively, a 2% concentration of triclopyr (Garlon 3A) mixed with water can be applied with a coarse, low-pressure sprayer, wetting the leaves thoroughly but not to the point of drip-off. Repeat applications again will likely be needed. The latter treatment is best done in fall when other plants (especially the kudzu) are going dormant. A 25% glyphosate or triclopyr solution can also be applied to cut stems at any time the ground is not frozen.[9]

Goats are also effective on Japanese honeysuckle, see above.

Before FCT or the park undertakes any program to remove and control the invasive kudzu and honeysuckle, it should develop a strategy and implementation plan for the coke ovens site. The exposed ovens are all in need of extensive repairs and will look even more decrepit once exposed. The ovens and other structures will be much more accessible, and unless they are fenced and patrolled, it should be expected that curious visitors will clamber into them, risking possible injury from collapse. The potential for vandalism or other unwanted activities in the ovens will increase. The kudzu and honeysuckle not only cover historic structures, but decades of trash and debris dumped along the access road, and this will all have to be cleared away at considerable expense; it may even require preparation of a hazardous materials plan.

Once the ovens are exposed, the earthen fill between them will be subject to erosion unless it is replanted with more benign vegetation. Chickamauga, Georgia has stabilized its smaller battery of ovens at its Coke Ovens Park with grasses, but these have to be mown regularly during the growing season. Replanting with native grasses should be considered, and some low-growing native sedges like Appalachian sedge (*Carex appalachica*) and Pennsylvania sedge (*Carex pensylvanica*) would not require cutting themselves,[10] though weeds and other growth on the ovens would have to be kept under control. Cumberland Trail State Scenic Trail does not currently have a lands crew available at Laurel-Snow, and would have to assign one for regular mowing on the ovens and the surrounding acreage, or else the ovens and the landscape would soon be reclaimed by the encroaching growth.

[7]Emery, *op cit*.
[8]Johnson, *op cit*.
[9]National Park Service, Plant Conservation Alliance's Alien Plant Working Group, fact sheet for Japanese honeysuckle, online at www.nps.gov/plants/alien/fact/loja1.htm, retrieved 18 September 2013.
[10]Sally Wencel, Friends of the Cumberland Trail, to Richard Quin, Pawpaw, email, 30 September 2013.

***Trees on Coke Ovens***

The southern batteries of the Richland coke ovens, as well as the southern third of the northern batteries, are mostly free from kudzu infestation. While this is good, these batteries are being subjected to severe damage by another vegetative threat, the encroachment of forest and the rooting of mature trees on the ovens themselves. The northern batteries were evidently kept clear of trees for many years while the southern ones were abandoned to the advancing woodlands. These now cover not only the two southern tiers of the coke ovens, but about a third each of the two northern groups.

These trees have rooted in the earthen fill between the coke oven beehive roofs and in the exposed earthen sides of the batteries. Others are growing on nearby banks and periodically fall onto the ovens. Some are quite large, being up to 2' in diameter at breast height. This suggests they have been growing here for many years.

The trees are causing catastrophic damage to the southern ovens. The earthen fill amidst the ovens in which many are rooted is not compacted like normal surface soil and cannot bear the weight of larger trees. Consequently, many have uprooted, either because they grew out of balance and fell, were toppled by winds, or simply developed too much biomass for the root system to support. As they fall, the root balls tear out of the ovens, causing horrendous damage. If the falling trees' roots have penetrated the oven beehive roofs, the toppling sometimes completely destroy an oven.

Trees falling on the roofs of ovens are also causing significant damage. Some of these have apparently been killed by the encroaching kudzu which shaded them out, then brought the trees down with the added weight of their biomass. The situation is serious now, but will become even more critical as the trees continue to grow, fall, and destroy more ovens.

The Pawpaw team inspected and inventoried nearly all of the 200 or so coke ovens at the Richland site. In the course of the survey, the team noted that the tree count exceeded one hundred mature trees and too many saplings to count.

Removing the trees would be very problematic. Small trees and saplings can probably be cut easily enough, but removing the larger, shallow-rooted trees growing in the loose earthen fill between the ovens will be hazardous work as shifting weight could cause them to uproot while being cut. Presence of many deadfalls and dead or dying trees only exacerbates the problem. Larger trees will need to be removed by a professional arborist who would climb



*Trees growing on and amidst ovens in the southwest battery, 15 March 2012.*

them and bring them down piece by piece; if they were simply felled, the shifting weight might cause uprooting and consequent damage, or the trees could strike others, knock them down, and cause those to uproot in turn. The trees should be cut down close to surface level, and sprouting or coppicing trees should be treated with a contact herbicide to prevent regrowth. Roots should be left in place to rot away; digging them out would only cause in additional damage and would add to the costs as well.

After determining the magnitude of the effort involved in removing so many trees, the Pawpaw team reluctantly recommends the park consider taking little or no action. Maybe smaller trees and saplings can be removed and brush cleared to open up views and stabilize a few ovens, but the tremendous costs and dangerous work required to remove trees from oven batteries few visitors will likely visit does not seem like the best use of resources in a park unit with many other competing needs. (Invasive, non-native species like Paulownia and Alianthus should, however, be aggressively controlled). Instead, the team recommends that the area be left much as it is, that enough brush be kept clear to keep the ovens visible from the nearby access road if it is opened to public use, and that simple warning signs be placed to discourage climbing on or into the ovens. Over decades to come, trees will destroy more and more of the ovens and the landscape will reclaim much of the site. The story of the ovens can still be interpreted at the stabilized ovens at the northern batteries. Much has been lost already and more will be in the years to come, but future park visitors can still benefit from good interpretation that will enable them to understand and appreciate this compelling historic industrial landscape.




*Richland coke oven SE-41, showing effects from tree collapse, 17 March 2012.*

***Trees on Walls and Mine Structures***

The greatest threat to the historic mine walls and structures (mine adits or entrances, tipple foundations, incline, ventilation structures, etc.) is from tree and vegetation growth. If left unaddressed, this will ultimately threaten the stability and integrity of these structures and can lead to their collapse or destruction.

Tree growth threatens the stability of structures in several ways. Roots exploit pre-existing gaps in walls and widen them as they grow in search of nutrients and moisture, leading to destabilization. Additionally, they provide an anchor for the tree itself, which as it grows becomes more and more of a concern. Large trees develop larger and more intricate root systems, which contribute to increased amounts of root damage. They also attain significantly more biomass than smaller trees, which not only increases their likelihood of falling, but also means that they cause more damage when they fall. Larger trees often remove other trees when they fall and the weight of a falling tree can damage or destroy walls. If the root systems of large trees are entangled in a wall, they can pull out and damage the wall when the tree falls. Smaller trees are less of a concern due to their smaller roots and lesser fall risk, but should not be overlooked as they will grow larger and pose threats to structures in the future.

The Pawpaw team determined on early visits that preservation of the historic structures will require removal of trees and saplings which were growing on or in such close proximity to walls that they would lead to eventual problems caused by root growth or tree collapse. During the initial site survey, the team estimated several hundred trees would have to be removed, many of which were of considerable size, if every feature was to be protected. This would require enormous amount effort and huge expenses for the park. The vast number of trees requiring removal would like affect the scenic aspect along the main Laurel-Snow Trail. In addition, when larger trees are felled, they would likely take out or severely damage other trees in their path unless extremely expensive logging by trained, tree-climbing arborists is utilized. As Pawpaw is committed to delivering realistic, cost-effective solutions in this plan, the team recommends a scaled back program of vegetation removal.

In August 2013, the Pawpaw team engaged Tennessee Technological University geology and botany student Andrew Eagar to conduct a detailed survey of tree growth on a limited number of walls and structures. The Pawpaw team selected five specific structures as the most critical historic structures as these were the ones visible to visitors hiking the Laurel-Snow Trail. These included the Paine Creek Trestle piers near the beginning of the trail, the large walls that evidently supported a tipple or loading structure for the Dixon Slope Mine just north of Paine Creek, the Dixon Slope adit and its associated retaining walls, the Dixon Slope ventilation structure, and the long segment of breast walls at the Laurel Creek Mine complex. These highly visible structures are at high risk for tree damage and of a high priority for the preservation of the mine resources and should be dealt with as soon as possible.

The team did not instruct Eagar to survey trees on the extensive sections of retaining walls supporting the short line railway route below the main Laurel-Snow trail, small segments of ramps and breast walls above the trail, paddock walls, or the extensive stone ramps and structures associated with the Laurel Creek Mine #8 Incline as very few of these would be seen by visitors. Had they been included, the tree count for this project would have numbered in the hundreds, drastically increasing the time and money needed to carry out these tasks.

As requested, Mr. Eagar counted trees on the identified critical structures. He was directed to count trees less than 5 inches in diameter at breast height (DBH), those greater than 5" DBH, and larger trees measuring 10" DBH or more as these would require more work to remove safely. The 5" threshold was established in response to an April 23 email from David Lincicome, Manager of TDEC's Natural Heritage Inventory Program, who stated that removal of trees of that size or larger would require consultation with U.S. Fish and Wildlife Service regarding habitat concerns for the Indiana bat, especially if federal funds or permits were involved.[1]

On the six selected structures, Mr. Eagar determined a total of sixty-three trees would need to be removed in order to protect the historic masonry. Of these, more than half (thirty-eight) were smaller than the 5" DBH threshold and twenty-five greater than 5" DBH, with four exceeding 10" DBH. These are summarized in the table below.

[1]David Lincicome, Manager, Tennessee Department of Environment and Conservation, Natural Area Heritage Inventory Program, to Bobby Fulcher, Manager, Cumberland Trail State Scenic Trail, email, 23 April 2013.

| STRUCTURE | Trees <5”DBH | Trees >5”DBH | Trees >10”DBH |
|---|---|---|---|
| Paine Creek Trestle | 7 | 2 | 0 |
| Dixon Slope Tipple Walls | 4 | 2 | 1 |
| Dixon Slope Mine Adit and Walls | 5 | 0 | 1 |
| Dixon Slope Mine Ramp | 2 | 5 | 0 |
| Dixon Slope Mine Ventilation Structure | 0 | 0 | 0 |
| Laurel Creek Mine Retaining Walls | 20 | 12 | 2 |
| TOTALS | 38 | 21 | 4 |

The Paine Creek Trestle piers have seven small trees and two large trees in need of removal. These are mostly on the middle portions on either side of the bridge and should be cut at the base of the trunk. The upper and lower retaining walls of the Dixon Slope Mine Tipple structure have four small trees, two large trees, and one tree greater than ten inches in diameter in need of removal. These should be cut as close to the base of the trunk as possible, with special care being taken for the extra- large tree involved with the lower retaining wall; due to its size and placement, this tree poses a risk to both the upper and lower walls if felled incorrectly. The tree should fall away from both walls and the roots should remain undisturbed. The ramp leading to the Dixon Slope Mine has two small trees and five large trees that should be removal; they are scattered along the length of the ramp and should be cut at the base of the trunk. The Dixon Slope Mine includes five small trees growing on the walls and one tree exceeding ten inches in diameter growing underneath the adit of the mine, discussed below. The other five should be cut normally. The largest number of trees are involved with the Laurel Creek Mine retaining walls. Here there are twenty small trees, twelve large trees, and two trees over ten inches in diameter spread across the length of the wall. Due to the proximity of these trees, care should be taken in order to avoid multiple trees falling into one another and causing collateral damage. Trees here range the top of the wall to the base, with many trees growing out from the middle of the wall as well. Trees should be cut as close to the base of the trunks as their positioning allows.

One tree is of especial concern, the large sycamore growing from the arch of the Dixon Slope Mine adit. Its lower trunk is touching the base of the arch and may be bracing the structure, preventing it from collapsing. This tree should be taken down in sections by a climbing arborist to a line with the top of the adit, leaving the portion of the trunk bracing the arch intact. As this is a sycamore, a species that rots very slowly, this will ensure the preservation of the arch for years to come. All other trees should be removed normally.

All felled trees should be carefully removed and the root system left in place to rot out under natural conditions. Manual removal of the roots would damage or destabilize structures, in addition to requiring extra time and money.



*Trees growing on the Paine Creek trestle piers are easily accessible and can be removed with limited effort.*



*One large tree on the Dixon Slope Mine tipple foundation threatens the stability of a large section of wall.*



*The seven trees growing on the ramp to the Dixon Slope Mine are easily reached, but most are larger than 5” DBH.*



*The large sycamore growing out from the base of the Dixon Slope Mine adit threatens a highly significant structure and will have to be carefully removed.*



*The trees growing out from the Laurel Creek Mine walls are especially problematic; if they fall, they will take out large sections of wall.*



*Here, a large part of wall is already missing because a tree fell and its rootball pulled out the stonework.*



*Trees rooted in walls should be cut as low as possible, but the roots should be left in place.*



*Richland coke oven SE-31 survives in better condition than most, but is difficult to reach due to deadfalls in the surrounding area.*

# RICHLAND COKE OVENS COMPLEX REPAIR OR STABILIZATION

The Richland coke ovens, located southwest of the Laurel-Snow parking area along the route of the Dayton Coal and Iron Company's short line railroad, are among the most significant features remaining from the coal and iron operations conducted here. Four batteries of ovens (many constructed back-to-back) extend for a quarter mile along the old rail line east of Richland Creek. Forty-four ovens were geolocated in the earlier archaeological survey. In March 2013, Pawpaw team members, cutting back kudzu and vines, located, inventoried and assessed a total of 199 ovens in various states of disrepair; they estimate there are another six or eight they could not reach in a dangerous zone of blown down deadfall trees.[1] Each oven was cleared of vegetation at the entrance where possible, evaluated for integrity and condition, and recorded with photographs. Pawpaw has prepared a database of the ovens and their condition; see Appendix A.

The ovens were used to convert coal from the mines on the east side of Richland Creek, those on Morgan Creek, and the Prospect Mine on the west side of Richland Creek into industrial coke for the Dayton Coal and Iron Company furnaces. Coke is a higher-carbon material made by smoldering impurities away from coal in a low-oxygen environment; it burns hotter than coal and ironmakers preferred it as it allowed them to make higher quality iron and steel. Coke was originally made in a process similar to early charcoal production, by piling coal into heaps and setting the outer layer afire, leaving the interior coal in a carbonized state. Beehive coke ovens, which were constructed of firebrick with small openings (trunnel holes) at top for loading and for gases to escape, were developed in England in the 18th century and were soon adopted in the United States. The Richland coke ovens (as well as the Nelson coke ovens on private land across Richland Creek) are typical beehive ovens.

These ovens were part of a continuous process. Coal from the mines was brought down to the processing site by rail and loaded into a large tipple at the site. Coal from the tipple was then sent to a coal washer which utilized water from the concrete cistern on the hill above, which in turn was fed by a pipe from Paine Creek). After washing away coal dust and grime, the coal was crushed, then transported on lighter rail cars down tracks atop the ovens, and loaded into them through the trunnel holes.

At the beginning of production, the coal in the ovens was lit and allowed to burn in an oxygen-deprived environment for two or three days; the finished coke was then raked out the larger side doors of the ovens into hopper cars in the depressed railbeds by and between the ovens and sent down to Dayton to the furnaces. New coal was immediately loaded into the ovens, and would ignite from the residual heat stored in the firebrick beehive domes.

At peak production, Dayton Coal and Iron Company was operating 377 coke ovens at the DCIC site (the 200 or so here and the Nelson ovens across Richland Creek). In 1907 the facility produced 120,000 net tons of coke. The approximately 200 Richland coke ovens survive in general states of collapse. To the north are stone walls and footings that supported the tipple, washer, crusher and coal bins, and the cistern for the washer is located along the Pocket Wilderness Road above the site.

The features should be interpreted in order for visitors to gain a full understanding of the scope of DCIC operations, allowing them to see that coal mining was only a part of a much larger process to abet the company's iron making operations. If the area is opened up, interpretive devices or guides can tell the story of how coal was brought from the mines, washed and crushed, converted to coke, and then transported to the furnaces. They can also discuss the coke production process and explore the significant environmental effects caused by hundreds of ovens operating day and night.

Unfortunately, the challenges for making the area easily accessible and stabilizing or restoring the surviving ovens will be a herculean and extremely expensive task. The previous section discusses issues involving the removal of kudzu, Japanese honeysuckle, and these are significant in themselves; this work would have to be completed in order for the ovens to be reached and be more closely assessed. Actual repair, stabilization, restoration or reconstruction of

[1]The 1901 Bureau of Mines report indicated there were 207 ovens "in blast" at the complex, so Pawpaw is fairly confident about its estimate.

the coke ovens would represent an even more enormous undertaking. In addition to the tremendous cost, various preservation ethics issues have to be addressed.

Not a single one of the 200 or so coke ovens is in presentable condition. Original stone facing on the battery banks has almost entirely disappeared. Perhaps the stone was sold off by the company liquidators, or it may have been quarried away by area residents for foundations and other purposes. A few pieces remain at some of the southernmost ovens, and the random ashlar end walls of some of the batteries are partially intact. But to completely restore the coke ovens to their original appearance, thousands of cubic yards of stone for facing would have to be quarried and laid.[2] The stone-lined walls supporting the railway tracks below the batteries is, however, fairly intact. New iron doors and trunnel heads (plates which covered the trunnel holes while the ovens were in use) would have to be fabricated and installed.

The earthen fill that packed the spaces between the ovens is likely choked with kudzu rhizomes or tubers and Japanese honeysuckle roots at the north end of the batteries, and tree roots have invaded the southern ones. Even if the park determines to cut the trees on the south ovens, unless they are cut at surface level, it will take years for the stumps to rot away, and over time, cavities will likely form where the roots finally deteriorate. Many yards of new fill would have to be applied under a full restoration scenario.

Of the 199 ovens evaluated, about a third have completely collapsed and are today mere depressions in the sides of the batteries. About half are partially collapsed, with anywhere from a third to three-quarters of the original brick beehives having fallen in. A small number, mostly in the southern two batteries of ovens beyond the kudzu area, are relatively undamaged with most of the brick beehive structures intact.

Full restoration of the ovens would require fabrication of thousands of new firebrick. (A Nashville firm, WASCO, Inc. makes firebrick for the furnaces at the Ford Glass Plant there and could likely make new ones for the ovens.) A skilled masonry team would have to build replacement ovens and repair existing ones. Some of the surviving beehive roofs may be held together today by plant and tree roots, and more damage is likely once the vegetation is removed.

If the coke ovens were restored, the earthen fill between the beehive roofs would have to be stabilized, likely by planting in grasses. This would commit the park to a regular mowing and reseeding schedule. Mowing could be reduced or eliminated if certain native grasses or sedges were used; however, these may be more difficult to establish.[3] Finally, some sort of fencing would be required to keep visitors out of the ovens, both to protect them and to discourage unwanted behavior.

Pawpaw's historic preservation subcontractor provided an estimate for rebuilding coke ovens to functional standards (meaning, they could be used for the actual production of coke) at $29,000 each. Some ovens would need less work, but all would require substantial repair or reconstruction. If an average cost for rebuilding each oven were set at $25,000, this would require an expenditure exceeding $5 million to fully restore all 207 ovens. This figure does not take into account clearing of kudzu and honeysuckle and removal of trees, repairs to the railbed walls, or any work on the tipple, washer and coal bin foundation walls.[4]

Using cheaper brick and stone to make more of a replica oven would bring down the cost per oven to $19,500. This would still require an investment of approximately $4 million. Using salvaged material would save money on the cost of material, but would require more labor.

Restoring the ovens partially, enough to present them to the public in a form in which they could be viewed and understood, would cost substantially less, though the work would still be extremely expensive. In 1998, the City of Chickamauga, Georgia acquired the site of the Durham Coal and Iron coke ovens and applied for state and federal funds to restore some of them as a heritage tourism site. The Durham ovens were in comparable condition to those

[2]One can see how the stone facing might have looked by visiting the Dunlap Coke Ovens Museum in Sequatchie County to the west; here, several hundred ovens still boast their original stone wall facing.

[3]Sally Wencel, Friends of the Cumberland Trail, email to Richard Quin and Sherry Beard, Pawpaw, 30 September 2013. She indicates that TVA has been investigating the use of native grasses to crowd out invasives on some of its power line sites.

[4]As the tipple site, washer and coal bin site is completely buried in vegetation, it was impossible to make any kind of cost estimates for work in this area. The vegetation will have to be thoroughly removed before any assessment can be conducted.



*Only a few of the ovens, like SM-1 at the south end of the lower batteries, retain any of their original stone facing.*



*This group at the Dunlap Coke Ovens in Sequatchie County shows how the facing would have looked. Ironically, very few of these have their intact brick beehive domes.*




*About a third of the ovens, like SM-20 shown here, have completely collapsed .*



*Here, a large part of wall is already missing because a tree fell and its rootball pulled out the stonework.*



*Chickamauga, Georgia has stabilized a number of ovens as a part of its Coke Ovens Park.*



*Others have not been rebuilt. Even so, the cost of mowing and maintaining the structures is significant.*

at DCIC, some intact, some collapsed, and all covered with vegetation. The city received funding for restoration work and the historic park opened soon afterwards. The city paid approximately $8,000 per oven for vegetation removal, cleaning and some rebuilding of stone walls. The park displays 36 ovens, both rebuilt and collapsed. If a figure of $10,000 per oven were used for similar work at the DCIC site (this provides a 20% buffer for inflation or more expensive labor), the cost of restoring ovens to this level of integrity would still total $2 million.

Stabilizing the coke ovens is another option. This is a less costly approach to reduce further deterioration and reveal the ovens to view, rebuilding a portion of the stone retaining wall and reconstructing unstable portions of the ovens using salvaged bricks and recreated elements matching the historic appearance. Wood shoring may be required, along with metal struts and supports. Joints and cracks would be pointed with an appropriate mortar mix. Contractors could perhaps use salvaged masonry units from the site. Where period brick and stone are not available or appropriate, new components manufactured to the appropriate size are available for masonry contractors. Based on the estimates for new oven construction, stabilizing the most intact of the ovens could start as cheaply as $3,575 but could range up to $8-10,000 per oven depending on their structural integrity and the amount of material required to replace.

Some members of the Friends of the Cumberland Trail asked about constructing a couple of entirely new coke ovens purely for interpretive purposes. This would probably cost at least $100,000, based on the approximately $30,000 unit cost for oven reconstruction, along with additional costs for building end walls, etc. Costs would likely be even higher as this would eliminate some expected cost savings for bulk orders of materials for the full 200 ovens.

All of these restoration/reconstruction/stabilization scenarios raise serious historic preservation ethics issues. With their background in historic preservation projects, the Pawpaw team quickly became concerned that many of these scenarios conflicted with what are considered appropriate forms of preservation today.

While there are numerous places where historic structures and landscapes have been thoroughly restored and lost historic elements reconstructed (Colonial Williamsburg is probably the best-known American example), many preservation agencies today would discourage the very extensive work needed to restore the Richland coke ovens to their functional appearance. If completely rebuilt, with new stone facing walls and doors, they will look like early twenty-first century features, not historic works from the period of significance.

Preservation agencies utilize the *Secretary of the Interior's Standards for Rehabilitation*[5] for determining appropriate preservation treatments of historic buildings, structures and landscapes. Not only do these provide advice on appropriate work, they are codified into federal law (36 CFR 67) and must be followed whenever federal funds or permitting is involved.

[5]Available online at www.nps.gov/tps/standards/rehabilitation.htm.



*The northern batteries can be reached today in wintertime, and a few on the west side could be stabilized for interpretive purposes.*



*However, such work should not even be contemplated until the invasive plants are removed and the site can be easily accessed.*

While Standard #6 does allow for the repair and replacement of deteriorated historic features, Standard #9 would discourage the more extensive scenarios outline above. The standard reads:

> *9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment*

This would discourage reuse of historic materials from the site for reconstructing or restoring a limited number of ovens. (Redstone, Colorado, the site of the former Colorado Fuel and Iron Company, did reuse brick and stone materials from their site to rebuild historic coke ovens, so there is precedence for an interpreted site using salvaged materials for its restoration project.) Furthermore, as any new work would have to be differentiated from the old, new stone facing and doors would result in a structure that would not reflect the historic appearance of the original ovens.

Construction of entirely new ovens for interpretive purposes would violate Standard #3, which dictates that "Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken." The new ovens would be non-historic features introduced into an historic industrial landscape, and would likely confuse some visitors who would not understand their age or purpose.

Pawpaw and former Southeast Tennessee Development District historic preservation planner Paul Archambault invited staff from the Tennessee Historical Commission (the state's historic preservation office and overseer of preservation programs that involve state lands and federal licensing and funding) to visit the site. Richard Quin and Paul Hoffman from Pawpaw followed up with a meeting the staff at their Nashville office in June. The THC staff were reluctant to endorse any major work that would significantly alter the historic landscape, require the quarrying of historic elements from some ovens for reconstruction of few, the construction of new ovens where none had existed for interpretive purposes, or heavily reconstructing or rebuilding the oven batteries with new facing and doors as such work would result in structures which were predominantly of new construction. Pawpaw requested a memorandum from the THC staff outlining their position.

The Pawpaw team cannot make any final recommendations regarding what treatments the park should undertake. Anything of such magnitude would have to be decided by the park or by state managers. The sheer scale of the costs would certainly make securing funding for many of these scenarios an enormous task in itself.

The authors of this plan would suggest consideration of a couple of much smaller-scale scenarios. If the cloaking kudzu and Japanese honeysuckle can be eradicated, then a couple of the ovens on the west side of the northwest battery in best condition could be stabilized and presented for visitors to view. This would require construction of a short stretch of deck or boardwalk, and some bars across the oven opening to prevent visitors from going inside. This would allow the visitors to see how the ovens were constructed, and encourage them to use their imaginations to envision what all 200 or so would have looked like during the historic period.

Pawpaw emphasizes that such work should not be undertaken unless the invasive plant issues are dealt with. If such a viewing platform were constructed now, it would be swallowed up by kudzu vines in the first season. Furthermore, visitors cannot even reach the ovens when the kudzu is in full summer or fall growth.

An alternative is essentially a "do-nothing" scenario. In this case, the ovens would be allowed to be reclaimed by nature. They could still be interpreted by panels or interpretive guides, located at the south end of the parking area, or near the ovens themselves if the park is ever able to open up an access trail along the old rail line route (see the section on wayfinding and multi-modal access). This would be the least expensive alternative and would have the least effect on what is basically an historic archeological site today.

# DYNAMITE MAGAZINE TREATMENTS

Located along the old rail line between the Laurel-Snow parking area and the Richland Coke Ovens is the only surviving building from mining operations on the site. This small rectangular concrete building was a dynamite magazine, constructed about 1922 by the Cumberland Coal and Iron Company which had recently purchased the property. It is typical of mine magazines from the period; the concrete walls and roof would help maintain the dynamite at a cool, stable temperature. Mining companies often favored concrete structures because they were secure against rifle fire, ostensibly from disgruntled miners or strikers.

The dynamite magazine is weakened from time and abandonment. The building's appearance can be improved starting with graffiti removal. A fast-acting paint stripper combined with pressure washing would likely remove the graffiti. The gentlest method would utilize a non-ionic detergent, Tween® or Triton® lines for example, used in conjunction with pressure washing. Ammonia is the next step up. Many paint strippers are available commercially, some specifically for concrete and masonry by Behr or Back to Nature. Active ingredients in most of these are organic solvents, which may not be suitable for use near water. Klean-Strip® by Back to Nature claims to be an environmentally safe paint remover that can remove multiple layers of paint with one application. Although the paint will be removed, it has been on the building for years and may leave residual stains or "ghosts." In this event, a commercially-available poultice, (cleaning chemical mixed with talc or other inert absorbent material), could be applied and allowed to stay in contact with the area for a longer duration (usually a day or more) while it pulls the staining material out of the substrate. Pawpaw's preservation consultant estimated the graffiti removal would begin at approximately $950 with gentle pressure-washing and paint-stripping. Alternatively, the building could be painted for about the same cost. Abrasive methods or mechanical removal are not recommended as they can cause permanent damage to the surface.

Before any treatment is undertaken, testing should be done in an unobtrusive area. The lowest possible effective water pressure should be used, and if the pressure washing starts to damage the concrete, the pressure should be reduced, or alternative methods should be employed. Water for the pressure washer can likely be obtained from Richland Creek if a long enough hose is used.

Stabilization of the building's concrete would involve injecting epoxy into the cracks to restore its structural integrity. This would cost upwards of $2,000.

Windows and the door opening could be secured with chain link for a few hundred dollars, although the team believes this could actually encourage additional vandalism by curious types; the structure should probably be left open as it is.



*DCIC Dynamite Magazine, showing graffiti and structural cracks, 17 March 2013.*



*The magazine in summer, showing encroaching vegetation, 14 July 2013.*

# MANAGING CLIMBING ON HISTORIC WALLS AND STRUCTURES

In a February 12 email to Richard Quin and Paul Archambault, Cumberland Trail State Scenic Trail Manager Bobby Fulcher asked that Pawpaw address the possibility of constructing barriers to prevent climbing on the Dixon Slope Mine walls, or new trail construction to discourage climbing on stonework.[1] The rockhouse area above the Dixon Slope mine is a popular spot this activity and the team observed rock climbing classes being taught here. The nearby mine walls obviously suggest themselves inviting climbing surfaces.

After evaluating the resources and seeing park visitors actually climbing on some features, the Pawpaw team is convinced action is needed. However, construction of fences or barriers would introduce a discordant element into the historic landscape. The team's preliminary thought is that appropriate signs to discourage climbing should be tried. They are recommending a positive message to engage visitors, something like "Help us protect these historic resources by not climbing on the walls." If the signs don't work, then other actions can be considered. Unwanted social trails should also be brushed out to deter visitor use.



*Climbers on Dixon Slope Mine tipple foundation walls, 14 July 2013.*

[1]Bobby Fulcher, Manager, Cumberland Trail State Scenic Trail, email to Paul Archambault, Historic Preservation Planner, Southeast Tennessee Development District, and Richard Quin, Pawpaw, 12 February 2013.



*Ventilation shaft for the Dixon Slope Mine. Located just a few feet off the main Laurel-Snow trail, it is explored by many visitors. Most evidently go no further than the flooded mine passage a short distance in, but nothing today would prevent a person from trying to gain access to the mine passages.*

# MINE GATING

There are numerous old mine entrances, ventilation shafts, and other passages remaining from the Dayton Coal & Iron Company operations in the Laurel-Snow State Natural Area, mostly on the west side of Richland Creek. These have potential for visitor entrapment or injury. In addition, some of the mine passages may be hibernacula for bat colonies. Gating mine entrances may be desirable for visitor protection, and to protect bats from disturbance or the spread of disease.

***Safety Concerns***

The various mines operated by the DCIC and its affiliates and successors at Laurel-Snow have been abandoned for eighty to one hundred years in most cases and pose risks to visitors who might try to enter them. While the company dynamited or closed off many entrances (the enormous Nelson Mine #1 entrance was dynamited specifically to keep trespassers from entering), a number of adits, entrances, and ventilation openings are still present in the area and pose potential problems.

While the natural caves in Tennessee's limestone formations are generally stable, abandoned mines are inherently dangerous places. Loosened rock can cave in, especially where the original wooden timbers used to prop up mine roofs are rotting in the often-damp conditions. Oxygen-deprived air or poisonous or explosive gases were historically present (three enormous mine explosions took the lives of many miners in 1895, 1901 and 1902), and may well be even more of a hazard than when the mines were operating as the historic ventilation systems are no longer functional. Deep water has seeped into some mine areas and presents other hazards. The very maze of mine grid openings on multiple levels could be bewildering. Finally, a visitor that goes in too far, without adequate lights, might be caught inside in the dark. Falls, a broken ankle, concussions caused by dislodged rock are only a few of the imaginable hazards. Because of these threats, mine rescues are very dangerous for the responders. Preventing access to the mines is highly desirable.

Cumberland Trail State Park Ranger Andrew Wright made a good argument for gating mine openings for safety reasons in an April 2013 email to the Pawpaw team, as follows:

> While this will be an expensive proposition that may or may not ever be funded, some form of gating seems necessary as part of a plan for this area. The air shaft along the trail is visited by almost every hiker in Laurel Snow. I agree this one should be a little bit inside the shaft, to not distract. This mine is filled with water on one side and collapsed rock on the other. The water extends out of site, and presumably fills the shaft for a long way. To my knowledge, we have never pulled anyone out of there but that has always seemed to be a possible concern for traffic in and out of this. There has been an alien mannequin pulled from the water, however. The other mines are off the beaten path, but I am certain they still receive some level of visitation. Visitors often show up back at the parking lot in broad daylight with headlamps on, and I can't count the number of people I have overheard saying something similar to: "There's a bunch of caves on the other side of the creek...I need to take you over there (when talking to someone else in their group)." Or, they will ask me how deep those caves are. I do my best to not only tell them that caves and mines are closed, that these are mines with the potential for roof collapse. They usually just stare back with a blank face. I have no doubt that several of the mines are visited regularly, and I don't imagine too many will be deterred by signage. A rescue into a cave is difficult and time consuming, but a rescue into a 100-year old mine puts all who enter into equal danger.[1]

Because funding for such gating may be difficult to obtain, the park should prioritize what openings should receive attention. The Pawpaw team agrees that the Dixon Slope Mine ventilation shaft referenced by Ranger Wright is the most obvious candidate, as it is checked out by many casual visitors, and there is some likelihood a curious individual or party will want to explore the passages at some point. If this passage is to be gated, the Pawpaw team recommends the gates be placed well inside the entrance, probably near the point the passage drops down to the flooded cross section, so as not to compromise the historic appearance of the exterior. Placing it well back in would still allow

[1]Andrew Wright, Park Ranger, Cumberland Trail State Scenic Trail, email to Richard Quin, Pawpaw, 11 April 2013.

visitors to enter the passage for a short distance, perhaps enough to discourage vandalism of the gates by area users who have always explored the first section of the shaft.

The team suggests a second priority should be the intact furnace ventilator shaft for the Laurel Creek Mine, a very deep stone-lined shaft approximately 11' in diameter and located right at ground level. While this structure is well off a trail, in summer time nearby vegetation partially hides it from view, and an unwary off-trail hiker could conceivably fall into it. Even if s/he were to survive the 50'-60' vertical drop, it is unlikely calls for help would ever be heard as the shaft would channel sounds straight up.



*The deep furnace vent shaft at the Laurel Creek Mines is seen by few visitors, but presents a dangerous falling or entrapment hazard. Summer vegetation makes it much less obvious.*

Mines and passages west of Richland Creek should likely be of lower priority as they are not easily accessible and are seen or chanced upon by relatively few visitors. Some of these mines are open; indeed, the Prospect Mine entrance can be explored for a considerable distance. As Ranger Wright has indicated that cavers and explorers do sometimes ask about or visit some of these mines, potential for an incident does exist. Warning signs might be enough to deter some visitors, but only gating would prevent access and completely rule out accidents or the need to endanger rescuers.

***Bat Concerns***

Although mines of course are man-made and not a part of the natural landscape, bats have long used inactive and abandoned mines for roosting habitats. Like the caves bats generally prefer, mines offer stable temperatures, protection from rain and snow, and are generally free of predators. Many Tennessee caves have been made inhospitable for bats by human activities; consequently, bats have increasingly made use of inactive mine drifts and shafts.

As in many other parts of the country, bats have taken up residence in mines in Tennessee. A 1983 survey of 114 Tennessee and Kentucky mines by the U.S. Army Corps of Engineers found that 28% of mine shafts contained bats. Among the species that inhabit mines are Rafineseque's Big-Eared Bat (*Corynorhinus rafinesquii*) and Eastern Small-Footed bats (*Myotis leibii*), both of which are candidates for federal protection (*Corynorhinus rafinesquii* has been listed as threatened since 1977, though it is on the IUCN Red List as a "Species of Least Concern;" *Myotis leibii* is under review for the Endangered Species Act though it, too, is on the IUCN Red List under "Least Concern.") Indeed, the largest known hibernating populations of both of these species is mines in Tennessee and in New York.[2]

Many Eastern bat populations have been devastated by a fungal disease known as "white-nose syndrome." The fungus, *Geomyces destructans*, grows best in cool humid conditions typical of bat hibernacula.[3] It is commonly thought the fungus is spread from bat to bat; however, there is a strong possibility humans might inadvertently transmit it from cave to cave (or mine) on their clothing or caving gear. In order to prevent this possible vector for the fungus, Tennessee Department of Environment and Conservation has temporarily closed all caves on state lands to public entry, mostly out of concern for two federally *listed* endangered species, the Gray Bat (*Myotis grisescens*) and the Indiana Bat (*Myotis sodalis*). U.S. Fish and Wildlife Service has asked all cavers to not only respect the state closure of caves, but to avoid mines or other passages that contain hibernating bats.[4]

[2]University of Michigan Museum of Zoology, "Animal Diversity Web entries for *Corynorhinus rafinesquii,* http://animaldiversity.ummz.umich.edu/accounts/Corynorhinus_rafinesquii and *Myotis leibii*, http://animaldiversity.ummz.umich.edu/accounts/Myotis_leibii/, retrieved 1 September 2013; Jacqueline J. Belwood and Rachel J. Waugh, "Bats and Mines: Abandoned Does Not Always Mean Empty," *Bats Magazine* Vol. 9 No. 3, Fall 1991, on the Bat Conservation International website, http://batcon.org/index.php/media-and-info/bats-archives.html?task=viewArticle&magArticleID=504, retrieved 1 September 2013.

[3]University of Michigan Museum of Zoology, *op cit.*

[4]"White Nose Syndrome Frequently Asked Questions Adapted from U.S. Fish and Wildlife Service Information, http://news.tn.gov/system/files/WNS%20FAQs.pdf, retrieved 1 September 2013.

During repeated site visits to the Dayton Coal & Iron resources in Laurel-Snow, the Pawpaw team has observed bats at dusk, some emanating from mine or vent openings. Although team members were not qualified to determine the species of bats in rapid flight, nor have they made any attempts to enter any mine passages, it's clear that some of the mine segments are used by roosting bats. A roosting bat (likely a pip) was also observed in a mine shaft by Lisa Huff, East Tennessee Regional Manager for TDEC's Division of Natural Areas, during a State Natural Areas Week hike.[5] Therefore, closing mines for safety reasons through backfilling, sealing with concrete, or dynamiting entrances could have an adverse effect on the bats making use of them. Only installation of proper gates, designed for proper airflow with bars separated at appropriate distances, would protect visitors from mine hazards and still allow bats ingress and egress to mine passages.

After reviewing materials on bat gating in Tennessee from various sources including the Tennessee Nature Conservancy, Pawpaw suggests that FCT and the park carefully consider where, if anywhere, gates or other treatments are warranted. First, a determination should be made if any bats present in the mine are endangered species, or species vulnerable to white-nose syndrome (not all species are affected). Next, might signs be sufficient to deter entry? Finally, which areas should be considered for gating. Perhaps consideration should be given to gating the obvious ventilator shaft from the historic Dixon Slope mine immediately next to the main Laurel-Snow trail (if so, Pawpaw would recommend gating well inside the vent so as not to detract from the structure's historic appearance), whereas the furnace vent for the Laurel Creek Mine, well away and up a steep slope from the trail, might not be gated (though it is a potential falling hazard for visitors). Small mine openings which are difficult to enter, or features located west of Richland Creek and thereby unlikely to be disturbed or even found by most visitors, might best be left alone.

Please review the footnoted reports, "Agency Guide to Cave and Mine Gates, 2009,"[6] and "Performing a Needs Assessment for Potentially Gating a Cave or Mine,"[7] before determining a policy. If gating is determined to be an appropriate action for safety reasons or to protect bats present in mine passages, gate designs should comply with industry standards as promulgated by the American Cave Conservation Association and Bat Conservation International. Tennessee Nature Conservancy has properly gated a number of caves on its properties and can offer guidance. Of course, Cumberland Trail State Park has had the entrance to Devilstep Hollow Cave on its Head of the Sequatchie unit gated, and can likely make its own determination.



*Tennessee Nature Conservancy installed the gates at left at Hubbard Cave, a large cave on one its preserves in Warren County. (Allen Cressler photo for Tennessee Nature Conservancy).*

[5]Lisa Huff, East Tennessee Region Manager, Tennessee Department of Environment and Conservation, Division of Natural Areas, email to David Lincicome and Bobby Fulcher, 23 April 2013.

[6]"Agency Guide to Cave and Mine Gates," 2009 by Jerry Fant; American Conservation Association; Jim Kennedy, Bat Conservation International; Roy Powers, Jr., American Conservation Association; and William Elliott, Missouri Department of Conservation, www.batcon.org/pdfs/sws/AgencyGuideCaveMineGating2009.pdf, retrieved 2 September 2013.

[7]"Performing a Needs Assessment for Potentially Gating a Cave or Mine" by Rick Olson, Division of Science and Resource Management, Mammoth Cave National Park, www.caves.org/grotto/esso/RESOURCES/gating%20a%20cave.pdf, retrieved 2 September 2013.

# OLD DAYTON RESERVOIR

Park management has expressed concern about the dam and asked for evaluation of its stability as a part of this project.[1] Pawpaw Partners does not have a hydraulic engineer on staff and cannot render a professional opinion on this matter; however, it appears the reservoir is largely filled up with silt and stone today and has depth of only 3' or so at its deepest point. The lake measures approximately 130' by 50' wide, and appears to have an average depth of no more than 2.5'; this yields a maximum surface area of 0.15 acres with a total volume of 0.38 acre feet, with a total volume of 123,823 gallons; as depths are shallower in many places, actual volume is likely less.

Since the dam is a low-head fixed barrier structure, it can impound no more water than is held by the crest of the dam; at higher water stages, excess water simply tumbles over the dam, or will submerge it entirely. Flood water events carry far more water down Richland Creek than the volume retained in the small reservoir, so it is likely that even if the dam were to be breached, the resulting surge would not be any greater than periodic flows following heavy rains.

If the park requires professional evaluation of the dam, a competent hydraulic engineer should be engaged to investigate the structure.

Pawpaw notes that the trail had washed out severely since it started its work, and the sign marking the reservoir has since disappeared.



*Old Dayton Reservoir on Richland Creek, 4 November 2012.*



*The dam from above, 23 February 2013. This photo shows the shallow depth of the reservoir.*



*The reservoir extends upstream about 150.'*



*Adney valve from the water pipe that conveyed water from the reservoir down the rail line right-of-way to Dayton.*

[1]Bobby Fulcher, Manager, Cumberland Trail State Scenic Trail, to Paul Archambault, Richard Quin and Sherry Beard, email, 21 February 2013.



*View looking down the incline plane that served the upper Laurel Creek Mine.*



*History hike with DCIC researcher William Wade, 22 March 2013.*



# PART II: INTERPRETATION

# INTERPRETING THE DCIC RESOURCES

Providing engaging interpretation of the Dayton Coal & Iron Company resources at Laurel-Snow will encourage park visitors to appreciate and understand the significance of the historic resources in conjunction with their enjoyment of the stunning scenery of the state natural area. Proper interpretation will take into account the varied interests of park visitors. Many come merely to walk the trails, to swim in Richland Creek, or to while away an hour or two with family and friends; others are drawn to the majestic waterfalls that give the area its name. Few actively seek out the historic resources associated with the industries that once thrived here, but visitor surveys indicate most are eager to learn more about them.

The National Association for Interpretation defines the concept as a "process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource." Of course, Laurel-Snow features outstanding natural resources as well as the historic resources surviving from the coal mining and processing operations. This project focused only on the cultural resources at the site; however, some of the suggestions can lend themselves to better interpretation of the unit's natural features as well.

Resources surviving from the mining operations—mine entrances, ventilation systems, structural foundations, retaining walls, the railway beds and the coke ovens—are at present almost unintelligible to many visitors. When they stumble upon the arched stone opening on the east side of the trail past Paine Creek, many have no idea what it was. If they are local residents who know that mining had taken place here years ago, they probably assume it was an old mine entrance, not a ventilation shaft that was used to provide air to workers deep in the mines below. Without interpretation, the features are cryptic; visitors see extensive walls and other works and have no idea what had taken place here. Interpretation of the resources will provide a new and immersive experience for Laurel-Snow visitors and encourage them to better appreciate the area's cultural remains.

One of the main challenges at the site is the lack of available staff to provide face-to-face, personal interaction with park visitors. There are no visitor centers, ranger stations, offices or concession operations. The park cannot provide a seasonal interpretive ranger as it has only limited staff to deal with many other units and demands. Therefore, this plan proposes on-site interpretation (either fixed wayside exhibits, a guide keyed to numbered posts, or a combination of the two) that will allow visitors to explore the historic features on their own. Younger visitors deserve to be engaged by materials designed specifically for them, not just watered-down versions of adult information. To provide for their specific needs, this plan provides a web-based Junior Ranger program compatible with those used in other Tennessee state parks. It provides age-specific content and engaging activities that will help a young visitor explore and understand the historic landscape. It can be downloaded, then completed during a site visit. In addition, two lesson plans have been developed for use in Rhea County schools; these can educate local students about their county's industrial past and help them appreciate their local heritage.

Specific recommendations regarding interpretive devices and programs may need to be updated as technology, funding, or resource conditions change. Nevertheless, the core recommendations should remain constant for years to come.

***On-Site Interpretation***

At present (2013), visitors arriving at Laurel-Snow find very little to tell them about the site. A single kiosk in the parking lot features a simple Cumberland Trail Conference map of the area, emergency contact numbers, and registration information for overnight camping. The map does show the location of the Dixon Slope Mine ventilation shaft (which it mislabels as the "Richland Mine'), but there is no contextual information explaining the significance of the area's industrial resources, or for that matter, describing why the area is a noteworthy state natural area.

To provide the most basic of interpretation at the site, a display for the existing kiosk can present information on the Laurel-Snow trail system and the natural resources at the site. A section can explain the historic features surviving from the Dayton Coal & Iron Company era as well. The kiosk features a 20" high-x-38" wide area protected behind a

sheet of plexiglass. An inexpensive introductory panel could be printed to fit this area. If another Plexiglas sheet could be installed, another interpretive panel could be placed at the rear.

In August 2013, Pawpaw and Friends of the Cumberland Trail volunteers conducted user surveys at the site. While a variety of information was solicited from Laurel-Snow visitors, the primary purpose was to determine opinions regarding different on-site interpretive options. Nearly nine out of ten respondents indicated they would like to learn more about the historic features they saw along the trail. When asked if they would prefer fixed interpretive panels, a guide keyed to numbered trailside posts, or a combination of fixed displays and numbered posts, half indicated they favored a combination of panels and a guide. Panels alone were favored by 40% of respondents, but only 10% indicated they would prefer the numbered posts and guides. Full results are found in the visitor survey section beginning on page 60.

Providing fixed panels or "waysides" along the trail and at the location of other DCIC resources would be the most expensive form of on-site interpretation, but it has several distinct advantages. Panels provide immediate information in context. By featuring historic photographs and maps along with text, they can help visitors understand that the features were once mines or processing facilities, not just rock walls or rubble. They are relatively permanent, and do not require periodic work like printing and stocking of brochures or guides. Downsides are that such signs are prone to vandalism, will eventually have to be replaced due to fading, and are by far the most expensive of the interpretive scheme that can realistically be employed at the site. They are also somewhat visually intrusive and may not be desirable to visitors wanting only to experience the natural landscape.

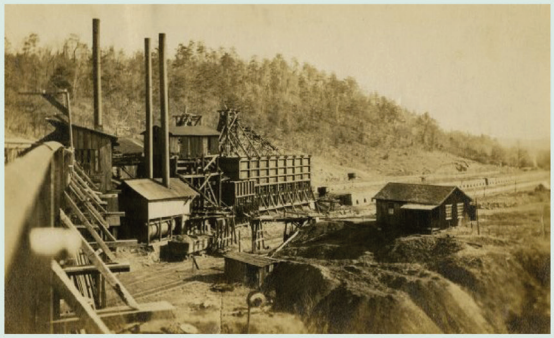
Dayton Coal & Iron Company
Heritage Tour

## Richland Coke Ovens

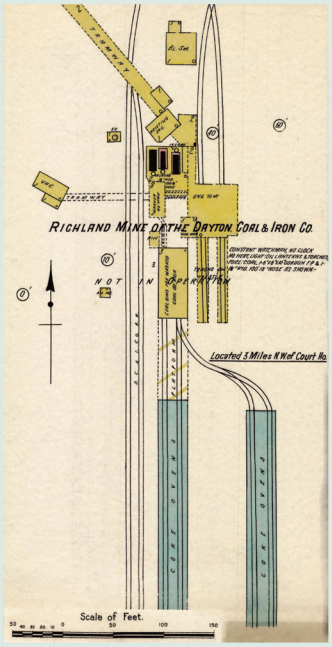
Coal from the DCIC mines was primarily used for making coke for the company's iron furnaces at Dayton. Four banks of beehive coke ovens, which burned off impurities in the coal, were located to the southwest. In all, 207 ovens operated at this complex, and another 125 across the creek at the Nelson mines.



*Coal was converted to coke in brick and stone coke ovens.*



Coal was transported from the mines on the short line railroad, then washed and crushed at a processing facility. It was then transported in smaller rail cars to the tops of the ovens visible at the right in the photo, burned in a low-oxygen environment for as long as 72 hours, then shipped on by rail to the furnaces.




*1914 Sanborn Insurance map of the Richland processing facility and coke ovens*

Cumberland Trail State Scenic Trail
Laurel-Snow State Natural Area

*Mock-up of an interpretive wayside for the Richland coke ovens.*

Pawpaw is providing designs for interpretive signs to be placed at various points along the main Laurel-Snow trail, at the site of the Richland coke ovens, and at the site of the iron furnaces in Dayton. In addition, it is designing a panel for the Scopes Trial/Rhea County Heritage Museum and one for the Rhea County Visitors Center. The three off-site panels would integrate features at Laurel-Snow SNA with the "Dayton Coal & Iron Heritage Tour" discussed on page 45. Pawpaw designed the panels for fabrication at a 36"-x-48" size; however, they will print well at smaller dimensions. The team suggests that smaller panels, perhaps as small as 11"-x-17," will be less distracting in the natural area, and also considerably less expensive to fabricate. Designs for the panels can be found in Appendix B.

A series of numbered posts keyed to an accompanying paper guide could be implemented at a considerably lower cost. Under this scenario, numbered posts would be placed at resource locations along the trail; the posts would be less visually obtrusive in the natural landscape. Visitors would be able to learn about the identified features in the paper guide. The latter can incorporate the same text and graphics, or a more detailed guidebook could be even be crafted; however, a simple guide, perhaps a single-page (front-and-back) sheet would be the least expensive to produce.

This scheme also has a couple of significant drawbacks. Some guides could end up as trailside litter; however, a well-designed and interesting guide would be a desirable souvenir and would likely not be discarded. The guides would also have to be regularly printed and restocked. To offset printing costs, FCT could provide a secured donation box or fee tube so visitors could purchase their guide; alternatively, they could "borrow" one for the duration of their stay. Restocking could be done on an occasional basis by the Laurel-Snow gatekeeper. Visitors could also download the guide at no cost in advance from the park and FCT websites. The guide might even be integrated into the new Tennessee State Parks' PocketRanger app discussed on page 55.

The guide could also incorporate a hiking trail map, information on the unit trail system, backcountry camping regulations and emergency contact information, allowing it to serve multiple purposes. Pawpaw has agreed to provide a sample guide once FCT and the park indicate whether they want a standalone guide for the historic resources, or a combined guide incorporating both natural and cultural interpretation.

Many of the surveyed visitors indicated a preference for a combination of fixed panels along with numbered posts and guides. Under this scenario, interpretive displays at the Laurel-Snow parking area would provide contextual information about the coal and iron industries, and the numbered posts and guides would explain individual features along the trail. The initial displays would tell the visitors about the historic features they will encounter; if interested, the visitors can pick or purchase a guide and use it to learn more about the various resources along the trail.

Soon after the onset of the project, Pawpaw and the sponsors agreed that interpretive devices, whether panels or posts, should be sited on the east side of Richland Creek. Resources on private land, like the Nelson Mine site and the Nelson coke ovens, and mines on park land on Morgan Creek, could be interpreted with devices located along the trail, but without specific locational directions, This would convey the same important information, but would not encourage trespass on private land, or crossing Richland Creek (which might result in accidents or needs for rescues).

Pawpaw has compiled engaging interpretative text and imagery that can be used in any of these scenarios; once FCT and Cumberland Trail State Scenic Trail determine their preference, final materials can be crafted quickly.

Even if FCT and the park ultimately decide upon a fixed wayside scheme, the paper guides could be used until funding for the panels could be secured and the waysides erected.

***Off- Site Interpretation***

Parks are dynamic classrooms where people interact with real places, landscapes, historic structures, and other tangible resources that help them understand meaning, concepts, stories, and relationships.

Freeman Tilden, the father of park interpretation, felt that interpretation addressed to children (say, up to the age of twelve) should not be a dilution of a presentation to adults. To be at its best it would require a separate program. Interpretation for children should be developmentally appropriate and children should be presented to at their own level. Children learn differently from adults and they process information differently as well. Programs for young

visitors should not only share facts and information about parks in a fun and interactive manner, but enhance their understanding and appreciation of a park and its assets. The programs should engage children in their visit and encourage them to protect and preserve the park and its features.

Pawpaw is presenting two programs to engage children in discovering the history of Dayton Coal and Iron Company are presented as part of the interpretive plan.

The first, a web-based Junior Ranger Program, offers a variety of activities to help participants learn about Dayton Coal and Iron Company and where coal comes from. The activities range from the geology of coal to figuring a miner's pay packet and will help them understand the role of DCIC in Rhea County as well as at Laurel-Snow SNA. The downloadable booklet also encourages stewardship of the park and its many features. Junior Ranger programs are used by the National Park Service, many state parks, and some local areas to motivate children and their families to get outside and experience natural and cultural resources. The programs interpret and celebrate a park and its surroundings and tell a story of the park's cultural and natural history. Each Junior Range booklet also contains the Junior Ranger Pledge and the duties of a Junior Ranger. The booklet is provided in Appendix C; a sample page is shown on the page opposite.

Lesson plans for local teachers to incorporate into their classes can engage young people in learning about the historic resources in their area. We are providing two lesson plans. The first, for primary aged students, helps them discover where coal comes from through a simple movement poem. Then the students are asked if they know any uses of coal in their daily lives. A middle school lesson plan, suitable for grades 4-6, engages the students in the world of folk heroes. Several real and imaginary personages are discussed along with the exaggerated characteristics with which folk heroes are often attributed. After learning about dangers miners faced, each student will formulate their own coal mining folk hero. These lesson plans are in Appendix D.

If young people can be encouraged to visit Laurel-Snow and learn about the historic DCIC features, they will gain an appreciation not only for these cultural resources but also for the natural beauty of the area. They will also learn why it is important to preserve both so that they can enjoy them as adults as can future generations.

| What's the real work like? | What are the real workers like? | Hero's physical traits | Hero's character traits | Hero's words | Hero's deeds |
|---|---|---|---|---|---|
| • Hard rock mountainsides<br>• Steep climbs<br>• Rock slides<br>• Swinging big sledgehammers weighing 9 pounds | • Strong back and arms<br>• Aerobic strength: heart, lungs continuous effort<br>• Work in teams | • Tall and muscular<br>• Great muscular and aerobic strength<br>• Endurance<br>• Used a 30-pound hammer with a 9-foot handle | • Perseverance, determination<br>• Proud of work<br>• Skill with hammer<br>• Self-sacrificing<br>• Brave | • "I'll die with a hammer in my hands."<br>• "Get me a thirty pound hammer with that nine foot handle--I'll beat your team drill down" | • Worked so hard he beat the steam drill<br>• Died rather than let the steam drill beat him |

*In this sample exercise from the "Create a Coal Miner Folk Hero" lesson plan, students are encouraged to review traits and actions of historic coal miner heros. In another task, they create their own hero.*

# What is Right/What is Wrong?

Laurel-Snow is not only a wonderful natural area, but the relics of the Dayton Coal and Iron Company make it a great place for learning about the history of the area as well. It is very important that we protect the industry resources of Laurel-Snow Unit of Cumberland Trail State Park so that others can enjoy them today and in the future.

Look the pictures below. Ask yourself if it is safe for yourselves or others? Does it harm anything in the park? Mark an X under activities that could harm you AND the mine and coke oven resources. Put a star under activities that are good.

SAMPLE PAGE FROM BOOKLET

Climbing on Walls



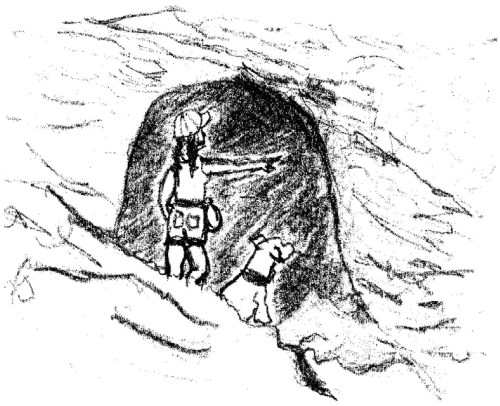
A. ____

Picking Up Litter



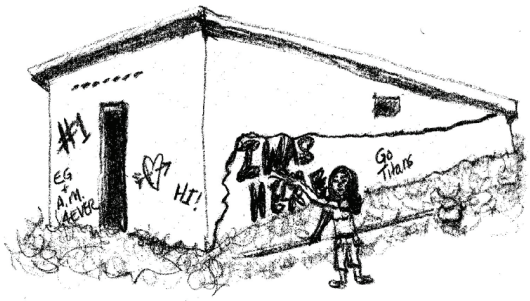
B. _____

Entering Old Mines



C. ____

Marking Buildings and Rocks



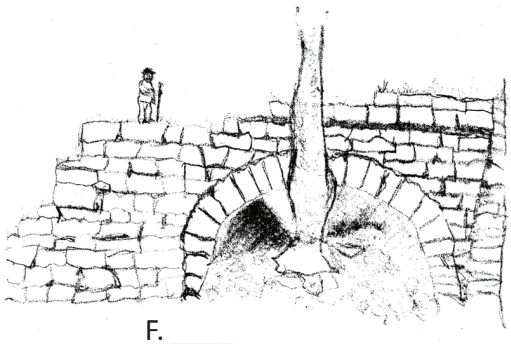

D. ____

Staying on Trails




E. _____

Climbing on Structures



F. ____

Check off the things you have done to protect the resources of the Laurel-Snow Area.

☐ stayed on trails ☐ left everything where I found it ☐ picked up trash
☐ respected other visitors ☐ looked at rocks and remains but did not disturb or deface them

What else did you do? _____

_____

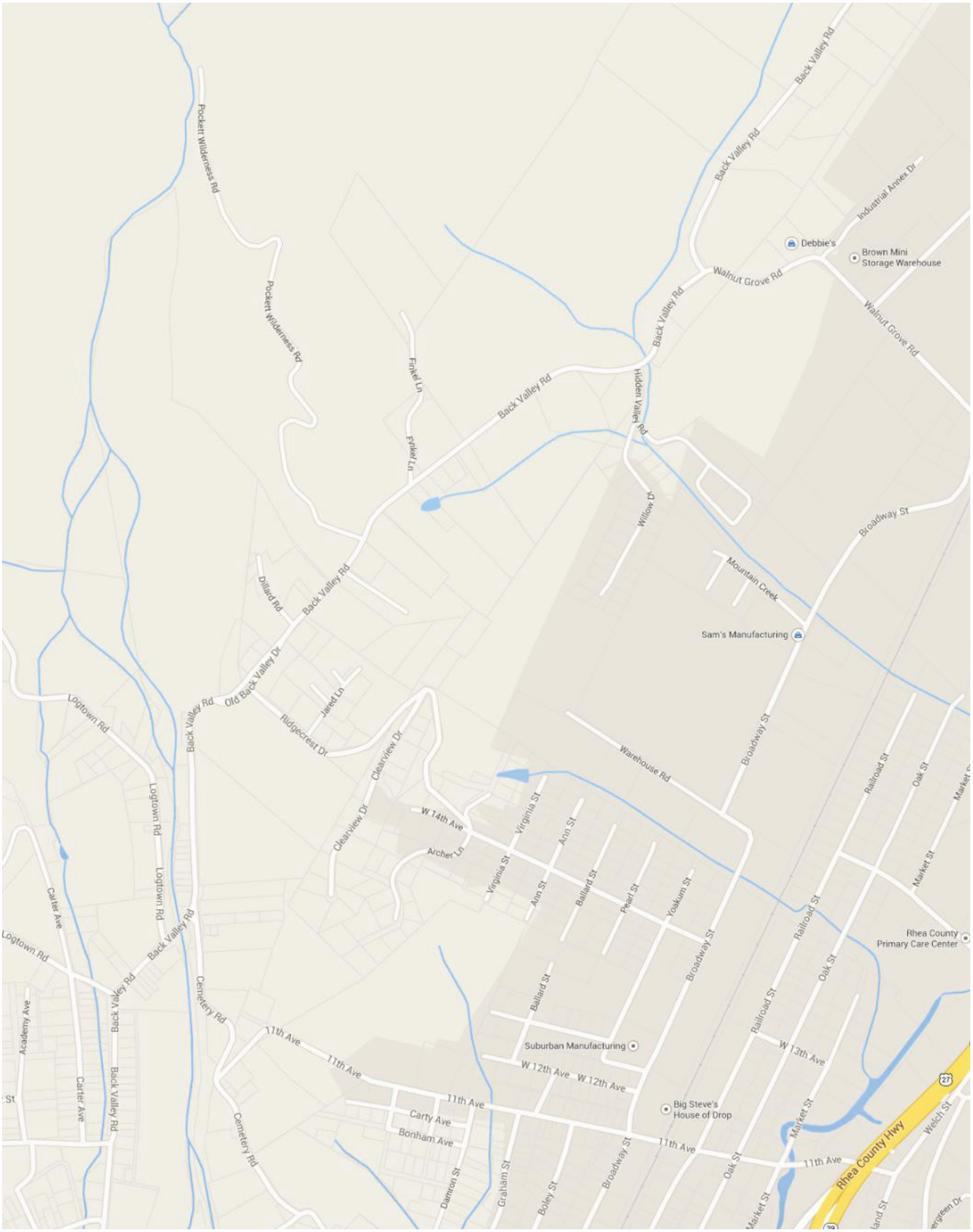
Good activities: B, picking up litter; E, staying on trail.
Harmful: A, climbing on wall; C, entering abandoned mines; D, defacing park resources



*Trail bridge on piers from the DCIC Short Line Railroad*
*Paine Creek Trestle*



# PART III: WAYFINDING AND MULTI-MODAL ACCESS




*Even in the most current (beta) version of Google Maps, Laurel-Snow State Natural Area (located at upper left) is not depicted.*

# WAYFINDING

On the Pawpaw team's first visit to Laurel-Snow, they encountered a problem likely shared by many other visitors, namely the park area is difficult to find. There are no signs directing visitors to the site from any roads, only the single site sign at the entrance with no approach signs on the road nearby. Asking local folks for directions to "Laurel-Snow" is problematic, too, as many residents still call the area "The Pocket."

Compounding the issue, the site is not listed on Google maps. A search for "Laurel-Snow" results takes one to Snow Road in Laurel, Mississippi; a search for "Laurel-Snow State Natural Area" directs one to the U.S. Forest Service regional office in Laurel, Mississippi. The actual area in Rhea County is not depicted in green as a park on Google maps. Pocket Wilderness Road does appear at close magnification but it is not really searchable; searching for "Pocket Wilderness Road Dayton TN" yields multiple locations, most directing one to Virgin Falls (another former Pocket Wilderness in White County), with the nearest result directing visitors to the office of the *Rhea County News* on Tennessee 127 southwest of Dayton.

Clearly, it would be very helpful to visitors if signs denoting turns to Laurel-Snow State Natural Area were located on highways around Dayton and on roads to the site. Standardized signs, using the ubiquitous brown background color and typefaces specified in the U.S. Manual on Uniform Traffic Control Devices (http://mutcd.fhwa.dot.gov/services/publications/fhwaop02084) and properly sized for controlling speeds (larger on the highways, smaller on Back Valley Road) should be employed. Pawpaw suggests signs on U.S. 127 at Walnut Grove Road with a smaller sign at the Back Valley Road intersection, and signs on Tennessee 30 directing visitors onto Back Valley Road. In addition, signs should be placed on Back Valley Road short distances before visitors reach the turn onto Pocket Wilderness Road as many visitors who make it this far overshoot the turn. The text might be accompanied by the RL-100 square sign denoting hiking trails.

To direct visitors from downtown Dayton along the proposed "Dayton Coal & Iron Heritage Trail," small logo signs could be installed. These would take visitors from the Scopes Trial/Rhea County Museum in the historic Rhea County Courthouse by the site of the Dayton iron furnaces and on to the Laurel-Snow area. The points could be numbered to correlate with text provided in an accompanying guide.




Since more and more visitors depend on computers, tablets and smartphones to locate places, the natural area should be added, at a minimum, to Google Maps (and perhaps to Apple Maps now used on IOS devices, and to Microsoft's Bing maps, used on Windows phones and devices). The park or the TDEC GIS specialist responsible for state park mapping (Bill Avent) should ensure the area is marked on Google maps by entering the map information on Google MapMaker (www.google.com/mapmaker) or by sending the appropriate GIS files to Google (and perhaps to Apple and Microsoft) so that the Laurel-Snow State Natural Area can be included on the maps.

In addition, TDEC's Division of Natural Areas should be asked to update its directional information on its site webpage (www.state.tn.us/environment/natural-areas/natural-areas/laurelsnow/). Instructions there currently direct visitors to turn off U.S. 27 onto Walnut Grove Road at the Eckerd Drug Store; this is now a Rite Aid (with a Walgreens across the street). Tennessee Wildlife Resources Agency copied the same erroneous directions into its Tennessee Watchable Wildlife web page for Laurel Snow (www.tnwatchablewildlife.org/watchareadetails.cfm?uid=0907161119427530 2&region=Laurel-Snow_State_Natural_Area&statearea=East_Tennessee) and this site should be corrected as well. Finally, the link from the Cumberland Trail State Park website for the Laurel-Snow unit (www.tn.gov/environment/na/natareas/laurelsnow/) yields an error page as well. With so many potential visitors relying on the internet for directions, efforts should be make to update the websites and to periodically check them for accuracy.

# MULTI-MODAL ACCESS

The Request for Proposals for the Dayton Coal and Iron Preservation, Maintenance and Interpretive Plan specified that the consultant "create alternative transportation (e.g., greenway, bike lanes) solutions that provide connectivity in Dayton/Rhea County to Laurel Snow State Natural Area."

The Pawpaw Team quickly recognized that there is no easy connection between downtown Dayton and/or other parts of Rhea County; almost all visitors reach the site by Back Valley Road and the unpaved Pocket Wilderness Road into the area. Better access to encourage pedestrian and bicycle access to the site is highly desirable. A considerable number of Laurel-Snow users are trail runners, mostly Bryan College students, and they would likely make regular use of a connecting trail with the town. Very few cyclists come to the site on account of the steep hill and the rough surface on Pocket Wilderness Road; providing a multi-use trail to the site would make the Laurel-Snow State Natural Area and the DCIC resources much more accessible to Rhea County residents and some potential visitors.

Historically, the DCIC short-line railroad serving the mines continued from the Laurel-Snow parking area alongside the Richland Coke ovens south to Back Valley Road, then paralleled the road south along the east side of Richland Creek to the old furnace site, then continued on to the company wharf on the Tennessee River. Looking at satellite photos of the area, the old rail line right-of-way would be an excellent location for a greenway or multi-use trail. Except for a cluster of four residences on Back Valley Road north of the road's crossing of Richland Creek, the entire right-of-way is undeveloped floodplain extending south as far as Donaldson Park, and the majority of the land is owned by a single property owner. Much of the potential route is likely in the floodplain of Richland Creek. Greenways and trails are ideal uses of flood plain lands as they can be designed to survive inundation, and can provide a highly desirable function in terrain that could otherwise not be easily developed. On the other hand, construction of proper greenway trails, with correct drainage and required parking areas and amenities, as well as design to accommodate ADA and other requirements, is very expensive. Even if Rhea County and the City of Dayton were willing to consider such a proposal, acquiring the needed parcels of easements in a conservative county where there is strong suspicion of such public investments may prove very difficult. The Pawpaw team suggests that recreation planners from the Southeast Tennessee Development District, which provides planning services to Dayton and Rhea County, discuss such a possibility with city and county officials and determine if such a project is even advisable.

A much less expensive and achievable project would be the construction of a multi-use trail from the Laurel-Snow parking area through the Richland coke ovens complex to Back Valley Road, following the old rail line route west of the coke ovens. This is today a rough service road, gated by the park but still used (illegally) by ATV users, mountain bikers and equestrians. A properly constructed trail through this section to Back Valley Road would provide a fairly level trail to the Laurel-Snow area along Richland Creek, bypassing the long hill and unpaved Pocket Wilderness Road segment. Such a trail would also open up excellent opportunities for interpreting the Richland coke ovens, the old tipple and washer site and the dynamite shack. In conjunction with such a trail, the City of Dayton might be persuaded to mark sections of Cemetery Street or Back Valley Road as bike routes, providing a seamless connection with the downtown area. This unlikely could be considered for a "rails-to-trails" grant as the right-of-way long ago reverted to other owners, but the Tennessee Greenways and Trails office at TDEC and the Southeast Tennessee Development District might help secure partial funding from other sources.

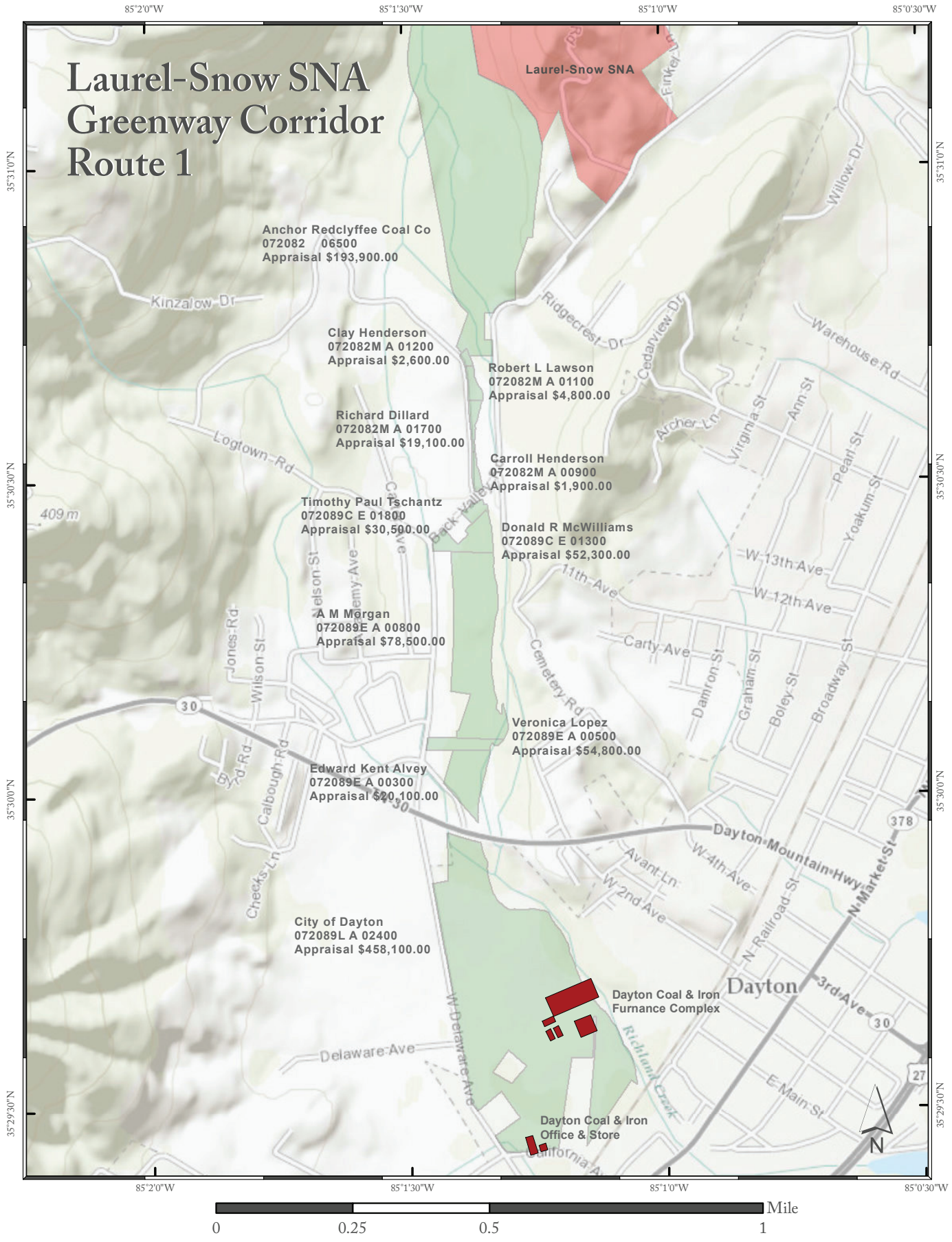
Before such a trail could be constructed, the state would have to purchase the intervening parcel(s) of land. In addition, restrictive bollards or gates would have to be installed that could prevent entry by vehicles and ATVs while still allowing entry by cyclists and walkers. The heavy kudzu cover cloaking much of the area would have to be removed or contained. Finally, large amounts of trash dumped over the years would need to be removed, and the area would have to be patrolled to prevent it being used for dumping in the future. These are all significant issues that would have to be addressed. Any such trail would be expensive, but would make the site much more accessible to downtown Dayton, and open up new interpretive opportunities.



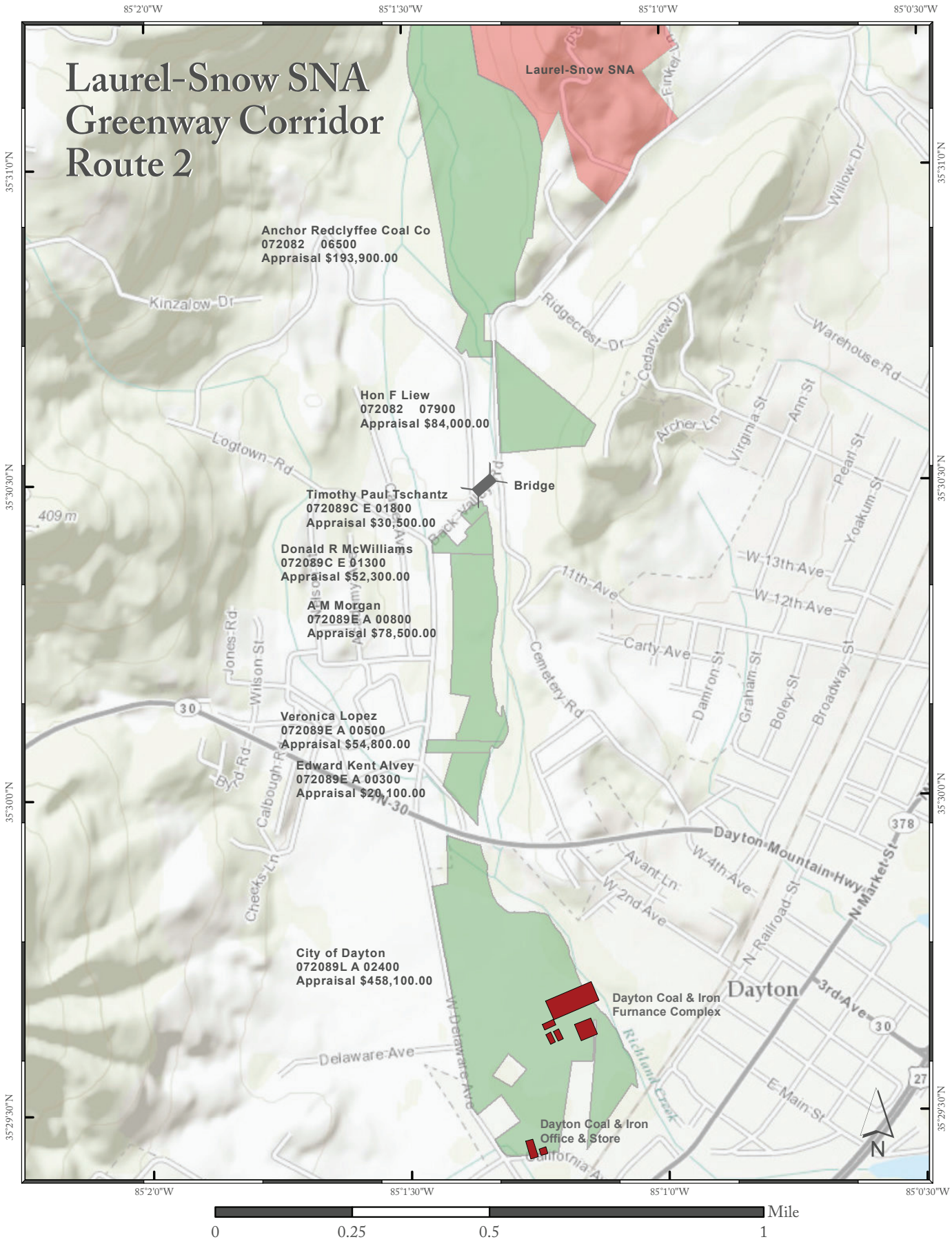
*The former DCIC Short Line Railroad intersects with Back Valley Road at this point. The section between here and the Laurel-Snow parking area would allow walkers, runners and cyclists to reach the site on an easy grade.*



*The nearby power line right-of-way is used by off-road vehicles, and access would have to be controlled to reduce dumping and illegal access to the site.*




*Required parcels for a greenway connecting Laurel-Snow SNA with Dayton. Map by James Brannon, GISP, Geodatabase Manager, Cumberland Trail State Scenic Trail.*




*Required parcels for an alternative route for a greenway connecting Laurel-Snow SNA with Dayton. Map by James Brannon, GISP, Geodatabase Manager, Cumberland Trail State Scenic Trail.*



# PART IV: MARKETING LAUREL-SNOW



*50-Foot Bridge*

# MARKETING

The 2011 Request for Proposals specified that a marketing plan for the Dayton Coal and Iron Company resources at Laurel-Snow State Natural Area be included in the preservation, maintenance, and interpretative plan. Cumberland Trail State Scenic Trail and Friends of Cumberland Trail may wish to consider the ramifications of marketing the site to additional visitors.

Laurel-Snow receives many thousands of visitors each year. On a beautiful day, the parking area overflows and cars are parked well up the hill on the access road. This creates potential hazards in the parking area as well as pushing the area beyond its optimal carrying capacity. FCT and the park should address whether they want to attract more visitors or instead focus on providing them with a better quality experience. The two goals are not necessarily compatible. Overuse may harm the ecosystems and degrade scenery. Additionally, historical, archeological, and natural features may suffer wear and tear.

If Friends of Cumberland Trail and Cumberland Trail State Scenic Trail determine that their goal is indeed to attract more visitors, this section will provide workable, cost-effective recommendations that may help them achieve that objective by attracting additional visitors and encouraging them to return.

Laurel-Snow, with its Dayton Coal and Iron Company features, is located within an easy drive time for several large cities in the Southeast United States as well as numerous smaller towns which makes a day trip convenient for a large regional population. For example, by car, Knoxville is a 1-1/2 hour drive and Chattanooga is less than 45 minutes away; Nashville, Atlanta, and Huntsville are all within 2-1/2 hours of Dayton.

One of the troublesome barriers to visitors is simply finding Laurel-Snow. No wayfinding signs direct visitors to the site, making it difficult to find for someone unfamiliar with the area. As noted in the way finding section of the plan beginning on page 25, it is also hard to find accurate directions online and using GPS. Directional signs would be very helpful and would enable visitors to easily find Laurel-Snow SNA.

Several opportunities exist to partner with groups in Rhea County to market Laurel-Snow and the historic DCIC features. Rack cards could be placed at the Rhea County Welcome Center, located at Main Street and U.S. 27 in Dayton, and the Scopes Trial/Rhea County Heritage Museum, housed in the historic Rhea County Courthouse. Other promising locations in the county would include hotels, marinas, popular restaurants, and shops. They could also be inserted in orientation packets at Bryan College. A display at fall registration would also reach a large number of students, and the Friends might also recruit new members and volunteers. The Pawpaw team also suggests locating interpretive panels at the Rhea County Welcome Center and at the Scopes Trial/Rhea County Heritage Museum with information on Laurel-Snow and DCIC. The one at the latter site could explore the interesting connection between the coal and iron company and the trial.

Rack cards are high impact, low cost, full-color tools to put information into the hands of your target audience. Standard rack cards are 4”x9” and contain information such as basic information along with eye-catching photos. They are convenient to pick up and carry and they also fit nicely into a #10 envelope for mailing. They can be printed for as little as 1-1/2 cents each for 5,000 double-sided cards. Pawpaw has provided a sample rack card with one side for DCIC and the other for Laurel-Snow; it can be viewed on page on the opposite page.

Friends of Cumberland Trail State Scenic Trail should coordinate with the Rhea Economic and Tourism Council (RETC) and the Rhea County Historical and Genealogical Society to provide interpretation of other resources in the area that are related to the DCIC. This would provide visitors additional DCIC sites to visit and would help to prolong their visits. A “Dayton Coal & Iron Heritage Tour” connecting sites in the town to Laurel-Snow and DCIC is discussed on page 25.

These two organizations may also be helpful in securing a state historical marker about the Dayton Coal & Iron for placement on U.S. 27. The Tennessee Historic Commission (THC) places approximately twelve markers each year including those that are fully funded by the Commission, partially funded, or funded completely by sponsors. The

# Laurel-Snow
## State Natural Area

TENNESSEE State Parks



*Majestic Waterfalls and Breathtaking Scenery*

This 2,259-acre wonderland is a unit of the Cumberland Trail State Scenic Trail, Tennessee's only linear state park. It takes its name from two of the four waterfalls located within the reserve. 710 acres of the area was formerly preserved as a Bowater Pocket Wilderness; the main trail was the first National Recreation Trail designated in Tennessee.

Laurel-Snow State Natural Area is located just minutes from downtown Dayton, Tennessee. From downtown, take TN 30 west 3/4 of a mile, turn right onto Back Valley Road, and follow it 3/4 mile to Pocket Wilderness Road on the left, across from Bethel Holiness Church.



*A unit of Cumberland Trail State Scenic Trail*



images courtesy of Cumberland Trail Conference and Pawpaw Partners

# Dayton Coal & Iron Company
## Historic Features at Laurel-Snow

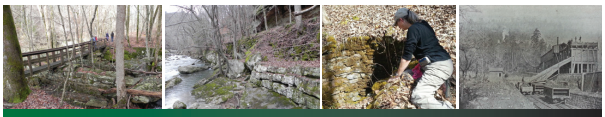
DAYTON COAL & IRON HERITAGE TRAIL



*Remnants of Tennessee's Industrial Heritage*

The Laurel-Snow State Natural Area is today a beautiful landscape with roaring waterfalls, towering forests and vibrant wildlflower displays, but in the late nineteenth and early twentieth centuries it was home to dozens of deep coal mines and hundreds of coke ovens that converted the coal to fuel for large iron furnaces at Dayton.

Although the industry ceased operations in the 1920s, hiking the main Laurel-Snow Trail takes you along an old mine railroad bed by numerous mine entrances, ventilation shafts and other features. Come learn about this fascinating period when coal was king in Rhea County.



***History Lives at Laurel-Snow***



*Mock-up of a rack card to promote Laurel-Snow State Natural Area, and on the reverse, the historic Dayton Coal & Iron Company resources located there. Example is slightly reduced in size to fit the page size of the report.*

markers program is an effective way to introduce highway travelers to Tennessee history. A historical marker on U.S. 27 will also help to direct visitors to the site. Cost of the markers runs $1400-$1575 each. Due to limited funds, THC rarely pays the full cost of the markers and is more likely to place one which is fully or partially sponsored. Matching funds may be available through TDEC, Rhea County Historical and Genealogical Society, or RETC. The following text meets the length and standards for Tennessee Historical Commission markets.

> **DAYTON COAL & IRON COMPANY**
> About 1-1/2 miles west along Richland Creek at Laurel-Snow State Natural Area lie ruins of coal mines and coke ovens financed by Scottish investors. The company operated from 1882 until forced into bankruptcy in 1913. The ventures provided coke for the company's iron furnace in the town of Dayton. Cumberland Coal & Iron Company continued the operations until 1927. Decline of the industries and the economic impact on Rhea County set the stage for the Scopes Trial in 1925.

Another opportunity to reach potential visitors and members are festivals that draw large numbers of people to Rhea County. Booths at the Tennessee Strawberry Festival, the Scopes Festival, and Pumpkinfest, Friends of the Cumberland Trail could reach large numbers of visitors with little effort. A guided walk along the first 1½ miles of the trail at Laurel-Snow, would offer visitors a taste of the beauty of the unit and allow them to explore the DCIC remains. Distributing rack cards at the booth might encourage visitors to return for further exploration.

Hiketoberfest, the Friends of Cumberland Trail signature event, could be a prime opportunity for informing potential visitors about Laurel-Snow and DCIC. A display about the features in the area should be of considerable interest to visitors.

All Cumberland Trail State Scenic Trail events should be publicized more often and earlier, not only locally but statewide. FCT and the park should provide information to local, regional, and state tourism contacts. The Rhea Economic and Tourist Council (RETC), the Southeast Tennessee Tourism Association (SETTA) and the Tennessee Department of Tourist Development (TDTD) all offer resources including listings on their website for attractions and events. Events should be posted early; even if there is only a date available, list it so visitors can start to plan, then update the listing as more information becomes available. They can also offer a place to link the Friends' website. FCT may wish to designate a board member for publicizing tours, hikes and other events.

Friends of Cumberland Trail should also establish a FREE site page on tnvacation.com. It is easy to set up and maintain. A representative from the group will need to register on the website to get started. Directions are provided. FCT and park images can be uploaded as well. Additionally, FCT should provide the state tourism representative with information about events, any press releases, high resolution images and videos (with credits and photo releases, if possible), as well as potential story ideas. Email this information to Melanie Beauchamp at TDTD;[1] she needs a 3-week lead time and can send to media outlets as well as Tourist Development's Facebook page, Twitter, and blogs. FCT should provide SETTA with information for their website as well.

SETTA and the TDTD will also assist with placing articles in local, regional, and state-wide publications to highlight DCIC and Laurel-Snow. They can also offer assistance with developing, updating, and distributing rack cards, brochures, etc., that would market Laurel-Snow as well as the entire Cumberland Trail State Scenic Trail system. Contact information is listed below.

Rhea Economic and Tourism Council (RETC)
Bill Hollin, Executive Director
Penny Hicks, Administrative Assistant
Phone: (423) 775-6171
Fax: (423) 775-7653
penny@rheacountyetc.com
www.rheacountyetc.com

[1] Melanie.beauchamp@tn.gov

Southeast Tennessee Tourism Association (SETTA)
Jenni Frankenberg Veal
Office: 423-424-4222
Cell: 423-595-2845
jveal@sedev.org
www.southeasttennessee.com

Tennessee Department of Tourist Development (TDTD)
David Jones, East Tennessee Regional Manager
Cell: 865.335.9142
dave.jones@tn.gov
www.tnvacation.com

Pawpaw strongly recommends that Friends of Cumberland Trail expand its use of social media as a marketing tool. Social media is a free, quick way to reach many people without considerable effort. The FCT Facebook page will reach a wider audience if information is posted more regularly. Twitter tweets and blogs can be prepared in advance and auto-scheduled to post. One Facebook post, tweet or a short blog entry each per week will keep Cumberland Trail State Scenic Trail in the minds of many. Facebook and Twitter can even be connected so if on puts a tweet on Twitter, it will post on Facebook as well.



*Tennessee State Parks' PocketRanger mobile app*

In early 2013, Tennessee State Parks rolled out its new mobile app. They engaged Parks by Nature Network to launch PocketRanger, a free iPhone and Android app for Tennessee state park visitors on the move. The app includes information on state parks attractions and facilities, campgrounds, and historic sites. The app provides everything a visitor needs including contacts, directions, available amenities, maps, events and links to important numbers and services. Information is updated regularly, and users can search by GPS location or a desired activity to find nearby locations for hiking, camping, boating, birding, and more. GPS maps can be cached in advance to ensure navigation remains possible in the event of lost mobile reception or limited access. Advanced GPS technology allows visitors to track and record trails, set waypoints, locate friends inside a park and even play games using the app's GeoChallenge. Other features that maximize the adventure include a built-in compass, interpretative and educational information, calendars of events, news and advisories, and weather alerts. The app's social media function and photo sharing allow users to post photos and share experiences with friends and family via Facebook and Twitter. FCT and Cumberland Trail State Scenic Trail could put directions, park and trail points, and events on this app. There is a GeoChallenge where users find places in the parks and earn points for prizes through PocketRanger. Several state parks have listed sites in their parks. This is a way to encourage visitors to explore the park's features.[2]

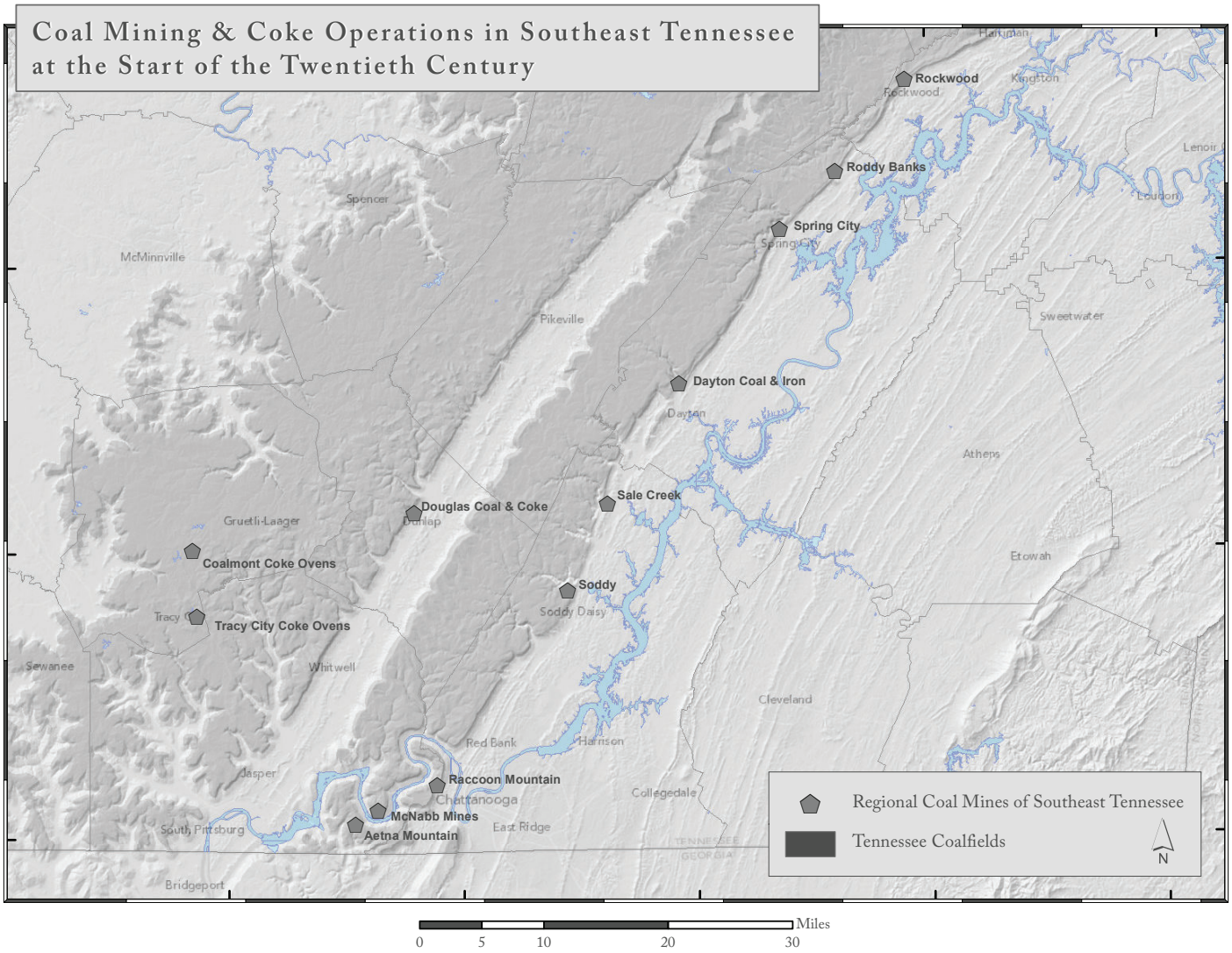
A final recommendation is a region-wide industry heritage trail outlining the many iron, coal, and coke related resources that still exist. Southeast Tennessee Development District had previously submitted a grant for such a heritage trail but did not receive it. Pawpaw recommends SETDD submit a revised grant request along with letters of support from FCT and other organizations with similar resources to establish the East Tennessee Coal and Iron Industry Heritage Trail.

Many related places are protected and preserved and several museums and sites directly related to the industry are now open. These include coke ovens in the Grundy Lakes unit of South Cumberland State Recreation Area; Dunlap

[2]Should FCT and the park create a GeoChallenge and other information for the app, it must be checked for functionality. Pawpaw has encountered several bugs and errors while using the app at other parks.

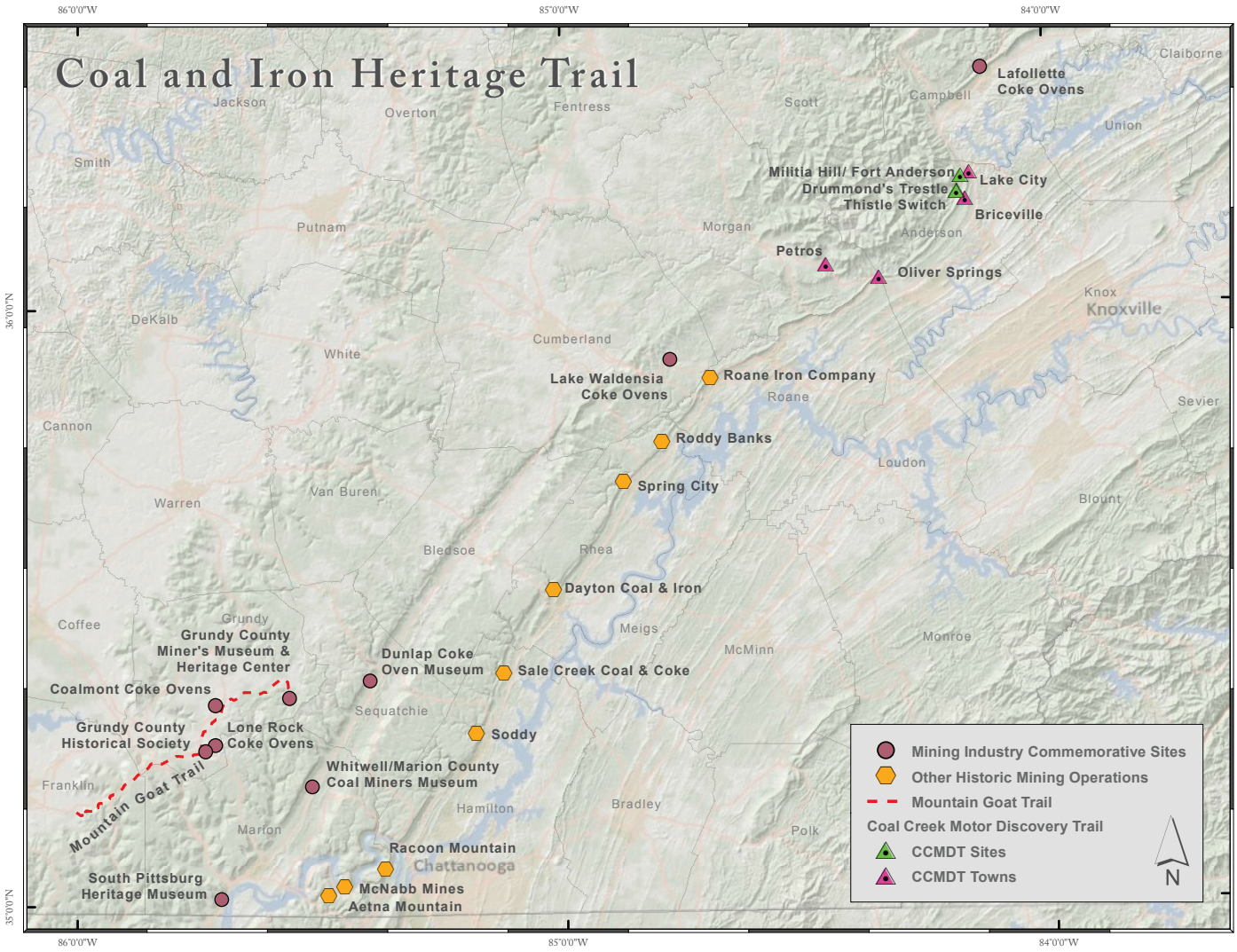
Coke Ovens Museum in Sequatchie County; Whitwell /Marion County Coal Miners Museum in Marion County; Lake Waldensia coke ovens in Cumberland County; Lafollette coke ovens in Campbell County; the Mountain Goat Trail, a former coal railway converted to a greenway in Franklin, Marion, and Grundy Counties; Grundy County Miner's Museum and Heritage Center in Palmer; South Pittsburg Heritage Museum and the Lodge Factory and store in Marion County; Coalmont coke ovens in Grundy County; Grundy County Historical Society Heritage Center in Tracy City; and Anderson County locations (Coal Creek Motor Discovery Trail – Fraterville, Ft. Anderson, Coal Creek Wars, etc.). Others which could be included to provide a comprehensive tour of historic coal and iron features throughout the Cumberland Plateau region.

An eventual offshoot of the heritage trail might be the development of an industry-related festival such as the Coalfields Folklife Festival centered in Grundy, VA, which celebrates life in the coal mining regions of Southwest Virginia, Eastern Kentucky, and Southern West Virginia. It highlights coal mining, agriculture and logging, wildlife of the Cumberland Plateau, and Appalachian culture.[3] With Friends of Cumberland Trail and Cumberland Trail State Scenic Trail's extensive background working with music and folk culture of the Cumberland Plateau as well as experience in organizing events, this has the potential of being a compelling project for the whole Cumberland Plateau region.




*Cumberland Trail State Scenic Trail Geodatbase Manager James Brannon provided this map showing coal operations around the start of the Twentieth Century.*

[3]Flyer at http://rockbridgegrown.org/uploads/Coalfields_Folklife_Festival_June_2009.pdf and information at www.bcbirdclub.org/folklifefestival/Index.htm.




*Selected sites for a Cumberland Plateau Coal and Iron Heritage Trail. Map by James Brannon, GISP, Cumberland Trail State Scenic Trail Geodatabase Manager.*



# PART V: VISITOR SURVEYS



# VISITOR SURVEYS

On Saturday, 24 August 2013, staff from Pawpaw Partners along with volunteers from Friends of the Cumberland Trail and other volunteers conducted visitor surveys at the Laurel-Snow State Natural Area unit of Cumberland Trail State Scenic Trail; additional surveys were conducted by Cumberland Trail State Scenic Trail staff members James Brannon, Ryan Maddux and Marcianne O'Day in September. The purpose of the surveys was to assess visitor interest in possible interpretation scenarios for the Dayton Coal & Iron Company resources along the main trail, though visitors were asked general information about their visit to Laurel-Snow as well. A copy of the survey form is below; figures are rounded off in the discussion following..

**Friends of the Cumberland Trail**

*Laurel-Snow State Natural Area, Cumberland Trail State Park Visitor Survey*

How many people are in your party? _____

Where are you from? Is everyone from the same place?

☐ Rhea County ☐ Surrounding County - where? _____

☐ Other Tennessee County - where?_____ ☐ Out of State - where? _____

How did you hear about Laurel-Snow?

☐ Website ☐ Tourist brochure ☐ Word of Mouth ☐ Other, please specify _____

What was the purpose of your visit today?

☐ Hiking - where did you hike? ☐ Trail along creek ☐ Laurel Falls ☐ Snow Falls ☐ Other

☐ Running ☐ Out with family/friends ☐ Camping ☐ Rock climbing ☐ Boating ☐ Swimming

How long was your visit? _____

Did you purchase anything locally for your visit?

☐ Food ☐ Gas ☐ Other, please specify _____

Did you notice the structures along the trail? Walls, entrances into the ground, other manmade features?

☐ Yes ☐ No

If so, would you like to learn more about them from information in the park? ☐ Yes ☐ No

If yes, would you prefer:

☐ Displays along the trail ☐ Numbered posts with guide ☐ Combination of displays and posts/guide

If no, why not?

☐ Not interested ☐ Already know about them ☐ Don't want signs or other intrusions on trail

*Thank you for your time! We hope you had a wonderful visit*.

Do you have any suggestions for the park from your visit today? _____

Not every visiting party completed a survey form, though the compliance rate was remarkably high, estimated by survey teams at about 85%. Some visitors indicated they would have filled out a survey but needed to get somewhere (usually a bathroom) quickly.

Forty-two parties of visitors completed forms, representing a total of 123 visitors. Respondents did not answer every question, and some provided conflicting information (for instance, some visitors indicated they did not want to see any interpretation at the area, but then checked that they preferred numbered posts and displays).

The first question asked how many people were in a visiting party. Most parties (21) consisted of two people (45%), followed by three (9 parties, for 20%) or solo hikers (five, for 16%). Parties of four or more accounted for 19% of the total visitation, the largest party that day being a group of eight.

Visitors were next asked where they were from. Sixty-seven respondents indicated they came from Rhea County, making up 55% of the 122 respondents to the question. The next largest groups of visitors came from Hamilton County (13), followed by Knox County (8) and other Tennessee counties (22 total responses from eight other counties).

Twelve visitors were from out-of-state, with four from Georgia, two each from New Mexico and Alabama, and individuals from California, New Jersey, Indiana and Arkansas.

Surveyors next asked parties how they learned about Laurel-Snow. The largest number had heard of it through word of mouth (49 responses for 48%). Another 21 (20%) had looked it up on various websites. Eighteen individuals reported they were local folks and had always known about it. Another five were Bryan College students. Two had attended the Tennessee Aquarium summer camp, one had read an article about the place in the Knoxville newspaper, and four had learned about it from swimmingholes.org.

Not surprisingly, most visitors indicated they had come to Laurel-Snow to hike. Of 77 total hikers (again, not everyone answered every question), the survey team was surprised to learn the largest number (19) had visited Laurel Falls, outnumbering the 18 who reported walking only along the creek. Another seven visited Snow Falls. Seventeen reported swimming, even though Richland Creek was muddy from overnight rains during at least one survey. Fourteen visitors reported they were spending the day with family and friends, but all had spent time on the trails. Six visitors were fishing, one was a rock climber, and six reported they were camping. Only one runner reported this as a choice, though the team has observed many runners during other visits.

Visitors reported lengths of stays from 20 minutes to all day. Of 82 responses, the largest group (34%) reported visits of from two to four hours. This was nearly tied by those reporting visits between one and two hours (33%) and other trips of various lengths. Seventeen visitors (18%) reported staying more than four hours.

The Pawpaw team was interested in learning if visitors had made any local purchases for their visits. Thirty visitors reported buying food, water or drinks, and 32 reported purchasing gasoline, and another three had purchased camping supplies. This data demonstrates that Laurel-Snow visitors have a small but steady positive impact on the Rhea County economy.

Remaining questions dealt with possible interpretive scenarios for the Dayton Coal & Iron Company resources along the main Laurel-Snow Trail. Visitors were first asked if they noticed the structures along the trail (walls, entrances into the ground, and other man-made features). Of 83 respondents, 87 (92%) indicated they had.

Visitors who had seen the structures were then asked if they would like to learn more about them through information provided by the park. Of 95 respondents, 94 (89%) said yes, they would.

Those who answered in the affirmative were asked to list their preference from three possible types of on-site interpretation: displays along the trail, numbered posts with a guide, or a combination of displays and numbered/posts and guides. Of the 103 respondents, slightly more than half (63) reported they preferred the combination of displays and numbered posts and guides. Another 32 (31%) preferred displays along the trail, and eight (10%) selected the numbered posts.

Those who wanted no interpretation along the trail were asked their reasons. Of the nine respondents, six (66%) reported they didn't want any signs or intrusions along the trail, and three (33%) said they were simply not interested.

Finally, visitors were thanked for their participation in the survey, and asked if they had any comments or suggestions for management of the park. A total of 26 comments were provided, all of which are listed below. Quite a few stated the need for better blazing or signs, and a few reported downed trees on the trails. [Note, there had been severe storms the night before one of the surveys.] The survey team would like to note that many comments were simply positive remarks about their site visits, affirming what the team already knew, that the Laurel-Snow SNA is indeed a wonderful place.

**VISITOR COMMENTS (Verbatim)**

*Clearly mark trails*
*Need more white blazes on trail*
*Erosion control for trail*
*Great park.  Lots of scenery and wildlife*
*It was fun*
*It's awesome*
*Bathrooms*
*Need to cut trees on trail*
*Trash cans*
*Mark the trails better*
*Everything was great!*
*Had a great time*
*Few more blaze markers at confusing sections*
*Trail is a little narrow in some places*
*Lots of downed trees need to be cleared*
*Signs to the falls*
*Just mark Laurel Falls Trail a little better*
*Clear path to reservoir*
*Better map at entrance*
*Trash removal/patrols*
*Need to clear weeds from around the rock climbing areas just before/after the mine*
*No, it is good*
*More/better guidemarks for viewable landmarks & features*
*Clearly mark trails*
*Make trail into a loop*
*Better signage*
*Slight trail maintenance*

# APPENDIX A: RICHLAND COKE OVENS CONDITION ASSESSMENT DATABASE

A total of 199 coke ovens (out of 200 reported by the company) were located in site surveys in February and March 2013. The ovens were assessed for condition and recorded with photographs. Additional photos were provided along with the report on a separate DVD.

**NORTHEAST BATTERY, WEST OVENS**

The two northern batteries are largely located in the zone overrun by kudzu and Japanese honeysuckle; the southernmost batteries are in the reclaimed woodland area, or blocked by deadfall trees. The northeast battery consists of a single row of ovens; all other batteries are double (with ovens staggered back-to-back).

| Northeast Battery, West Ovens | | |
|---|---|---|
| Number | Condition | Photos |
| E-1 | Front of arch collapsed; otherwise in good condition |  |
| E-2 | Front 2/3 collapsed; filled with earth, damaged by tree fall. Poor condition overall. |  |
| E-3 | Front half collapsed; filled with earth to within 2” of top of arch. Very poor condition. |  |
| E-4 | Mostly intact including trunnel hole (charging hole at top). Some bricks dislodged and the entry arch is missing some bricks at the rear. Overall good condition. |  |

E-5 Front half collapsed. Two small breakdowns at rear. Roof collapsed as far in as trunnel hole.



E-6 Front 2/3 collapsed. Rear beehive shell in good condition.



E-7 Front collapsed as far as charging hole. Poor condition.



E-8 Front half collapsed from charging hole forward. Poor condition.



E-9 Front half collapsed. Poor condition.



E-10 Completely collapsed, and filled with earth.



E-11 Completely collapsed, and filled with earth.



E-12 Front half collapsed from charging hole forward. Remainder in fair condition. Oven could be cleared enough to interpret construction.



E-13 Roof entirely collapsed; oven filled with earth. Back wall has also collapsed.



E-14 Roof collapsed from charging hole forward. Otherwise, beehive in good condition. More of side and front walls intact than E-12.



E-15 4/5 collapsed; oven filled with earth.



E-16 3/4 collapsed; mostly filled with earth.



E-17 Totally collapsed.



*The following eight ovens could not be recorded in the first round of surveys due to dangerous deadfalls, but were recorded in the second round once the team secured proper safety gear. The second number in parentheses reflects temporary numbers assigned in the field and are correlated to the photographs.*

E-18 (E-1) Oven is totally collapsed.



E-19 (E-2) Oven is very intact; however, trees growing on roof threaten its structural integrity.



E-20 (E-3) Oven is 5/8 collapsed due to deadfalls.



E-21 (E-4) Oven is totally collapsed and covered in deadfalls.



| | | |
|---|---|---|
| E-22<br>(E-5) | Oven is located in dangerous deadfall zone and could not be safely assessed. |  |
| E-23<br>(E-6) | Oven is located in dangerous deadfall zone and could not be safely assessed. |  |
| E-24<br>(E-7) | Oven is located in dangerous deadfall zone and could not be safely assessed. | See photo with E-24. |
| E-25<br>(E-8) | Oven is located in dangerous deadfall zone and could not be safely assessed. | See photo with E-24. |
| E-26<br>(E-9) | Oven is located in dangerous deadfall zone and could not be safely assessed. | See photo with E-24. |
| E-27<br>(NE-1) | Oven is very intact; considerable amount of stone facing remains intact. However, large trees growing on roof threaten structure. |  |
| E-28<br>(NE-2) | Oven is very intact, and large amount of stone facing survives. Deadfall tree leaning against front entrance. |  |
| E-29<br>(NE-3) | Oven is very intact; some stone facing survives. Trees are growing on roof, and there is a large deadfall on top. |  |

| | | |
|---|---|---|
| E-30 (NE-4) | Oven is very intact, but no stone facing evident. Deadfall are blocking front, and large trees growing on roof threaten integrity. |  |
| E-31 (NE-5) | Oven has half collapsed due to deadfall falling against front. | No photo possible due to dangerous deadfall. |
| E-32 (W-1) | Oven has two-thirds collapsed. |  |
| E-33 (W-2) | Oven has completely collapsed. |  |

**NORTHWEST BATTERY, EAST OVENS**

The following section evaluates the ovens on the east side of the northwest battery. As with the northeast battery, most of the ovens are in the zone heavily impacted by kudzu and Japanese honeysuckle. The southernmost ovens are impacted by tree growth and deadfalls. Many of the ovens in this battery have collapsed or are heavily damaged, but some are fairly intact and could be stabilized for future interpretive purposes.

| Northwest Battery, East Ovens | | |
|---|---|---|
| Number | Condition | Photos |
| M-1 | Large tree has fallen on top and front third has collapsed; remainder of oven is intact. |  |

M-2 Largely intact including trunnel hole and oven is in overall good condition. However, the relative inaccessibility and location in a tree windfall zone discourages interpretation.



M-3 Tree has fallen across the front and partially obstructs the oven. Only the front has collapsed. Oven is rather inaccessible due to windfallen trees.



M-4 Oven has collapsed from trunnel hole forward. Bricks at front of arch are very instable. Otherwise, oven is fairly intact.



M-5 Front half of oven has collapsed.



M-6 Largely intact including trunnel hole (though it is clogged with vegetation). Access to front mostly blocked by collapsed earth.



M-7 Largely intact, but access partially blocked by earth slide.



M-8 Front of oven collapsed from trunnel hole forward; some of the beehive firebrick show signs of melting from high heat.



M-9 Oven has collapsed in front of trunnel hole. Bricks at front are instable.



M-10 Generally in good condition.



M-11 Half of oven roof has fallen in at front.



M-12 Oven is largely intact. Some instable bricks at arch opening.



M-13 Front 2/3 of oven roof has caved in. Back beehive wall in good condition.



M-14 Front third of roof has collapsed; otherwise in good condition.



M-15 Front third of oven has collapsed.



M-16 Two-thirds of oven has collapsed; poor condition.



*The following five ovens could not be recorded in the first round of surveys due to dangerous deadfalls, but were recorded in the second round once the team secured proper safety gear. The second number in parentheses reflects temporary numbers assigned in the field and are correlated to the photographs.*

M-17 (M-1) Oven has completely collapsed.



| | | |
|---|---|---|
| M-18<br>(M-2) | Oven has 4/5 collapsed. |  |
| M-19<br>(M-3) | Oven has 4/5 collapsed. |  |
| M-20<br>(M-4) | Oven has completely collapsed. |  |
| M-21<br>(M-5) | Oven has completely collapsed; in dangerous deadfall zone. |  |
| M-22<br>(M-6) | Oven has completely collapsed; in dangerous deadfall zone. | See photo with M-22 |
| M-23<br>(M-7) | Oven has completely collapsed; in dangerous deadfall zone. | See photo with M-22 |
| M-24<br>(M-8) | Oven has completely collapsed; in dangerous deadfall zone. | See photo with M-22 |
| M-25<br>(M-9) | Oven has completely collapsed; in dangerous deadfall zone. | See photo with M-22 |

**NORTHWEST BATTERY, WEST OVENS**

The following section evaluates the ovens on the west side of the northwest battery. As with the northeast battery, most of the ovens are in the zone heavily impacted by kudzu and Japanese honeysuckle. The southernmost ovens are impacted by tree growth and deadfalls. Many of the ovens in this battery have collapsed or are heavily damaged, but some are fairly intact and could be stabilized for future interpretive purposes.

As this area is the most accessible to visitors (at least in winter months and early spring when the kudzu and honeysuckle have died back), special attention was given to identifying several ovens that could be stabilized for future interpretive purposes. Based on the evaluation and consultation with the regional historic preservation planner, Ovens W-20 and W-21 seem to have the best potential. The brick beehive domes are largely intact and appear sturdy at present. Visitors should be kept from entering by a fence or bar across the entrance, but they offer good opportunities for viewing how the ovens were constructed.

## Northwest Battery, West Ovens

| Number | Condition | Photos |
|---|---|---|
| W-1 | Oven is approximately half intact; difficult to access due to deadfalls. |  |
| W-2 | Two-thirds of oven has collapsed; dangerous to approach due to overhanging deadfall. |  |
| W-3 | Largely collapsed; inaccessible due to dangerous deadfall. |  |
| W-4 | Completely collapsed |  |

W-5 Front third of oven has collapsed; difficult to reach due to deadfall. Great brick floor.



W-6 Completely collapsed.



W-7 Oven is in very good condition; only some brick at entry have fallen in.



W-8 Oven in very good condition overall.



W-9 Oven appears to be intact, but deadfall and breakdown at entrance makes assessment too dangerous.



W-10 Front quarter of oven has collapsed; other brick at front are very instable.



W-11 Oven appears to be completely collapsed, but perhaps a third remains intact behind breakdown.



W-12 Oven is fairly intact except for brick at entry.



W-13 Completely collapsed.



W-14 Oven is two-thirds collapsed.



W-15 Oven is two-thirds collapsed.



W-16 Front third of oven has collapsed; remainder is in fair condition and may be suitable for viewing.



W-17 Oven is about one-third collapsed from trunnel hole forward.



W-18 Oven is largely intact, but some breakdown at front. May be suitable for viewing from front only.



W-19 Oven has largely collapsed; only rear wall is exposed.



W-20 Oven is almost intact; some collapse at floor level.



W-21 Oven is almost intact.



W-22 Oven is one-third collapsed.



| | | |
|---|---|---|
| W-23 | Oven is half collapsed. |  |
| W-24 | Roof of oven has collapsed; filled with earth to near ceiling at rear. |  |

**SOUTHEAST BATTERY, WEST OVENS**

The two southern battery banks are both double banks, meaning coke ovens are staggered back-to-back along their entire length. Both battery banks are in the area being impacted by reclaiming woodlands, and many have been damaged by tree growth, falling trees, or deadfalls. The ovens on the west side of the southeast battery are the most heavily damaged of the coke ovens complex, as well as the most difficult to access.

| Southeast Battery, West Ovens | | |
|---|---|---|
| Number | Condition | Photos |
| SE-1 | Oven has collapsed; some stone intact at base |  |
| SE-2 | Oven has collapsed; some face stone intact at base |  |
| SE-3 | Oven has largely collapsed; some stone intact at base. Surviving beehive brick exhibit fine glazing. |  |

SE-4 Oven has collapsed; small tree growing inside.




SE-5 Oven has collapsed; small tree growing in cavity and top of tree fills it.




SE-6 Oven has collapsed due to fallen tree.




SE-7 Oven has collapsed due to fallen trees.



SE-8 Oven has collapsed; small trees growing in cavity.




SE-9 Oven is mostly intact; however, two small trees growing from entrance will eventually tear apart structure.



SE-10 Mostly intact, but again, small trees growing inside pose threat to structural integrity.




SE-11 Oven is almost intact; two trees growing on roof should be removed before they destroy structure.




SE-12 Front third of oven has collapsed due to tree damage.




SE-13 Oven has completely collapsed; tree growing in cavity.




SE-14 Oven has completely collapsed; trees growing inside.




SE-15 Oven has completely collapsed.



SE-16 Half of oven has collapsed.



SE-17 Front two-thirds of oven has collapsed; half filled with earth.



SE-18 Half of oven has collapsed.



SE-19 Half of oven has collapsed due to fallen tree; parts of beehive visible in rootball.



SE-20 Oven has half collapsed; some face stone is intact.



SE-21 Oven is seven-eights collapsed; some face stone survives. Destruction caused by falling tree,s and remnants of oven are visible in rootballs.



SE-22 Oven has half collapsed; tree growing on roof.



SE-23 Oven has half collapsed due to large trees growing on top; some face stone survives.



SE-24 Oven has collapsed; some face stone survives.



SE-25 Oven has completely collapsed; rootball of fallen tree in cavity.



SE-26 Oven is largely intact; deadfall snag resting on side. No face stone.



SE-27 Oven is 2/3 collapsed; trees growing on top, no face stone.



| | | |
|---|---|---|
| SE-28 | Oven has completely collapsed due to fallen trees. |  |

**SOUTHEAST BATTERY, EAST OVENS**

These ovens are not only located in the zone being reclaimed by advancing woodlands, and suffer accordingly from damage from falling trees and deadfalls, they are also difficult to access as the former depressed railroad ditch used for unloading the ovens is frequently filled with standing water or mud. While several of the ovens are in fairly intact condition, most are threatened by tree growth and deadfalls. Removal of vegetation will be necessary to ensure their long-term survival.

| Southeast Battery, East Ovens | | |
|---|---|---|
| Number | Condition | Photos |
| SE-29 | Oven is in good condition, but has no face stones. Tree growing on top threatens integrity. |  |
| SE-30 | Oven is largely intact. Beehive brickwork is exposed, and a few face stones survive. Small trees growing on front. Deadfall makes access difficult. |  |
| SE-31 | Oven is very intact; dome construction very visible. Some facing stone still present. |   |

| | | |
|---|---|---|
| SE-32 | Oven is in excellent condition; unfortunately, access for visitors would be difficult. |   |
| SE-33 | Oven is very intact and in excellent condition, but no face stones survive. Dome construction is very visible. |   |
| SE-34 | Oven is five-eighths collapsed due to deadfall. Root ball of tree that caused damage is visible above. |  |
| SE-35 | Oven is in fair condition; beehive is collapsing at top due to multiple deadfalls on roof. |  |
| SE-36 | Oven is largely intact; large rootball on roof. |  |
| SE-37 | Oven is in good condition, but dangerous deadfalls threaten its integrity. |   |

| | | |
|---|---|---|
| SE-38 | Oven appears to be largely intact. |  |
| SE-39 | Oven appears to be largely intact, but opening mostly filled with earth. |  |
| SE-40 | Oven appears to be largely intact, but again, opening mostly filled with earth. |  |
| SE-41 | Oven is three-fourths collapsed due to deadfall; rootball on roof. |  |
| SE-42 | Good condition, and some face stone survives. Deadfall on top. |  |
| SE-43 | Oven appears to be largely intact. Brick dome construction is evident from front. Deadfall on roof. |  |

| | | |
|---|---|---|
| SE-44 | Oven is two-thirds collapsed due to deadfall. |   |
| SE-45 | Oven is three-quarters collapsed due to large deadfall. |   |
| SE-46 | Oven is largely intact despite deadfall against front. |   |
| SE-47 | Oven has largely collapsed due to deadfalls. |  |
| SE-48 | Oven is one-quarter collapsed. Deadfall and tree growing in front. |  |
| SE-49 | Oven is in good condition except for small collapse around trunnel hole. Excellent details of beehive construction evident, and some facing stone survives. |  |

| | | |
|---|---|---|
| SE-50 | Some parts of front wall have collapsed; otherwise in fair condition. Some facing stone intact. |  |
| SE-51 | Oven appears largely intact; however, entry largely blocked by earth, though fairly clear at top. Some stone facing survives. |   |
| SE-52 | Oven appears largely intact; however, entry largely blocked by earth, though fairly clear at top. Some stone facing survives. |  |
| SE-53 | Oven is in fair condition, but some deadfall damage to roof. |  |
| SE-54 | Oven is in fair condition, though some of the front wall has collapsed. |  |
| SE-55 | Oven has two-thirds collapsed as a result of large deadfall. |  |

**SOUTHWEST BATTERY, EAST OVENS**

The following section evaluates the ovens on the east side of the southeast battery. These ovens are again located in the zone impacted by advancing woodlands. Tree growth, falling trees, and deadfalls have damaged many of these ovens, and others will be lost if growing trees are not removed.

Despite the heavy damage to the battery from the trees, a number of ovens are relatively impact and boast fairly intact brick beehive domes. A number of these feature the best surviving remnants of the original stone facing that once clad all the ovens. Unfortunately, the relative inaccessibility of these ovens, along with dangers from unstable dead-falls, should discourage visitation and interpretation unless major work is undertaken.

| Southwest Battery, East Ovens | | |
|---|---|---|
| Number | Condition | Photos |
| SM-1 | Oven has collapsed, but some original face stone survives at base and lower sides. |  |
| SM-2 | Oven has collapsed, but some original face stone survives at base and lower sides |  |
| SM-3 | Oven has collapsed, but some original face stone survives at base and lower sides |  |
| SM-4 | Oven has collapsed, but some original face stone survives at base and lower sides |  |

SM-5 Oven has collapsed, but some original face stone survives at base and lower sides




SM-6 Oven is largely intact except in this case, exterior stone wall is missing. Good condition.




SM-7 Oven is two-thirds collapsed and is half-filled with earth.




SM-8 Oven is nearly completely intact except for missing stone facing.



SM-9 Oven has completely collapsed; two trees growing inside.



SM-10 Oven is about half intact; some earth fill, no base wall stones.




SM-11 Oven is nearly completely intact except for missing stone facing.




SM-12 Oven has collapsed from trunnel hole forward. Brick are very instable. Can see brick construction details at trunnel hole.




SM-13 Oven is largely intact but tree is spreading its roots at entrance; will destroy oven if not removed.




SM-14 Oven is four-fifths collapsed, and tree growing on rear wall.



SM-15 Oven is half-collapsed.




SM-16 Oven is fairly intact, but is collapsing around trunnel hole.




SM-17 Oven is largely intact, but large tree on roof poses threat to structure. Some base stones remain.



SM-18 Oven is very intact, except for missing base stones.




SM-19 Oven is very intact except for missing base stones; however, tree growing on roof poses severe threat to structural integrity.



SM-20 Oven has completely collapsed.




SM-21 Oven has completely collapsed, but some base stones survive.



SM-22 Oven has completely collapsed, but some base stones survive.



SM-23 Oven is very intact, but filled with earth at front. Tree on roof poses threat to integrity.



SM-24 Oven is very intact, except only a few base stones survive, and structure is filled with earth at front. Trees on roof pose threat to integrity.



SM-25 Oven is very intact but filled with earth at front. Trees on roof.




SM-26 Oven has totally collapsed, but some face stones survive.



SM-27 Oven has half collapsed, and is located amidst dangerous deadfallls.

No photo; structure could not be safely approached due to dangerous deadfalls.

SM-28 Oven has completely collapsed and is filled with deadfall debris.




SM-29 Oven has completely collapsed; some face stones survive.




SM-30 Oven has completely collapsed, and cavity is filled with deadfall debris.



| | | |
|---|---|---|
| SM-31 | Oven has completely collapsed. |  |
| SM-32 | Oven has completely collapsed. |  |

**SOUTHWEST BATTERY, WEST OVENS**

While these ovens are located amidst deadfalls and heavy woodland cover, they can be seen from gated access road passing through the area, and removal of vegetation to ensure their survival should be a priority as they would be highly visible features if the access road is opened up as a proposed hiking trail or greenway segment.

| Southwest Battery, West Ovens | | |
|---|---|---|
| Number | Condition | Photos |
| SW-1 | Oven has completely collapsed. |  |
| SW-2 | Oven has completely collapsed. |  |
| SW-3 | Oven has completely collapsed but some face stone survives. |  |

SW-4 Oven has completely collapsed.



SW-5 Oven has completely collapsed.



SW-6 Oven has half collapsed.



SW-7 Oven has half-collapsed.



SW-8 Oven has half collapsed.



SW-9 Oven has completely collapsed.



SW-10 Oven has mostly collapsed; large tree growing in cavity.



SW-11 Oven has completely collapsed.



SW-12 Oven has half collapsed, but some original stone facing survives.



SW-13 Oven has completely collapsed.



SW-14 Oven has mostly collapsed.



SW-15 Two thirds of oven has collapsed.



SW-16 Oven has half collapsed.



SW-17 Oven has three-quarters collapsed.



SW-18 Front quarter of oven has collapsed; large tree growing on roof.



SW-19 Oven has half collapsed. No photo.

SW-20 Oven has completely collapsed.



SW-21 Oven has two-thirds collapsed.




SW-22 Oven has completely collapsed.



| | | |
|---|---|---|
| SW-23 | Oven has mostly collapsed. |  |
| SW-24 | Oven has half collapsed. |  |
| SW-25 | Oven appears fairly intact, but only a small part of opening is visible due to earth fill. |  |
| SW-26 | Oven has completely collapsed. |  |
| SW-27 | Oven not visible due to deadfall tree blocking access. | No photo. |
| SW-28 | Oven has completely collapsed. |  |

SW-29 Oven has two-thirds collapsed; large tree growing in cavity.



SW-30 Oven has two-thirds collapsed and same large tree as in SW-29 is growing in side wall.



SW-31 Oven has completely collapsed.



SW-32 Oven has completely collapsed.



# APPENDIX B: MOCK-UPS OF POTENTIAL INTERPRETIVE WAYSIDE EXHIBITS

# Dayton Coal & Iron Company Heritage Tour

## Richland Coke Ovens

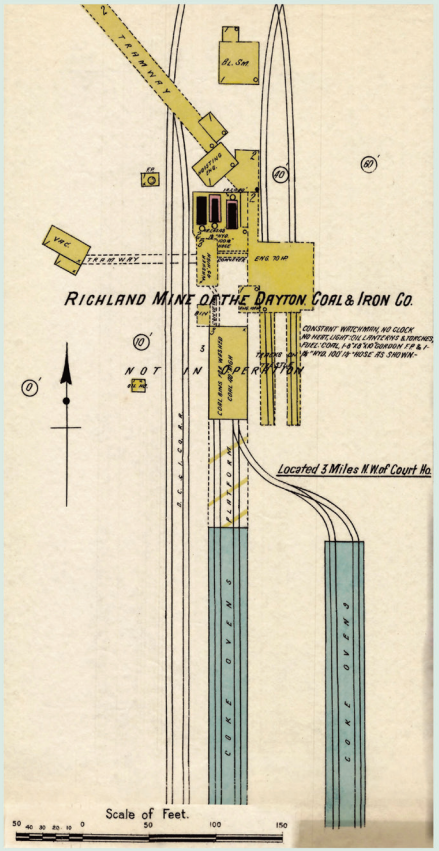
Coal from the DCIC mines was primarily used for making coke for the company's iron furnaces at Dayton. Four banks of beehive coke ovens, which burned off impurities in the coal, were located to the southwest. In all, 207 ovens operated at this complex, and another 125 across the creek at the Nelson mines.



*Coal was converted to coke in brick and stone coke ovens.*



Coal was transported from the mines on the short line railroad, then washed and crushed at a processing facility. It was then transported in smaller rail cars to the tops of the ovens visible at the right in the photo, burned in a low-oxygen environment for as long as 72 hours, then shipped on by rail to the furnaces.




*1914 Sanborn Insurance map of the Richland processing facility and coke ovens*

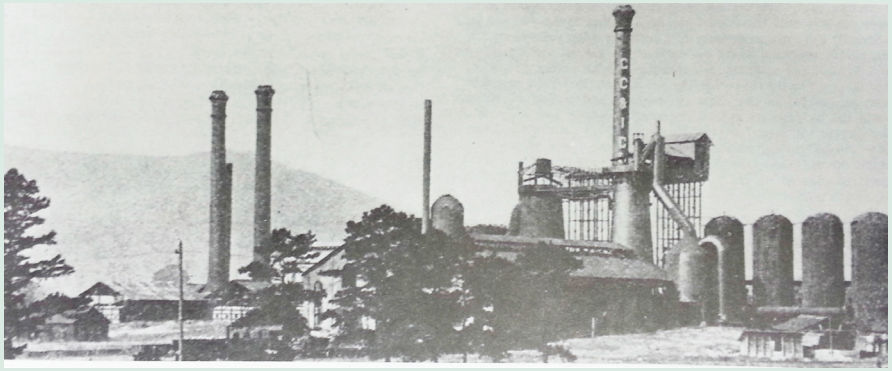
**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

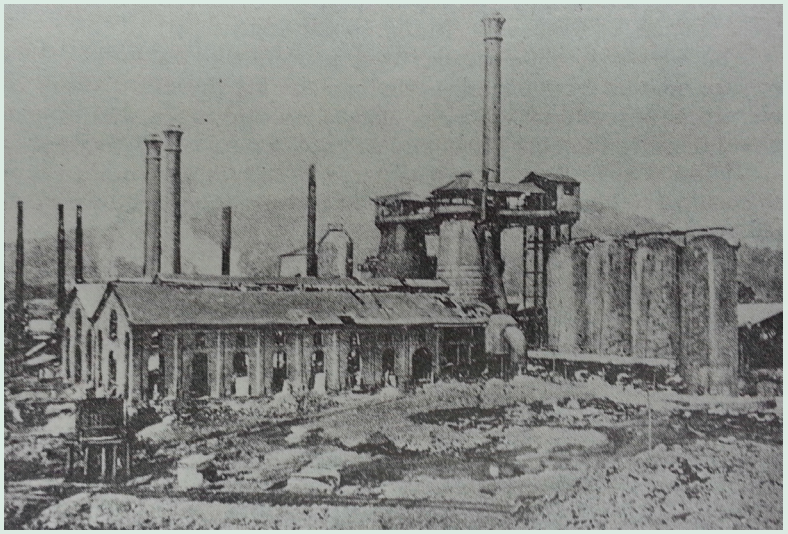
# Dayton Coal & Iron Company Heritage Tour

## Dayton Furnaces

In May 1884, Dayton Coal & Iron began erecting two enormousblast furnaces on this site. The coke-fired furnaces had a capacity of 150 tons per day. They featured six Whitwell stoves, each 21' in diameter and 60' tall. The main chimney, which provided an updraft for the furnaces, was 8' in diamater and 160' tall. The furnaces were "blown in" and started production in 1886. At peak production, the furnaces made 90,000 tons of foundry and pig iron each year.



*Dayton Furnaces in the 1920s. The "CC&IC" on the stack stands for Cumberland Coal & Iron Company, which took over operations in 1922.*



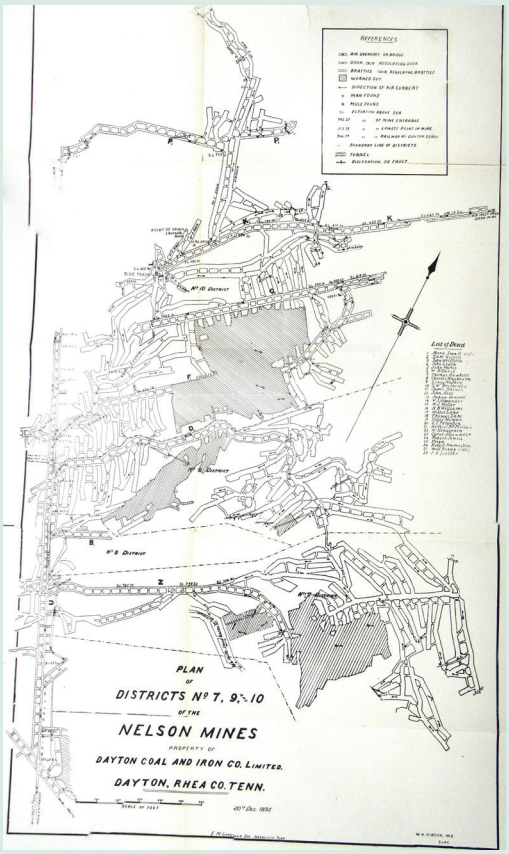
Quality control issues and growing competion led to the bankruptcy of Dayton Coal & Iron in 1913. Its last successor company, Cumberland Coal & Iron, shut down operations in 1927. The furnaces were dismanted in 1935.

# Dayton Coal & Iron Company Heritage Tour

## Nelson Mine

The most important of the DCIC operations was its Nelson Mine, located across Richland Creek. It opened in 1885 and exploited the Nelson seam, considered one of the finest in the nation, discovered that year by mining engineer John C. Nelson.

This was a slope mine, meaning passages dropped at an angle to the coal seam as much as 568' below. This put it below the level of Richland Creek, and the mine often flooded and had to be pumped out. by 1910, nearly 500 acres of underground mining area had been exploited.






The mine featured extensive facilities, including the cable conveyor at left, a loading tipple, apowerhouse, and its own batteries of coke ovens.

Two deadly accidents at the mine illustrated the dangers of coal mining. An enormous explosion in December 1895 took the lives of 28 men and boys. Another in April 1902 killed 22. The Nelson Mine closed in 1910.

**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## Prospect Mine

One of the larger of the DCIC operations, the company's Prospect Mine was located across Richland Creek and accessed the rich Nelson coal seam. Operations began about 1901 and continued longer than most of the other mines, finally shutting down in 1925.



*The main entrance to the Prospect Mine today. The mine is located on private land is not accessible to the public.*



Coal from the Prospect Mine was transported across Richland Creek on a high wooden trestle that connected it to the Richland Coke Ovens complex. It was processed there and sent on to the company furnaces at Dayton.

**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## Dynamite Magazine

Dynamite was extensively used in coal mining to blast coal free from the formations. The soft coal could be bored with hand-cranked or later, powered electrical drills. Dynamite was then inserted into the holes and detonated to break out the coal.



*Tamping dynamite in a coal seam.*



Dynamite was safer than the black powder explosives it replaced as it required a blasting cap for detonation. Still, it was susceptible to ignitions from sparks or fire. Only limited quantities were allowed in the mines each day. Other dynamite was stored in fireproof structures called magazines.

This structure, constructed about 1922 by the Cumberland Coal and Iron Company, is typical of magazines from the period. The concrete walls and roof would maintain the dynamite at a cool, stable temperature. Mining companies also preferred to use concrete structures because they were secure against rifle fire, obstensibly from disgruntled miners or strikers.

> *"Danger of explosion occurring in a magazine emanates mostly from sources outside of the building, the walls of which should be proof against rifle bullets and fire. The building should be further protected against lightning and provided with secure fastenings that will prevent unauthorized persons from entering."*
>
> ~ *Coal Age Magazine*, 1916

**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## Dixon Slope Mine

Walls along the trail here and above are remnants from the Dixon Slope Mine, the most ambitious of the DCIC operations. Begun about 1891, the deep mine extended nearly half a mile in hopes of reaching the rich Nelson coal seam.



*The stone arch on the hill above was the main adit or entrance to DCIC's Dixon Slope Mine.*



By summer 1892, miners had extended the passages for 1,364 feet but had not reached the Nelson seam. In December, the length reached 2,000' and a 31" seam was discovered. More passages were opened to try to find thicker veins. But little coal was ever brought out.

DCIC invested more than $100,000 into this mine but saw little return on its investment. Work continued for several more years. At one point, the mine was extended under Richland Creek and connected with the Nelson Mine on the other side. The mine flooded in 1897 and forced a closure of the Nelson Mine as well.




**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## Mine Ventilation

Coal mines required large quantities of fresh air for miners and draft animals, and for carrying away toxic or explosive gases from the mines. Blasting coal raised enormous clouds of dust that had to be cleared quickly.





The first mines here relied on the furnace system of mine ventilation. Shafts were constructed from the mines to the surface above, and a fire was lit at the bottom. Heated air would create an updraft, and fresh air would rush in from mine openings to fill the void. At left is a surviving air shaft from the Laurel Creek Mine to the north.

This structure was a mine vent for the Dixon Slope Mine. Young boys were employed to open and close doors at openings to direct air into different parts of the mine. The ventilation shaft goes back a short ways to the main mine passage which is flooded and blocked by breakdowns.

Later mines utilized electrical fans for ventilation.



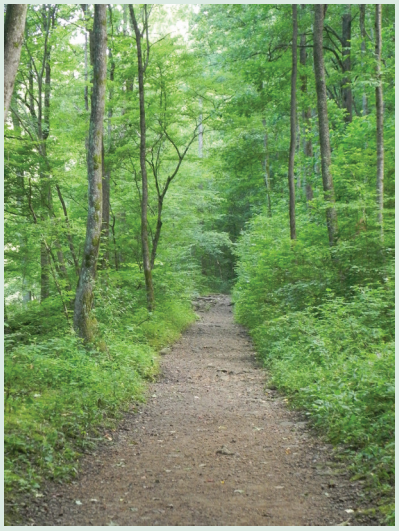
**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

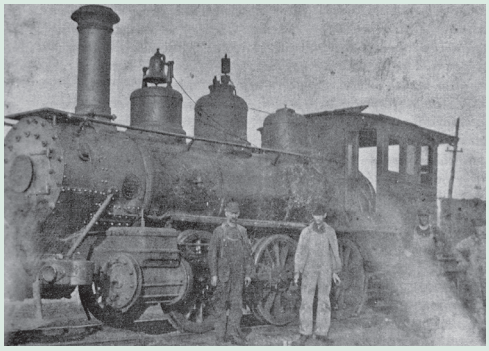
TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## Short Line Railroad

The first mile of the Laurel-Snow Trail follows the route of the "short-line railroad" constructed by DCIC to serve its mines. It paralleled Richland Creek from Dayton to the former Laurel Creek Mine. Branches served mines on Morgan Creek and others across Richland Creek.

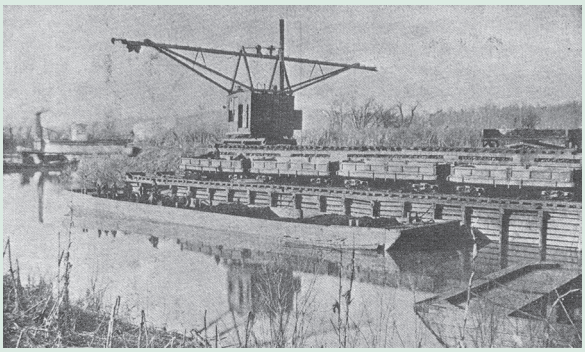




*One of the DCIC locomotives*

Construction of the eight-mile line began in January 1882 with the arrival of twenty carloads of rails at Dayton. By March, the main railbed had been completed, and the first of the company locomotives was put in service.

The line carried coal from company mines to tipples and washers further down the creek. It also served the two coke oven complexes, from which it brought coke to the company's furnaces at Dayton. From there, it carried coal and finished iron to the company wharf on the Tennessee River.



*DCIC wharf on the Tennessee River at Dayton*

**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

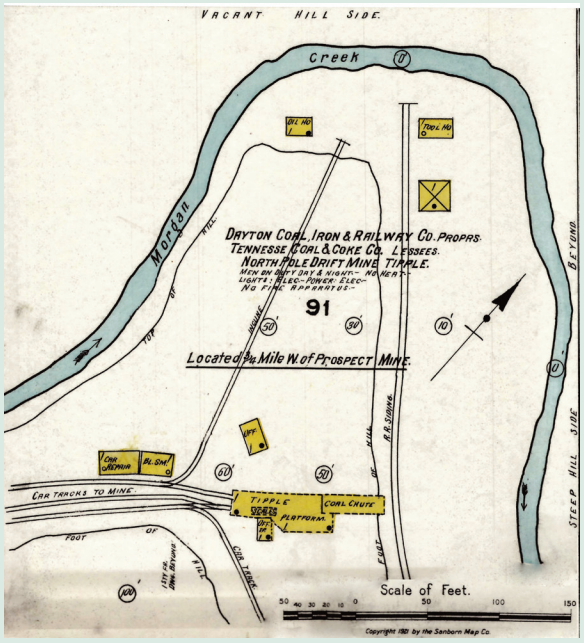
TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## North Pole Mine

Located on the south side of Morgan Creek, the stream you see entering Richland Creek on the opposite bank, was the DCIC's North Pole Mine, which began operations about 1901.






*Sanborn Insurance Company map depicting the processing facilities at the North Pole Mine.*

This productive drift mine accessed the Richland coal seam. Extensive facilities at the mine site included a tipple, fan house, tool house, oil house and a railcar repair shop.

The North Pole Mine continued to be operated by DCIC and its successor, the Tennesse Coal & Coke Company, until 1920.

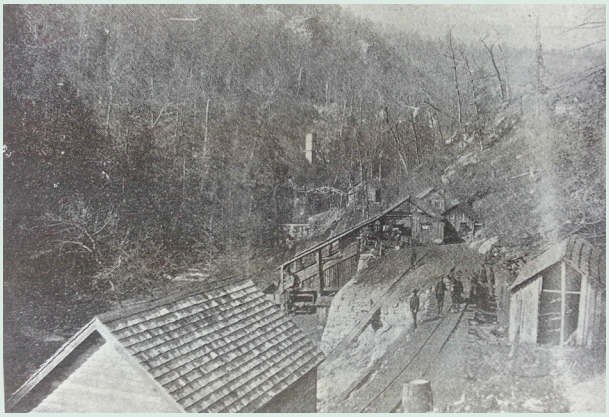
**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

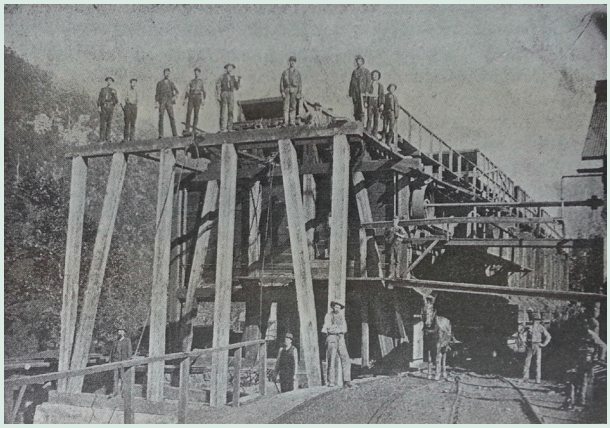
# Dayton Coal & Iron Company Heritage Tour

## Richland Mines

The earliest of the DCIC mines bore deep into the productive Sewanee coal seam at this point. Begun in the early 1880s, the works extended nearly 3,000' from the main entrance which was located above these stone retaining walls.



*Entrance to one of the Richland mines*



*Richland Mine coal bunkers*

In 1901, the mine and its accompanying works employed about 140 workers. The mine had nineteen different entrances. A large tipple was located at entrance #10; this loaded coal from the mines to railroad cars, which in turn took them down to the coke ovens.

By 1902, DCIC considered the coal here to have been largely worked out, but operations continued off and on until 1910 when the Richland Mines were permanently closed.



**Richland Gulch Mines.**

Mining operations at Richland Gulch mines near this place, under the supervision of Mr. J. H. Ferguson, are now in full blast and progressing finely. A shaft is being sunk to prove the lower veins of coal, which is sunk to the depth of 50 or 60 feet, the sides of which will be walled with brick and cemented in order to secure them and keep out water. This we are satisfied is a highly important thing, as it proves the hidden strata on a level measure. Mr. Ferguson expects to sink the shaft from one to two hundred feet.—*Dayton Times.*

**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

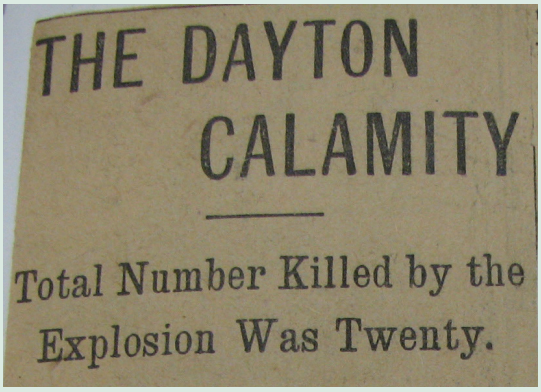
TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## DISASTER!

Coal mining was not only exhausting work, but extremely dangerous as well. Miners could be injured or killed by collapsing formations, struck by rail cars, poisoned by toxic gases, or blown to pieces in mine explosions.



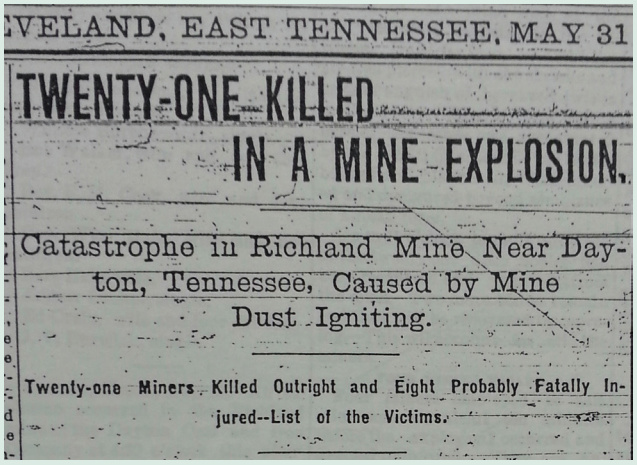

THE DAYTON CALAMITY

Total Number Killed by the Explosion Was Twenty.

On December 20, 1895, twenty-eight men and boys were killed by an explosion of coal dust in the DCIC's Nelson Mine. A mine ventilation fan malfunctioned, possibly allowing coal dust to build up to unsafe levels. At the time, it was the worst mine disaster in Tennessee history.

On May 27, 1901, a devastating coal dust explosion took the lives of 21 men here at the Richland Mine. Flames shot out the mine and scorched trees 300' away from the entrance.

Another coal dust explosion, apparently caused by a defective fuse, killed another 22 men at the Nelson Mine in April 1902.


VELAND, EAST TENNESSEE, MAY 31

TWENTY-ONE KILLED IN A MINE EXPLOSION.

Catastrophe in Richland Mine Near Dayton, Tennessee, Caused by Mine Dust Igniting.

Twenty-one Miners Killed Outright and Eight Probably Fatally Injured--List of the Victims.

**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## Laurel Creek Mines



These stone retaining walls are features from the Laurel Creek Mines which opened in 1884 to work the Sewanee coal seam. The drift mine's passages extended 4,500.' Coal was removed using a rope-haulage system. In 1905, miners were producing an average of 175 short tons per day.



*A coal mine incline plane or gravity railway*

The Laurel Creek Mines closed in 1906.

The mine had numerous entrances, all of which are blocked off or collapsed today. Some of the passages tied in with those of the Richland Mines farther down the creek.

In 1909, a new entrance was opened high on the escarpment above. To bring coal down from the mine, an incline railway spur was constructed serve it. Weight of descending coal-laden cars would pull empties up on and adjoining track. Cuts and stone abutments from the incline can be found today.

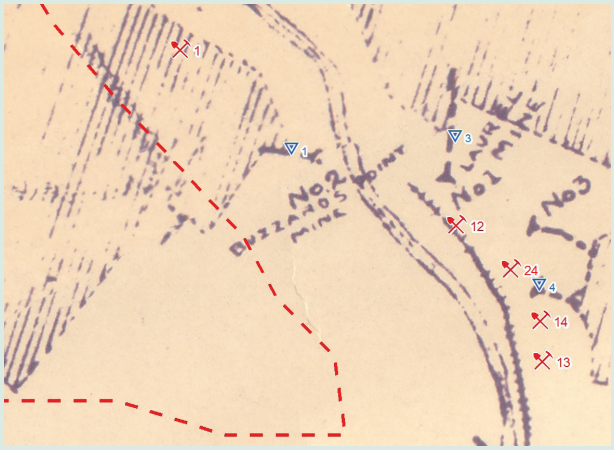
**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

# Dayton Coal & Iron Company Heritage Tour

## Buzzard Point and Upper Falls mines

Northernmost of the DCIC mines, the Buzzard Point mine was located along Morgan Creek across the valley from this point. Named for the high rock promontory above, it was accessed by a single-line railway track. It was in operation about 1901.






State mining reports also refer to another mine opened farther up the creek about 1909. The Upper Falls Mine was so distant from other operations that an incline was constructed to haul cars 325' from the slope to the mine entrance, then another 7,000' to the tipple. All traces of this mine have apparently been obliterated.

**Cumberland Trail State Scenic Trail**
**Laurel-Snow State Natural Area**

TENNESSEE State Parks

# APPENDIX C: PROPOSED JUNIOR RANGER PROGRAM

# Cumberland Trail State Scenic Trail
## Laurel-Snow State Natural Area

---

# Junior Ranger




# Get Outdoors!

**This Junior Ranger Adventure Guide Belongs to**

NAME _____ AGE _____

PARK NAME _____ DATE _____

# Kids, read this with your parents!



Dear Parents,

We are delighted your child has decided to become a Tennessee State Parks Junior Ranger!

We are certain you and your family will enjoy your time exploring the parks, touring visitor centers, attending park programs, hiking the trails, and experiencing all the fun and exciting adventures Tennessee State Parks offers.

We know that when people develop a love for nature and the outdoors it leads to healthy lifestyles and a lifetime of fun adventures.

Thank you for making Tennessee State Parks part of your family history.

Let's Get Outdoors!

# DAYTON COAL AND IRON COMPANY

WELCOME TO THE LAUREL-SNOW STATE NATURAL AREA, A UNIT OF THE CUMBERLAND TRAIL STATE SCENIC TRAIL

As you walk through Laurel-Snow, you see many remains of a great industry. From 1881 to 1913, the Dayton Coal and Iron Company operated coal mines and coke ovens here. Coal mining was very important to this area; it provided many jobs for the community. Coal was used to make coke which was used in the iron works in Dayton. There are hundreds of shells of coke ovens still standing at Laurel-Snow today as well as remnants of many coal mines. This was a bustling area and supported the Rhea County economy for many years.

This Junior Ranger Program will help you to discover and understand what life was like in the coal mining community. There are several activities from which to choose in order to earn your Junior Ranger Badge.

## How to Become a Junior Ranger

Complete the Activities in your Adventure Guide while you explore your Tennessee State Parks.

*It's okay to ask a parent or a friend for help!*

| STEP 1 | |
|---|---|
|  | All ages: Complete **Safety** on Page 4. |
| **STEP 2** | |
|  | Ages 6-8: Complete 2 topics<br>Ages 9-12: Complete 3 topics<br>Ages 13+: Complete 5 topics<br><br>Pages 5-10. |
| **STEP 3** | |
|  | Take the Junior Ranger Pledge to protect the resources of Tennessee State Parks.<br><br>Page 11. |




# LEAVE ONLY FOOTPRINTS!

When you visit Dayton Coal and Iron Works at Laurel-Snow Unit of the Cumberland State Park or other units of the Tennessee State Park system, be prepared. Take a peek in your group's packs and bags to see if you have the essential 10 items for a day hike. Most importantly, don't forget to take your brain. Use common sense when you are on an adventure!



_____Map/compass

_____Whistle

_____Snack

_____Fire starter (matches or lighter)

_____Rain gear/extra clothing

_____Sunscreen/sunglasses

_____Flashlight

_____Water

_____First aid kit

_____knife

**Stay on the trail.** There are many caved in mines and open ventilation shafts in the hills. It would be very easy to fall into one of these abandoned sites and be trapped or injured. You could also lose your way if you went too far from the trail. Do not put yourself or others in danger!

Always follow park rules. They are there for YOUR safety and to protect the park so that others can enjoy it as well.

## Leave only footprints. Take only memories and pictures!

Draw a picture below of your day visiting the Dayton Coal and Iron Company historic site at Laurel-Snow.

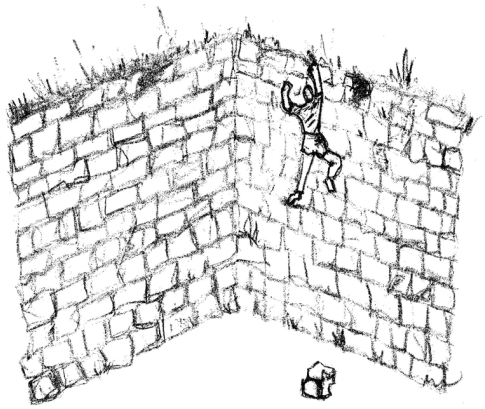
# What is Right/What is Wrong?




Laurel-Snow is not only a wonderful natural area, but the relics of the Dayton Coal and Iron Company make it a great place for learning about the history of the area as well. It is very important that we protect the industry resources of Laurel-Snow Unit of Cumberland Trail State Park so that others can enjoy them today and in the future.

Look the pictures below. Ask yourself if it is safe for yourselves or others? Does it harm anything in the park? Mark an X under activities that could harm you AND the mine and coke oven resources. Put a star under activities that are good.

Climbing on Walls



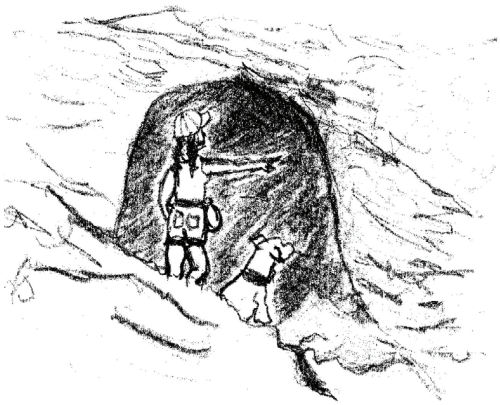
A. ____

Picking Up Litter



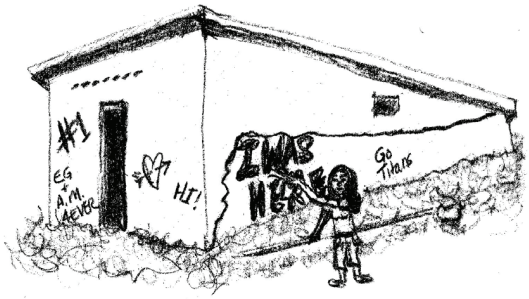
B. _____

Entering Old Mines



C. ____

Marking Buildings and Rocks



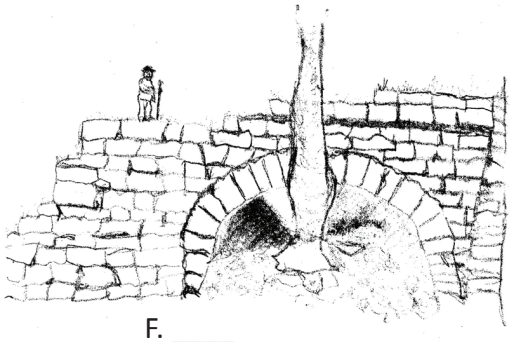

D. ____

Staying on Trails




E. _____

Climbing on Structures



F. ____

Check off the things you have done to protect the resources of the Laurel-Snow Area.

☐ stayed on trails ☐ left everything where I found it ☐ picked up trash
☐ respected other visitors ☐ looked at rocks and remains but did not disturb or deface them

What else did you do? _____

_____

Good activities: B, picking up litter; E, staying on trail.
Harmful: A, climbing on wall; C, entering abandoned mines; D, defacing park resources

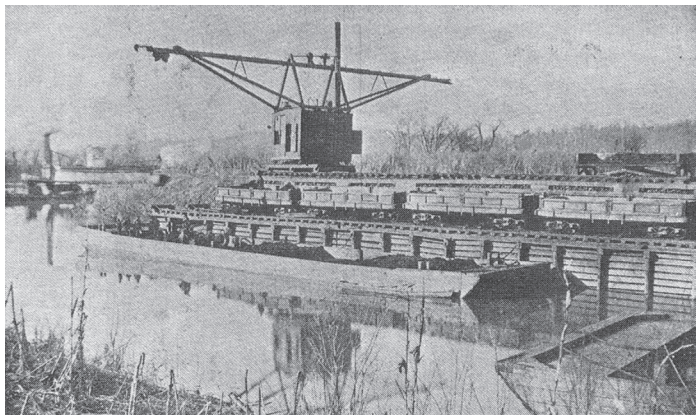
## DAYTON COAL AND IRON COMPANY - TRANSPORTATION

While you are visiting Laurel-Snow, try to imagine yourself living during that time. Life was much different than it is now. Horses and mules played a big role in transportation in Rhea County. They were used to move lumber, coal, and rock. Farmers used them to clear land for their pastures and crops. Preachers, teachers, mail carriers, and country doctors used horses to travel to remote homesteads of the communities.

The trail you walk on along Richland Creek was where the railroad ran, carrying coal to the coke ovens for processing. But more importantly, the railroad made it possible to transport coke to the iron works several miles away in Dayton. The railroad also carried iron from Dayton to the Tennessee River where it was shipped all over the country. There were no interstates, few automobiles, and no airports yet.

Below are a couple of pictures taken when the Dayton Coal and Iron Company was in business. The first shows rail cars getting coal at a tipple. The other shows a company barge on the nearby Tennessee River.





*Look at the modes of transportation below and circle those that might have been used to move coal, coke, and iron when Dayton Coal and Iron Company was in business.*

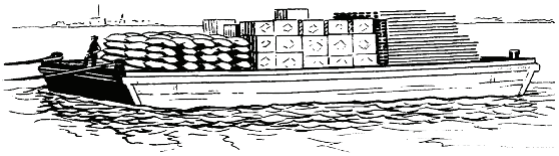












YES: Mule, Train, Barge
NO: Bicycle, Airplane, Elephant

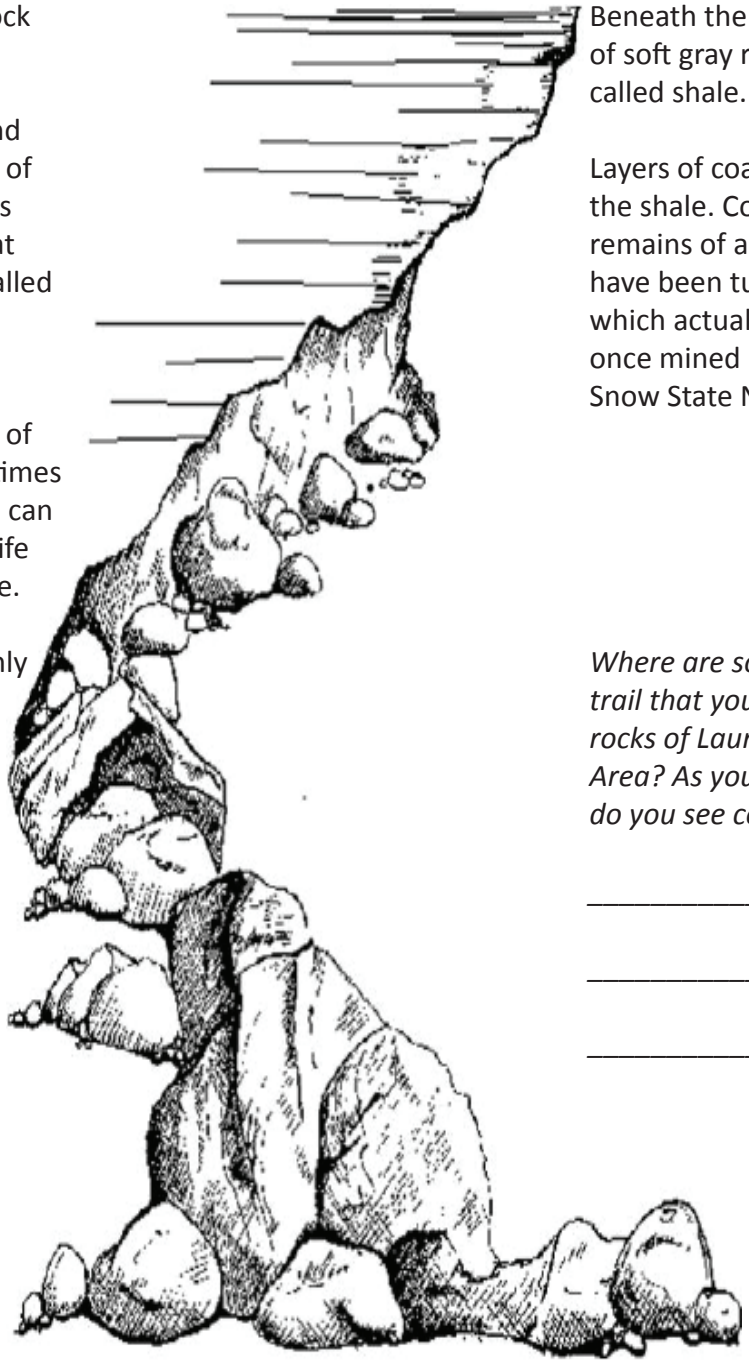
# Geology

Merriam-Webster Dictionary defines geology as "a science that deals with the history of the earth and its life especially as recorded in rocks". So, put on your geologist (a person who studies rocks) hat for a bit and let's take a looks at the geology of Laurel-Snow.

Richland Creek flows two miles through Laurel Snow State Natural Area then through Dayton to the Tennessee River. Over millions of years the river has carved a gorge into the rocks. The rocks that make up the Cumberland Plateau were all deposited by water long, long ago. This type of rock is known as sedimentary rock. The sedimentary rock here is stacked one layer on top of another just like the layers in a cake.

The most common type of rock in the park is sandstone. It is the rock which makes up the cliffs, arches, rock shelters and boulders. Sandstone is made of grains of sand and sometimes small pebbles. Sandstone that contains a lot of pebbles is called conglomerate.

Under the coal, limestone is found. It is made up of shells of ancient sea creatures. Sometimes fossils of this ancient sea life can be found in this ancient sea life can be found in the limestone. Most of the limestone is still below the ground and can only be seen in a few places.



Beneath the sandstone is a layer of soft gray rock formed from clay called shale.

Layers of coal can be found below the shale. Coal is made of the remains of ancient plants that have been turned into a black rock which actually burns! Coal was once mined in what is now Laurel-Snow State Natural Area.

*Where are some places along the trail that you can really see the rocks of Laurel-Snow State Natural Area? As you walk along the trail, do you see coal seams?*

_____

_____

_____

*Unscramble the letters for the names of these types of rock. Then, place the rock layers in the proper order by using the information above.*

*ahles* _____

*aclo* _____

*mesoetnli* _____

*denntsosa* _____

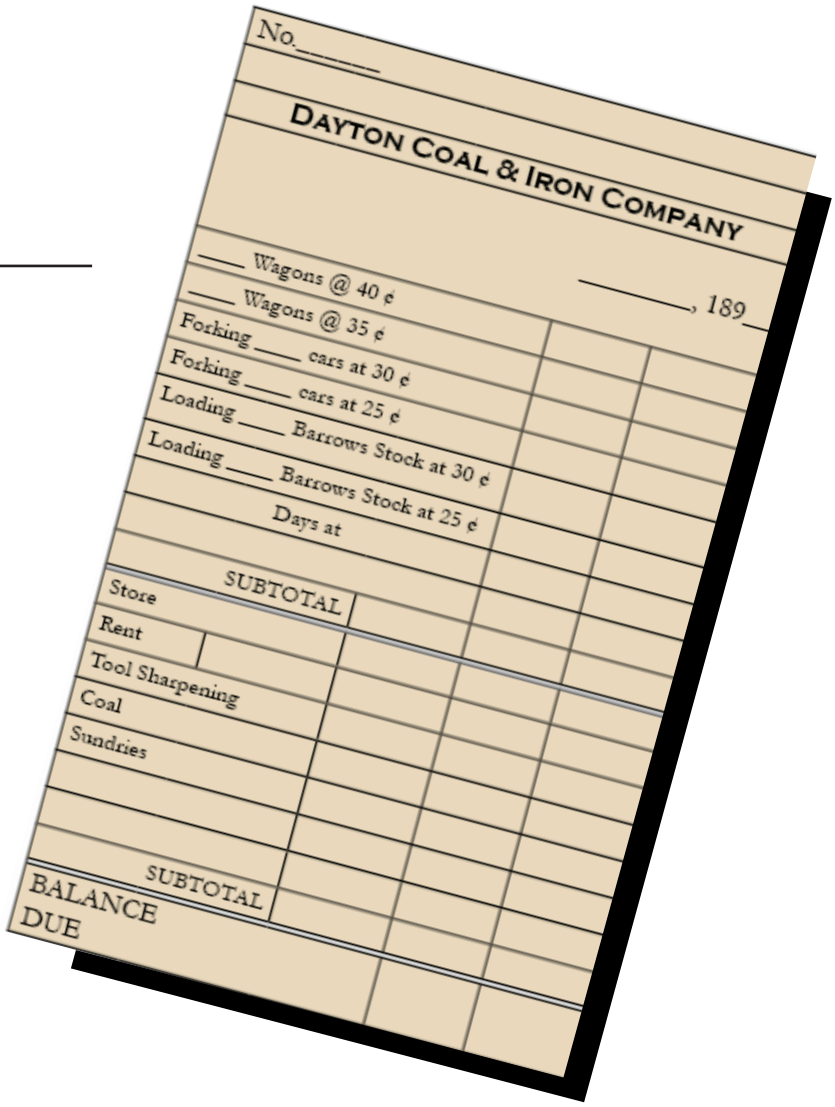
**ANSWERS**: shale, coal, limestone, sandstone. The proper order is sandstone, shale, coal, limestone.

## PAYDAY – SCRIP, THE COAL MINER'S CREDIT CARD

Due to the rural location of mining operations and difficulties transporting large amounts of cash over poor roadways, many coal companies chose to issue tokens to pay their workers. Scrip was a "coal miner's credit card". Scrip was made from aluminum, copper, brass, paper fiber, bronze, nickel, wood, and zinc. Most metal scrip were punched with a letter or symbol that made it easier to recognize and sort. Sometimes the miner received only a credit for his wages at company businesses. Scrip was not redeemable for cash until 1918 when the U.S. Supreme Court ruled that the miner could receive U. S. currency on payday if he did not owe the company money.

Because mines were often far away from established towns, the miners sometimes received only credit at company businesses set up in the mining town. This meant that they could buy goods and services only from the company store. In addition to groceries, clothing, and other necessities for the home purchased at the company store, a miner often had to pay rent to live in a company house, pay for his own tools, powder, caps, and provide other mining supplies. He was often charged a monthly fee for the company doctor, water, electricity, blacksmith charges on his tools, and make a contribution to a funeral fund.

A miner was paid according to the amount of coal he loaded. The quality of the coal was also considered. If there was an excess of non-coal rock, such as shale, in the load, the miner's pay was docked. If his load was of really good quality, he may be paid a bit more. Here is a pay slip for a miner in 1895.




---

*Fill out a pay slip for George Jenkins (employee # 27) who worked at Dayton Coal and Iron Company. This is for the period from June 16-31, 1896.*

*Mr. Jenkins loaded 81 wagons at 40 cents each and 2 wagons at 35 cents each.*

*What Mr. Jenkins owes:*

*Store $16*
*Rent $3*
*Tool sharpening 25 cents*
*Coal 15 cents*
*New light for $2*

*Mr. Jenkins's son was sick last month and he still owes the doctor $4.30.*

***How much did Mr. Jenkins make? How much does he have until next pay day in two weeks?***

Mr. Jenkins earned $33.10. He owed a total of $29.40.
His remaining pay was $3.70.

# A CHANGING LANDSCAPE

As you walk on the trail through Laurel-Snow, you are surrounded by towering trees. The landscape here has undergone several transitions in the past 100 years. Native Americans and settlers in the early 1800s saw almost solid forest. Then settlers began clearing land for farming and for towns. In the late 1800s, when Dayton Coal and Iron Company (DCIC) was being built, mining companies clear-cut much of the timber. When DCIC closed in 1913, nature took over and reclaimed the land once again. However, not only the trees again grew tall; other non-native species such as kudzu and honeysuckle also invaded the land.

*Look at the picture below. This scene is typical of a coal mining area during the time DCIC was in business.*



*Now look around you and try to imagine what this area looked like when the mines were being worked. The area would have looked very different then, wouldn't it? What do you suppose happened to all the trees that were here when Dayton Coal and Iron Company began?*

_____

_____

_____

*What signs do you see that DCIC existed here? How has nature worked her magic in restoring the land?*

_____

_____

_____

*Did you notice the kudzu covering the coke oven area? Kudzu is a non-native invasive plant. That means that it was brought to the area and it is taking over an area and keeping native plants from growing here. It is a very difficult plant to get rid of. Kudzu can grow up to 4 feet per DAY! How would you feel if kudzu took over YOUR house?*

_____

Trees were cut to build mine offices and other mine buildings as well as worker houses. They provided timbers to support the inside of the mine roofs and wood for the ventilation doors. Trees were also turned into railroad ties for the tracks inside and outside the mines, bridge trestles to cross Richland Creek, and many other uses.

# GOING DOWN, DOWN, DOWN: WORKING IN A COAL MINE

Miners work in very dangerous conditions. They worked below ground, far from the mine entrances. They feared cave-ins and explosions, which could be deadly. During the period that the Dayton Coal and Iron Company operated, the safety standards of today's coal mines did not exist. Nor did the safety equipment used by modern miners.

Below is a picture of some tools used in mines during the time that DCIC operated. See if you can figure out what they are. Draw a line from the name and description to the picture.

Lunch bucket. Miners carried their lunch to work in a three-section bucket. The top was for desserts, the middle for a sandwich, and the bottom section was for drinks.

Blasting powder bucket. This smaller bucket contained blasting powder used to dislodge coal from the coal veins.

Lamps and caps. Before carbide lamps, coal oil lamps were used for light in the mines. Carbide lamps produced a bigger and better light. The miners wore a cap to which the light was attached.

Picks. The basic tool for miners was a pick. Most had a wooden handle but some did not because of limited space in the tunnels. Picks broke the coal loose from the veins.

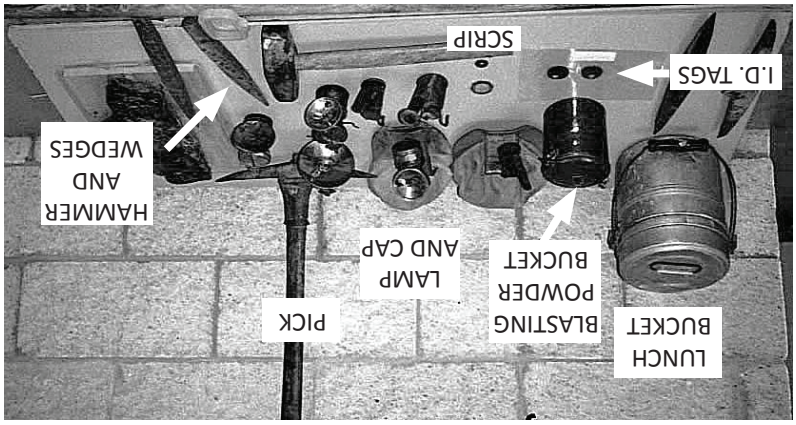


Hammer and wedge. A hammer and wedge was used to break up a large block of coal so it could be loaded into the coal cars by hand.

ID tags. The two copper disks in the baggie are ID tags issued to miners. They were numbered. When a mined filled a coal car, he hung his ID tag on the side of the car. When the coal was dumped, the miner got credit for the weight of coal.

Scrip. The two coins are examples of scrip used to pay miners. Some companies used paper script.

Tamp and needle. The metal needle and wooden tamping tool in front were used when a miner had to blast a coal vein to break the coal out. He would drill a hole, insert blasting powder rolled into a piece of newspaper, and tamp it into place. The needle would be pushed into to pierce the powder roll, a blasting "squib" inserted and lit. The miner would hurry to safety. After the blast, he would fill his car with coal.



# CONGRATULATIONS!

You have completed the requirements to be a Junior Ranger for the Dayton Coal and Iron Historic Site at Laurel-Snow Unit of the Cumberland Trail State Park.

Your duties as a Junior Ranger in Tennessee State Parks are:

- Teach others to conserve and wisely use natural and cultural resources.
- Be prepared for park adventures.
- Learn the park rules and follow them.
- Protect our state parks by staying on trails.
- Spend time outdoors learning about the world in which you live.
- Inspire others to visit state parks and become involved in the outdoors.
- Tell others about the Tennessee State Parks Junior Ranger program.

## Junior Ranger Pledge

***I*** _____

*Your name*

***will love and care for the Nature***

***and History of Tennessee***

***Its plant, animals, and people that***

***make it special to me.***

_____ _____

Signed Date

# APPENDIX D: SCHOOL LESSON PLANS

# Where does coal come from and how is it used?

**Objective:** Students will learn where coal comes from.

**Grade level:** K-3

**Lesson time:** Three 15 minutes sessions so that students can do the motions smoothly while reciting the poem.

**1. Provide background to students.**

Long ago, before the age of the dinosaurs, steamy swamps filled with giant trees and large leafy plants covered many parts of the earth. As the trees and plants died, they sank to the swamp bottom where they formed layers of soggy dense material called peat. Over time these beds of peat became buried by sand and clay and formed sedimentary rock. The layers of rock grew so heavy that the water was squeezed out of the peat. Heat and pressure from the rock compacted the peat to form coal. Most coal mined today is believed to have been formed about 300 million years ago. Early stages of coal formation still continues today as trees and plants in swampy areas die and decay to form peat. However, this process will take millions of years.

This is how the coal found at the coal mines operated by Dayton Coal and Iron Company at Laurel-Snow was formed.

**2. Movement poem to help students learn where coal comes from.**

During the first session, read the poem and demonstrate the movements to the students. On the second reading, read each line and have the students repeat it while performing the movements. Repeat second reading.

During the second session, read the section and have them repeat with the motions. During the third session, see how much they can remember with only prompts.

“Here is a movement poem to help you learn where coal comes from.”

**Coal Poem***

| **[POEM TO RECITE]** | **[ACTIVITY TO PERFORM]** |
|---|---|
| Before the time dinosaurs roamed to and fro,<br>Many plants grew high and low. | Sweep your arms from side to<br>side to show roaming to and from. |
| In this big green garden, plants grew fast.<br>After they died and piled up high,<br>They turned into something neat called peat. | Squat down and shoot up quickly, then<br>slowly raise your hands in front of you.<br>Then jump into the air as if in surprise<br>when you say the word “neat”. |

| | |
|---|---|
| Pressure, heat and years gone by,<br>Peat turns into coal, you know. | Pound fist into palm of other hand. |
| Dig it up, clean it up and ship it one, two, three. | Pretend to dig with a shovel, then rub something clean in your hand. Then flatten your hand and move it forward away from you. |
| Burn it and turn it into energy. | Circle fists around each other. |
| It makes light go on and keeps us warm.<br>Everybody needs electricity. | Pretend to pull on a cord to turn on a light, then hug your body and rub hands together. |

*from Illinois Coal. . .DIG IT! A Teacher's Guide for Coal Education

**3. How do we use coal?**

We use coal in many ways in our lives today. Coal is burned to provide electricity. The power to run your television or your lights might come from the coal plant at Watts Bar!

*There are many things made from coal as well. See if you have ever used any of the things listed below.*

| | | |
|---|---|---|
| baking powder | insulation | plastic |
| batteries | linoleum (some) | poster board |
| chalk | mothballs | rubber bands |
| concrete (small pieces) | paint | shingles (some) |
| fertilizer | paper clips | sugar substitute |
| golf balls | perfumes | trays |
| | pens | |



# LARGER THAN LIFE: COAL MINERS' FOLK HEROES

**Objective:** Students will understand the role that folk heroes play. Students will create a Coal Mining Folk Hero for Dayton Coal and Iron Company.

**Grade Level:** 4-6

**Lesson time:** One 50-minute class period.

**Procedures:**

1. **Provide background on Dayton Coal and Iron Company.**

Dayton Coal and Iron Company and its successors operated mines and coke ovens at Laurel-Snow from 1882 until 1927. During the period of operation, coal miners faced danger every day. It was dark in the mines and very dirty. There was danger from roof collapses, build-up of coal gases and dust that could explode, and blasting that could go wrong. Three really bad explosions made national news. In December 1895, a blast lit the coal dust on fire at the Richland Mine trapping and killing 29 men and injuring others. Only 3 workers were rescued alive. The cause of the explosion was said to be an open lamp used by the gas inspector. In May 1901, an explosion at the Nelson mine occurred when a misfired powder blast ignited mine gases which exploded in a fireball that shot 300 feet outside of the mouth of the mine and scorched trees. Thirty men died in that explosion, and several were severely injured. A third explosion in March 1902 killed 35 miners including men standing outside.

2. **Discuss worker folk heroes. Give illustrations of real and imaginary folk heroes. Ask students if they are familiar with any folk heroes.**

Folk heroes help us understand what workers want to be like: what they thought made a good worker, what they admired about each other, what they tried to be like themselves. Looking at work folk heroes tells a lot about what real workers were proud of about themselves.

Most folk heroes, real and make-believe – have exaggerated physical and character traits needed for the real job. They are all hard-working, brave, and self-sacrificing.

Real life Tennessee train engineer Casey Jones became a folk hero not only by driving his locomotive faster to make up lost time. During a crash, he stayed with his train so he could apply the brakes as long as he could. Casey died in the crash, but he saved many other lives.



Another real life folk hero was Tennessee Congressman Davy Crockett, well known for his coonskin cap. David "Davy" Crockett was a frontiersman, soldier and politician. He is commonly called the "King of the Wild Frontier". He represented Tennessee in the U.S. House of Representatives, served in the Texas Revolution, and died at the Battle of the Alamo. Here is the first stanza of "The Ballad of Davy Crockett":

*Born on a mountain top in Tennessee, greenest state in the land of the free*
*Raised in the woods so's he knew ev'ry tree,*
*Kilt him a b'ar when he was only three*
*Davy, Davy Crockett, king of the wild frontier!*

Mike Fink was also a real life folk hero. He was known as the "King of the Keelboaters" that ran up and down the Mississippi and other rivers. He stood 6-foot, 3 and weighed 180 pounds and he claimed he could "outrun, outshoot, throw down, drag out and lick any man in the country". Some of the tales told had him riding a moose like a horse, wrestling alligators and drowning wolves with his bare hands.

According to Walter Blair and Franklin J. Meine in "Mike Fink, King of the Mississippi Keelboatmen" (New York 1933), Mike Fink roared that,

> "Im a Salt River Roarer! I'm a ring-tailed squealer! I'm a reg'lar screamer from the ol' Massassip'! WHOOP! I'm the very infant that refused his milk before its eyes were open, and called out for a bottle of old Rye! I love the women an' I'm chockful o' fight! I'm half wild horse and half cockeyed-alligator and the rest o' me is crooked snags an' red hot snappin' turtle. I can hit like fourth-proof lightnin' an' every lick I make in the woods lets in an acre o' sunshine. I can out-run, out-jump, out-shoot, out-brag, out-drink, an' out fight, rough-an'-tumble, no holts barred, ary man on both sides the river from Pittsburg to New Orleans an' back again to St. Louiee. Come on, you flatters, you bargers, you milk-white mechanics, an' see how tough I am to chaw! I ain't had a fight for two days an' I'm spilein' for exercise. Cock-a-doodle-doo!"

John Henry was a real African American worker who helped to build railroads through the mountains of West Virginia, Maryland, and Pennsylvania in the 1870s. Before the days of heavy machinery, men used picks, hammers, and dynamite to cut tunnels through the mountains. John Henry was a "steel driver" – he hammered a steel drill bit deep into the rock while another man turned the drill to make a deep narrow hole to be filled with dynamite. When the dynamite went off, the rock cracked, and men carried the pieces away. It seemed like John Henry could hammer all day long. His boss was excited about a new steam-powered drill that had arrived and he wondered if it could speed up their work by drilling faster than the teams of men. John Henry took on the machine. John Henry worked harder than he ever did before – and he BEAT the machine! But he worked so hard, his heart gave out. The next day, the machine did the work while John Henry's family and friends prepared for his funeral.






Tall tale hero Paul Bunyan and his blue ox, Babe, were larger than life. Paul Bunyan was an exaggerated version of a real life lumberjack. He was clever, strong, and independent. Paul performed incredible feats such as chopping down a whole forest in one day! He is said to have straightened the twisty Mississippi river by tying one end to Babe and having her pull.

Pecos Bill was said to have fallen out of a covered wagon and been raised by coyotes and his teething ring was a Bowie knife. He used a rattlesnake as a lasso and once lassoed and rode a tornado!

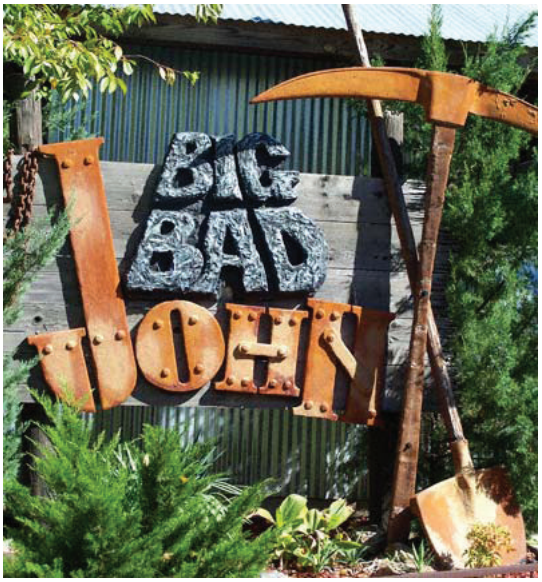
**3. Have the class read or listen to the song *Big Bad John*, by Jimmy Dean, and discuss. A link to a Youtube video of Mr. Dean singing his song is provided below. Discussion questions are also provided.**

***Big Bad John***

*Big John*
*Big John*
*Ev'ry mornin' at the mine you could see him arrive*
*He stood six foot six and weighed two forty five*
*Kinda broad at the shoulder and narrow at the hip*
*And everybody knew, ya didn't give no lip to Big John*
*(Big John, Big John)*
*Big Bad John*
*(Big John)*

*Nobody seemed to know where John called home*
*He just drifted into town and stayed all alone*
*He didn't say much, he kinda quiet and shy*
*And if you spoke at all, he just said, "Hi" to Big John*
*Somebody said he came from New Orleans*

*Where he got in a fight over a Cajun Queen*
*And a crashin' blow from a huge right hand*
*Sent a Louisiana fellow to the Promised Land, Big John*
*(Big John, Big John)*
*Big Bad John*
*(Big John)*




*Then came the day at the bottom of the mine*
*When a timber cracked and men started cryin'*
*Miners were prayin' and hearts beat fast*
*And everybody thought that they'd breathed their last, 'cept John*
*Through the dust and the smoke of this man made hell*
*Walked a giant of a man that the miners knew well*
*Grabbed a saggin' timber, gave out with a groan*
*And like a giant Oak tree, he just stood there alone, Big John*
*(Big John, Big John)*
*Big Bad John*
*(Big John)*

*And with all of his strength he gave a mighty shove*
*Then a miner yelled out, "There's a light up above"*
*And twenty men scrambled from a would-be grave*
*Now there's only one left down there to save, Big John*
*With jacks and timbers they started back down*
*Then came that rumble way down in the ground*
*And then smoke and gas belched out of that mine*
*Everybody knew it was the end of the line for Big John*
*(Big John, Big John)*
*Big Bad John*
*(Big John)*

*Now they never reopened that worthless pit*
*They just placed a marble stand in front of it*
*These few words are written on that stand*
*At the bottom of this mine lies a big, big man, Big John*
*(Big John, Big John)*
*Big Bad John*
*(Big John)*
*(Big John)*
*Big Bad John*
------by Jimmy Dean

For an audio of Jimmy Dean singing *Big Bad John*, visit Youtube: http://www.youtube.com/watch?v=KnnHprUGKF0

1. What story is this song telling? What kind of man was Big Bad John? What was his character like? Where in the song is exaggeration used?
2. What is the "big idea" behind this song?
3. Do you think Big Bad John could be a folk hero?
4. What other laborers and common people have become folk heroes? What imaginary workers have people invented? What function have these folk heroes served for people?
5. Do you think we have folk heroes today? Which media characters help today's workers deal with their problems on the job?

**4. Create a Coal Miner Folk Hero**

Review this profile for folk hero John Henry:

| What's the real work like? | What are the real workers like? | Hero's physical traits | Hero's character traits | Hero's words | Hero's deeds |
|---|---|---|---|---|---|
| • Hard rock mountainsides<br>• Steep climbs<br>• Rock slides<br>• Swinging big sledgehammers weighing 9 pounds | • Strong back and arms<br>• Aerobic strength: heart, lungs continuous effort<br>• Work in teams | • Tall and muscular<br>• Great muscular and aerobic strength<br>• Endurance<br>• Used a 30-pound hammer with a 9-foot handle | • Perseverance, determination<br>• Proud of work<br>• Skill with hammer<br>• Self-sacrificing<br>• Brave | • "I'll die with a hammer in my hands."<br>• "Get me a thirty pound hammer with that nine foot handle--I'll beat your team drill down" | • Worked so hard he beat the steam drill<br>• Died rather than let the steam drill beat him |

Create your own Coal Mining Folk Hero. Create your coal miner hero's character (body and personality) by exaggerating what real miners do. Imagine the words he or she might say and the deeds he or she might do. Draw a picture of your Coal Mining Folk Hero.

| YOUR Coal Miner Folk Hero | What is real coal mining like? | What are real coal miners like? | Miner hero's physical traits (body) | Miner hero's character traits (personality) | Hero's words | Hero's deeds |
|---|---|---|---|---|---|---|
| **Your coal miner hero's name** | • Dark, cold, damp, dirty<br>• Close quarters: narrow tunnels, low roof with wood supports<br>• Dangers: gas leaks, coal dust, cave-ins | • Work in a team<br>• Cautious and safe<br>• Strong, skilled with tools<br>• Able to work in dark, close quarters (nimble)<br>• Protect lungs, limbs<br>• Wears lamps, hardhats, long underwear, gloves, boots<br>• Used picks, hammers, drills, and powder charges to get coal. | | | | |