

Cucumber Magnolia High Conservation Value Forest Proposal Recommendation

Submitted by: John Friedrich

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Cucumber Magnolia High Conservation Value Forest Proposal Recommendation

Three locations that contain the state endangered cucumber magnolia (*Magnolia acuminata*) have been nominated for a High Conservation Value Forest designation (Figures 1, 2, and 3). Two of these populations fall within Clark State Forest and the other on Jackson-Washington State Forest. The intent of High Conservation Value Forests according to the FSC-US Management Standard 2019 is to, “manage to protect and maintain their identified high conservation value attributes. In some cases, active management is consistent with these attributes, and in other cases (e.g., most old growth forests), active management is specifically precluded” (pg. 71). The Forest Stewardship Council (FSC) introduced the concept of High Conservation Value Forests (HCVF) in 1999 to ensure identification and proper management of forest areas with exceptional conservation values (FSC 2019). In 2007, the Indiana Department of Natural Resources Division of Forestry (DoF) designated an initial 15 areas as HCVFs and 10 more were added from 2008 to 2018. Two more locations have met the HCVF requirements from 2018 to present. These initial 27 HCVF areas are dedicated nature preserves except for 1.

The FSC-US Management Standard (2019, p. 109) identifies 6 categories of High Conservation Values (HCVs) that are used to justify the designation of High Conservation Value Forests. Page 1 of the submitted proposal states, “make the State Endangered Cucumber Magnolia (*Magnolia acuminata*) the recipient of high conservation value 1 designation, at least on par with the previous determination of yellowwood tree.” High Conservation Value (HCV) 1 is a “forest area containing globally, *regionally*, or nationally *significant concentrations of biodiversity values* (e.g., endemism, endangered species, refugia). HCV 1 includes RTE (rare, threatened, and endangered) species” (FSC 2019, p. 110).

The cucumber magnolia is the most cold-hardy magnolia in the U.S. (Weeks et al 2005, p. 134). According to Charles C. Deam in his *Trees of Indiana* book (1931, p. 166), cucumber magnolia was found from the “north shore of Lake Erie, western New York, eastern Ohio, southern Indiana, southern Illinois, and along the Appalachian Mountains to southern Alabama, and west to Arkansas. It doubtless occurred in all or nearly all of the counties in southern Indiana south of a line drawn from Richmond to Vincennes. It no doubt was extremely local.” Deam goes on to describe a few encounters with local “pioneers” on their observations, “a pioneer 81 years old who always lived in Washington County told me that there were two trees on his farm near Pekin, and they were the only two trees he knew of in the vicinity. The trees were popular because the neighbors came for the fruit to put into whisky for making bitters, which were specific for many ailments. I have seen only a shrub on the Clark County State Forest” (Deam 1931, p. 166). Deam ended his remarks stating that, “the cucumber tree has been too rare in Indiana to be of economic importance. The greatest interest with us is the distribution.” (Deam 1931, p. 167). The range for this species from the *101 Trees of Indiana* book states that the cucumber magnolia, “now apparently only occurs in Washington County. Possibly a few counties in southcentral and southeastern parts of the state; more widespread in southern Indiana originally” (Jackson 2003, p. 98). More specifically, cucumber magnolias prefer “rich, moist woodlands” (Jackson 2003) and “moist, deep, fertile soils or protected, cool, wooded ravines and along streams and lower slopes. It is not common anywhere, but rather occurs as a scattered tree” (Weeks et al 2005, p. 134). These observations align well with the Continuous Forest Inventory (CFI) data that is collected by the Division of Forestry through its Forest Inventory and Analysis (FIA) crew. “The CFI inventory of DoF State Forest property is based on a sample of 3,921 plots located randomly across those lands (a total area of 159,146 acres), a sampling rate of approximately one plot for every 40 acres. Data

is gathered from quantitative and qualitative measurements that describe forest-site attributes; stand characteristics; tree measurements on live and dead stems such as species, diameter, height, damage, tree quality; counts of regeneration; and estimates of growth, mortality, and removals” (Gallion 2022). From the CFI data for a completed cycle from 2017-2021, no cucumber magnolias were recorded as a tree or a seedling on any plots statewide on private or public land.

Cucumber magnolia has a long history of medicinal use. An article from the Botanic Medical and Surgical Journal from March 1, 1847 listed several uses for the fruit, seeds, and bark. “These seeds have a bitter aromatic taste and are quite pungent. We have used them extensively and consider them very valuable in certain forms of disease; especially where there is a phlegmatic temperament, or a general relaxed state of the system. In dropsical affections, we have found the magnolia to be a superior remedy The tincture of the seeds or bark, used freely three or four times a day, has been found a valuable remedy for chronic rheumatism. Indeed, we hardly know an article which possesses tonic, stimulant, and diuretic properties, to such an extent, as the magnolia acuminata.” A more recent study from 2019 found that *Magnolia acuminata* is high in both antioxidants and anticancer activity (Elansary et al 2019).

The United States Department of Agriculture (USDA) describes cucumber magnolia as a light loving species that “sprouts readily” and responds well to forest stand management (FSM). However, it should not be assumed that if FSM was applied elsewhere in the region, that this species would emerge from the seed bank or be introduced by wildlife. It has been noted that the “reproduction of cucumber tree in the forest is scarce because of the destruction of seed by birds and rodents, high susceptibility of the seedlings to freezing, and the exacting conditions required for germination” (USDA). Habitat destruction and type conversion is most likely the reason for the decline of this species. Historical records of this species in other counties were most likely

removed along with their associated ecosystems. Cucumber magnolia was placed on the endangered species list in Indiana in 1984. Currently, cucumber magnolia is listed by the Indiana Department of Natural Resources Division of Nature Preserves as globally secure but critically imperiled and endangered in the state (IDNR 2023).

Cucumber magnolia was first located in a 35-acre section of Jackson-Washington State Forest in the 1980's. This area was formally dedicated as Indian Bitter Nature Preserve in 1986. Since the dedication of Indian Bitter Nature Preserve, 3 more populations of the cucumber magnolia have been located within Indiana's State Forests. One population is found at Jackson-Washington State Forest (JWSF) and will be referred to as the Pull Tight Road site. The 2 other locations are at Clark State Forest (CSF) and will be referred to as the Flatwood Road site and the Winding Road site.

The Pull Tight Road site at JWSF was first discovered in the mid 1980's during a property line run for a neighboring private land's timber harvest. It was noted that the majority of the population appeared to be on private property with at least one and the possibility of more mature individuals and several seedlings and saplings on JWSF property. "Some work has been done on the state forest side to enhance the population, though more is needed" (Proposal, p. 1).

The first written modern documented mention of cucumber magnolia at CSF was in a cruising forester's notes from 2008 in the Flatwood Road area. Cucumber magnolia's presence was noted again at this location in 2009 during a timber harvest. During a field visit to inventory cucumber magnolia at the Flatwood Road site, a 6-inch diameter American chestnut (*Castanea dentata*) was found within the population of magnolias. American chestnut is listed as globally rare and critically imperiled and endangered in the state by the Indiana Department of Natural Resources Division of Nature Preserves (IDNR 2023).

The third site, and most recent discovery of cucumber magnolia is the Winding Road site at CSF. This section of CSF was purchased in 1903, making it possible this is the site that Charles Deam referenced in his *Trees of Indiana* book from 1931 (Flatwood Rd location was purchased in 1939). In 2008, this site was inventoried, and a resource management guide was written. A single tree selection timber harvest with regeneration openings followed in 2012. It was not until 2020 that cucumber magnolia was found and confirmed at this site during an ecological assessment as this location had been selected as a location for a proposed gun range. During the ecological assessment, it appeared that a mature cucumber magnolia had been misidentified and cut within one of the regeneration openings during the 2012 harvest. Over the past decade that stump has produced several sprouts and the magnolias in the area have been regenerating prolifically. Since the ecological assessment, a few more mature trees have been found in this area. An increment borer was used to age the northwest most 15-inch cucumber magnolia and was determined to be approximately 60 years old.

The High Conservation Value Forest Committee made several trips out to each of these sites, including Indian Bitter Nature Preserve, to locate, GPS, and take notes on the number of cucumber magnolias and associated species (Figures 4, 5, and 6). An individual point was taken for each tree over 6 ft tall and the presence or absence of regeneration (Chart 1, Table 1). Those under 6 ft tall were noted. At the Pull Tight location, there were a total of 13 trees over 6 ft tall (2 trees per acre) with an average diameter of 9.8 inches. This site had the largest average diameter of all 4 locations. The Flatwood Road location had the second most individual stems at a total of 89 individuals over 6 ft tall (34 trees per acre), with an average diameter of 3.0 inches. The Winding Road population had a total of 61 individuals over 6 ft tall (11 trees per acre) with an average diameter of 2.9 inches. Indian Bitter Nature Preserve (IBNP) had the most trees over 6 ft tall, with

192 stems and an average diameter of 3.2 inches. IBNP had some understory thinning work completed within the last 5 years and the cucumber magnolia responded very well with new regeneration.

With cucumber magnolia being listed as a state endangered and critically imperiled species and having confirmed locations, the HCVF committee has decided to move forward with recommending these 3 populations located at Pull Tight Road, Flatwood Road, and Winding Road, be designated as High Conservation Value Forest 1. These locations house significant concentrations of cucumber magnolia in the state of Indiana, which the committee agrees meets the definition of High Conservation Value 1. This decision also aligns with the DoF's Procedure Manual that states, "The goal is to keep existing species and populations viable for the future" (Section N: Natural Areas), and that, "if Rare, Threatened, or Endangered communities were identified in this area, the activities prescribed in this guide will be conducted in a manner that will not threaten the viability of those species" (Appendix II E-1 Ecological Considerations).

Three management recommendations were given in the proposal as well; 1. "It is recommended that periodic work continues to release seedlings and saplings from shade tolerant competition and other competition as needed so they become mature individuals", 2. "It is recommended that a seed orchard with individuals from all three populations be established for the state tree nursery", and 3. "It is recommended that a neighbor private holding adjacent to the Jackson-Washington SF population not located in a nature preserve be targeted for land acquisition when available as it contains a sizeable magnolia population". These management recommendations will be taken into consideration when the properties and appropriate staff develop management guides for these proposed High Conservation Value Forest areas.

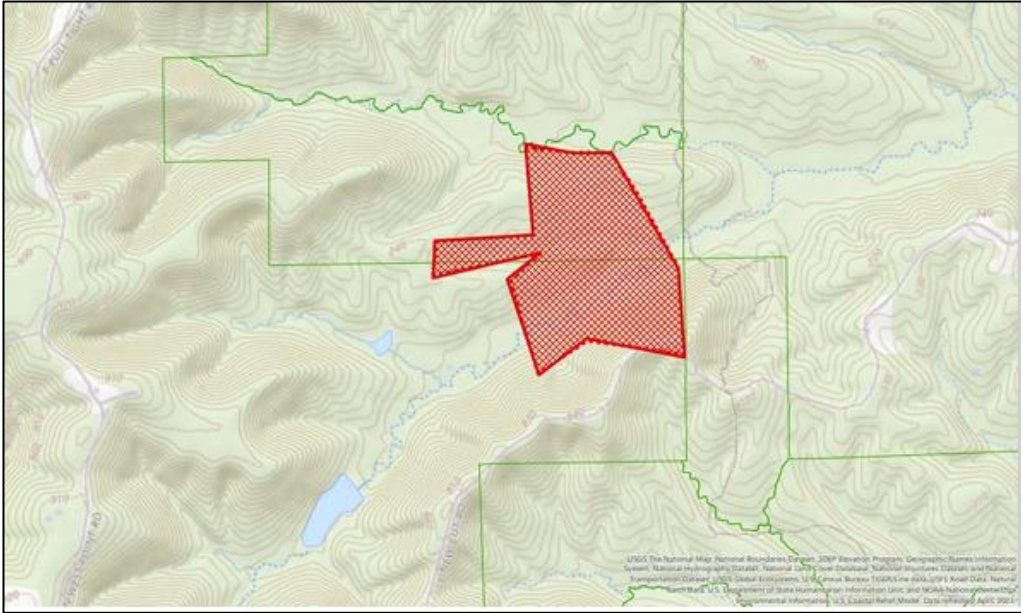


Figure 1. Proposed high conservation value forest at Jackson-Washington State Forest near Pull Tight Road.

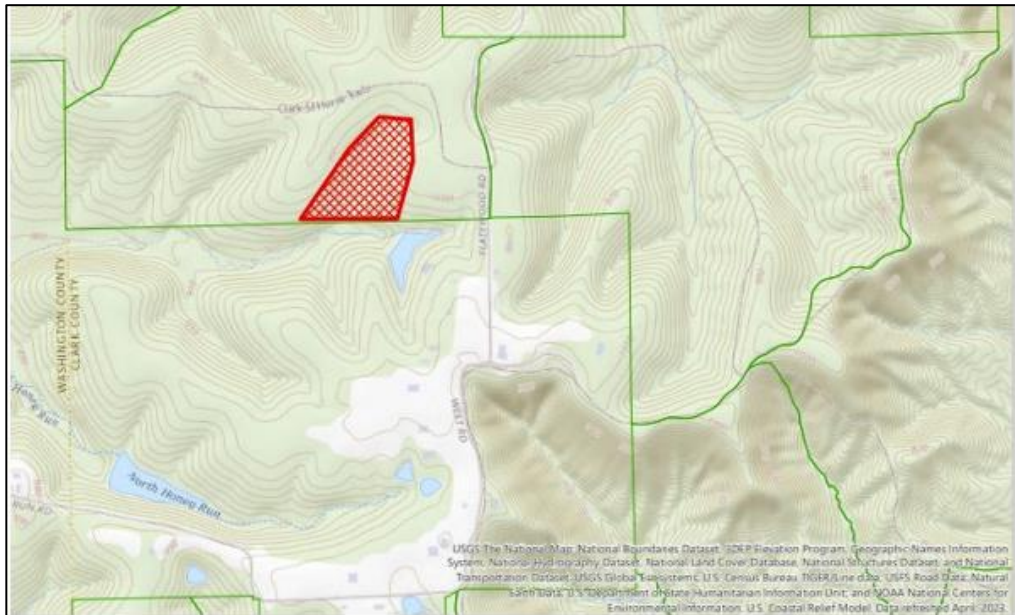


Figure 2. Proposed high conservation value forest at Clark State Forest near Flatwood Road.

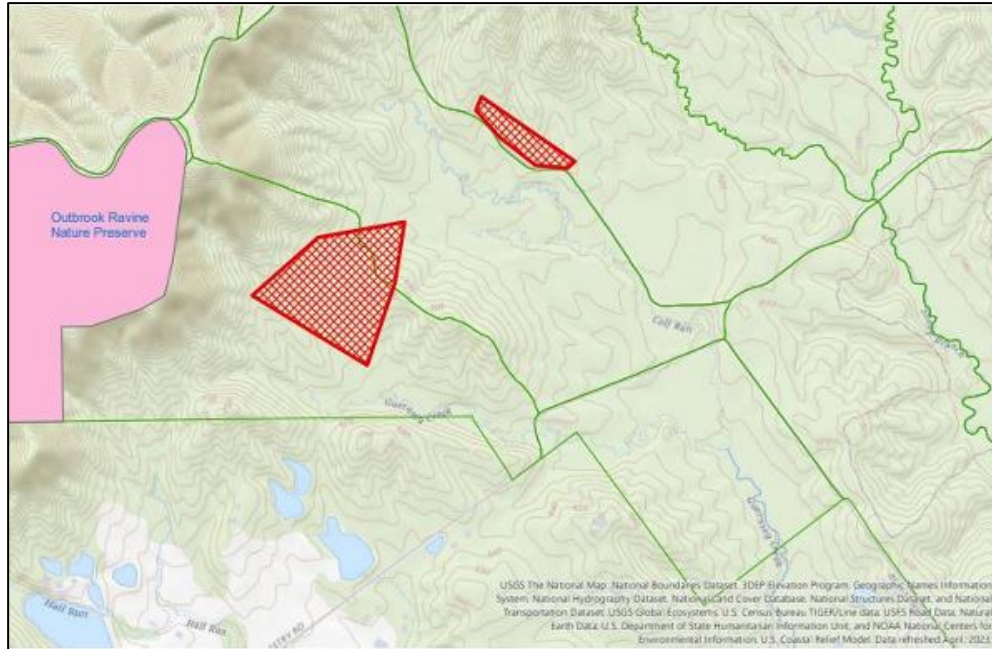


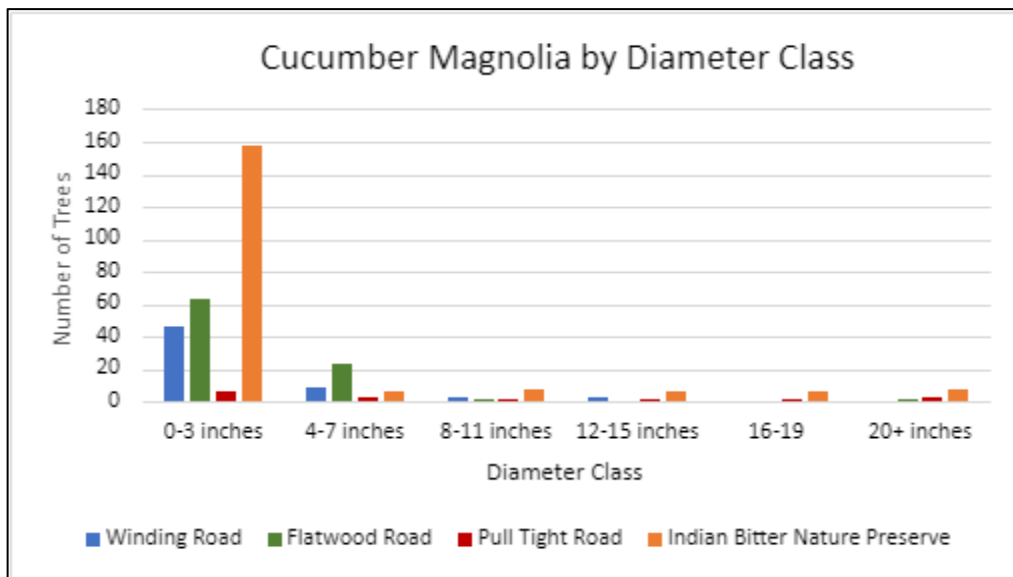
Figure 3. Proposed high conservation value forest at Clark State Forest near Winding Road.



Figures 4 and 5. Photo on left is from the Pull Tight Road site with a flagged sapling and the author of the proposal, John Friedrich. Photo on the right is a mature magnolia with committee member and Clark State Forest Property Manager, Elena Crosier.



Figures 6 and 7. Leaves and bark from a cucumber magnolia.



Graph 1. Number of cucumber magnolias by diameter class and site location.

| Diameter Class | Clark State Forest | | Jackson Washington State Forest | |
|----------------|--------------------|---------------|---------------------------------|-------------------------------|
| | Winding Road | Flatwood Road | Pull Tight Road | Indian Bitter Nature Preserve |
| 0-3 inches | 46 | 63 | 6 | 157 |
| 4-7 inches | 9 | 23 | 3 | 7 |
| 8-11 inches | 3 | 2 | 1 | 8 |
| 12-15 inches | 3 | 0 | 1 | 6 |
| 16-19 | 0 | 0 | 2 | 6 |
| 20+ inches | 0 | 1 | 3 | 8 |
| Total | 61 | 89 | 16 | 192 |
| Average | 2.9 | 3.0 | 9.0 | 3.2 |
| Acres | 5.5 | 2.6 | 7.8 | 17.2 |
| Trees per Acre | 11.1 | 34.2 | 2.1 | 11.2 |

Table 1. Diameter class, acreage, and trees per acre at the 3 study sites and Indian Bitter Nature Preserve.

Designation Decision: The state forester has up to 60 days to make a final decision to either accept or reject the committee's recommendation. This decision will be given to the review team.

Committee recommendations accepted.

Committee recommendations rejected.

John R. Seifert (signature)

Date

Cucumber Magnolia HCVF Response to Public Comments

Q. The population of cucumber magnolia located in the regeneration opening southeast of the fire tower is located in the same area as the proposed new gun range at Clark state forest. For the past few years Clark state forest has had information available for this new gun range at open houses and in newsletters asking for public comment on the project. Will these state endangered trees be protected during the construction of that project? What will the division do to prevent any harm or mitigate the damage done? Is there no other spot a gun range could be considered that did not impact RTE species? Magnolias do like disturbance as shown by its explosion of regeneration in the opening mentioned in the HCVF proposal but land clearing for a gun range will not promote this species. I would like to know how the Division committed to promoting and enhancing cucumber magnolia plans to handle this. I have yet to see information on these plans.

A. A preliminary gun range design was completed a few years ago, however due to material changes in the design, and the size of the magnolia population found, the division will resume work with an engineering and design firm to address changes. At this same time, the division will look at options to shift the overall footprint to minimize impact to the cucumber magnolia.

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Appendix I: High Conservation Value Forest Committee Members

Megan Crecelius began working for the Indiana DNR Division of Forestry in February 2016 as an Inventory Forester and started as Forest Ecologist in October 2022. She received her Bachelor of Arts in Biology - Ecology & Conservation emphasis from Franklin College in 2014 and completed a Master of Science in Botany from Ball State University. During her time at Franklin College, she completed and published an undergraduate study on the population ecology of the Puttyroot Orchid (*Aplectrum hyemale*) and tended to the college's greenhouse. She also spent a summer working in the Friesner Herbarium at Butler University. At Ball State University, Megan preformed and published a floristic inventory and floristic quality assessment of Hayes Arboretum's constructed wetland and associated woodlands as her thesis project while assisting in other floristic inventories with her classmates and professor. During her time there she taught Introduction to Botany labs and worked in the university's herbarium.

Elena Crosier began her career with the Division of Forestry as a resource specialist at Harrison-Crawford State Forest in 2014. During her time there she became a member of the Division of Forestry's GIS committee, served as secretary of the Indiana Society of American Foresters, and twice earned the division's Resource Specialist of the Year Award. In 2021, she became the second woman to manage one of Indiana's state forests and the first woman to manage Indiana's oldest, Clark State Forest. Elena earned a Bachelor of Science in Wildlife and a Bachelor of Science in Forestry from Purdue University

Scott Haulton, Forestry Wildlife Specialist, Indiana DNR, Division of Forestry: Scott brings over 25 years of relevant professional experience to his role with the HCVF nomination review committee. Scott's professional experience spans the fields of forest management, public land management and natural area restoration, wildlife ecology research, and imperiled species impact assessment, particularly as it relates to forest management and community restoration. During his more than 15 years with the Indiana Division of Forestry, Scott's primary responsibilities have focused on managing the State Forest wildlife habitat management program and providing guidance to the DNR and the public on issues related to forest management and wildlife. Scott's academic training includes a Bachelor of Science in Environmental and Forest Biology from the State University of New York College of Environmental Science and Forestry and a Master of Science in Wildlife and Fisheries Sciences from Virginia Tech. He is recognized as a Certified Wildlife Biologist by The Wildlife Society.

Brenda Huter attended Carroll College, now Carroll University, in Waukesha, Wisconsin majoring in Biology and Geography. She spent her summers doing hands-on resource management and environmental education for the Wisconsin Youth Conservation Corps program. In 1993, Brenda came to Indiana for graduate school at Indiana University where she obtained a Master of Environmental Science - Applied Ecology and a Master of Public Affairs – Environmental and Natural Resources Management. Brenda began her career with Indiana Department of Natural Resources (DNR) – Division of Forestry as a GIS intern during graduate school. In 1997 she joined the DNR full time as a resource specialist at Yellowwood State Forest focusing on environmental education, recreation, watershed management, special species and cultural site management, GIS, and data management. In 2004, Brenda transferred to the

Cooperative Forest Management staff where she manages programs that promote conservation of privately owned forests: Classified Forest & Wildlands Program, green certification, and the Forest Legacy Program.

Josh Kush started with the Division of Forestry in 2010 as an assistant property manager at Morgan- Monroe State Forest. He worked as a resource specialist at Martin State Forest before becoming its property manager in 2019. Josh transitioned to property manager at Jackson-Washington State Forest in 2023. He earned his bachelor's degree in forestry from Paul Smith's College.

Jason Larson received a Bachelor of Science from Purdue University and a Master of Science from Miami University (Ohio). Throughout his undergraduate and graduate career, he participated in field research on the ecology of reptiles and amphibians. Before starting with the Division of Nature Preserves, Jason worked for the IDNR Division of Outdoor Recreation as a Member of the Wildcat Creek Crew, as an Assistant Field Steward for The Nature Conservancy, and as Assistant Curator for the Biology Collection of the Indiana State Museum. He has been the Southeast Region Ecologist for the IDNR Division of Nature Preserves since 2006, focusing on natural area restoration and rare plant monitoring and recovery.

Andrew Reuter received his Bachelor of Arts in Outdoor Resource and Recreation Management at Indiana University in 2005. Throughout his undergraduate tenure, he worked seasonally for the US Forest Service - primarily within the Charles C. Deam Wilderness. Andrew began his IDNR career in the 2007-08 spring seasons as a seasonal firefighter, participating on nearly 100 prescribed and wildfires across Indiana in those two seasons alone. After a short duration working for Student Conservation Alliance and the National Park Service in Virginia and beginning his Masters work at the University of Virginia Tech, he returned to start his fulltime career as a Wildfire Specialist with Division of Forestry. He successfully completed his Masters in Natural Resources through the University of Idaho, where he focused his studies on Fire and Forest Ecology. After three years with Division of Forestry, and a year as Natural Resources Coordinator at Camp Atterbury, he transitioned to DNR Division of Nature Preserves as the Central Region Ecologist. From 2014-2022 he spent his time managing State Dedicated Nature Preserves and natural areas across 26 counties. He engaged in multiple Threatened and Endangered species monitoring and enhancement efforts, plant and community inventories, natural areas registers, environmental site reviews and Potential Dedication assessments. He led multiple actions throughout the Central Region to maintain, protect, enhance, and restore natural communities, utilizing prescribed fire, invasive species controls, and forest stand management. He was recently promoted to Assistant Director for the DNR Division of Nature Preserves.

Brad Schneck began working for the Indiana DNR Division of Forestry in 1998 as a property Forester. He briefly left the division in 2002 to serve as Conservation Director at Camp Atterbury Joint Maneuver Training Center before returning in 2007 as Property Manager at Jackson-Washington State Forest and Starve Hollow SRA. He became Assistant State Forester – Property Section in 2019. He received his Bachelor of Science in Forestry from Purdue University.