



GREENING

the crossroads

A GREEN INFRASTRUCTURE VISION FOR CENTRAL INDIANA



THE CONSERVATION FUND

America's Partner in Conservation

FOREWORD

Central Indiana matters. It is where we work, raise our families, share our faith and welcome visitors from around the globe for world-class conventions and sporting events.

It is also an area of rich biodiversity, home to freshwater mussels, neotropical migratory birds, and vibrant forests.

This is our chance to work together to raise awareness about our natural assets, to protect natural areas, to improve our air and water quality, and to enhance our quality of life.

We have an opportunity to connect people to nature in their own communities. Now is the time.

James Wilson

PRESIDENT
CENTRAL INDIANA LAND TRUST

Heather Bacher

EXECUTIVE DIRECTOR
CENTRAL INDIANA LAND TRUST



BLACK-EYED SUSANS | WAPIHANI NATURE PRESERVE, HAMILTON COUNTY

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CENTRAL INDIANA SOYBEAN FIELD

INTRODUCTION

Central Indiana is the crossroads of America. The capital of Indiana, Indianapolis, lies at the core of the state and was founded on an optimistic vision of the future in a land of plenty. Good soils for farming, mature forests, and clear running rivers and streams were all natural assets that attracted pioneers and residents and helped build a healthy economy.

We are now also at a crossroads. A green movement is sweeping the nation, with citizens demanding cleaner energy and water and concerns of climate change regularly occurring in the evening news. But, in recent years, Indiana has experienced declines in natural assets that may in turn endanger the state's economy and our quality of life.

Consider how the state and region have fared in the following national metrics on environmental issues:

- Forbes.com ranks Indiana 49th out of 50 states in its America's Greenest States Report (Alesia, April 22, 2009).
- Indiana has the highest amount of toxic discharges into water bodies according to the US EPA (Giller, May 23, 2009).
- Indiana ranks 16th for adult obesity - with 27.4 percent of adults being obese according to the Robert Wood Johnson Foundation (Bergoetz, July 2, 2009).
- Indiana ranked 7th in the United States for its rapid loss of farmland according to the American Farmland Trust (AFT, 2002).

To reverse the decline in quality as well as quantity of natural assets and improve the public perception of central Indiana as a desirable place to live and work, the Central Indiana Land Trust, with funding from the Nina Mason Pulliam Charitable Trust, invited The Conservation Fund to guide the public through a process to create this Greening the Crossroads vision.

This vision has been crafted by the citizens of central Indiana and is a broad-based, collaborative effort. As with the early pioneers, we too have an optimistic vision of the future. And it is now up to us to begin Greening the Crossroads.



A green infrastructure network is an interconnected system of natural areas and open space that conserves ecosystem values, helps sustain clean air and water and provides benefits to people and wildlife.

What is green infrastructure?

Just as communities need to strategically direct development to maintain and enhance quality of life, communities also need strategic conservation to accommodate development while maintaining a healthy environment. The infrastructure that sustains a community is both built (e.g. roads, utilities) and natural (e.g. drinking water, clean air, forests).

A green infrastructure network is an interconnected system of natural areas and open space that conserves ecosystem values, helps sustain clean air and water and provides benefits to people and wildlife. Once designed, a green infrastructure network provides a framework that can be used to guide future growth and land conservation decisions to accommodate population growth while preserving community assets and natural resources (Benedict and McMahon, 2006).

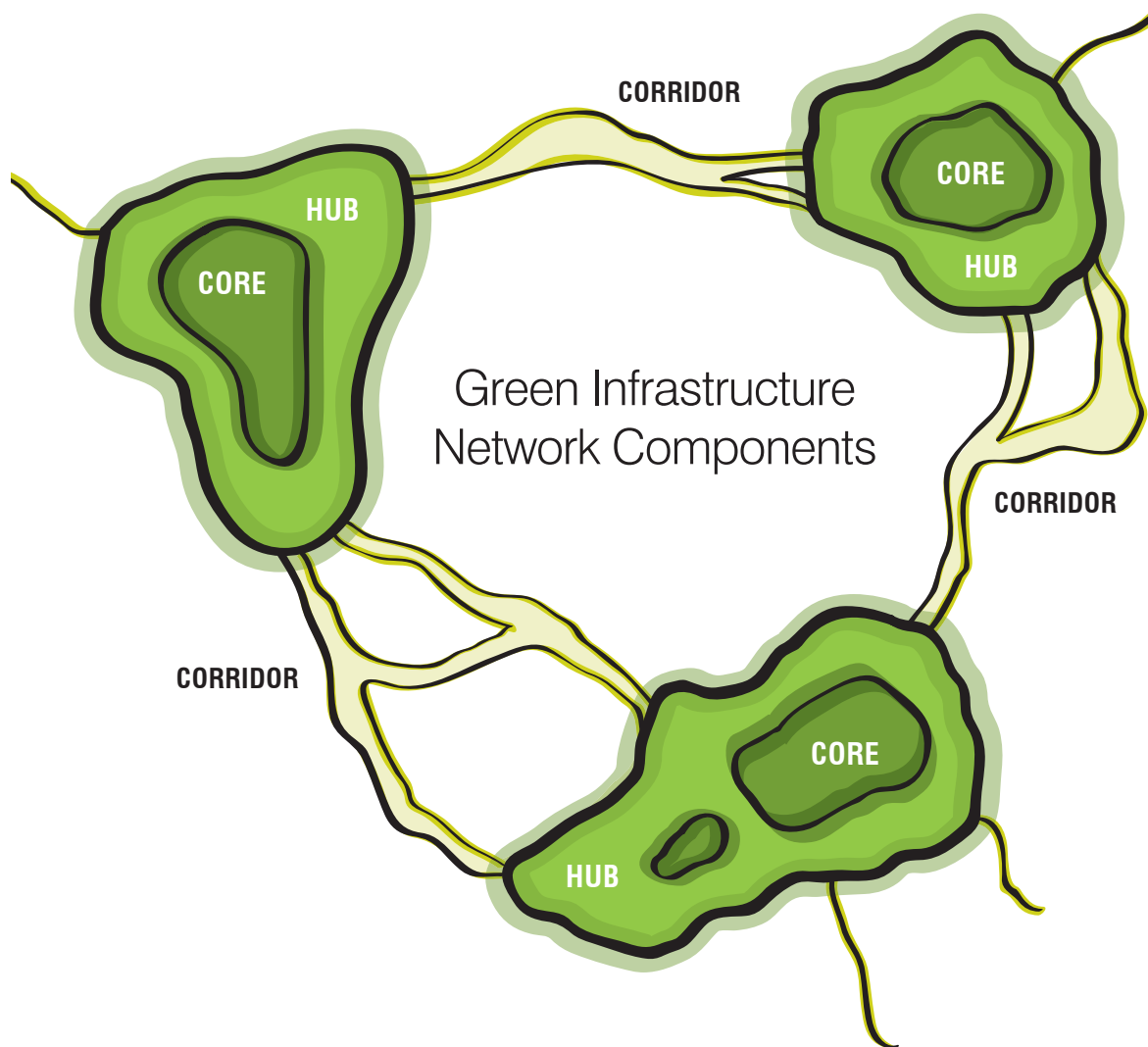
Green infrastructure has become a popular term, referring to everything from green roofs to ecologically friendly stormwater management systems and large networks of natural areas. What these different usages have in common is a basic recognition that our built environment and our ecological environment are connected and interrelated. For the context of this project, our definition of green infrastructure is at the landscape scale – illustrating an ecologically based network of public and private lands. Green infrastructure is planning beyond an individual parcel or park scale. It is the big picture vision for a region.

Green infrastructure networks are composed of core areas, hubs, and corridors. Core areas are the nuclei of the network and provide essential habitat for sensitive wildlife. Buffering the core areas are hubs, which are the largest, least fragmented contiguous areas of forest, wetlands, stream systems, or other native landscape. Hubs provide breathing room for plants and animals, ecosystems and

people. Corridors are connectors in the landscape and provide for animal movement, seed and pollen dispersal, plant migration and may provide recreation opportunities. Often these corridors can be used for passive recreation such as hiking, biking, or, with water corridors, canoeing, rafting, and fishing.



Gray infrastructure refers to traditional man-made structures, such as roads, railways, airports and sewers that bind a community together and help improve the efficiency of our economy. This infrastructure is planned, maintained and is considered to be a basic necessity and an investment in our future. We believe that green infrastructure provides equal value to communities and requires the same level of attention, care and concern.



CORE areas are the nuclei of the network and provide essential habitat for sensitive wildlife.

HUBS are the largest, least fragmented contiguous areas of forest, wetlands, stream systems, or other native landscape. Hubs provide breathing room for plants and animals, ecosystems and people.

CORRIDORS are connectors in the landscape and provide for animal movement, seed and pollen dispersal, plant migration and may provide recreation opportunities.

GRAY INFRASTRUCTURE refers to traditional man-made structures, such as roads, railways, airports and sewers that bind a community together and help improve the efficiency of our economy.



Why is green infrastructure important?

Green infrastructure is the underlying system that supports human life, as well as wildlife. A healthy green infrastructure network is an overall indicator of the health of a community. By planning and implementing a green infrastructure network, we are investing in our future. A green infrastructure network provides an array of ecological, social and economic benefits.

By protecting wetlands:

- Habitat is provided for a range of wildlife, which provides recreational opportunities (bird watching, hunting, fishing) and supports nature-based tourism and educational opportunities.
- Stormwater runoff is slowed and retained, improving a community's disaster resistance, without having to build man-made stormwater retention structures.
- Sediments and pollutants such as nitrogen and phosphorus are reduced, helping to avoid costly regulatory interventions.

By protecting healthy forests:

- Jobs are protected for over 54,000 Hoosiers who work in forest-based manufacturing, generating payrolls of over \$1.4 billion annually (Bratchovich, 2004).
- Over \$1 billion is infused annually into Indiana's economy as a result of forest-based recreation and tourism (Bratchovich, 2004).
- Air quality is improved, and air temperatures are moderated by forest cover.

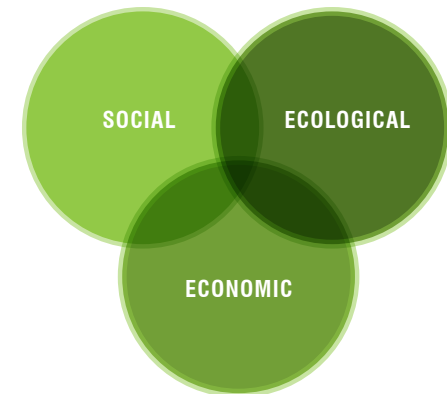
By protecting rivers and streams:

- Sources of drinking water are conserved, using natural processes such as wetland filtration instead of expending public funds to construct filtration plants.
- Recreational activities such as canoeing, swimming and

fishing generate jobs in the economy and provide important quality of life opportunities.

- With buffer strips of vegetation along waterways, Indiana's precious top soil is conserved from erosion, sustaining farming and a vital sector of the Indiana economy.

BENEFITS OF GREEN INFRASTRUCTURE



Other benefits from implementing a green infrastructure network include:

- A high quality of life, attracting businesses and retirees
- Improved overall public health and increased opportunities for physical activity and recreation
- Habitat restoration for rare and endangered species, as well as for keeping common species common
- An adaptable strategy for addressing impacts from global climate change
- Visualization of the community's future

How is green infrastructure used?

Green infrastructure is also a process – a way to identify the best lands to accommodate development and gray infrastructure while also considering the best lands to conserve. It is a collaborative approach specifically designed to obtain community input, create goals, design policies, identify land protection and enhancement priorities, and develop funding mechanisms to create a lasting legacy for a region.

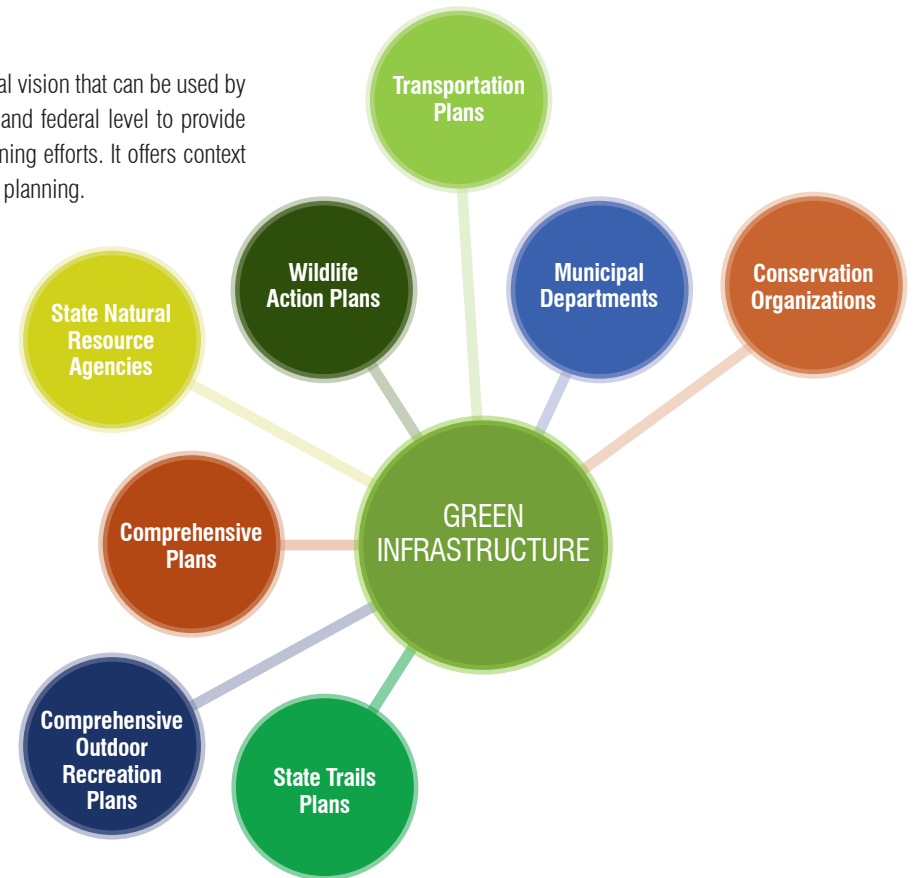
Green infrastructure is not a regulatory program. A green infrastructure network can provide information to communities and decision makers about their region. A green infrastructure network encourages communities to plan for their natural systems before large scale development in order to maximize the benefits that these systems provide. When used in conjunction with other planning processes, green infrastructure may guide the pattern of development. It does not dictate whether development will occur.

At the local level, a green infrastructure plan can help planners and residents update or prepare local and regional open space and comprehensive plans. Green infrastructure highlights critical areas for conservation, providing information to help coordinate zoning and regulatory policies and relating local natural resources to surrounding communities via corridors. Local capital improvement plans can be enhanced with the use of green infrastructure networks that reflect the needs of different municipal departments (public works, schools, and parks). Green infrastructure promotes the wise use of public funds to provide public services by using natural systems in addition to or instead of man-made systems.

State agencies may consult green infrastructure plans when they are engaged in updating their organizational strategic plans. State natural resource agencies find green infrastructure networks helpful in their work on wildlife action plans, statewide comprehensive outdoor recreation plans and state trails plans. Green infrastructure networks can help inform transportation plans and assist transportation agencies in meeting federal requirements for consultation, natural resource inventories and consideration of environmental mitigation (Amundsen, Allen and Hoellen, 2009).

Greening the Crossroads is a regional vision that can be used by decision makers at the local, state and federal level to provide information and guide existing planning efforts. It offers context to guide current programs and local planning.

GREENING THE CROSSROADS is a regional vision that can be used by decision makers at the local, state and federal level to provide information and guide existing planning efforts.





Study area: Central Indiana

Central Indiana offers residents and visitors a range of landscapes from rolling forested hills to the hustle and bustle of Indianapolis to the quiet meanderings of rivers and streams weaving through fields of corn and soybeans. Within these landscapes there are special places such as nature preserves, fishing holes, bird watching areas, city parks and other sites that make a place a home. The Greening the Crossroads vision seeks to connect these landscapes and special places together, conserving and restoring a rich tapestry of ecological and recreational assets.

For the green infrastructure network, the following nine counties were examined: Boone, Hamilton, Hancock, Hendricks, Johnson, Madison, Marion, Morgan, and Shelby. To ensure that connecting natural features in neighboring counties were included in the analysis, a five mile buffer was added around the study area. The combination of the nine counties and the five mile buffer produced a study area of over 3.1 million acres in size, representing 13% of the entire state of Indiana.

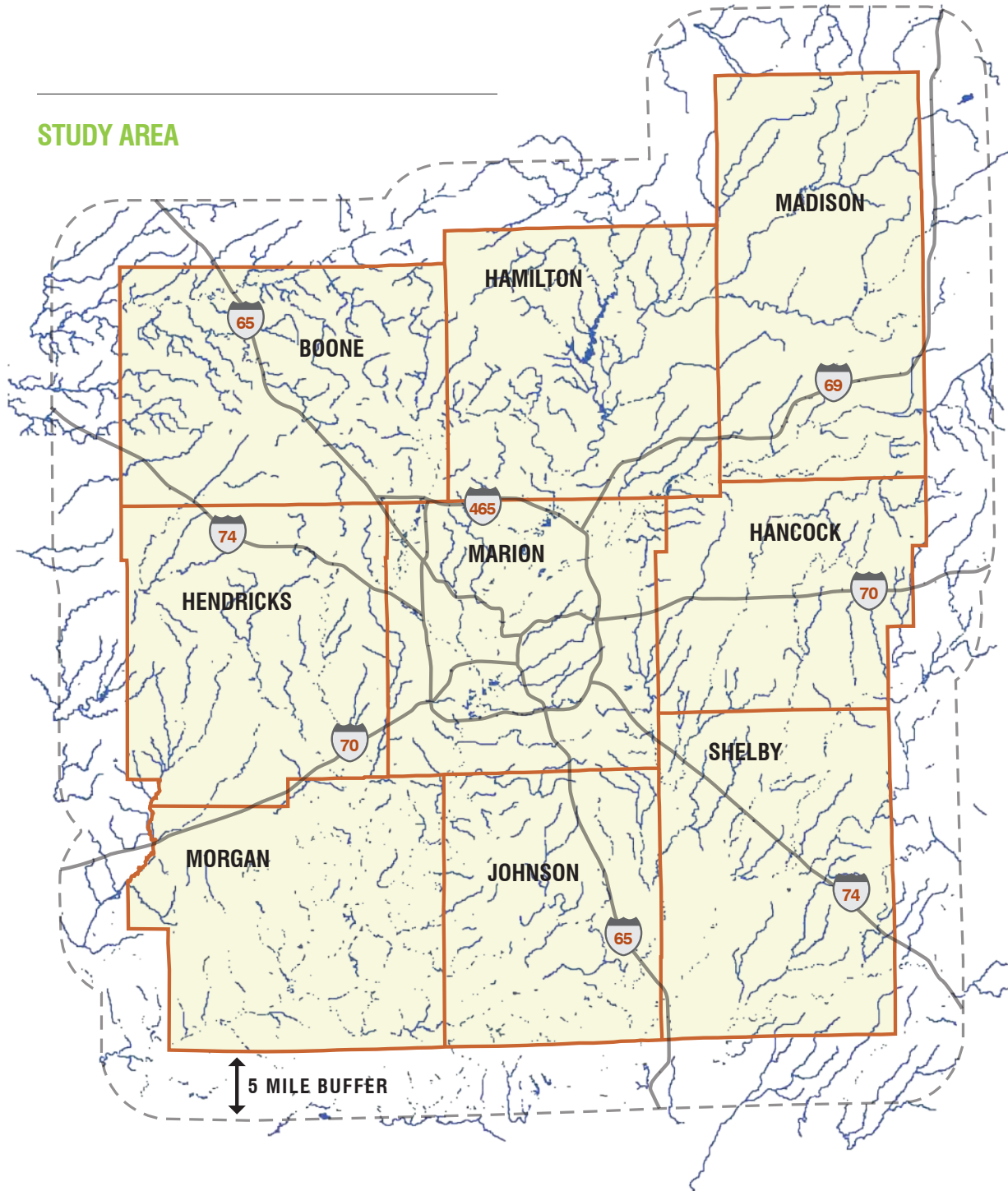
The green infrastructure network provides a snapshot of the landscape of central Indiana. At the heart of the study area is Marion County and the city of Indianapolis. Indianapolis was created as the state capital, a fresh start reflecting the earnest vision of pioneers. Today, with a population of over 880,000, Indianapolis is one of the 20 most populated cities in the US. According to the 2001 National Land Cover Data map of the study area, it is estimated that over 17% of the land has been developed as a mixture of residential and commercial uses as well as gray infrastructure such as roads.

However, the region surrounding Indianapolis and Marion County is mostly rural. Over 68% of the study area is farmland, and another 13% is forestland. Preserving the contrast between the



urban and rural landscapes is crucial to protecting the sense of place. As farmland is the dominant land use across the region, working with the farming community on management practices and highlighting the benefits of green infrastructure will be critical.

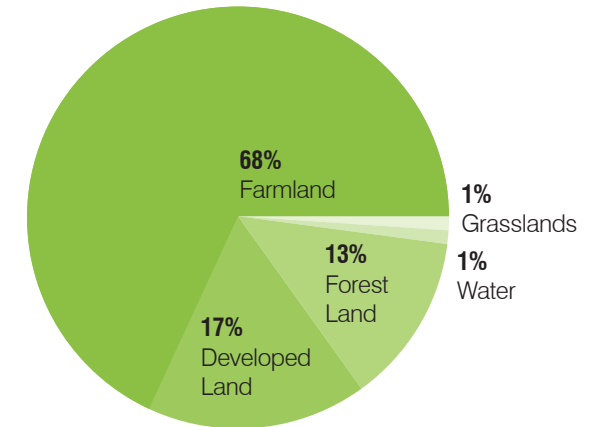
STUDY AREA



3.1 MILLION ACRES in size.
13% of the state of Indiana.

Nearly **1.8 MILLION RESIDENTS**
28% of the state's total population.

LAND USE CLASSIFICATIONS



MILES





GREEN INFRASTRUCTURE PLANNING PROCESS

There are three distinct elements within a green infrastructure planning process:

- Leadership Forums and Public Input Sessions
- Designing the Network
- Implementation Plan

The first step of a green infrastructure plan is the formation of a Leadership Forum, which is a broad collection of stakeholders drawn from communities across the study area to provide input and guidance to the planning process. The goals and indicators for the green infrastructure network come from the Leadership Forum. Forum members review the planning assumptions, collected data, network design and implementation ideas.

Using initial guidance from the Leadership Forum, the planning team starts the second step - the design of the green infrastructure network. This step begins with the drafting of a network design protocol that outlines how the network will be constructed, planning assumptions that need to be made and data to be used. During this phase, the planning team works with a Technical Advisory Committee to review the details of network protocol such as the types of wildlife species to be used, assumptions on habitat needs and availability of data. This science-based planning process makes use of the latest peer review literature and principles of landscape ecology, wildlife management and conservation biology.

Once the network has reached an appropriate stage in the design process, it is time for the final step, the drafting of the implementation plan. Every community is unique, and this step

begins with an assessment of the capacity of existing initiatives, such as government programs, to implement the network and its overall goals. During this stage, the Leadership Forum provides valuable input on implementation options. Linking the goals of the planning process with opportunities identified in the green infrastructure network and prioritization of implementation steps is the final part in helping make the green infrastructure network not just a good idea but a reality.

Keeping these three general steps in mind, planning is an iterative process. Green infrastructure networks are crafted with the best available information and rely on many local and national experts. Changes in technology, industry, and the economy all have an influence on the landscape. Our understanding of the natural world is constantly being updated and new information generated. New challenges, such as global climate change, will impact the landscape in ways that can only be imagined today. Implicit in the planning process is the need to revisit and revise a green infrastructure network. This vision is just the first chapter on green infrastructure for central Indiana.

Leadership forums were held to receive feedback and input from key leaders in the conservation community.

Leadership forums

The Central Indiana Land Trust and The Conservation Fund partnered to hold two Leadership Forums, which took place in July of 2008 and June of 2009. These forums were held to receive feedback and input from key leaders in the conservation community.

The first Leadership Forum allowed attendees to provide input about the planning process, network design, and natural community assets. Participants were also divided up into teams for a brainstorming session on potential goals for the green infrastructure process.

The refined list of goals produced at this forum includes:

- Conserve significant contiguous natural habitat
- Identify and protect a network of stream and land corridors for wildlife movement and human enjoyment
- Help local planning become more environmentally sensitive
- Increase public awareness of the multiple benefits of a green infrastructure network
- Increase public support for green infrastructure
- Increase the coordination of green infrastructure and gray infrastructure projects (utility and road corridors) to maximize the benefits for nature and people

At the second Leadership Forum, attendees reviewed the methodology for delineating core habitats and other natural resources. Implementation strategies were then discussed followed by breakout sessions on four topics: Forest Interiors, Water Quality and Quantity, People, Greenways and Wildlife Corridors, and Working in an Agricultural Landscape.

Both leadership forums attracted a wide range of stakeholders, including representatives from county parks and recreation

departments, Soil & Water Conservation Districts, state government agencies, university research programs, university land-owning interests, and a wide range of nonprofits including representatives from the Land Trust Alliance and the Indiana Land Protection Alliance. Please refer to page 57 for a full list of forum participants.



Public input sessions

Each Wednesday in August of 2009, the Central Indiana Land Trust invited the public to its office for discussions about each of the four breakout session topics. Cliff Chapman, of the Central Indiana Land Trust, spoke at each of the meetings, giving a general overview of green infrastructure, the two Leadership Forums, and maps produced by The Conservation Fund. Each night also had a program of speakers who were topical experts.

The first session on August 5th delved into the subject of Working in an Agricultural Landscape. The surprising turnout of 38 people made for a full house. Gail Peas of the U.S. Department of Agriculture provided a thorough accounting of different programs available for farmers to make their enterprises greener and provide wildlife habitat.

Terry and Gale Sherwood were special guests at the first gathering. They shared with the audience how they used government programs to plant trees and meadows on their land and explained how they have gotten neighbors interested. Then they pointed out areas on a map where neighbors are now planting trees instead of corn. Audience member Donna McCarty commented, “These folks have shown that getting involved is contagious. All we need are some ambassadors and we can make this happen.”

The Land Trust welcomed 29 participants at the second session on August 12th, focusing on People, Greenways and Wildlife Corridors. Katie Smith, Director of the IDNR Division of Fish and Wildlife Diversity Section and Steve Morris, Director of the IDNR Division of Outdoor Recreation spoke about trails and wildlife corridors.

A challenge that came out of the evening was how to make safe highway crossings for wildlife along corridors.

A participant, Steve Van Zant, commented, “I applaud the Central Indiana Land Trust for doing this; awareness is the first step and I’m very glad you’re hosting this discussion tonight.”

The third public input session on August 19th explored forest interiors with 22 in the audience. Scott Haulton, Wildlife Biologist with the IDNR Division of Forestry presented information regarding the science behind the importance of forest interior habitats. Tom Hougham spoke about his family’s donation of a conservation easement to the Central Indiana Land Trust. Several members of the audience were interested in how citizen scientists can report occurrences of invasive species when in the woods.

The last public input session on August 26th drew the largest crowd, when 40 participants looked into Water Quality and Quantity issues. Amy Smith, an environmental scientist with JF New and Associates described how two-stage drains work to improve water quality in the agricultural landscape. John Hazlett, Director of the Indianapolis Office of Sustainability, discussed efforts the city is making to improve water quality and retain storm water more naturally. Audience member Glenn Pratt raised concerns about phosphates and added that “no-till farming should be incorporated along with two-stage drains as it can help retain soil in fields, improving water quality.”

In total, 129 people came to these meetings to learn and share their ideas showing strong interest in protecting and connecting natural areas in Central Indiana.

PUBLIC INPUT IN ACTION

Cliff Chapman, of the Central Indiana Land Trust, spoke at each of the meetings, giving a general overview of green infrastructure.





Green infrastructure network design

The Conservation Fund team studied the landscape of central Indiana and focused on outlining forests, wetlands and aquatic systems. For each of these three landscape types, the Fund team examined the needs of key wildlife or “focal species” that use these landscapes. Information on the habitat needs of focal species for the landscape types provides thresholds and habitat conditions necessary to delineate suitable habitat.

The green infrastructure network was created using the latest data, local experts, and a technical review team composed of regional, state, and local stakeholders. The Fund team provided the technical team with a copy of the methodology used to form the network for peer review. A conference call was held to collect comments and suggested modifications.

Based on the technical review team’s comments, the species were selected to create the core areas of the network. For example, the Fund used the king rail to design core wetlands. The king rail migrates to Indiana during the summer and uses a range of habitats with a preference for marshes.

The habitat needs for species are modeled using Geographic Information Systems (GIS). Map layers that depicted natural resource features for each of the three landscapes were highlighted and combined to form the basic building blocks of the network or “core areas.”

To make the network robust, these core areas were increased in size by adding compatible land cover types, forming a protective buffer or hub around either individual core areas or groups of core areas. Finally, all of the hubs were connected together with corridors in a way that made ecological sense in order to create a network, allowing for movement of wildlife.

A draft of the core areas was presented for feedback at the second Leadership Forum held in June of 2009. A complete draft network was reviewed by Central Indiana Land Trust staff in July of 2009 and cross checked for regional scale accuracy with the final network released in November of 2009.

Technical Review Team Members:

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The Conservation Fund

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Core areas defined by focal species

INDIANA BAT

Myotis sodalis



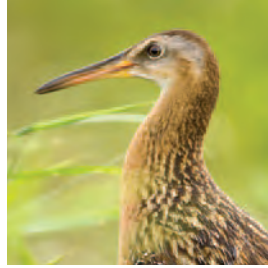
Indiana bats need heterogeneous forest patches, dynamic habitat conditions, and viable prey populations for breeding success.

HABITAT: FORESTED WETLAND

Forested core wetlands are defined by state of the art modeling identifying suitable habitat for Indiana bats including known occurrences in the green infrastructure network.

KING RAIL

Rallus elegans



King Rails need emergent marsh patches of at least 20 acres for breeding success.

HABITAT: EMERGENT WETLAND

Emergent core wetlands are 20 acres or larger in the green infrastructure network.

RIVER OTTER

Lontra canadensis



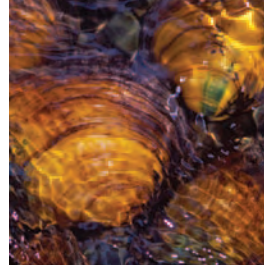
River otters need clean water for hunting and plentiful prey to maintain viable populations.

HABITAT: AQUATICS

Core aquatics are stream segments 15 miles upstream and downstream from known river otter occurrences with high water quality indices in the green infrastructure network.

MUSSELS

Multiple Species



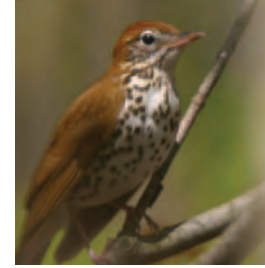
Freshwater mussels are filter feeders and need clean running streams to survive. Their larval stage is parasitic to an array of fish species. Therefore, diverse and healthy host fish populations are also necessary.

HABITAT: AQUATICS

Core aquatics are stream segments containing known mussel beds with high water quality indices in the green infrastructure network.

WOOD THRUSH

Hylocichla mustelina



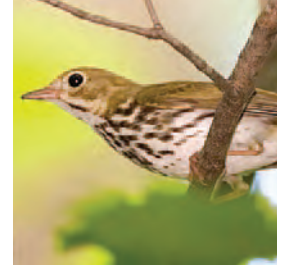
Wood thrush need forest patches of at least 247 acres for breeding success.

HABITAT: GLACIATED FOREST

Glaciated core forests are 247 acres or larger in the green infrastructure network.

OVENBIRD

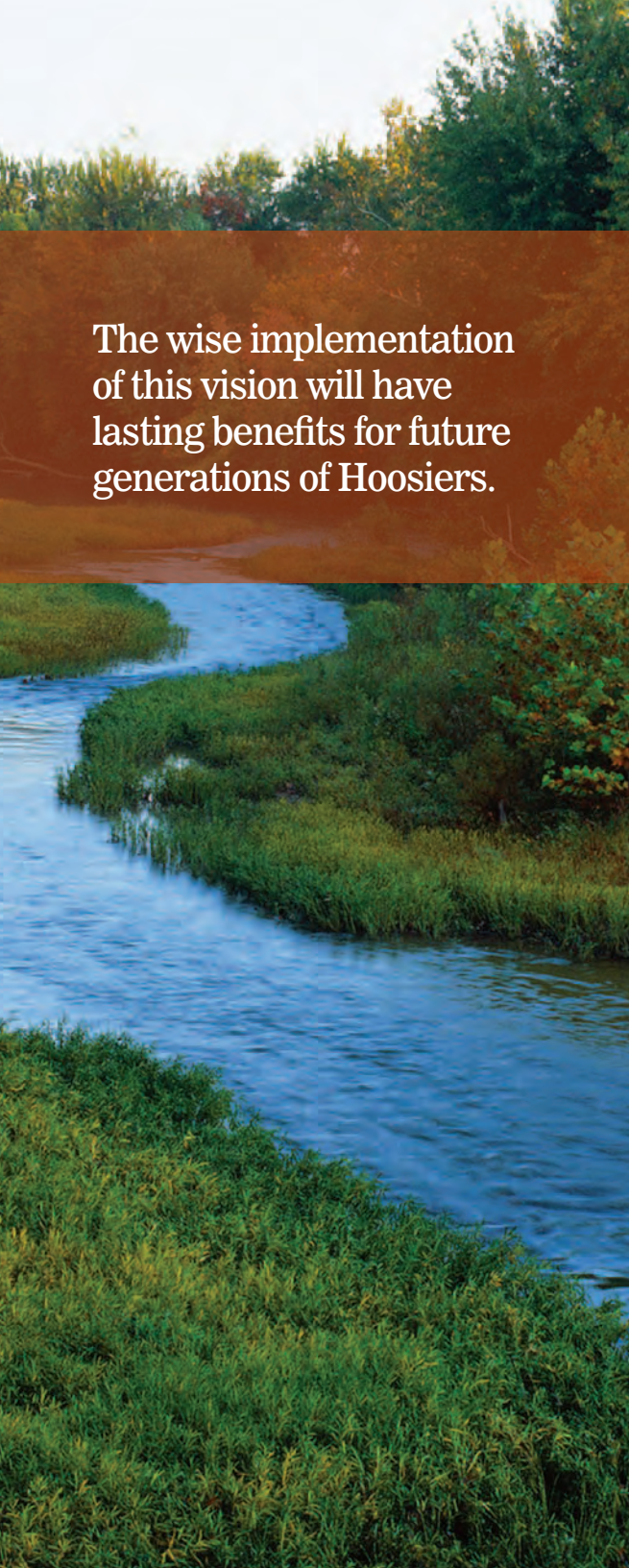
Seiurus aurocapillus



Ovenbirds need forest patches of at least 750 acres for breeding success.

HABITAT: UNGLACIATED FOREST

Unglaciated core forests are 750 acres or larger in the green infrastructure network.



The wise implementation of this vision will have lasting benefits for future generations of Hoosiers.

Green infrastructure network summary

The final central Indiana green infrastructure network covers 316,192 acres or roughly 10% of the study area. A significant portion of the work of implementing the network has already been achieved through past Hoosier efforts to establish parks and public lands. In fact, over 19% of proposed network is already protected by federal, state and local organizations.

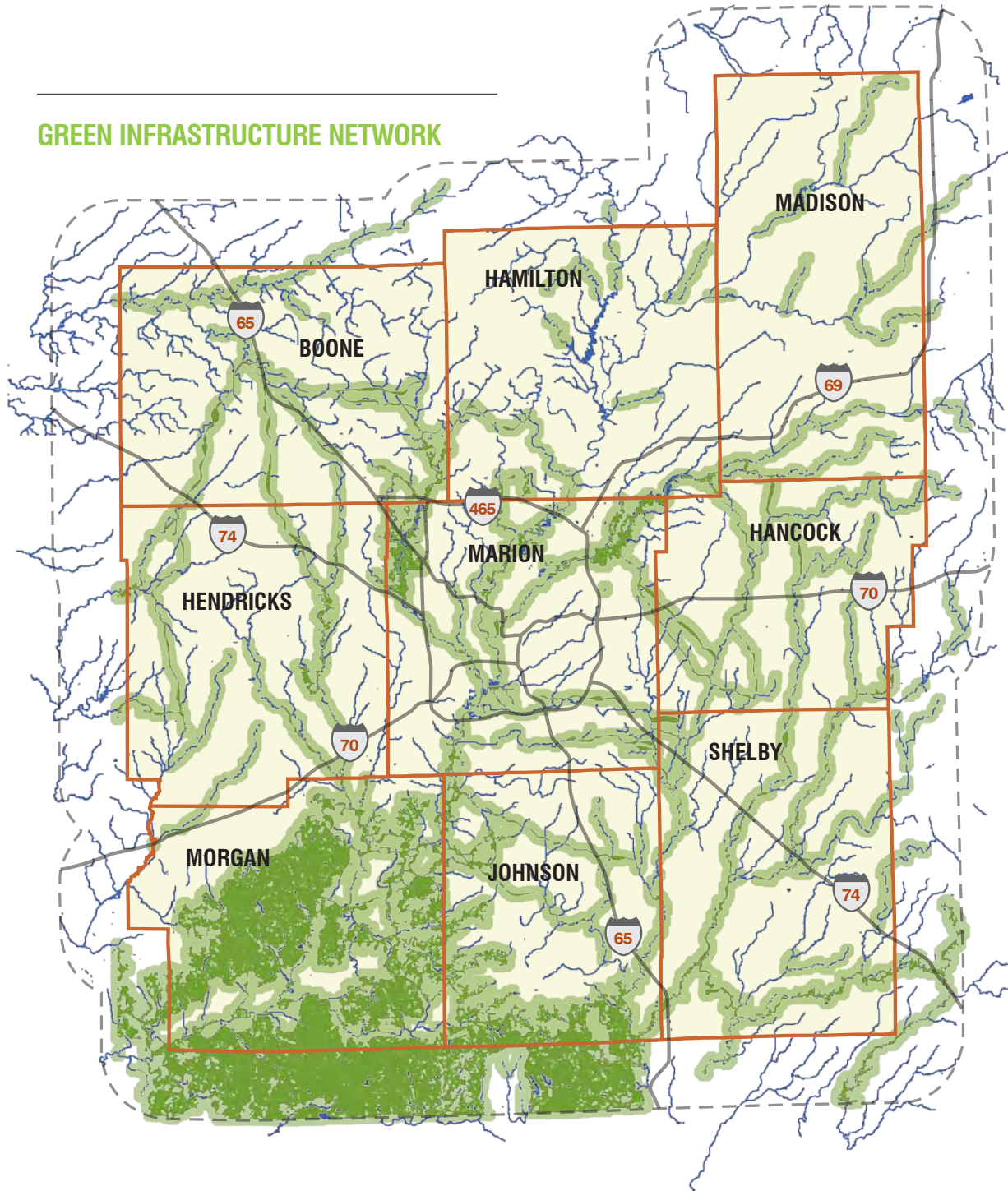
The remaining 254,873 acres is held by a wide range of private landowners, including individuals, companies, universities and other organizations. One of the goals of this effort is to highlight opportunities these private land owners have to protect and wisely steward these important network components.

The Classified Forest and Wildlands Program is one example of a state-sponsored effort to encourage the voluntary stewardship of woodlands and wildlands by private landowners. Landowners enrolled in the program are eligible for a property tax assessment of \$1 per acre in return for following a professionally written management plan. Within the green infrastructure network, over 3,740 acres or 1% of the network is enrolled in the Classified Lands program. The Greening the Crossroads vision could be used to help public officials and conservation groups with outreach to landowners who might benefit from enrollment in a variety of incentive programs.

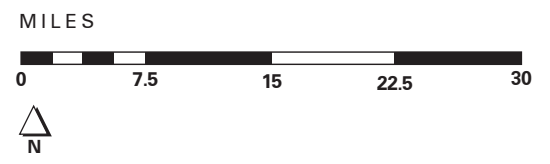
Almost 20% of the green infrastructure network is located within a floodplain. This figure is likely to be a conservative estimate as the floodplains have expanded due to increased development, rate of runoff and precipitation. Lands highlighted both as floodplains and green infrastructure would be solid public investments as they would increase a community's disaster resistance to floods and provide park lands with recreational opportunities.

Many of the corridors highlighted by the network are also proposed routes for trails advocated by the state trail plan, Hoosiers on the Move. The overlap of trails and corridors underscores the importance of providing the Greening the Crossroads vision to public officials and staff to effectively implement existing programs. The wise implementation of this vision will have lasting benefits for future generations of Hoosiers.

GREEN INFRASTRUCTURE NETWORK



- GREEN INFRASTRUCTURE NETWORK
- WATER BODIES
- STREAMS
- INTERSTATES
- COUNTY BOUNDARY
- STUDY AREA





SWAMP WHITE OAK | MARION COUNTY

GREEN INFRASTRUCTURE THEMES

While pulling together the right suite of species to represent central Indiana for the network design, the project team also needed to think about the context of the region. Beyond the three types of core areas that are important for habitat - forests, aquatics, and wetlands - the team had to consider how people fit into the plan too. These became themes that are discussed within this section.

A forest interior, the first theme, is more complex than just a forest. It is a large tract of contiguous forest that provides enough room for species that need larger areas to live sustainably. If forest interior habitat is protected, hundreds of species will benefit, including people.

Aquatic resources are the next theme. They are important to species such as freshwater mussels and river otters, but they are also important for people, providing water for drinking and growing crops. The theme Water Quality and Quantity addresses all of these issues, as well as flooding and flood abatement.

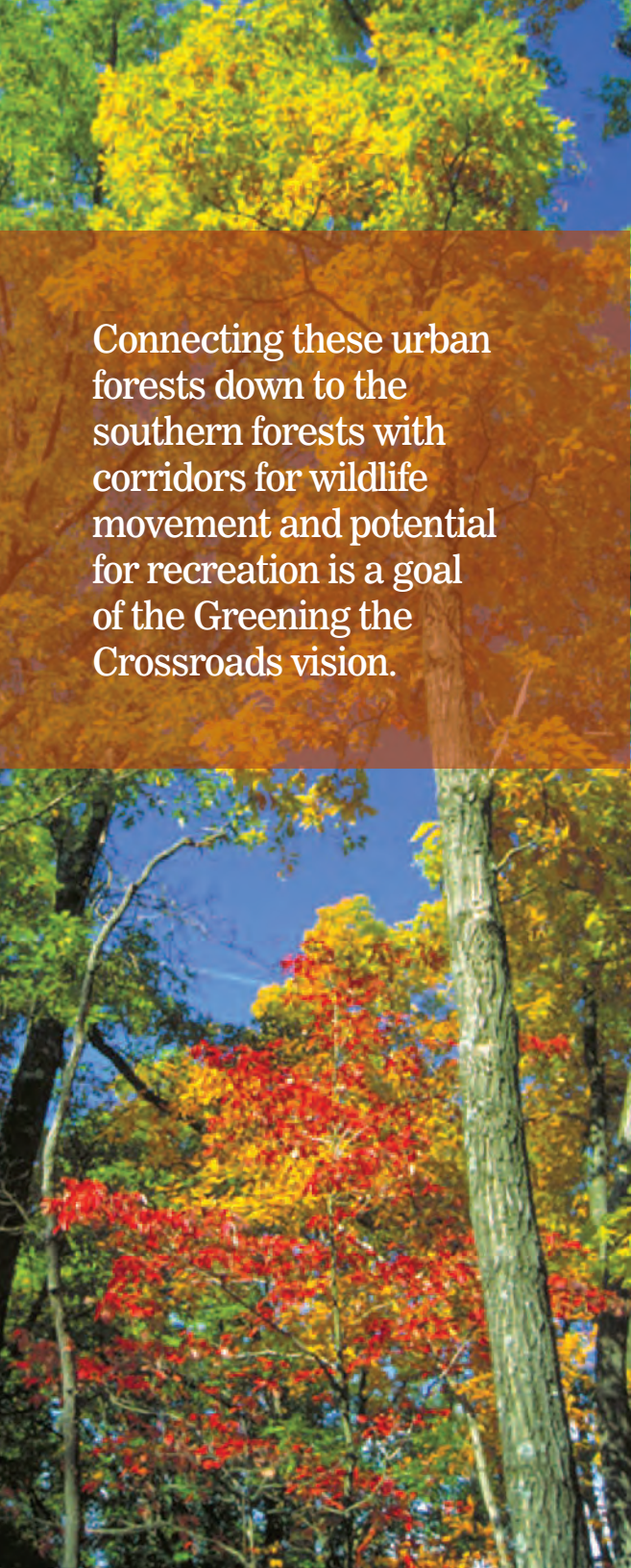
Another common theme throughout this planning process is connectivity. It would be a shame, if in the process of connecting forests and wetlands via wildlife corridors, no trails were added. Connecting people to nature is essential to the future of conservation. This vision of what central Indiana can look like in the future is more than lines on a map or thousands of planted trees, it is Hoosiers enjoying the landscape they live in and taking pride in its beauty.

Farmland covers the largest amount of the network making it a dominant theme in central Indiana. Any successful conservation plan has to take into account the role of farmland on the landscape.

With a plethora of programs available to assist farmers in making their working lands greener, this landscape can be viewed as an opportunity rather than a challenge.

Wetlands, the final theme, make up a very small part of our land cover today, although they add a great deal to our overall biodiversity. Some wetland restorations have been wildly successful in Indiana. Protecting the few remaining existing wetlands is paramount, but restoring destroyed wetlands will be necessary as well.





Connecting these urban forests down to the southern forests with corridors for wildlife movement and potential for recreation is a goal of the Greening the Crossroads vision.

Forest interiors

Central Indiana has healthy forests which provide habitat for wildlife, scenic vistas for citizens to enjoy and an array of jobs that support the local economy. For a green infrastructure network, forest interiors are large unfragmented contiguous blocks of forestlands. The definition of what constitutes a core forest relies on outlining the habitat requirements of an array of wildlife species including the ovenbird and the wood thrush.

Over 158,000 acres of core forest lands were highlighted within the green infrastructure network. There is a rich mosaic of protected forest lands, including US Forest Service lands, State Forest lands, and land trust preserves and easements. In addition, many private landowners are enrolled in the Classified Forest and Wildlands program that helps landowners manage their land in an environmentally sensitive manner.

Due to a long history of park planning in Indianapolis and Marion County, over 8,000 acres of core forest habitat is found within the county boundary. These forest lands filter and clean the air and water, temper the peaks of summer heat and provide recreational opportunities for residents. Connecting these urban forests down to the southern forests with corridors for wildlife movement and potential for recreation is a goal of the Greening the Crossroads vision.

Public Input Summary

A breakout session on forests was held in the final Leadership Forum, and an evening public input session on forest interiors was held on August 19th and attended by 22 stakeholders. Participants believed that the Greening the Crossroads vision could help conserve forest by:

- Helping expand Forest Legacy focus areas beyond the Hurricane Hills tract in southern Morgan County
- Coordinating outreach efforts for landowner incentive programs
- Facilitating neighbor-to-neighbor conservation education
- Highlighting areas for forest restoration
- Facilitating increased public input on public forest viability
- Promoting citizen science in locating invasive species



Bradford Woods

A fond memory of many residents who grew up in central Indiana is their school trip to Bradford Woods, a 2,500-acre forest in Morgan County. Bradford Woods is located within one of the core forest lands of the network. By working with officials at Bradford Woods, Indiana University and surrounding landowners, best management practices and conservation options such as conservation easements can be promoted, allowing for significant amounts of contiguous forest interior habitat to be conserved.

Water quality and quantity

Central Indiana's rivers and streams have been vital to the economic development of the region, influencing settlement patterns and providing a water supply for crops and drinking water. The network relies on ecological indicators and wildlife species, such as the river otter, to identify the highest quality rivers and streams in the study area. In addition, state and local experts recommended a suite of freshwater mussel species as indicators of high quality water, as these species are very sensitive to changes in water quality. Using the habitat needs of these species, their known locations and appropriate buffers, core areas were outlined, covering over 13,000 acres of aquatic and upland habitat.

Public Input Summary

A breakout session on water issues was held in the final Leadership Forum, and an evening public input session was held on August 26th and attended by 40 stakeholders. Participants believed that the Greening the Crossroads vision could help water issues by:

- Guiding development away from floodplains
- Focusing restoration of vegetated buffers along key rivers and streams
- Guiding the use of best management practices to improve water quality
- Promoting the upgrade of ditches to two-stage drains
- Promoting no-till farming within the network

Improved Disaster Resistance

The spring floods of 2008 caused an estimated \$88 million in damage in the White River Watershed. Flood waters carried away tons of prime top soil and caused an estimated \$13.6 million in damage to roads, railways, sewers, and bridges (Hicks, 2008).

The implementation of the Greening the Crossroads vision can help the region become more disaster resistant by increasing the amount of land available for natural stormwater retention, slowing runoff by replanting riparian areas with appropriate native vegetation and preventing the erosion of precious topsoil.



Over 49,000 acres of the green infrastructure network within the nine counties is located within a floodplain. By conserving these flood prone areas, a community is not only reducing its risk of flooding but providing recreational resources, habitat for wildlife and improving water quality. The network can be used by communities in applying for federal programs to reduce flood damage, such as the Community Rating System operated by the Federal Emergency Management Agency.

IMPLEMENTATION BENEFIT

The implementation of the Greening the Crossroads vision can help the region become more disaster resistant by increasing the amount of land available for natural stormwater retention, slowing runoff by replanting riparian areas with appropriate native vegetation and preventing the erosion of precious topsoil.



People, greenways and wildlife corridors

Many parts of the green infrastructure network are appropriate for recreation, relaxation and non-motorized transportation. The collection of forests, wetlands and aquatic hubs are connected through a series of ecological corridors. By using the needs of wildlife to design a corridor network, the corridors are wider than standard recreational hiking trails or bike paths. For this network, the proposed corridor width for forest corridors was 328 feet, or roughly 100 meters. Where appropriate, these wildlife corridors can serve a dual purpose of recreation as well as promoting wildlife movement across the region. Across the study area, over 90,000 acres of potential corridors were highlighted.

Public Input Summary

A breakout session on trails and corridors was held in the final leadership forum, and an evening public input session was held on August 12th and attended by 29 stakeholders. Participants believed that the Greening the Crossroads vision could help trails and corridors by:

- Facilitating work with the Indiana Department of Transportation to target enhancement projects for trails, greenways, wildlife crossings and acquisition as part of mitigation for project impacts.
- Promoting recreation and conservation within the local comprehensive planning processes
- Promoting wildlife and recreation corridors to state, regional and local groups planning or managing trails or greenways

Hoosiers on the Move

Indiana's state trail plan set a bold goal of providing to all Indiana residents trail opportunities within 15 minutes or 7.5 miles by the year 2016. Many of the state trail plan's proposed trails are within proposed green infrastructure network corridors. The White River



Wapahani Trail running from Indianapolis down to the border of Morgan County is nested nicely within a proposed corridor. The proposed Eagle Creek Trail, planned sections of the Fall Creek Trail in Marion County, and the B&O Trail, running from Marion County to Hendricks County, also overlap with corridors. By providing network information now, these proposed recreation trails can be sized to facilitate both wildlife movement and the needs of residents for recreation and alternative commuting. An extensive corridor system will lead to a more active, healthy population, and improve the quality of life for Hoosiers.

Working farmlands

As the largest land use in the study area, farming touches all aspects of the green infrastructure network. The woodlot owned by a farmer may be part of a core forest area. A core wetland may border a farmer's field. The management of farmland is critical to health of the network.

According to the February 2009 Agricultural Census, within the nine counties, 604 farms have enrolled 14,782 acres in farmland conservation incentive programs. These farmers adhere to best management practices that promote green infrastructure. By reviewing the network, farm resource agencies can identify and work with farmers who have the largest impact.



Public Input Summary

A breakout session on agriculture was held in the final leadership forum, and an evening public input session was held on August 5th and attended by 38 stakeholders. Participants believed that the Greening the Crossroads vision could help agriculture by:

- Identifying local ambassadors such as county Soil & Water Conservation District staff and board members to

bring the message of green infrastructure to their communities or peer groups

- Identifying landowners who would benefit from incentive programs that promote best management practices and environmental restoration activities
- Educating landowners within the network about incentive programs that benefit wildlife
- Promoting the upgrade of ditches to two-stage drains

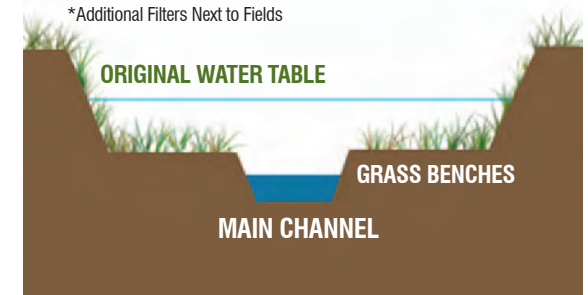
Two Stage Drains

County drainage boards and surveyors oversee a vast network of agricultural drainage ditches designed to move water as quickly as possible off farmland to improve soil aeration, minimize plant stress and improve crop yields. Once a drainage board approves the classification of a stream as a regulated drain, the board has a right of entry to maintain the ditch within a 75-foot buffer on either side of creek, often involving the clearing of vegetation within the buffer.

Ecologically, streams function best with vegetated buffers that help trap sediment, phosphorus and nitrogen. Streams with vegetated buffers also slow the rate of runoff, preventing flash floods. With the removal of vegetation along streams, erosion is greater, removing precious topsoil, and increasing the instability of the bank.

The Ohio State University has developed an alternative design called a natural channel or a two-stage drain. The Greening the Crossroads vision can help facilitate discussions with county drainage boards by identifying sites along significant headwaters and first and second order streams for the installation of two-stage drains. Federal cost-share funding may be available to offset the associated costs.

TWO STAGE DRAINS





Wetlands provide valuable services including filtering water, slowing stormwater runoff and removing pollutants.

Wetlands

Wetlands are the incubator of life in a green infrastructure network. For communities, wetlands provide valuable services including filtering water, slowing stormwater runoff and removing pollutants. According to the Indiana Department of Environmental Management, 200 years ago there were 5.3 million acres of wetlands across Indiana. Today 85% of those wetlands have been lost. The conservation of existing wetlands and restoration of wetland systems is critical to maximizing the public benefits of the green infrastructure network.

The focal species for wetlands was the king rail, which needs at least 20 acres of contiguous wetland habitat. In addition, the Indiana bat was used for outlying forested wetlands, which it uses for its summer roosting and foraging. Using the habitat needs of these species, over 10,000 acres of core wetland habitat was highlighted in the network.

Public Input Summary

A breakout session on water issues, of which wetlands were considered a part, was held in the final Leadership Forum, and an evening public input session was held on August 26th by Central Indiana Land Trust, attended by 40 stakeholders. Participants believed that the Greening the Crossroads vision could help wetlands by:

- Identifying existing wetlands for protection
- Identifying opportunities for wetland restoration
- Working with state and regional agencies as well as communities to reference the network in their environmental review process

Goose Pond and Wetland Reserve Program

An inspiring wetland restoration story is the work at Goose Pond,

an 8,000-acre Wildlife Management Area that is jointly managed by the Indiana Department of Natural Resources and the USDA Natural Resources Conservation Service. Restoration efforts began over nine years ago and included the creation of over 36 miles of earthen levees, 400 acres of tree plantings, 1,400 acres of prairie restoration, nearly 3,860 acres of shallow water wetlands and a 1,226-acre shallow water impoundment.



The wetland restoration work is starting to be recognized by both wildlife and people. In 2008, 14 king rails were seen at Goose Pond. In comparison, in the previous year only 28 king rails were seen in the entire state of Indiana. Along with returning wildlife, in 2008 an estimated 3,000 sportsmen visited Goose Pond due to its abundant and diverse hunting and fishing opportunities. In 2009, an array of unusual bird species, including some seen in Indiana for the first time, were seen by hundreds of birdwatchers from across the region. This wonderful project, started from the cooperation of a private landowner with a government agency, is now a model of the power of restoring a landscape.





DUTCHMAN'S BREECHES | MADISON COUNTY FLATWOODS

NETWORK IMPLEMENTATION

Key to the successful implementation of the network is the creation of a framework. This framework helps match available resources such as planning tools, existing programs, and funding sources with people and opportunities in the network. Another important principle is that key natural resources and working lands (forest and farmland) be identified and protected before development occurs.

One of the key elements of the central Indiana green infrastructure network is the importance of rivers, streams, and wetland resources. Conserving aquatic and wetland resources is based on sound ecological principles. The green infrastructure strategy of protecting these natural resources is fiscally prudent public policy since well-functioning ecosystems provide economic benefits and services to communities such as improved flood control, clean drinking water and recreational opportunities.

Environmental restoration is another element of successful network implementation. There are many government programs that provide funding and technical assistance to restore wetlands, plant vegetated buffers along rivers and streams and remove invasive species. The network highlights areas for restoration to rebuild corridors and buffer core areas. As the landscape of central Indiana has been transformed over many years, the restoration of important elements of the ecosystem will not happen overnight and there are significant obstacles to overcome. However, the Greening the Crossroads vision will help the array of public and private partners to be strategic in their approach to conservation, maximizing resources to achieve the best possible outcome.

Another key element to the successful network implementation is private stewardship. Many private landowners are already excellent stewards. Rewarding landowners for their sound stewardship efforts and encouraging other landowners to adopt ecologically beneficial management practices is crucial to making the green infrastructure network a reality. There are many tools that can help landowners, including funding programs for best management practices, conservation easements, and funding for restoration of habitat. The implementation framework will help landowners work within a voluntary, collaborative initiative to achieve results that benefit both the landowner and communities.

A detailed report on implementation opportunities is provided in the electronic version of this report, available at: www.conservingindiana.org.



A plan is only as good as the commitment and steps taken to implement the vision.

Implementation and measuring success

A plan is only as good as the commitment and steps taken to implement the vision. In both Leadership Forums, participants helped frame the goals of the planning process, considered how to link those goals with implementation opportunities and finally how to measure the overall success of those implementation actions on achieving the goal. Many of the implementation opportunities and indicators are drawn from the plans of existing partners such as government agencies, nonprofits and private organizations. This cross fertilization between partners is crucial as it is the bridge establishing how the daily activities of partners contribute to implementing the Greening the Crossroads vision.

From the diverse group of private and public partners interested in central Indiana conservation, a green infrastructure coalition will be formed to drive the implementation of the goals outlined in the Greening the Crossroads vision. The Central Indiana Land Trust will host a Leadership Forum each year, revisiting the implementation of the green infrastructure network. This annual meeting will provide time to share the achievements of the year, assess progress among diverse stakeholders and evaluate opportunities for the coming year. The following list of goals, opportunities and indicators, based on input from the Leadership Forums, is designed to help the coalition of partners understand their role in implementation and frame the conversations at the annual Leadership Forum. These measures are also subject to change over time and are not viewed as a static list, but a starting point for implementation.

Goal 1: Conserve significant contiguous natural habitat

OPPORTUNITIES

- Work with willing landowners on both fee acquisition and conservation easements in the network

- Work with Indiana University and surrounding landowners to conserve significant contiguous blocks of forest lands around Bradford Woods
- Expand Forest Legacy focus area beyond Hurricane Hills tract in southern Morgan County
- Identify and work with landowners who would benefit from incentive programs that promote best management practices and environmental restoration activities
- Identify appropriate resting places for migratory species on route to northern and southern destinations
- Restore wetlands

INDICATORS

- Increase in the amount of land protected in fee acquisition and conservation easements highlighted by the green infrastructure network
- Increase in viable populations of federal and state rare, threatened, and endangered species
- Achieve the Division of Forestry's goal of conserving 100,000 acres of forest land by 2016
- Increase in the number of rivers and streams that support a healthy aquatic ecosystem according to US Environmental Protection Agency
- Increased diversity and number of migratory birds sighted in bird counts such as the Indiana Audubon's Christmas bird count and the Cornell Lab of Ornithology's back yard bird count

Goal 2: Identify and protect a network of stream and land corridors for wildlife movement and human enjoyment

OPPORTUNITIES

- Work with the Indiana Department of Transportation to target enhancement projects for trails, greenways,

- wildlife crossings and acquisition as part of compensatory mitigation for project impacts
- Work collaboratively on the watershed plans outlined by the US Environmental Protection Agency's Section 319 of the Clean Water Act, to help improve water quality for rare species, and expand recreational use of rivers and streams
 - Protect mussel and Indiana bat habitat by engaging in riparian forest restoration along core aquatic and wetland systems in Southern Shelby and Johnson Counties including Atterbury National Guard facility
 - Focus on upstream restoration of Fall Creek east of Fort Benjamin Harrison State Park, and assess opportunities for clubshell mussel reintroduction
 - Highlight opportunities for replanting floodplains and upland areas with trees and other appropriate vegetation
 - Promote wildlife and recreation corridors to state, regional and local groups planning or managing trails or greenways
 - Implement "buy-out" programs in flood-prone areas that could make corridor connections for the network

INDICATORS

- More feet of stream and river banks conserved
- Increase in the number of restoration projects in riparian areas
- Reduction of the number of rivers and streams impaired for recreational use
- Establishment of trails, greenways and protected lands within 7.5 miles or a 15 minute drive for every citizen of Indiana within the nine-county study area

Goal 3: Help state and local planning become more environmentally sensitive

OPPORTUNITIES

- Encourage communities to engage in proactive floodplain

- management through participation in the Community Rating System and other Federal Emergency Management Agency programs
- Provide the Greening the Crossroads vision to county and municipal governments for use in their comprehensive planning, park planning and regulatory review process
 - Consider and examine the potential use of linking impact fees to the green infrastructure network
 - Adjust the Indiana Department of Natural Resources permit process to include/assess cumulative and future impacts from proposed developments
 - Improve Rule 5 enforcement by the Indiana Department of Environmental Management regarding stormwater management at construction sites
 - Update and develop accurate floodplain maps to further refine and target flood prone lands for conservation
 - Promote eco-tourism, recreation, conservation and quality of life issues with local comprehensive planning processes

INDICATORS

- Increase in the number of communities that address riparian corridors in their local ordinances
- More communities with open space requirements connected with the green infrastructure network
- Higher number of communities enrolled in the Community Rating System to proactively reduce vulnerability to flooding or enacted no build ordinances within established flood plains
- Increase in the number of municipalities and counties that include the Greening the Crossroads vision and its recommendations in comprehensive plans

GOAL 1: Conserve significant contiguous natural habitat

GOAL 2: Identify and protect a network of stream and land corridors for wildlife movement and human enjoyment

GOAL 3: Help state and local planning become more environmentally sensitive

GOAL 4: Increase public awareness of the multiple benefits of a green infrastructure network

GOAL 5: Increase public support for green infrastructure

GOAL 6: Increase the coordination of green and gray infrastructure projects, particularly utility and road corridors, to maximize the benefits for nature and people



Implementation and measuring success

Goal 4: Increase public awareness of the multiple benefits of a green infrastructure network

OPPORTUNITIES

- Distribute the Greening the Crossroads vision to all municipalities, counties and relevant state agencies
- Identify and educate private landowners within the network about conservation tools, incentive programs and best management practices
- Document the cost of sprawl through cost of community service studies and forecast cost savings from ecosystem services studies on the benefits of green infrastructure
- Identify and work with local ambassadors to bring the message of green infrastructure to their communities or peer groups

INDICATORS

- Number of network maps and Greening the Crossroads reports distributed to municipalities, counties and relevant state agencies
- Number of network maps displayed in each of the nine county government offices and public libraries
- The occurrence of an annual Leadership Forum to assess implementation and address issues of mutual importance
- Increase in the number of landowners contacted within areas highlighted by the green infrastructure plan regarding stewardship and conservation.
- Increase in the number of volunteers working on restoration projects of lands highlighted in the green infrastructure network
- Increase in the number of ambassadors trained in green infrastructure and familiar with the Greening the Crossroads vision and green infrastructure network

Goal 5: Increase public support for green infrastructure

OPPORTUNITIES

- Advocate for increased state and local funding for land conservation and restoration, including the use of State Revolving Fund for acquisition, and increased funding for the Indiana Heritage Trust
- Identify and work with landowners who would benefit from incentive programs that promote best management practices and environmental restoration activities

INDICATORS

- Increase in public funding for land conservation and stewardship
- Increased enrollment in landowner incentive programs promoting environmental stewardship including: the Conservation Stewardship Program, Conservation Reserve Program, Wildlife Habitat Incentive Program, Classified Forest and Wildlands Program, and Conservation Reserve Enhancement Program
- Increase in voluntary landowner donations of conservation easements
- Increase in support from private foundations for land conservation and restoration activities.
- Increase in membership of nonprofit organizations working to fulfill the Greening the Crossroads vision

Goal 6: Increase the coordination of green and gray infrastructure projects, particularly utility and road corridors, to maximize the benefits for nature and people

OPPORTUNITIES

- Work with the Indiana Department of Transportation to target enhancement projects for trails, greenways, wildlife crossings and acquisition as part of compensatory mitigation for project impacts
- Work with local drainage boards to install and utilize two-stage drains and other innovative designs to improve the environmental functionality of the drainage network
- Work with state and regional agencies as well as communities to reference the green infrastructure network in their environmental review process

INDICATORS

- Increased number of communities offering incentives to locate new development near existing gray infrastructure within the study area
- Number of projects that Indiana Department of Transportation and local public works departments use to locate wildlife crossings, in enhancement project planning or to locate mitigation sites for project impacts
- The inclusion of Central Indiana Land Trust and other natural resource oriented organizations in government-sponsored forums or committees looking at long term economic development initiatives
- Number of green infrastructure projects incorporated with gray infrastructure projects

Several other areas around the country have worked with The Conservation Fund to successfully plan and implement green infrastructure plans. The following is a list of project examples.

Kansas City: MetroGreen Vision

The MetroGreen Vision led to the protection of 200 corridor miles and approximately 91,000 riparian acres. The plan has helped the regional planning council secure the first-ever grant for highway mitigation planning from the Federal Highway Administration.

Minneapolis/St. Paul: Metro Greenways

Metro Greenways has helped identify and conserve 29 acquisition projects protecting about 2,500 acres and 16 projects restoring 606 acres.

City of Atlanta, Georgia

Atlanta's Green Infrastructure Plan has led to land acquisition projects and development of a revolving loan fund for conservation efforts.

City of Houston, Texas

Houston's Green Infrastructure Plan helped the Houston Parks Board identify and acquire the West 11th Street parcel, a significant urban park, and currently helps the city reach goals of the City Parks and Recreation Master Plan.

Angelina County, Texas

Angelina County's Green Infrastructure Plan led to the formation of a nonprofit organization to coordinate the development of nature-based tourism in the two surrounding National Forests. It also sparked recreational trail development and a resource-based economic strategy for local communities.

Kent County, Delaware

Kent County adopted plan as the official strategic plan for the Kent County Conservancy, a local land trust. The green infrastructure network design is being used to update the Criteria and Standards used to identify and map State Resource Areas according to the Delaware Land Protection Act (Delaware Code Title 7, Chapter 75).

State of Maryland

Green Infrastructure network design methods are being used to update the statewide green infrastructure map that guides land acquisition priorities and to identify environmental stewardship opportunities for transportation improvement projects by the State Highway Administration.

Major planning efforts are also underway in a wide range of cities including Fairbanks, Alaska; Salt Lake City, Utah; and Nashville, Tennessee. In each case local leaders have viewed green infrastructure as the method to help increase their city's green image, improve the quality of life for residents and address an array of environmental challenges.

For more information on green infrastructure planning across the country, visit <http://www.greeninfrastructure.net>.



FRESHWATER MUSSELS | CENTRAL INDIANA STREAM

COUNTY SUMMARIES

The land cover data used for this plan paints a picture of central Indiana dominated by farmland and development. A closer look not only reveals a rich diversity of plants and animals and the habitats that support them, but stories of Hoosiers making a difference. Central Indiana is home to old growth forests, beautiful wetlands, streams supporting freshwater mussels, a federally endangered species, and breath-taking spring wildflower displays in our woodlands.

The following pages describe green infrastructure opportunities by county in more detail while highlighting special features and special people who are Greening the Crossroads.



Boone County

Boone County, located northwest of Indianapolis, is characterized mainly by agricultural land interspersed with streams and their accompanying riparian corridors.

The largest wooded tracts in Boone County are found along or very near Eagle Creek, and the stream corridor itself creates a ribbon of riparian forest through the county. Protecting these stretches of green is important from both an ecological and outdoor recreation standpoint.

With Eagle Creek Reservoir being an important drinking water source for the city of Indianapolis, protecting its headwaters improves watershed quality and can save significant tax dollars by decreasing expensive water treatment infrastructure needs.

Another important waterway in Boone County is the headwaters of Sugar Creek. Sugar Creek carves its way through the sandstone bluffs of Montgomery and Parke Counties, creating one of the most popular destinations for folks who want to float or paddle down one of the state's most scenic rivers.

Sugar Creek is also an important habitat resource for Indiana bat, river otter, and mussel species. Protection of this riparian corridor could help these species, as well as dozens of migratory bird species, and also extend recreation opportunities for paddlers and bass fishermen to stimulate the local economy.

Dreams Do Come True

Jane Taylor is a librarian in Boone County who grew up on a farm outside of Thorntown helping her parents milk cows, feed pigs, and plant and harvest corn on the family farm. She never left. "This is the only home I've ever known," said Taylor. "I watched

my father build the barn, corn crib and hog barn. He was a draftsman working in Lebanon but always wanted to move to the country and own a farm."

The beautiful 100-acre tract of land situated at the confluence of Brush Creek and Sugar Creek in northern Boone County is a mix of farm fields and forest with a house, barn and outbuildings. "If someone came to me today and offered me \$500,000 for my land, I wouldn't take it," said Taylor looking past a giant black walnut tree to a field of tall corn, "I wouldn't know where to go. I don't want to live any place else but here."

Ms. Taylor is donating a permanent conservation easement on her 100-acre farm, located within the green infrastructure network, to the Central Indiana Land Trust. This easement allows her to maintain an area around her house and continue to farm the land, but does not allow any conversion of forest to agriculture. The Land Trust is seeking funds to help plant the farm fields back to native forest.

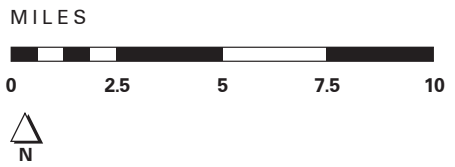
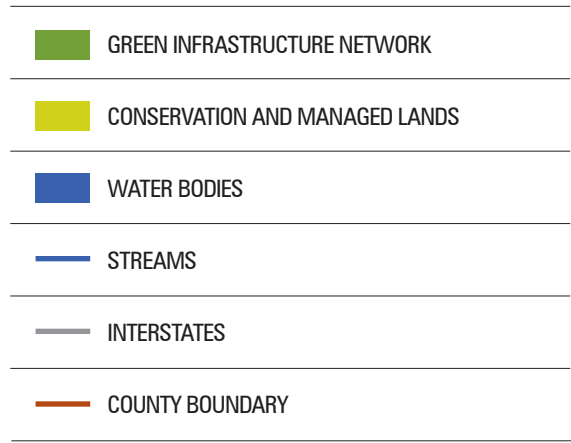
By working with the U.S. Department of Agriculture, Jane can receive rental payments for her floodplain fields matching what she now gets from a tenant farmer. She can restore habitat, keep her income flow, and enjoy viewing more wildlife from her home.

"I've always wanted to make my land a nature sanctuary. I never thought I could afford to do it. I wanted to share my home with the animals, giving them a safe haven," she said. "By donating a conservation easement on the land, I'm getting everything I wanted. Dreams do come true."

"If someone offered me \$500,000 for my land, I wouldn't take it... I wouldn't know where to go. I don't want to live any place else but here."



Jane Taylor



Acres in Boone County: **270,768**

Acres in the Network: **10,555**

Acres Protected in the Network: **20**

Hamilton County

Hamilton County, just north of Indianapolis, is not only Indiana's fastest growing county but its most affluent as well. The towns of Carmel, Fishers and Noblesville are three of the state's 20 largest cities. Here there is both great need and opportunity to address land protection.

The White River corridor offers restoration opportunities that benefit both people and wildlife. This effort has begun with the purchase and restoration of Strawtown-Koteewi Park and Burr Oak Bend Nature Preserve. Additionally, Conner Prairie recently converted a large floodplain area along the White River from farm fields to prairie.

Other important streams in the green infrastructure network include Cicero and Hinkle Creeks, both flowing into Morse Reservoir, and Cool Creek which meanders its way through Carmel. Cool Creek offers great greenway opportunities, connecting several parks along its course to Wapihani Nature Preserve at its confluence with the White River.

Better than a Fairy Tale

Situated just north of the Hamilton County line lies 100 acres known as Sherwood Forest. Owned by Terry and Gale Sherwood, this land along Cicero Creek was permanently protected with a conservation easement donated to the Central Indiana Land Trust in 2009. Although there are no flamboyant robbers of the rich and givers to the poor hiding in the woods, the story of this forest sounds like a fairy tale.

Terry Sherwood was quick to notice his new neighbor's daughter thirty years ago and the two fell in love. After raising two children, the two still hold hands while walking along their fields. Their love for each other is equaled by their love for their land.

Over the last few years, this farmer and teacher team has planted thousands of trees in fields that fragmented the forest on their property. Both sides of the family are still neighbors, and they have worked with both families to plant trees, providing corridors from one forest patch to another. In many ways, the Sherwoods began implementing green infrastructure before they had ever heard of it.

They have been able to afford these forest restoration efforts by enrolling land in the USDA's Conservation Reserve Program, which provides cash rent for the formerly row-cropped acres, as well as cost-share for planting trees.

Their work will greatly improve the drinking water of Morse Reservoir, benefitting residents of Indianapolis. It will also pay off for species like the wood thrush and Indiana bat. In fact, their land is part of the green infrastructure network and is suitable habitat for Indiana bat. The story of this forest is not a fairy tale. Even better, it is real, and the permanent protection of their 100 acres gives it a happy ending.

In many ways, the Sherwoods began implementing green infrastructure before they had ever heard of it.



Gale & Terry Sherwood





- GREEN INFRASTRUCTURE NETWORK

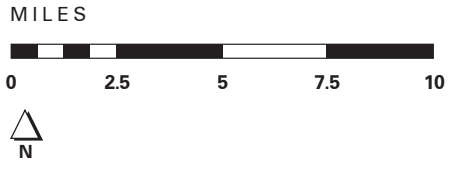
- CONSERVATION AND MANAGED LANDS

- WATER BODIES

- STREAMS

- INTERSTATES

- COUNTY BOUNDARY



Acres in Hamilton County: **257,349**
 Acres in the Network: **4,413**
 Acres Protected in the Network: **30**

Through strategic partnerships we can find ways to increase rare species populations while at the same time not interfering with the purpose of the airport.



Don Gorney

Hancock County

Productive soils have produced a rich farming history in Hancock County, located due east of Indianapolis. Though predominantly surrounded by agriculture, Sugar Creek and Brandywine Creek are high quality streams supporting diverse assemblages of freshwater mussels, which are indicators of high quality streams.

Increased enrollment into programs like the USDA's Conservation Reserve Program can continue to expand the quality indices for Sugar and Brandywine Creeks. Converting ditches to two-stage drains and planting trees and grasses along major streams and regulated drains will help stormwater infiltrate and recharge groundwater systems.

Another strategy to further protect these aquatic resources is no-till farming. This practice can dramatically decrease soil run-off into ditches and ultimately Sugar and Brandywine Creeks.

Like several other counties in the metropolitan area, Hancock County is experiencing suburban growth. With this growth comes an increased demand for greenspace and parks. As officials and park boards plan for the future, protecting lands along Sugar Creek and Brandywine Creek should be given high consideration as they afford outdoor recreation opportunities while protecting important aquatic resources.

Mt. Comfort Airport: An Oasis for Grassland Birds in Central Indiana

By Don Gorney, President, Amos W. Butler Audubon Society

Extensive grass and clover fields at Mount Comfort Airport provide critical nesting habitat to a suite of grassland-dependent

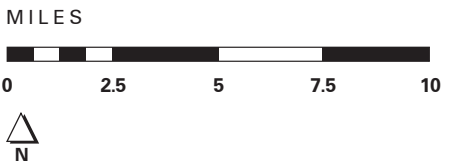
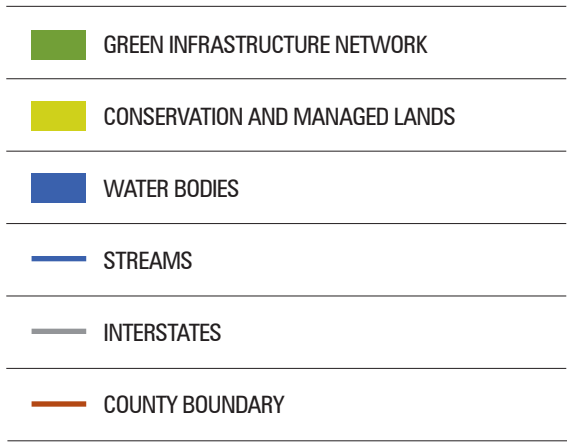
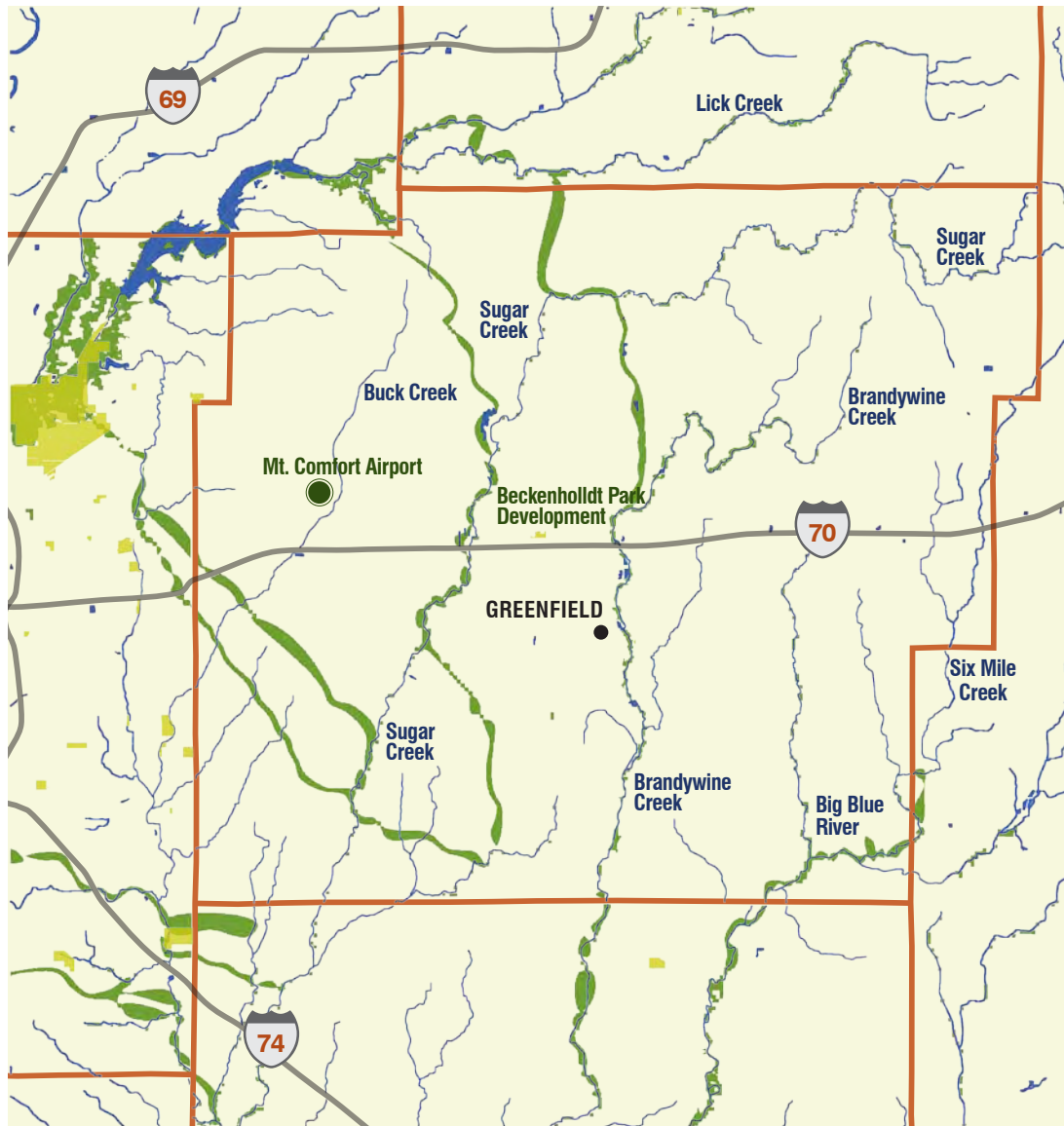
bird species including upland sandpiper, bobolink, dickcissel, grasshopper, Savannah, and field sparrows, horned lark, and Eastern meadowlark. None of these species are common in central Indiana due to the paucity of available grassland habitat. Upland sandpiper, a state endangered species, is not known to breed anywhere in central Indiana except for the grasslands at the Mount Comfort Airport.

Northern harrier, also state endangered, is often seen in the summer at the airport, but is unconfirmed as a breeding species. Providing an indication of the uncommon status of other airport breeders, the U.S. Fish & Wildlife Service lists dickcissel, field sparrow, and grasshopper sparrow as species of conservation concern for central Indiana.

Primary threats to the grassland species at the airport are a haying schedule that often takes place during the breeding season and the human and vehicular traffic that occurs during the annual Indianapolis Air Show, held during the summer.

Practical opportunities to enhance and protect these rare species' habitat exist. One is the protection of adjacent agricultural fields and their conversion to short-grass prairie, allowing for an expansion of breeding populations. Another is working with airport officials to alter the haying schedule, or to protect the nests of the species of the highest conservation concern during the haying process.

We are fortunate to have the grasslands at Mount Comfort Airport, and through strategic partnerships we can find ways to increase rare species populations while at the same time not interfering with the purpose of the airport.



Acres in Hancock County: **196,407**

Acres in the Network: **7,054**

Acres Protected in the Network: **30**



The first park of its kind in Indiana, this unique and innovative concept will benefit area residents for generations...



Indiana Bats



Hendricks County

Hendricks County is the second-fastest growing county in the state and offers several important natural resources.

Big Walnut Creek flows through McCloud Nature Park, located in western Hendricks County. As Big Walnut flows into Putnam County, it passes by Hemlock Ridge Nature Preserve owned by the Central Indiana Land Trust and continues downstream through the 2,700-acre Big Walnut Preserve owned and managed by both The Nature Conservancy and the IDNR Division of Nature Preserves. Big Walnut is a key creek for aquatic resources.

Another important stream corridor in Hendricks County is White Lick Creek. Its East Fork in the southeast section of the county is noted for its Indiana bat habitat and noted for aquatic resources along its West Fork and main channel.

Protecting these riparian corridors offers opportunities for greenways. Most of the remaining forest in Hendricks County is found along a stem of White Lick Creek, making its course through the county a high priority for protection. A White Lick Creek greenway system could protect important wildlife habitat while offering outdoor recreation as well as help maintain or improve a high quality stream.

Bringing People and Rare Species Together at Sodalis Park

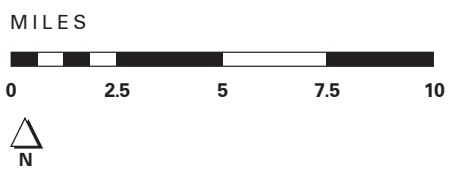
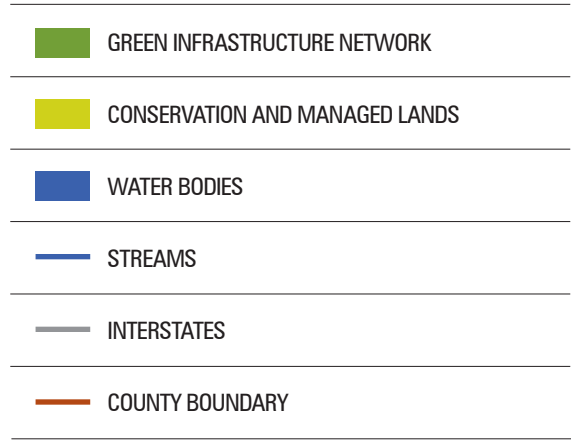
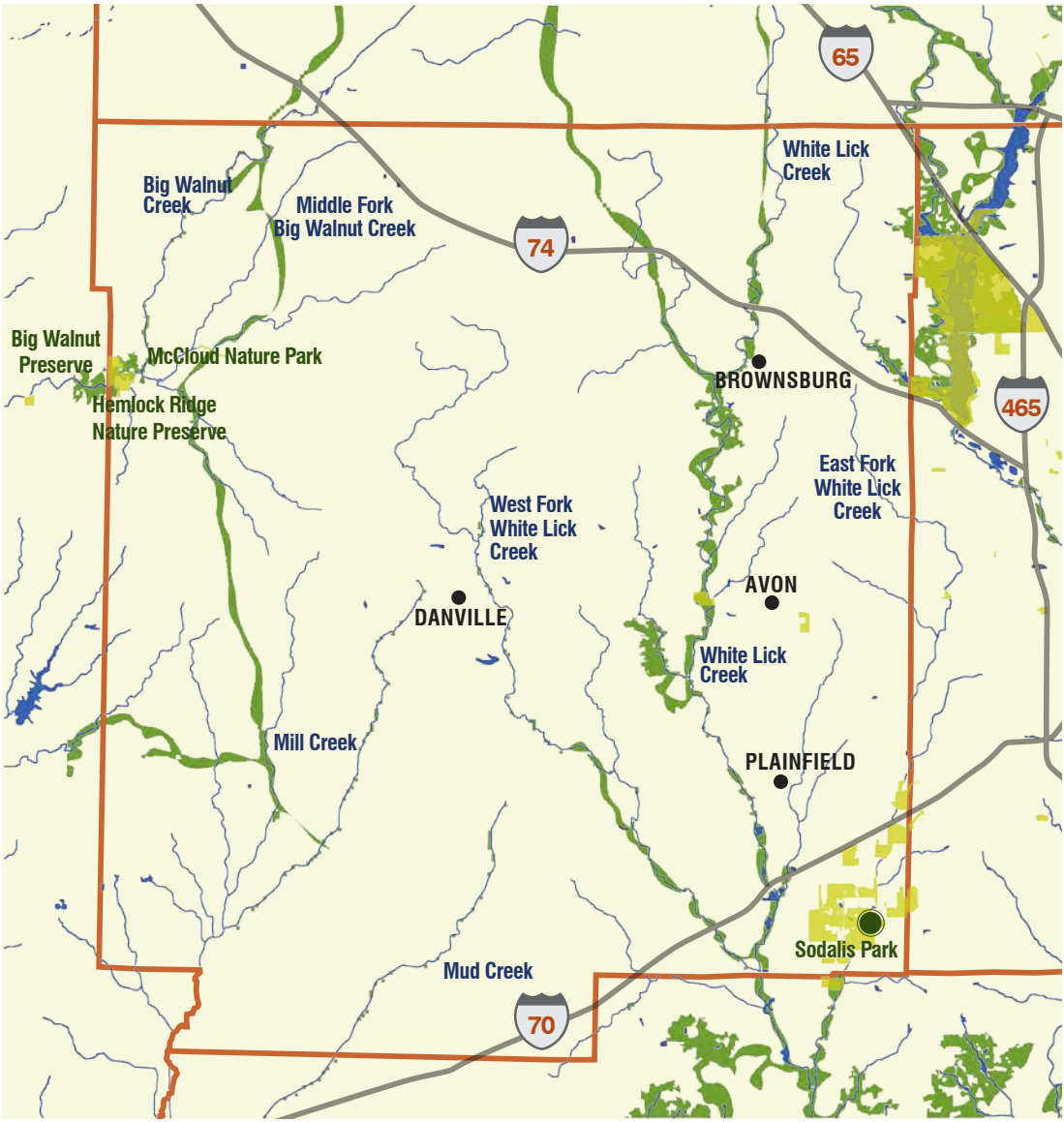
By William Roche, Superintendent, Hendricks County Parks and Recreation

In June of 2009, Hendricks County Parks and Recreation opened a nature park on 210 acres under permanent protection by U.S. Fish & Wildlife Service (USFWS). This land, along with thousands of acres, was purchased by the Indianapolis Airport Authority as a mitigation strategy for displacement of the Indiana

bat (*Myotis sodalis*), a federally endangered species. As part of the mitigation agreement, the Airport Authority agreed to abide by a Habitat Conservation Plan written and to be overseen by the USFWS.

In 2006, the Indiana Department of Natural Resources rated Hendricks County as 'critically deficient' in the amount of open space available to meet the needs of residents, citing the county as deficient by nearly 6,000 acres compared to optimal standards. The ability to build a nature park near a developed area of the county will not only provide residents with access to a much needed resource, but it will also create a learning laboratory where interpretive signage, programs, and educational partnerships will give the public a front row seat to learn of the success and challenges experienced by researchers in the effort to save the Indiana bat.

The first park of its kind in Indiana, this unique and innovative concept will benefit area residents for generations, by allowing researchers to collaborate with park staff in developing programs and educational material about the latest field studies. It is hoped that the success of Sodalis Park can serve as a model for other protected areas that could both benefit an endangered species as well as the public.



Acres in Hendricks County: **261,475**
 Acres in the Network: **8,996**
 Acres Protected in the Network: **150**

Johnson County

Johnson County, on the south side of Indianapolis, has a large population area in the northern part of the county and thousands of acres of forest in its southern half.

The Millard Sutton/Amos W. Butler Audubon Sanctuary, owned and managed by the Central Indiana Land Trust, protects the state's largest great blue heron rookery. Located in the northwest corner of the county along the White River, the preserve is surrounded by agricultural fields and gravel mining. With the county's population centered between Interstate 65 and State Highway 37, the area around the preserve, west of State Highway 37, affords an opportunity to protect land and reforest it before it is further impacted by development.

Southern Johnson County has thousands of acres of forest, most of which are found along the Brown County line. Protecting large, unfragmented blocks of forest like these provides forest interior habitat critical for many declining species.

Forested stream corridors flowing through the county offer opportunities to protect existing forest and also unfragment forest to decrease edge effects. In the southeast part of the county, large blocks of forest are present within Camp Atterbury as well as to its west between Lamb and Princes Lakes in Johnson County and Sweetwater Lake in Brown County.

Bill and Tom Hougham: Continuing a Family Legacy of Service

The Hougham family's roots run deep in Johnson County and exemplify a history of public service. With relatives being past County Surveyors, a founder of Franklin College, and a superintendent of Johnson County schools, brothers Bill and Tom Hougham are continuing their family's legacy by protecting 285 acres of hardwood forest.

Their family started acquiring land in the area now known as Lamb Lake decades ago. The brothers grew up hunting mushrooms and fishing, and their families now share their passion for the forest.

The Hougham land, located in the southern portion of Johnson County, is a high quality example of the Brown County Hills ecosystem, with black and white oaks hugging steep slopes, and tulip trees standing straight in narrow ravines. Rare species like hooded and worm-eating warblers are common here.

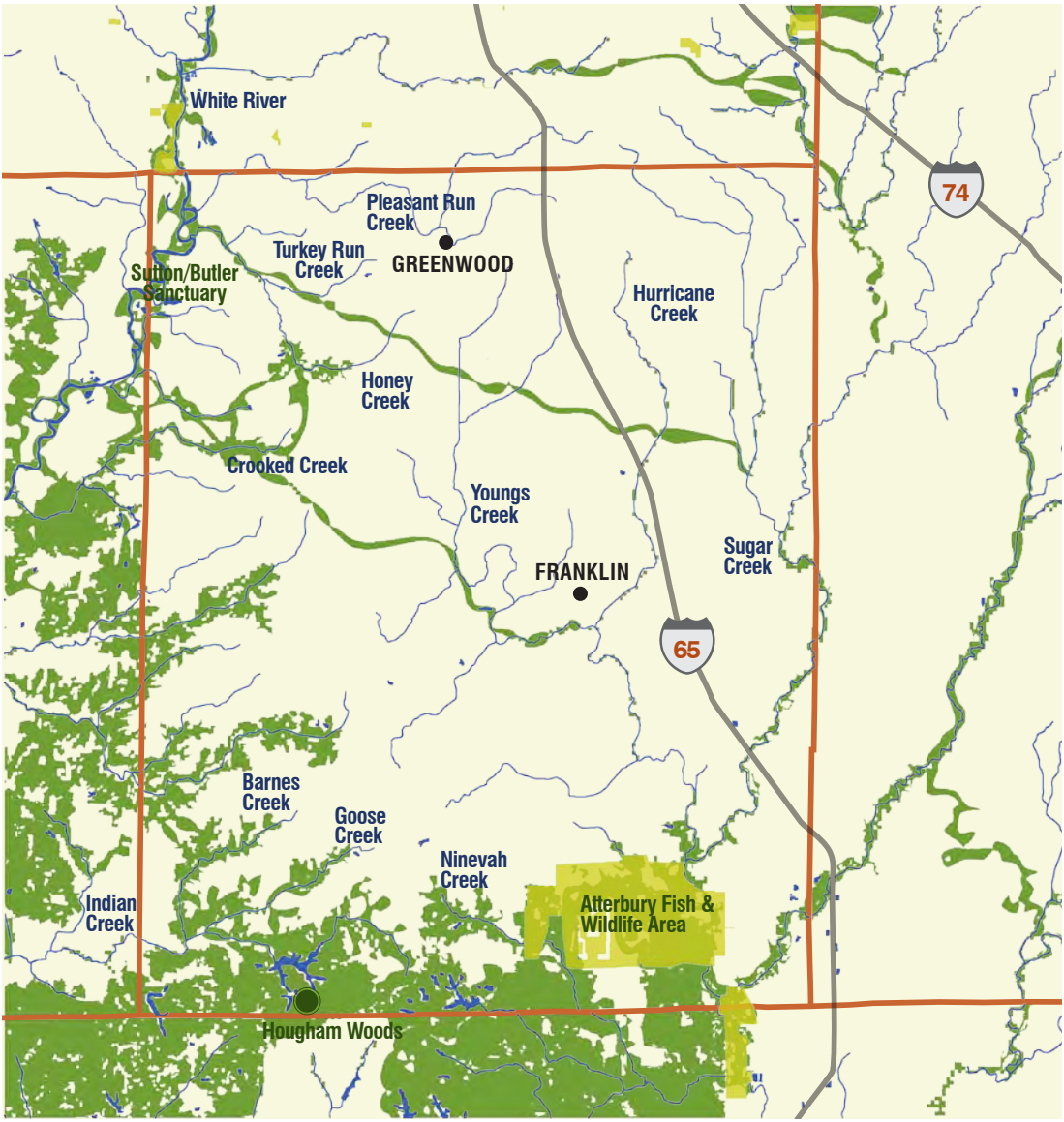
Because of its close proximity to Lamb Lake, it could be very profitable to subdivide for wooded home lots. The Hougham family sees both ecological and family value, though, in keeping it in one tract rather than parceling it. By protecting the woods forever with the donation of a conservation easement, Tom and Bill Hougham are ensuring that each generation of their family will have the same opportunity to make personal connections to this special place.

For the Houghams, protecting the forest is not just about preserving nature for the sake of plants and animals; it also leaves a family legacy. The woods will always be there - for hooded warblers, for grandkids, forever.

Brothers Bill and Tom Hougham are continuing their family's legacy by protecting 285 acres of hardwood forest.



Tom & Bill Hougham



- GREEN INFRASTRUCTURE NETWORK

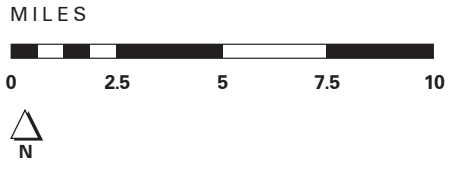
- CONSERVATION AND MANAGED LANDS

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Acres in Johnson County: **205,858**

Acres in the Network: **31,263**

Acres Protected in the Network: **4,100**

Madison County

Fall Creek is well known to many central Indiana residents for various reasons. It is the stream that flows through Ft. Benjamin Harrison State Park; it is the namesake for a busy thoroughfare which runs beside it; and is the water source for Geist Reservoir. Fall Creek and its main tributary Lick Creek run the width of Madison County and both rank high for aquatic resources in the green infrastructure network.

The White River also contains good aquatic resources upstream of Anderson, and buffering the White River riparian corridor and the area around Mounds State Park was recommended by participants at the 2008 Leadership Forum.

Wetland areas along Killbuck Creek are noted in the network as well as important aquatic resources for Killbuck Creek and several other tributaries to the White River. Buffering riparian areas along these streams is recommended, as well as exploring two-stage drains as an alternative to traditional ditch systems that feed into these streams. Also, water quality could benefit from the conversion of selected agricultural lands to tree plantings through the USDA's Conservation Reserve Program.

Fens: Central Indiana's Peatlands

Fens are groundwater wetlands that are rich in calcium and other minerals. This leads to an interesting plant community that is a combination of prairie and sedge meadow. Unlike most wetlands, fens have constant water flow just beneath the ground surface. Many historic records refer to fens as "springy places" - an apt description since they are, in fact, natural springs and quite bouncy when walked upon.

When most people think of peat, they think of "peat moss" from bogs, which is actually partially decomposed sphagnum moss. Fens are peatlands too, however, instead of moss growing over itself on top of an acidic ancient lake, the peat is formed from sedges decaying over time in open, colorful, prairie-like settings.

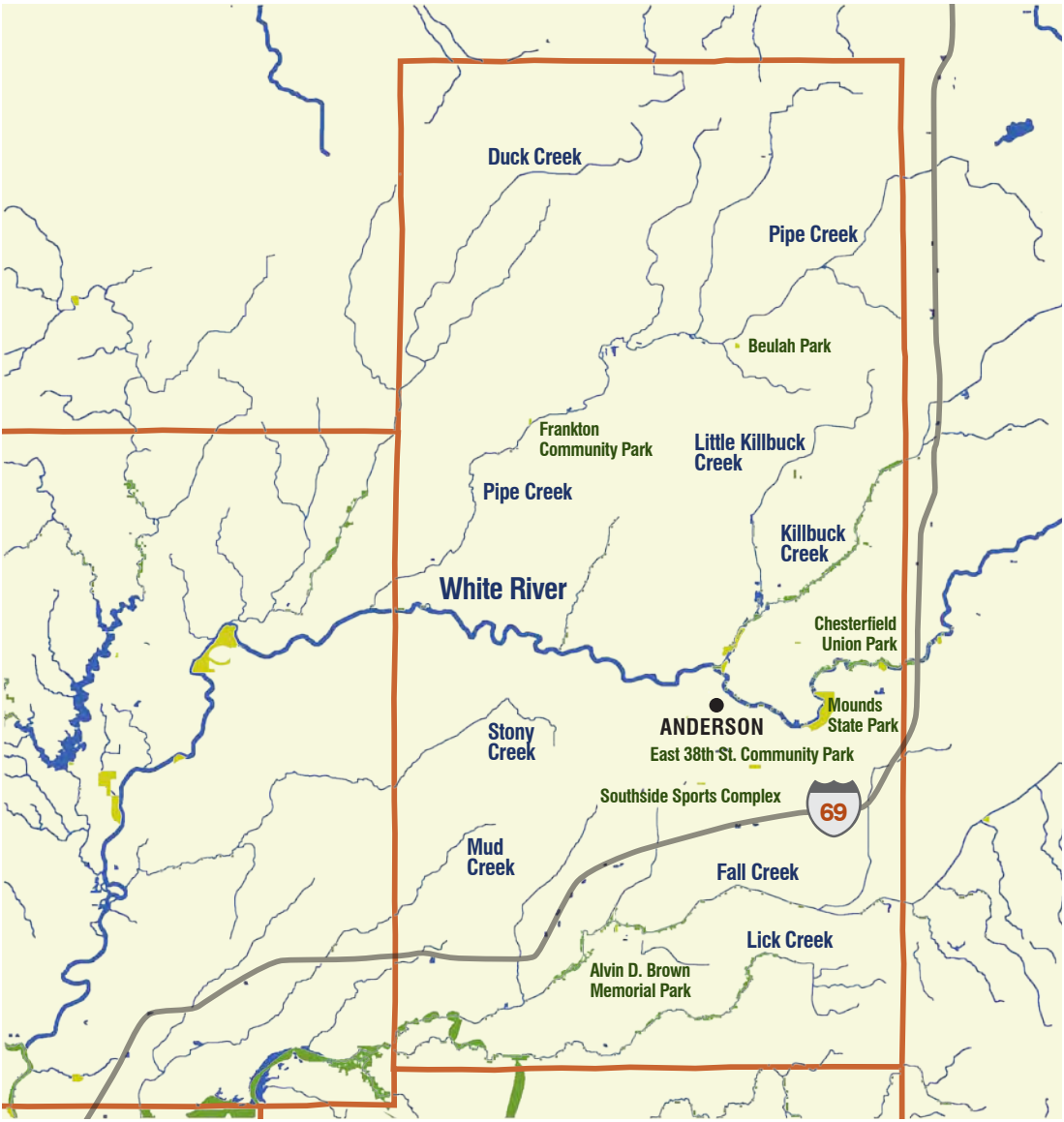
Central Indiana fens are generally found near major rivers, sometimes perched along bluffs formed from outwash when the last glaciers melted. Often overlooked, and sometimes fairly small, finding a fen in full bloom is like discovering buried treasure.

Constant flow of alkaline groundwater keeps many species of plants from growing in fens, but may explain why fens sometimes contain carnivorous plants like bladderworts or sundews. With many plants growing together in an uncharacteristic geography, unusual wildlife can be found too. Baltimore checkerspot might be seen nectaring from prairie dock in the summer after its larvae have fed on nearby turtlehead plants. Several uncommon dragonflies also hawk for unsuspecting prey throughout the summer, and sometimes the rare northern leopard frog can be found before leaping away.

Unlike most wetlands, fens have constant water flow just beneath the ground surface, which constantly takes away needed nutrients.



Prairie dock (*Silphium terebinthinaceum*)



- GREEN INFRASTRUCTURE NETWORK

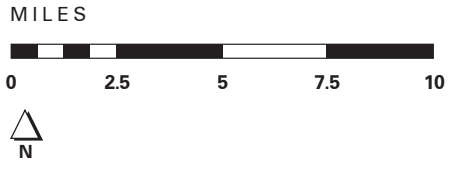
- CONSERVATION AND MANAGED LANDS

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- STREAMS

- INTERSTATES

- COUNTY BOUNDARY



Acres in Madison County: **289,736**

Acres in the Network: **2,836**

Acres Protected in the Network: **40**

Marion County

Marion County and the city of Indianapolis are practically one and the same. Few cities in the United States can claim to have one of the nation's largest city parks as well as a large state park within their boundaries. Likewise, few Midwest cities have public lands that offer sailing as well as the opportunity to lose one's self in large blocks of forested natural areas. Of the ten state-dedicated nature preserves located in the nine-county study area, four are located in Marion County.

Eagle Creek is located entirely within the green infrastructure network, from its entrance into the county, through Eagle Creek Park, all the way to its confluence with the White River near downtown Indianapolis. Protecting this riparian corridor offers great opportunities for greenways and trails.

Protected as a state nature preserve, Woolen's Gardens old growth forest is located along Fall Creek just downstream of the 1,700 acre Fort Harrison State Park. Most of this riparian corridor is heavily forested. Protecting more forest along Fall Creek upstream and downstream of Fort Harrison State Park is a priority.

Flowing through the heart of Indianapolis is the White River. The Greening the Crossroads vision recommends protecting important wetland habitat in southern Marion County as suitable Indiana bat habitat. The White River is an important wildlife corridor in the urban area, and further protection of riparian habitats can offer outdoor recreation opportunities such as greenways, fishing, and paddling.

Eagle Creek Park:

Marion County's Natural and Recreational Gem

Eagle Creek Park, located in northwest Marion County, is the nation's seventh largest city-owned park. Its 4,395 acres of woods, meadows and water are home to 260 species of birds, 400 species of flowering plants, and 100 varieties of trees.

The land was purchased by J.K. Lilly between 1936 and 1958 and protected as a nature preserve. Lilly donated the land to Purdue University in the late 1950s, which later sold it to the City of Indianapolis over a four year period from 1962 to 1966. Eagle Creek Reservoir was created starting in 1966 as a result of the need to control flooding of Eagle Creek, a tributary of the White River. The earthen dam, finished in 1969, created the 1,383-acre reservoir, which is now a draw for residents from around central Indiana who sail, canoe, kayak, row, and swim.

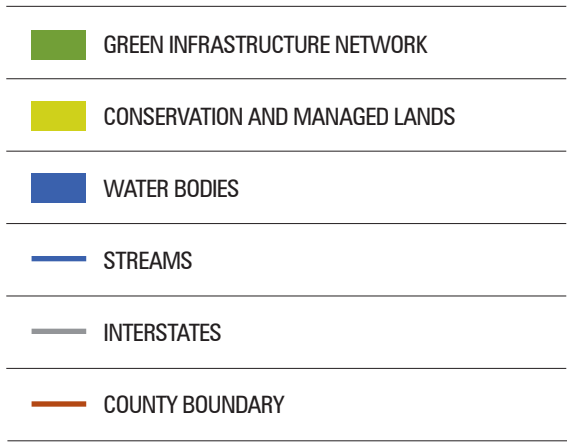
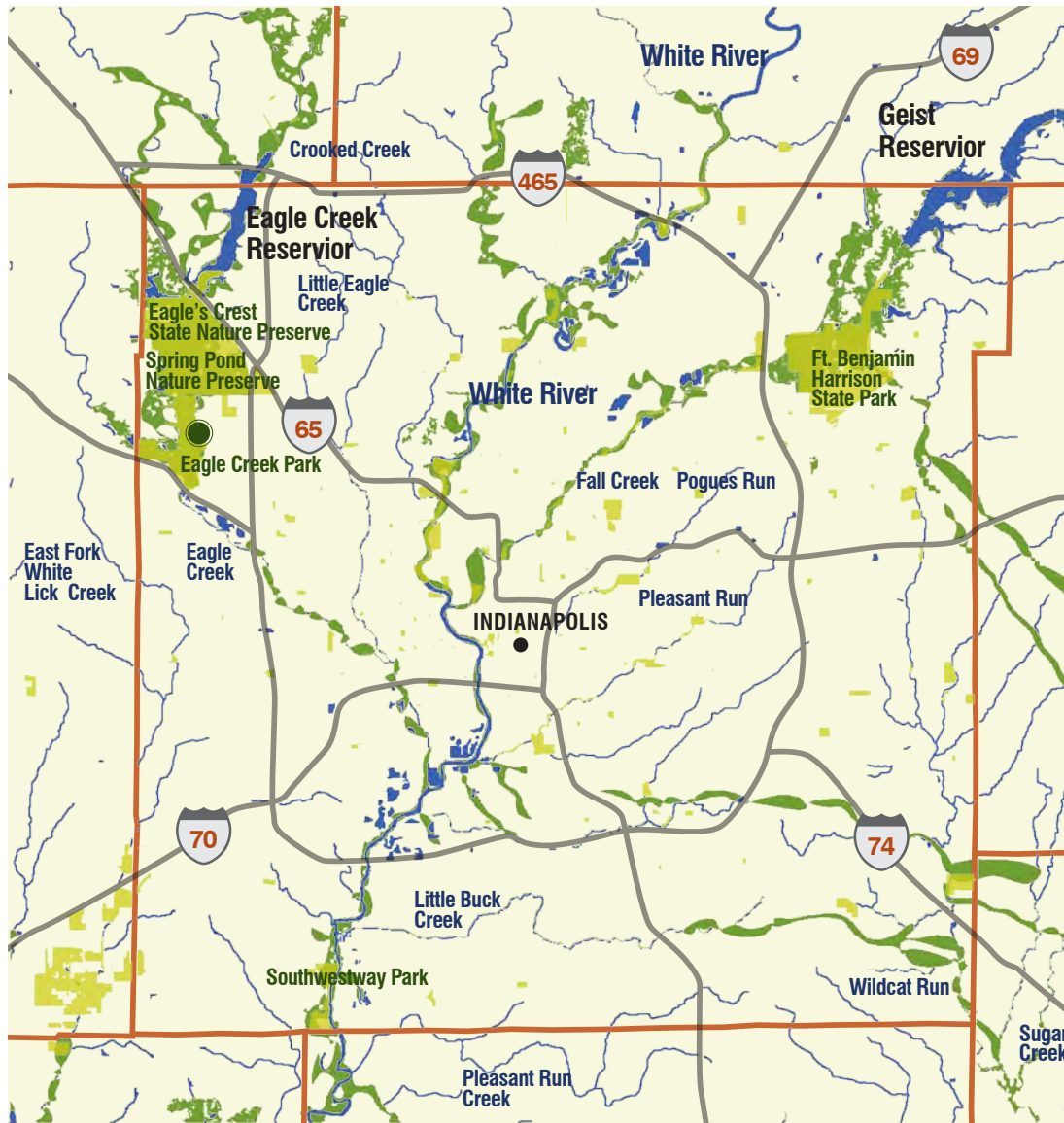
Eagle Creek Park is home to two nature preserves, Eagle's Crest Nature Preserve and Spring Pond Nature Preserve, as well as an ornithology center, the new state-of-the-art Earth Discovery Center, and Scott Starling Nature Sanctuary. Hiking, swimming, boating, fishing, and bicycling are some of the many recreational opportunities offered by the park for central Indiana residents.

These amenities are enjoyed by over a half million visitors each year, thanks to the visions of J.K. Lilly, Purdue University, the City of Indianapolis, and the supporting Eagle Creek Park Foundation.

Hiking trails, swimming, boating, fishing, and bicycling are some of the many recreational opportunities offered by Eagle Creek Park for central Indiana residents.



Kayaking on Eagle Creek Reservoir



MILES



Acres in Marion County: **257,686**
 Acres in the Network: **21,719**
 Acres Protected in the Network: **6,000**

Morgan County

Situated between Indianapolis and Bloomington, Morgan County has maintained its rich heritage of rural forest and farm lands with a small town atmosphere. The northern extension of the rugged and heavily forested Norman Upland, sometimes more locally known as the Brown County Hills, terminates south of Mooresville. This is the dominate land feature of Morgan County.

The ruggedness of this topography does not easily allow for row-crop agriculture, but affords optimal tree growing conditions. Morgan County has a long history of forestry and is home to the region's only state forest, Morgan-Monroe. Additionally, the area is home to Indiana University's 2,500-acre Bradford Woods, Ravinia Woods which is the area's only Forest Legacy conservation easement, and Blue Bluff, one of the state's oldest nature preserves.

Protecting the legacy of Morgan County forests is a high priority for the Greening the Crossroads vision. Conservation easements on private forest lands can be tailored to fit the wishes of consenting landowners who can receive significant tax incentives for donating such easements. The land stays in private ownership and can still be available for forestry but is protected from being converted to other uses. This would benefit species like the ovenbird, which needs large blocks of forest to survive, and it would support jobs in the timber industry.

Looking beyond Morgan County's vast forests, the green infrastructure network also highlights important wetland areas along the White River between Martinsville and Gosport. These areas represent suitable habitat for Indiana bat supported by the surrounding forest.

Waverly – The Next Historical Stop in Indiana

By Kenny Hale, Plan Director, Morgan County Plan Commission

In the town of Waverly, Morgan County is working to both revive the history of the White River and create recreational opportunities. Many of the homes and buildings located in the lowest lying areas in the town, most located in the White River floodway, have been deteriorating for many years. They have been inundated by murky floodwaters over and over, each flood taking its toll. In 2005, the county began to make changes.

The county's first goal was to buy all of the property in the floodway west of Old State Road 37, while preserving the old church, bank, livery stable, and blacksmith shop. The second goal was to clean up Waverly and turn it into a park.

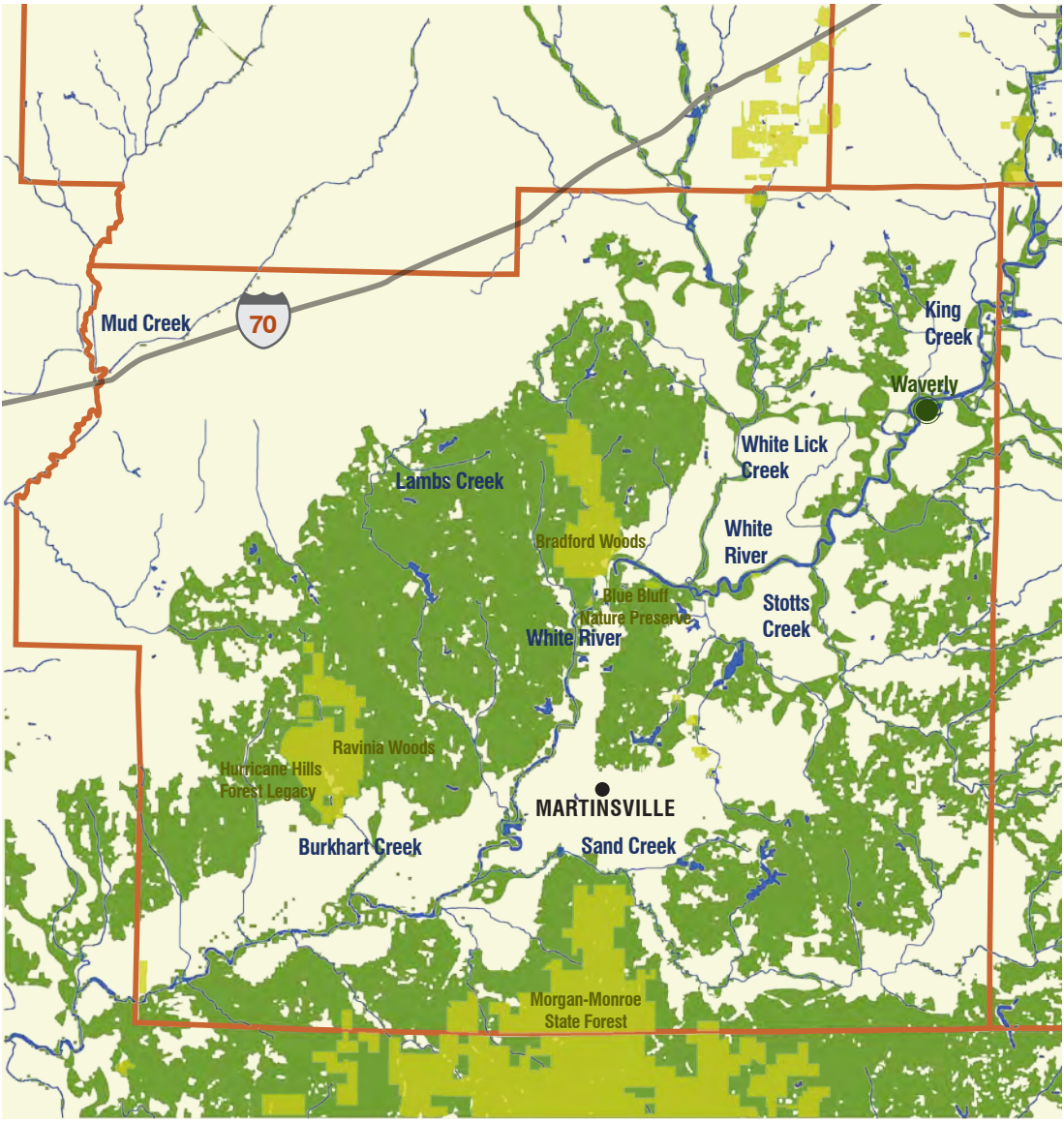
The county has spent riverboat revenue to purchase 14 lots and tear down 10 homes and 12 accessory buildings along with removal of all septic tanks. With the help of the Federal Emergency Management Agency and Indiana Department of Homeland Security, the county will purchase another 43 frequently flooded properties.

Morgan County officials have gathered about 60 photos of historical downtown Waverly, along with a list of all the old businesses. The hope is to save memories of the bygone years through a museum, and to use a portion of the old bank building as a canoe rental office for the park system, while making the rest of the area a living history park and recreational park with trails and sports fields. Upon the completion of the acquisitions, the new park would be approximately 50 acres along the White River and open to the public.

In the town of Waverly, Morgan County is working to both revive the history of the White River and create recreational opportunities.



Kenny Hale



- GREEN INFRASTRUCTURE NETWORK

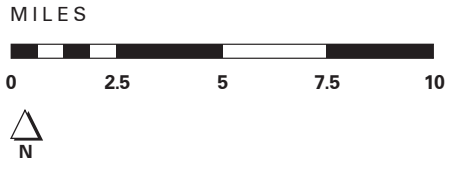
- CONSERVATION AND MANAGED LANDS

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Acres in Morgan County: **261,818**

Acres in the Network: **113,745**

Acres Protected in the Network: **10,000**



Phil remembers his dad being tempted to sell trees for veneer after World War II, but never did, saying, “I knew that if I ever sold them, I would feel bad every time I looked at the stumps.”



Phil Meltzer

Shelby County

Shelby County, southeast of Indianapolis, is home to high quality streams, stable populations of freshwater mussels, a scenic river corridor and central Indiana’s only privately owned old growth forest. The county is connected to its neighbor to the north, Hancock County, by way of Brandywine and Sugar Creeks and to Decatur County to its southeast by the Flat Rock River.

Brandywine and Sugar Creeks both support freshwater mussels and river otter. Keeping the water quality of these streams high is an important challenge for the citizens of Shelby County. As many of the tributaries to these streams are regulated drains, one of the best strategies for maintaining and improving water quality could be converting ditches to two-stage drains. Planting trees along major streams or warm-season grasses along regulated drains will help stormwater infiltrate and charge groundwater systems.

The Flat Rock River corridor is underappreciated for its beauty and tranquility. Unusually clean for its size with bluffs uncharacteristic for central Indiana, the Flat Rock can be a destination for canoers, kayakers, and bass fishermen. Protecting and expanding its forested riparian area and protecting wetland areas along its course are high priorities for Shelby County’s green infrastructure.

The Last Old Growth Forest: Meltzer Woods

Phil Meltzer has been doing for over 80 years what his family has since 1857: preserving a window of Central Indiana’s past by never cutting a live tree out of his 48-acre forest. Meltzer Woods fits every definition of “old growth forest” with giant trees, downed trees left to decay and sporadic granite boulders protruding from the soil, evidence the land has never been plowed.

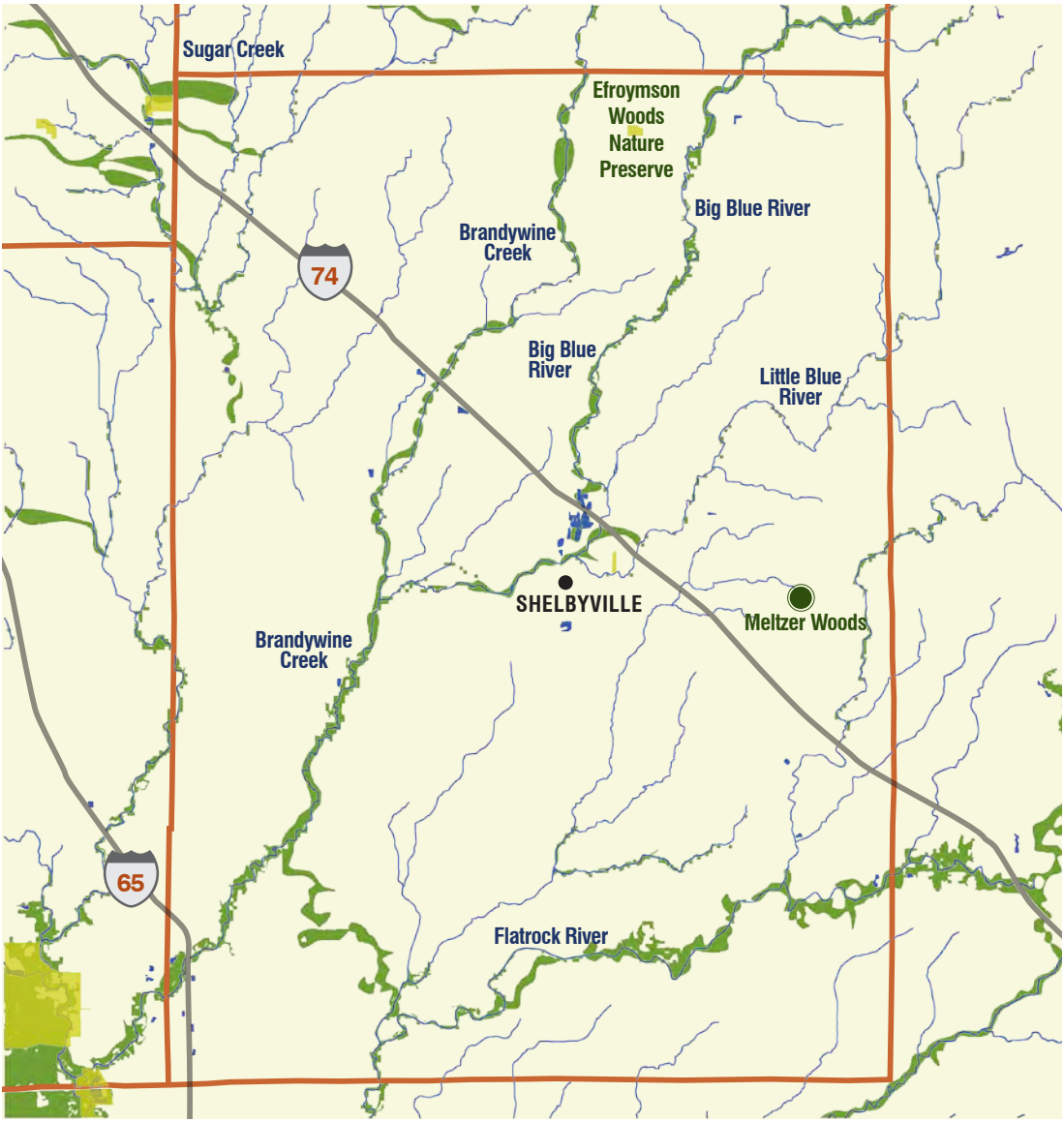
Located southeast of Shelbyville, the forest is dominated by beech and maple but the largest trees are Shumard’s red, burr, and chinquapin oak with some surreal examples standing as they have for centuries. The spring wildflower display is diverse and phenomenal. Just standing in the woods gives a sense of solitude and humility.

Meltzer Woods remains the only privately owned, unprotected example of old growth forest in Central Indiana, and is one of only five examples known to exist in the state’s Central Tillplain Natural Region.

The family has resisted selling timber from the forest through multiple wars and depressions over the past 150 years. Phil remembers his dad being tempted to sell trees for veneer after World War II, but never did, saying, “I knew that if I ever sold them, I would feel bad every time I looked at the stumps.”

The Meltzer family took an important step in the protection of their land by entering into a management agreement with the Central Indiana Land Trust in 2008. Under this agreement, invasive species will be removed using the Land Trust’s expertise and cadre of volunteers while the land remains under ownership of the Meltzer family. By eradicating invasive species, the future will be that much more certain for these centuries-old trees.





- GREEN INFRASTRUCTURE NETWORK

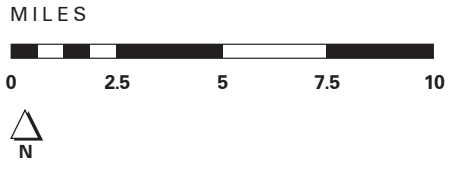
- CONSERVATION AND MANAGED LANDS

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- STREAMS

- INTERSTATES

- COUNTY BOUNDARY



Acres in Shelby County: **263,962**

Acres in the Network: **11,582**

Acres Protected in the Network: **0**



SUNRISE | WAPIHANI NATURE PRESERVE, HAMILTON COUNTY

CONCLUSION

Greening the Crossroads is a collective vision for the future of the region. The included green infrastructure network is based on our best scientific understanding of ecology, wildlife habitat and landscapes. The authors of this vision benefited greatly from the countless hours that public agency staff, university faculty, nonprofit staff and the public spent thinking about the conservation of natural resources, community assets and the future of central Indiana. These stakeholders contributed their perspective and enthusiasm for local places, while striving to consider the ecological needs and landscape features that connect one community to another. The Greening the Crossroads vision is unique for the state of Indiana, and we hope, a model for others to follow.

Ultimately, the implementation of the Greening the Crossroads vision will require a much higher degree of collaboration than has been seen previously. There is good reason to be optimistic. Central Indiana is home to many strong institutions, is the seat of state government and has many wonderful natural resources. There are many efforts underway to help landowners manage their land with an environmental focus, active efforts at land conservation and inspiring stories of environmental restoration. The Greening the Crossroads vision can help all parties by organizing these different efforts, honing the focus of exiting initiatives, raising public awareness, increasing resources available and articulating results to the public and policy makers.

As always the will of the citizens will determine the implementation of this effort. This network represents our communities' highest aspirations for our future. It's up to each of us to find our role and help carry this vision forward into reality.

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IDNR *Outdoor Indiana Magazine*: p. 17,27,34,42,48
Indiana Business Journal:
p. 37

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