Boone County Conservation District
6028 Camp Ernst Road, Burlington, KY 41005
Phone: 859-586-7903 ext. 3 Email: info@bccdky.org
www.bccdky.org

Boone County Conservation District Report

Inventory of environmentally sensitive areas and natural resources in Boone County, KY

Introduction and Purpose

Boone County Planning Commission is in the process of completing a comprehensive plan entitled "Our Boone County: Plan 2045" (Plan). This Plan lays out the countywide objectives which aims to balance development and preservation needs for the cities of Florence, Union, and Walton, as well unincorporated Boone County. The Plan is in development and intends to articulate Land Use and other recommendations built from public engagement efforts.

The Boone County Conservation District (BCCDKY) is using the comment period to address the Plan's goals and objectives for the Environmental and Natural Resource section. Upon initial comments and discussions with Planning Commission personnel, the BCCDKY and Planning Commission agreed that a high-level study was needed to help identify Boone County's most environmentally sensitive areas and natural resources. Amid planned development and growth for the county, it is important to identify our most pristine and unique natural communities. These areas promote the health and wellbeing of our citizens (growing population) by providing clean air, improving water quality, creating opportunities for recreation, and protecting the biodiversity and habitat for many unique species of plants and wildlife in the County. This study will aid the Planning Commission's goals and objectives regarding environment and natural resources which include the following:

Goal A: Recognize and protect natural systems and resources (greenspace, streams, wetlands, forests, etc.) essential to safety, health, economic stability, and overall quality of life in the land use planning process.

Objectives:

1. Preserve areas which possess unique environmental characteristics and use as passive or active recreational areas or be appropriately incorporated into development design.

2. Utilize careful design and development review of proposed developments to protect and maintain the environmental and structural integrity of Developmentally Sensitive areas, watersheds, and scenic areas, especially hillsides. Evaluate impacts related to ecological systems, wildlife habitats, soils, and water during development design.

3. Utilize existing topography and vegetation (including mature trees) and preserve the existing character of the land during development design and utilize best practices for construction which properly manage construction impacts.

Goal B: Promote adequate Active and Passive Recreation facilities and programs to meet changing demographics and preserve significant natural features and open spaces.

Objectives:

1.Preserve scenic and natural areas with significant and unique qualities that are close to or within established and developing residential areas through the creation or maintenance of parks and open spaces.

2.Assess areas for appropriateness of new parks and green space. Strategically locate active recreation areas and facilities to be easily and safely accessible to the population; and encourage Active Transportation (bicycling and pedestrian) connections between parks and recreation facilities.

3.Encourage tourist oriented commercial facilities which minimize impacts on other land uses.

4.Protect and sustain resource lands such as agriculture and other agricultural uses by encouraging preservation, diversification of agricultural uses, and assessment of impacts on agricultural operations by proposed development.

In order for the county to meet these Plan goals and continue to protect our natural resources, it is necessary to identify the most environmentally sensitive areas in the county in which special considerations should be taken regarding the conservation of these natural areas.

The purpose and overall objective of the Environmental Quality Modeling Study is to facilitate selection of the best and most high-quality environmental areas within Boone County. This Study's goal is to use industry-accepted mapping and scientific methodologies to avoid or minimize future adverse natural community impacts, to the extent practicable. This Study involves the acquisition and evaluation of environmental, land use, and Boone County GIS data to develop several constraints and attributes that combined suggest that certain areas should consider future conservation and preservation strategies implemented while meeting the overall Plan's objectives. Areas presented in the Study are ecologically unique, important for health and wellness, valuable to the County, and should be conserved and considered for zoning changes. The BCCDKY has used the methods described below to identify the most environmentally and ecologically unique areas in the county for the Planning Commission to consider conserving and not allowing for future development or zoning changes in these identified areas.

Methods

Based on the key goals of the 2045 Plan, BCCDKY's primary objective was to use industry accepted mapping data to identify certain environmental components and elements that would be deemed developmentally sensitive or have future strategies developed for conservation. BCCDKY used the Ohio-Kentucky-Indiana Regional Council of Governments' (OKI) Environmental Mitigation and Suitability Modeler (EMSM) which is an application that provides environmental, boundary, tree canopy data, and more, to help decision makers identify the areas of the OKI region most suitable for mitigation investments. Users can select factors relevant to their specific analysis, weigh the importance of each layer, and view a map that presents priority areas for them. Many of these factors display and account for relevant environmental data that should be considered for future conservation. In addition to identifying potential mitigation projects, BCCDKY can utilize the EMSM to prioritize conservation efforts in Boone County.

The following publicly available data was factored into the EMSM. Specific characteristics or measurements that contribute to our goals were isolated within each category. A brief description of each attribute is provided below, and more information can be found in Table 1.

OKI Forested Areas (40% weight) - Forest location is displayed at 30m resolution. Data is derived from LiDAR (Light Detection and Ranging) analysis and image classification of color infrared imagery and was collected in 2020 in Kentucky. (Figure 1A)



Recognized Biodiversity (25% weight)- from The Nature Conservancy (TNC) Resilient Land mapping tool. The Conserving Nature's Stage focus on abiotic drivers of biodiversity is meant to complement, not replace, biodiversity-based conservation priorities. This map assembles information on places recognized for their biodiversity value (rare species, intact habitat, or exemplary natural communities) in separate studies including ecoregional assessments and state wildlife action plans and integrated these results to create maps of conservation opportunity areas for species of greatest conservation need. This also includes recent information from the Natural Heritage Network (and other sources) on high quality species and community occurrences, and protected land managed for biodiversity and natural processes. This assessment ensures a comprehensive footprint of current biodiversity areas while integrating them with representative abiotic features which underpin that biodiversity, ensuring that networks of resilient sites are distributed across all abiotic 'stages' needed to conserve future biodiversity. (Figure 1B)

Resiliency (25% weight) - from TNC's Resilient Land mapping tool. A site's Resilience Score estimates its capacity to maintain species diversity and ecological function as the climate changes. It was determined by evaluating and quantifying physical characteristics that foster resilience, particularly the site's landscape diversity and local connectedness. The score is calculated within ecoregions based on all cells of the same geophysical setting and is described on a relative basis as above or below the average. This study focuses on the areas noted as above average resiliency. (Figure 1C)

Proximity to Parks and Protected Areas (10% weight)- These lands are deemed protected because they are owned and managed by public entities or non-profits dedicated to land preservation for recreation and/or ecological function. Areas include but are not limited to parks (including pocket parks, natural areas, ball fields, areas with maintained turf), preserves, FEMA purchased parcels for flood mitigation, and lands owned by a public entity identified for future parks. Not all of these areas are open to the public. Distances include ranges of ¼, ½, and 1 and greater than 1 mile. (Figure 1D)

More information on scoring and weight can be found at OKI's link below:

https://www.oki.org/data-maps/view-data-maps/environmental-mitigation-suitability-modeler-emsm/

Additional Areas

Parcels Abutting Large Perennial Streams – The major perennial streams within Boone County exhibit high quality aquatic habitats that are essential for our county's local wildlife, both human and ecosystem health, and recreation opportunities. A buffer of 0.25-miles was created surrounding the County's primary perennial streams and was factored into the scoring of our model and described in further detail below. Large streams in Boone County include Woolper Creek, Gunpowder Creek, Big Bone Creek, Middle Creek, and others.

(Figure 1E)

Conservation Easements – Using Boone County Planning Commission GIS data, we considered parcels with conservation easements which are legal agreements that restrict the future uses of a property to protect its conservation value. These areas were not calculated into the model scoring but displayed in our study for reference.

Other Sensitive Areas – Boone County also contains many unique geological and cultural areas that are not shown on national or local mapping data sets. These areas contain unique geological features and known prehistoric archaeological sites. Using aerial imagery and soils data along with collaboration of input of identified sites by the Boone Conservancy and BCCDKY, we are identifying these areas as "sensitive" areas in need of protection from potential negative developmental factors. These areas include The Boone Conservancy's Ohio River Conservation Corridor, the unique geological formations of Split Rock at the mouth of Woolper Creek, and areas surrounding Big Bone Lick State Historic Site.

Evaluation and Results

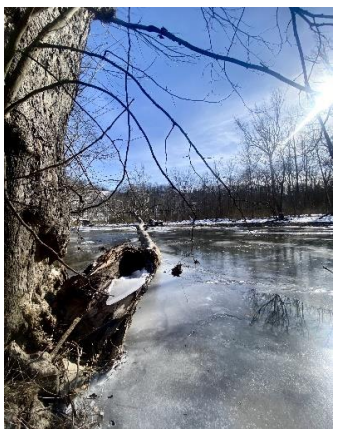
Data was extracted from the EMSM modeler for Boone County in August 2024. Overlapping focused characteristics within the modeler revealed areas within the county that share some or all characteristics within the modeler and were shown on a gradient scale from 0 to 9, with '0' holding none of the applied attributes and '9' holding most or all the applied attributes. (Figure 2a). For purposes of this study, we are showing the highest values from the modeler (Scores = 6 – 9). As model scoring areas can range from range from 0.05 acres – 996 acres, we believe that any high scoring area over 1 acre is significant in conservation therefore only high-scoring (6-9) areas larger than 1 acre were selected for our study (Figure 2b). Since areas surrounding large perennial streams in Boone County were not selectable features in the EMSM model, a 0.5-mile buffer around our perennial stream selection and added to our model results. One (1) additional scoring point was added to areas where the buffer overlaps an existing high-scoring area. As a result, we are highlighting and presenting parcels with high-quality areas scoring 7-10 within our study. These areas are shown in Figure 3. Upon revisions of the map and the additions of known conservation easements and other sensitive areas mentioned above, we have identified areas within our county with high environmental sensitivity and need for future conservation. These areas on the map align with multiple significant and high-quality environmental factors within our county and are described in greater detail below.

Score = 10

As shown in Figure 3, the highest scoring areas (totaling 3,143 acres) these areas contain all 5 scoring attributes used within our study (Forested Area, TNC Recognized Biodiversity, TNC Resilient Land, Parks and Protected Area, and within 0.25-miles of Large Perennial Streams) with high relative values. These areas can be considered the highest in environmental quality within the county and hold great ecological value and significance and that value will only increase with future conservation. Examples of these areas are:

- The mature forested areas surrounding Middle Creek within and abutting Camargo Hunt Park, Middle Creek Park, and Boone Cliffs Nature Preserve, including southern portions of Dinsmore Woods/Homestead.
- The mature forested areas surrounding Gunpowder Creek within and abutting Conservation Park #1 (Volpenheim Property), Dan Beard's Camp Michael, YMCA Camp Ernst, and Gunpowder Creek Nature Park (Sperti).
- Forested hillslopes north of the intersection of KY-20 and Stone Creek Lane, north of the mouth of Woolper Creek.
- Headwaters of Big Bone Creek at the south edge of Adair WMA.

It should be noted that a majority of these highest scoring areas are within steel slope areas, not suitable for development, however areas surrounding these should be taken under special considerations in order to preserve and maintain the environmental quality of the highest scoring areas.

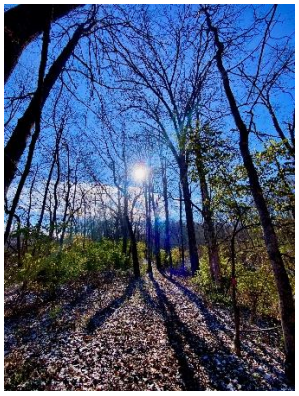



Score = 9

The next highest scoring areas (totaling 13,114 acres) contain at least 4 or all 5 scoring attributes used within our study with high relative values. These areas can also be considered high in environmental quality within the county and hold great ecological value and significance and that value will only increase with future conservation. Examples of these areas are:

- The mature forested valley surrounding Woolper Creek from its mouth at the Ohio River, upstream to its confluence with Ashby Fork, including Split Rock Conservation Park.
- Forested hillslope headwaters of Peaks Branch, the north-facing slopes of Taylor Creek, Big Bone Creek (Adair WMA), and Riddles Run.
- Areas within and abutting Carder Dolwick Nature Preserve, Boone Cliffs Nature Preserve, Dinsmore Woods Nature Preserve
- Forested hillslopes north of the intersection of KY-20 and Stone Creek Lane, north of the mouth of Woolper Creek.
- Mature forested areas along and abutting Middle Creek between KY-18 going north to Possum Path Road
- Mature forested areas along and abutting Gunpowder Creek and its perennial tributaries from KY-536 upstream to its intersection with Camp Ernst Road.





Score = 8

The third best scoring areas (totaling 12,991 acres) contain 3 or more of the 5 scoring attributes used within our study with moderate to high relative values. Upon initial observation, forested areas within the TNC Recognized Biodiversity and TNC Resilient Land overlap areas make up for a majority of this third best scoring area. These areas are mostly located within the Middle, Woolper, and Gunpowder Creek watersheds and are abutting the higher quality areas that scored a 9 or 10. Other areas in this scoring category resulted from mature forest areas near perennial stream buffers and within the vicinity of a park or protected area. Examples include:

- Mature forested areas in western Boone County starting south of Petersburg and continuing south to Rabbit Hash. These forested areas are mostly east of KY-20 which runs along the Ohio River and west of Woolper Road and East Bend Road.
- Mature forested areas abutting the high quality (9 and 10) areas described above within the Gunpowder Creek Watershed from the creek's intersection with KY-536 (Rabbit Hash Road) upstream to its intersection with Camp Ernst Road near Camp Ernst Lake.
- Areas abutting the high quality (9 and 10) areas described above within the Big Bone Creek Watershed (Adair WMA), between Beaver Road and Big Bone Church Road.
- Forested areas in and surrounding Central Park and the Boone County Arboretum, South Fork Park, Giles Conrad Park, Boone's Landing, Big Bone Lick State Historic Site, Mountain Ball Park, and Waller Stephenson Mill Park.

Score = 7

The fourth best scoring areas (totaling 36,924 acres) contain 2 or more of the 5 scoring attributes used within our study with moderate relative values. Upon initial observation, forested areas abutting large perennial streams within either the TNC Recognized Biodiversity or TNC Resilient Land areas make up for a majority of this scoring. Being the largest in area, these areas are widespread and mostly located within the northern and western portions of Boone County. Examples include:

- The forested buffer along the Ohio River between the County's northeastern most point (Anderson Ferry), downstream to Petersburg and including the forested buffer along the Ohio River tributaries known as Elijah's Creek, Sand Run, Garrison Creek, Second Creek, Taylor Creek, and Peaks Branch
- The forested buffer surrounding upper Woolper Creek and its perennial tributaries starting at the creek's intersection with Woolper Road and continuing upstream to its headwaters.
- The forested buffer surrounding upper Big Bone Creek and its perennial tributaries (Dark Hollow Branch and Beaver Branch) starting at the creek's intersection with Beaver Road and continuing upstream to its headwaters. This includes Mud Lick Creek from its confluence with Big Bone Creek to its headwaters.
- The forested buffers surrounding the perennial Ohio River tributaries of Lick Creek, Gunpowder Creek (from Rabbit Hash Road to its mouth)

As shown in Figure 3, most of the high-quality areas in our Environmental Quality Modeling Study (areas containing >1 acre scoring 7-10) exist within the less developed western Boone County as well as the northernmost points of the county near the Ohio River. This is namely because the large tracts of continuous mature hardwood forests have been maintained. This is largely due to lack of cities or urban developments, containing small roads constricting traffic capacity, and steep slopes which make it difficult for construction. In particular, the Gunpower Creek watershed holds the largest areas of environmentally sensitive land, followed by the Ohio River Drainage (Middle Creek) between the Woolper Creek and Gunpowder Creek watersheds.

Discussion and Future Studies

The results in this Environmental Quality Modeling Study show that by using sound and publicly available scientific data, areas of high priority conservation in the county can be identified and addressed in the 2045 Plan. This Environmental Sensitivity Modeling Study is useful and important to consider as the county continues to grow and develop, but still needs to conserve highly sensitive areas. This study shows the potential for what we can identify and prioritize within the county, and we hope to continue to work with county planning stakeholders in future planning. The constraints and parameters used in this study can be modified to identify more areas or more sensitive areas within the county. We hope to continue to address these needs in the future as the Boone County landscape changes as these Study methods provide flexibility as new and better data becomes available.



The Southeast Conservation Blueprint

The Blueprint is a living, spatial plan that identifies priority areas for a connected network of lands and waters across the Southeast and Caribbean. It's helping more than 400 people from over 180 organizations bring in new funding and inform their conservation decisions.

The Southeast Conservation Blueprint is the primary product of the Southeast Conservation Adaptive Strategy (SECAS). The Blueprint is more than just a map. It's a living spatial plan to achieve the SECAS vision of a connected network of lands and waters across the Southeast and Caribbean. So far, the Southeast Blueprint has helped bring in more than $190 million in conservation funding to protect and restore over 300,000 acres.

The Blueprint identifies priority areas based on a suite of natural and cultural resource indicators representing terrestrial, freshwater, and marine ecosystems. A connectivity analysis identifies corridors that link coastal and inland areas and span climate gradients. Because the Blueprint is a living plan, it will evolve over time, driven by improvements to the underlying science, our growing understanding of on-the-ground conditions, and input from new partners. So far, more than 2,000 people from over 600 different organizations have actively participated in developing the Southeast Blueprint.

Upon reviewing the SECAS blueprint's high priority areas for Boone County, KY you can see a close correlation with our study in the areas that were marked as the highest priority (Figure 4).

https://secassoutheast.org/blueprint.html

Now that these areas can be easily identified using the model and align well with other high-level ecological studies, we believe that the Planning Commission should consider these results in future zoning and development planning for the county.

These findings could also be used to promote other ongoing future conservation initiatives within Boone County. It would be beneficial to communicate these results to the landowners of these high-quality properties. These results can be used to make an effort to recognize individual property owners of their high-quality habitat and potentially create incentives for them to maintain the ecological integrity of their land. Providing certificates of recognized high-quality environmentally sensitive habitat, access to education on how to maintain their land for future generations (i.e. deed restrictions and conservation easements), or tax breaks for maintaining these lands are just a few suggestions.

The BCCDKY looks forward to working with the Planning Commission further in this effort to conserve our natural resources amid the need for development and economic growth.

Table 1

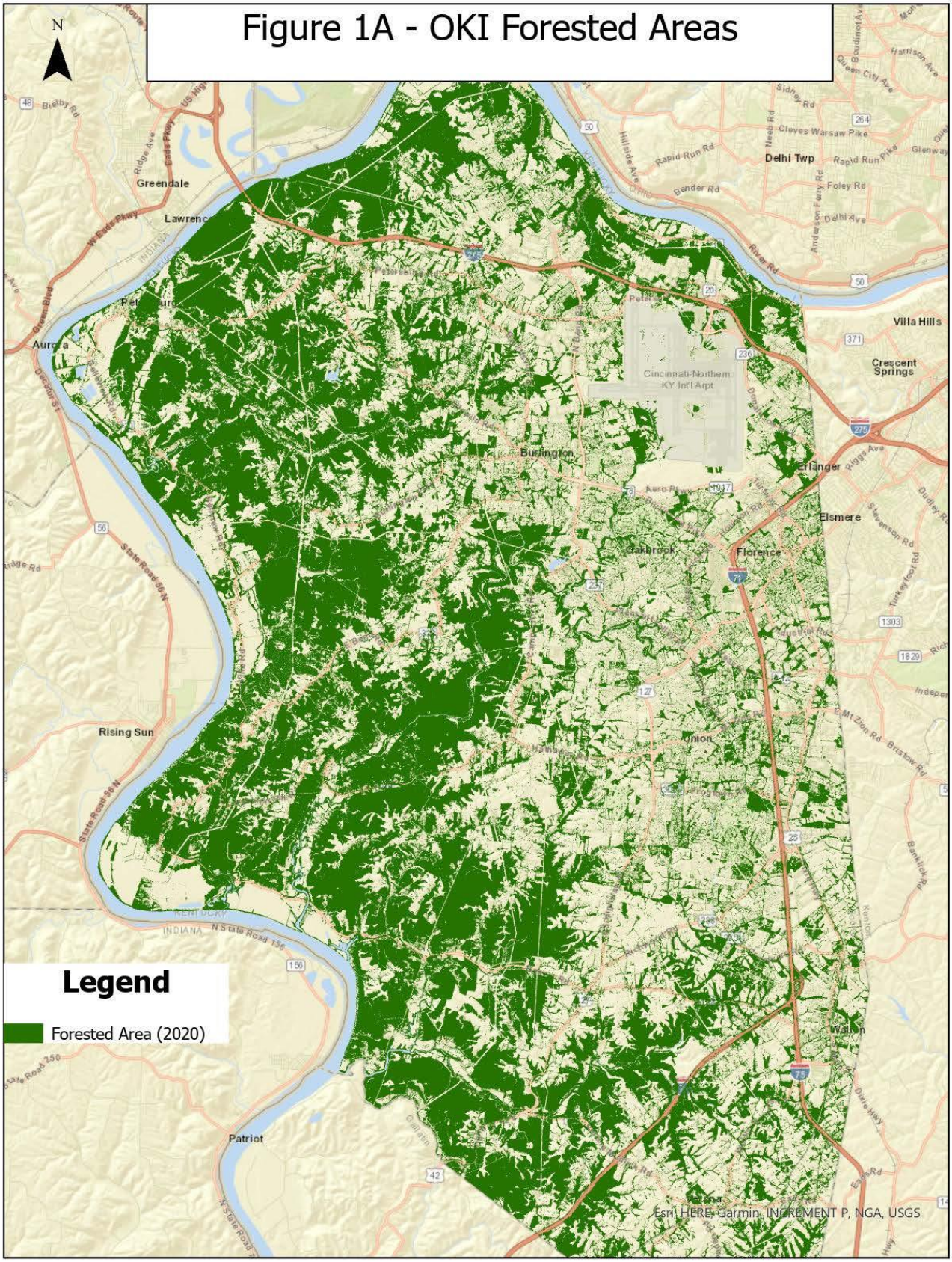
Attribute Summary for EMSM Model

Description	Weighted Score
OKI Forested Areas (40% overall)	
No	1
Yes	9
TNC Recognized Biodiversity (25% overall)	
Recognized Biodiversity area	9
Non-recognized biodiversity area	2
TNC Resilient Land (25% overall)	
Non-resilient area	2
Resilient	9
OKI Parks and Protected Areas (25% overall)	
Protected Area	9
Less than 0.25 – mile buffer	8
Between 0.25 - 0.5 mile buffer	6
Greater than 0.5 mile buffer	2

Notes:

https://www.oki.org/data-maps/view-data-maps/environmental-mitigation-suitability-modeler-emsm/

Figure 1A - OKI Forested Areas



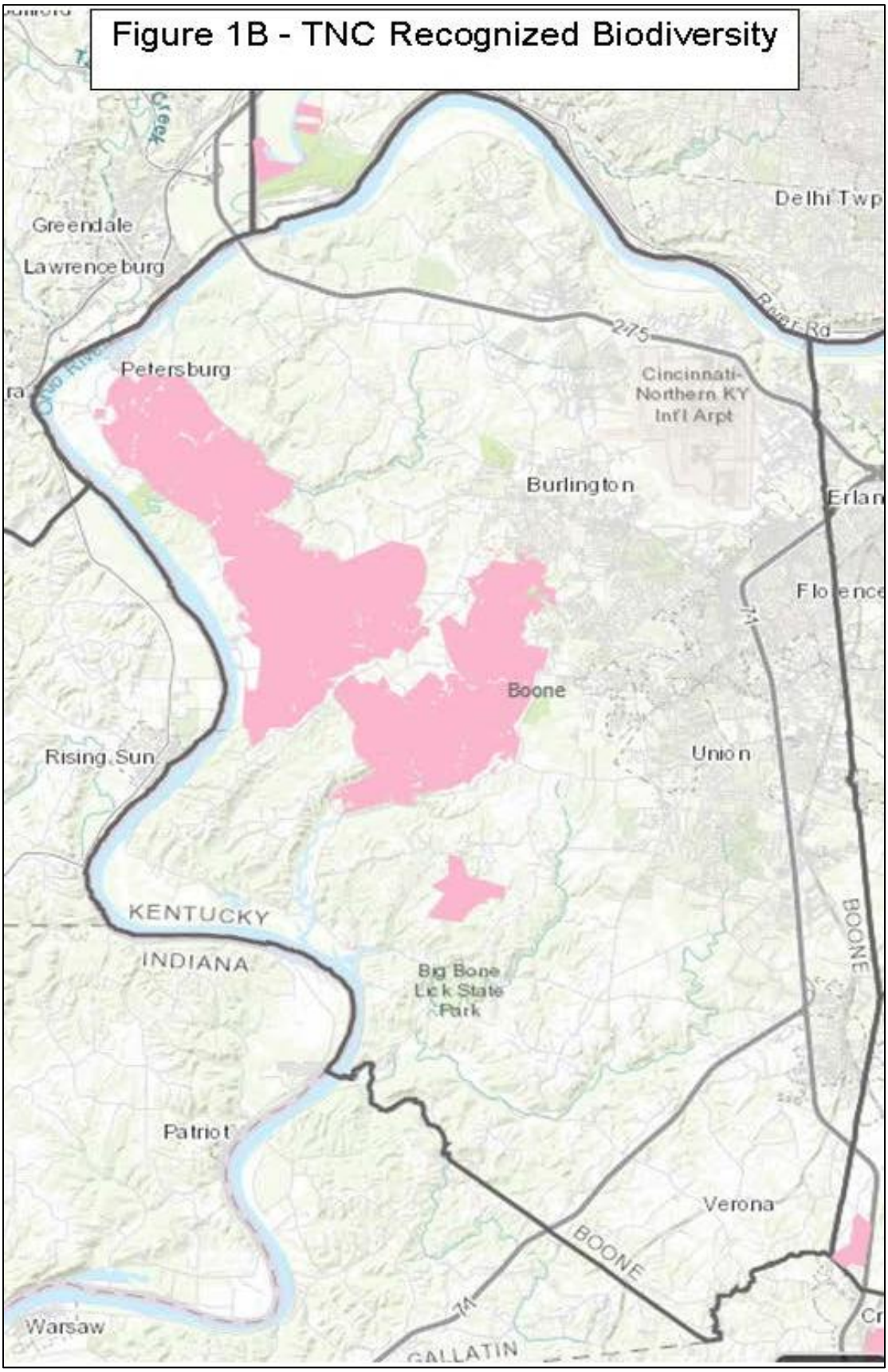


Figure 1B - TNC Recognized Biodiversity
Greendale
Lawrenceburg
Petersburg
Delhi Twp
Cincinnati-
Northern KY
Int'l Arpt
Burlington
Florence
Boone
Union
Rising Sun
KENTUCKY
INDIANA
Big Bone
Lick State
Park
Patriot
Verona
Warsaw
GALLATIN
BOONE
BOONE
71
71
275

Figure 1C - TNC Resiliency

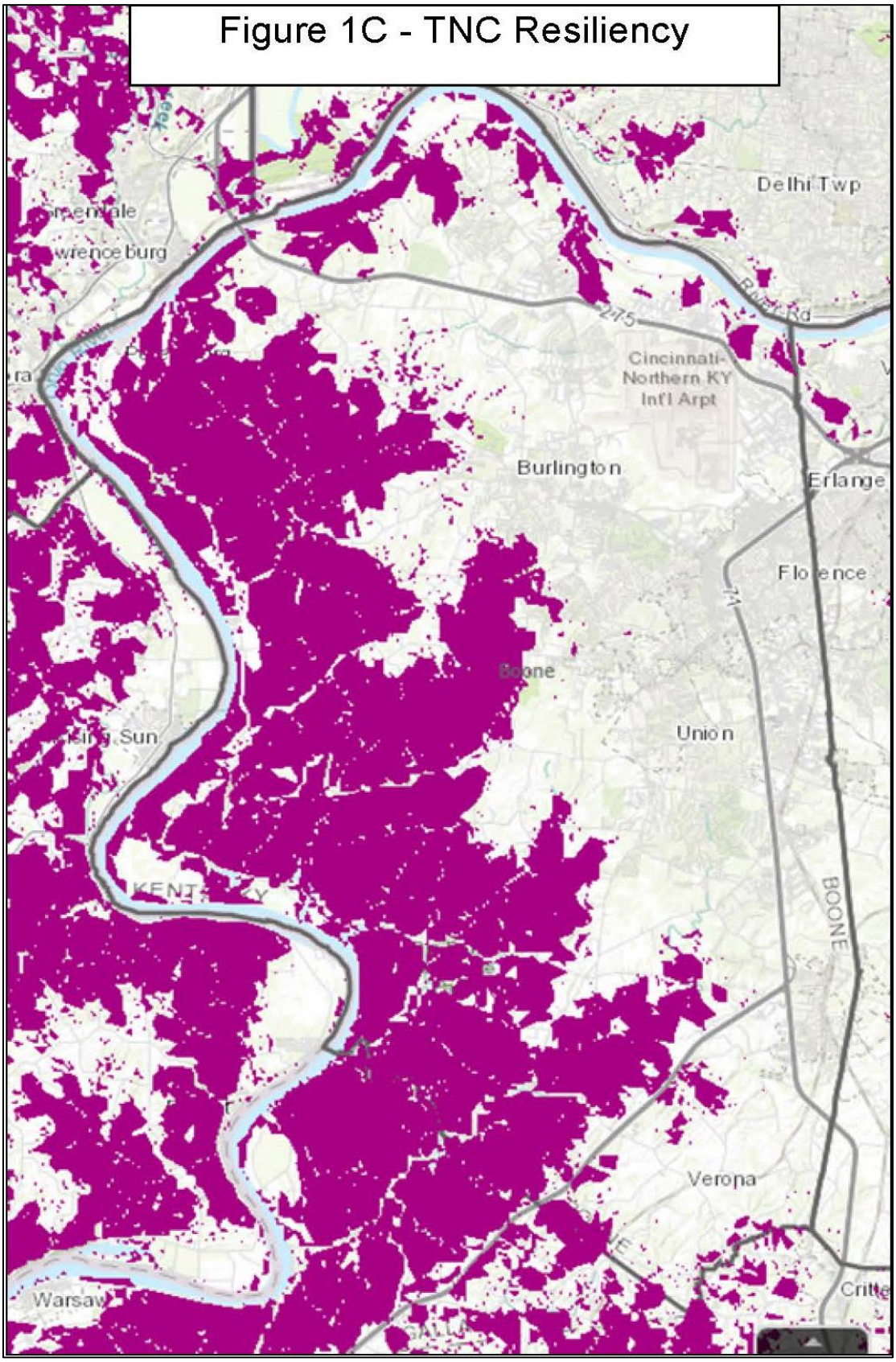


Figure 1D - Parks and Protected Areas

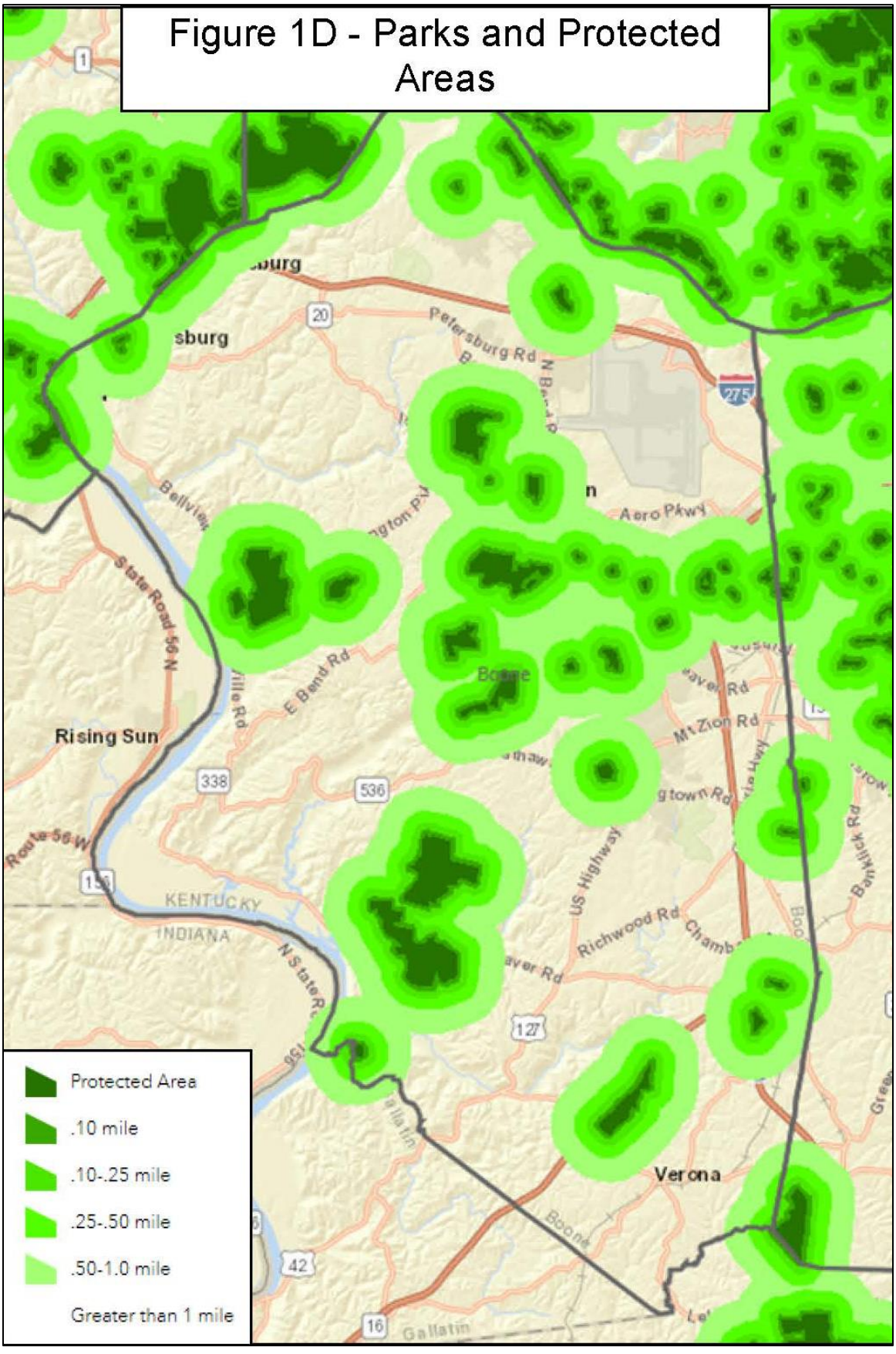


Figure 1E - Areas Abutting Large Perennial Streams

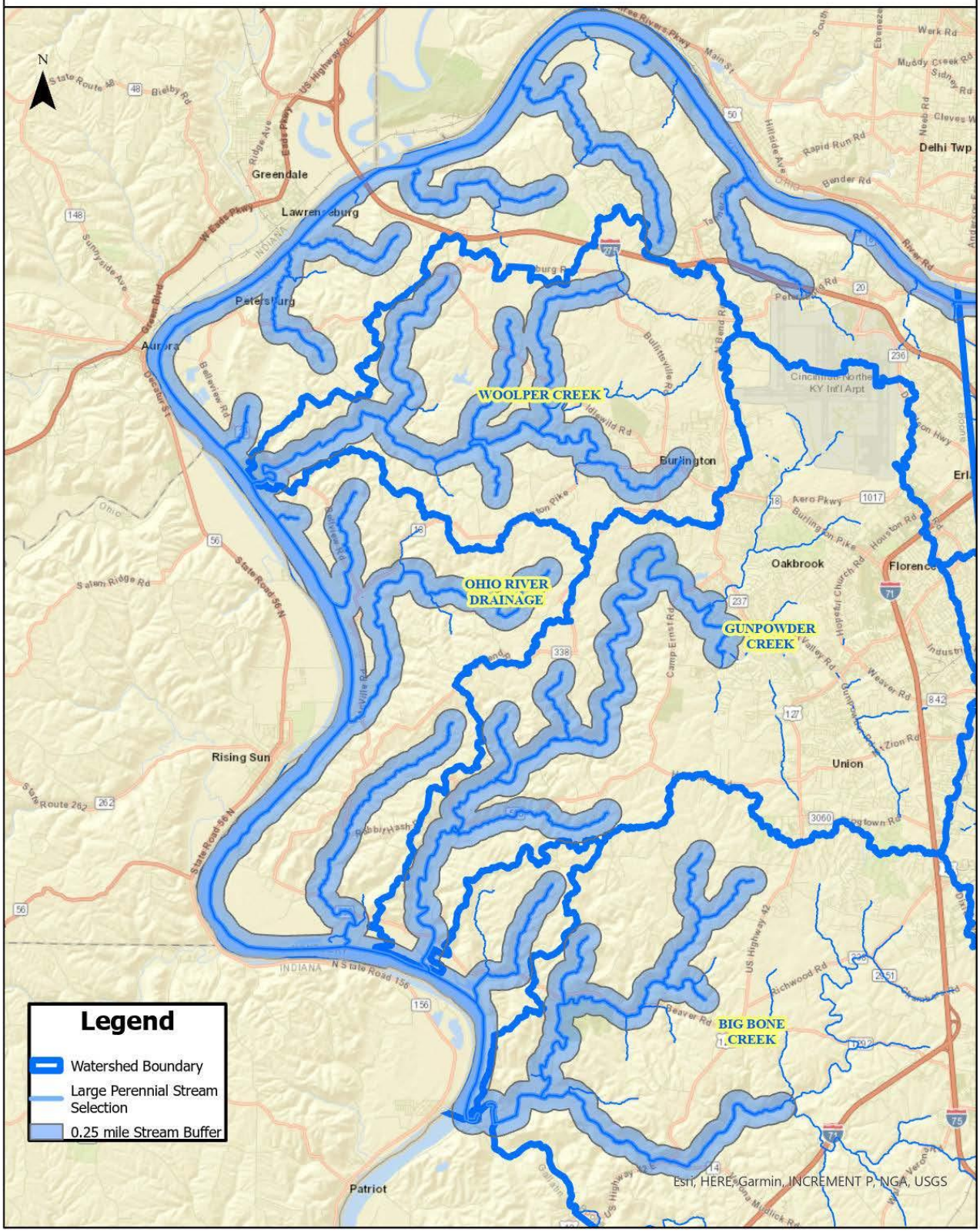


Figure 2A - EMSM Model Raw Data

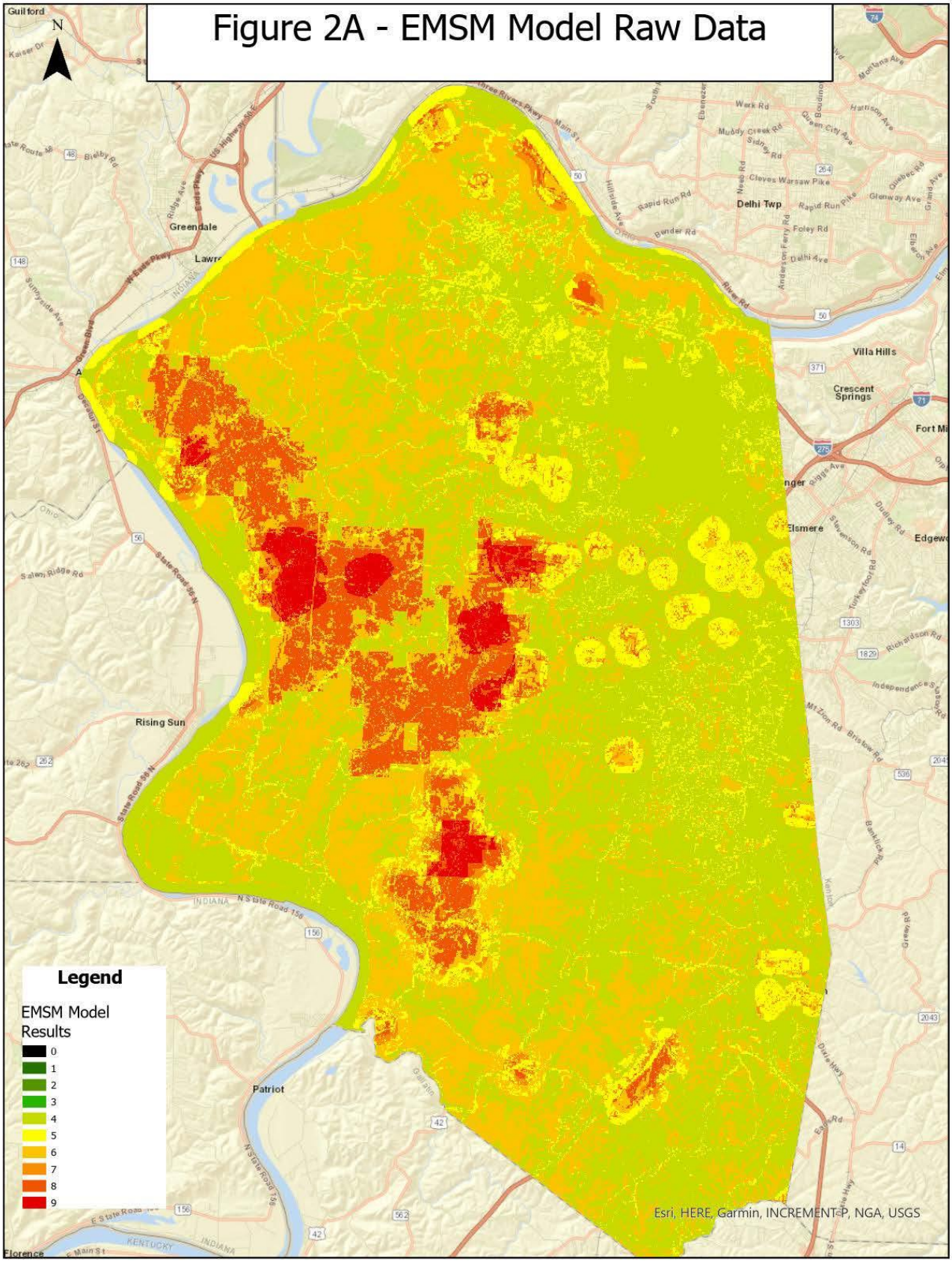


Figure 2A - High Scoring (6-9) Areas >1

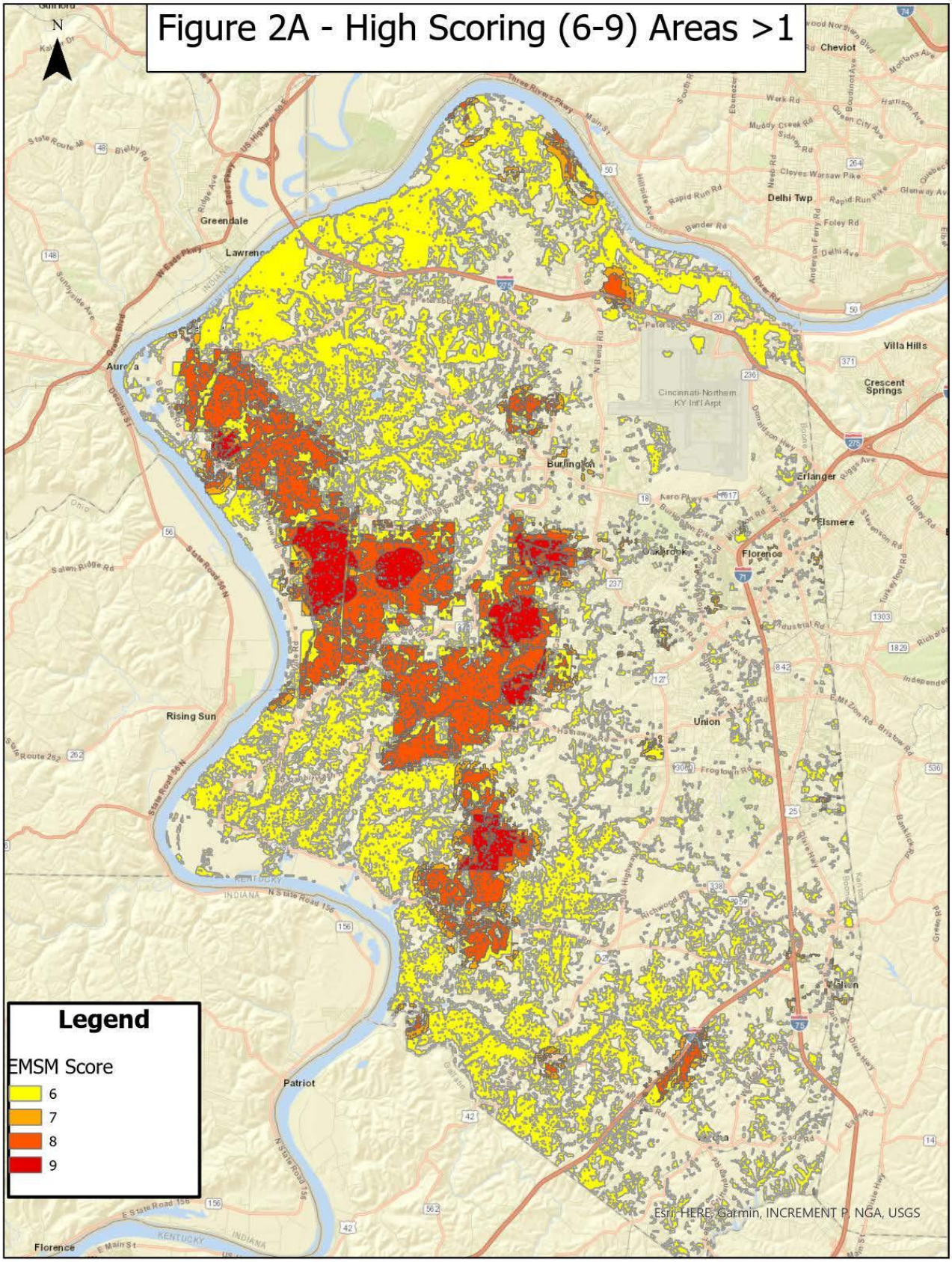


Figure 3 - Environmental Quality Modeling Study Results

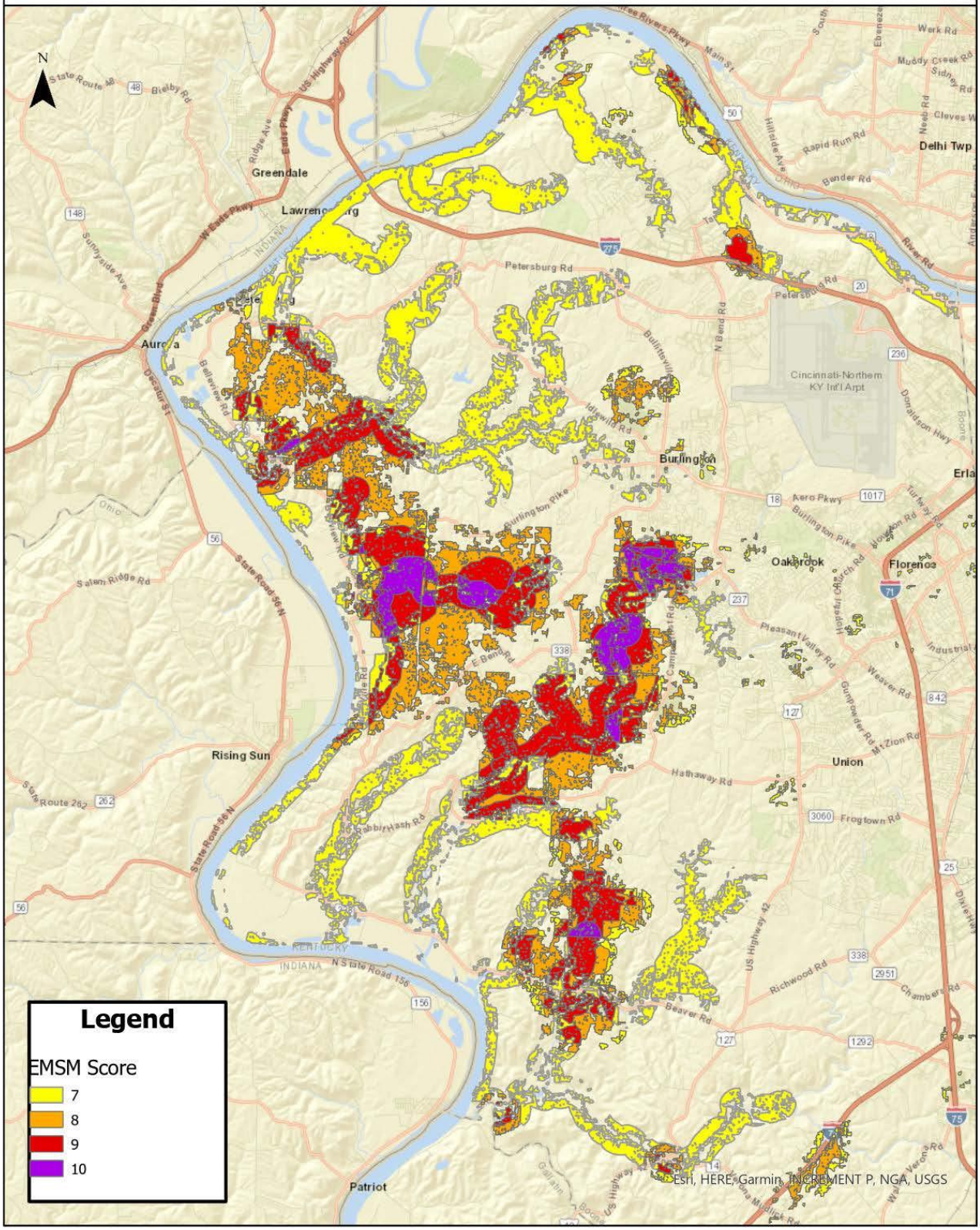


Figure 3 - Environmental Quality Modeling Study Results (With Additional Reference)

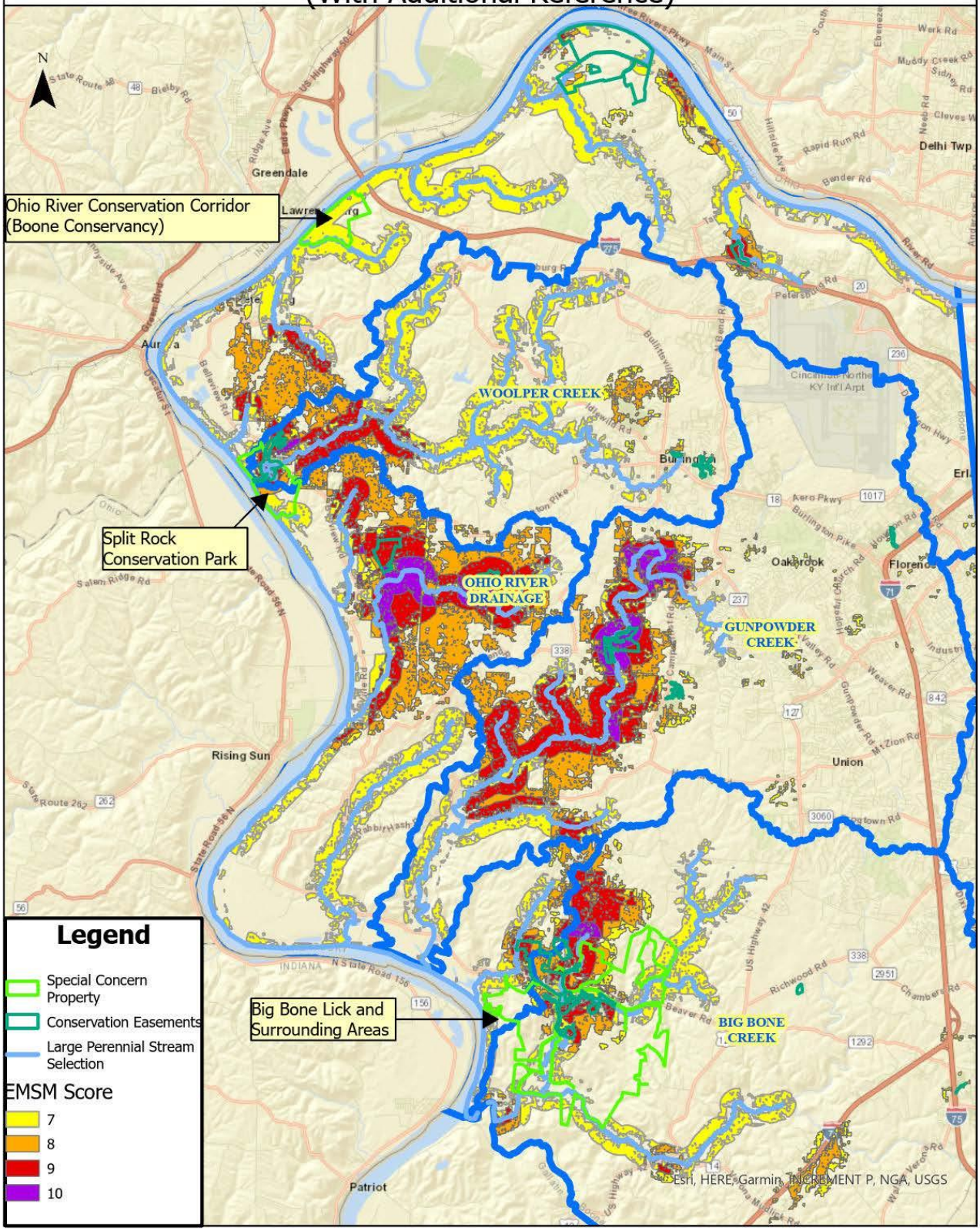


Figure 4 - The Southeast Conservation Blueprint for Boone County