

In Search of a Reference – The Least Disturbed Condition In a Kentucky Landscape



Presenter: Andrew J Stump, Environmental Scientist
Kentucky Wetland and Stream Fee In-Lieu-Of
Mitigation Program



Presentation Overview:

- KDFWR FILO History
- After Action Review (AAR)
- Identifying Projects to Assess
- Compiling Potential Reference Sites
- Building a Biogeographic Filter
- Using Biogeographic Filters For Prioritization



A fisherman wearing a hat and boots stands in a stream, holding a large fish. The scene is set in a lush, green forest with trees and foliage. The image has a green tint.

KDFWR FILO & After Action Review

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History, Organization, and Structure

The Wetland and Stream Fees In-Lieu-Of (FILO) Mitigation Program – Est. in 2000

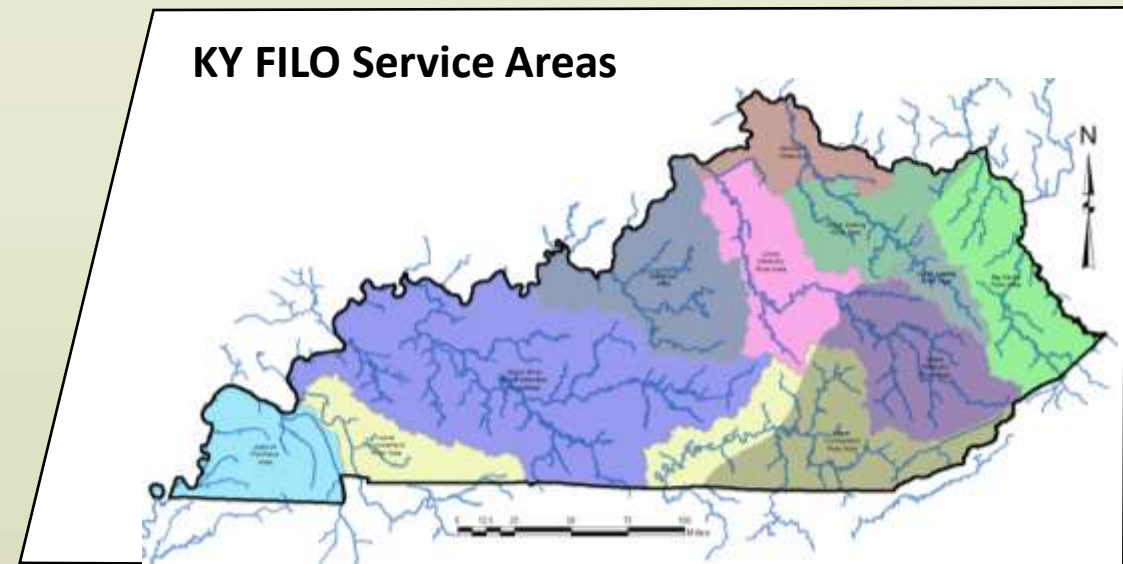
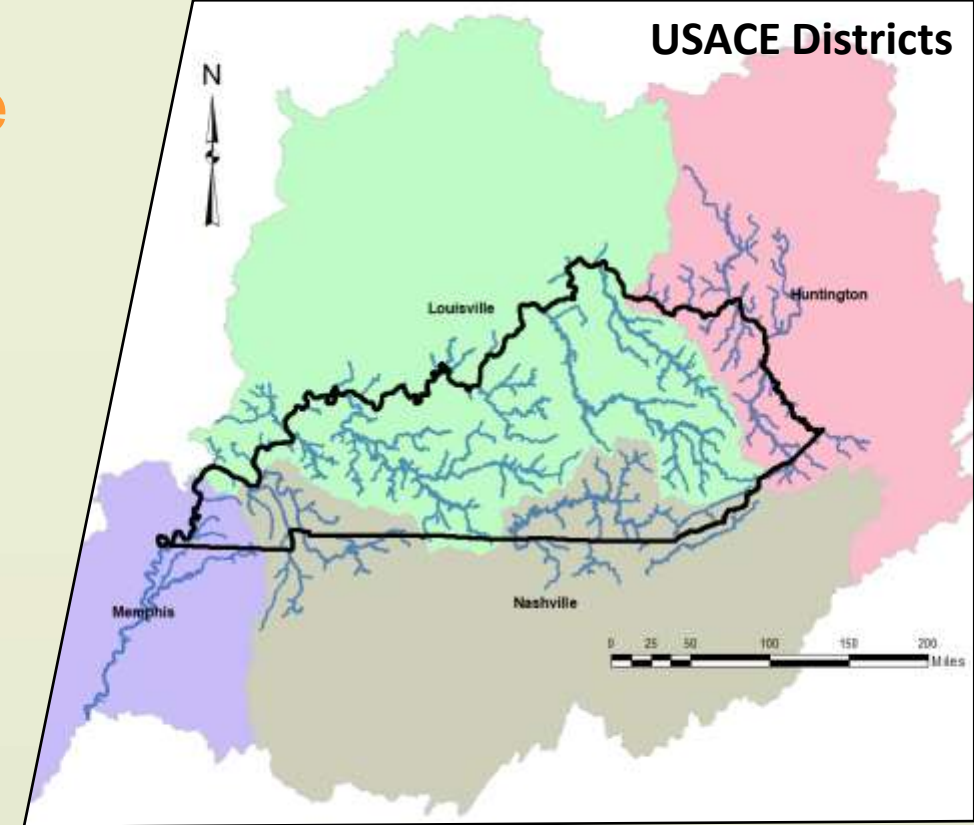
- Tasked with restoring, enhancing, establishing, and preserving aquatic resources

Our Programmatic Landscape

- 4 USACE Districts
- 11 Service Areas
- 4 Agencies on the IRT

Procedures for in-lieu-fee mitigation are lined out through our Instrument with the Corps

- Mitigation LOP: “Letter of Permission Authorizing New Mitigation Projects Associated with Approved Compensatory Mitigation Banking and In-Lieu Fee Instruments”
- Request for an “**After Action Review**”





After Action Review - AAR

General Purpose

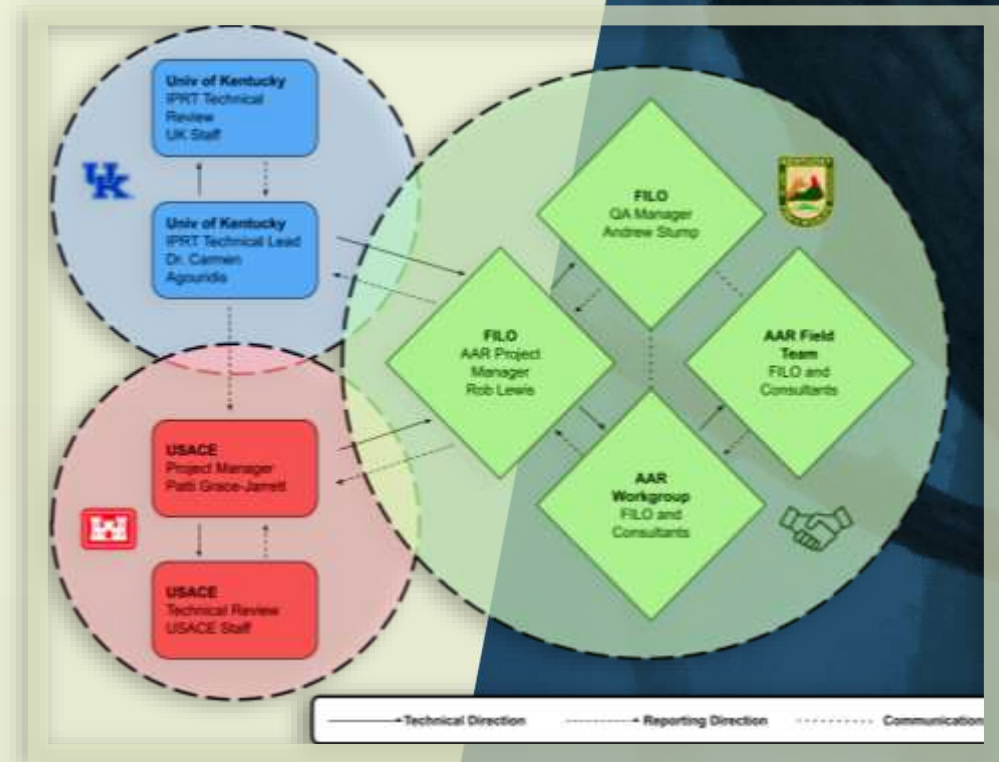
- Evaluate the ecological effectiveness of approved compensatory mitigation on stream projects

Scope of Analysis – FIVE Elements

1. Site Sustainability and Resiliency
2. Long-term Trajectory Towards an Ecological Reference – LDC
3. Compensatory Mitigation
4. Appropriateness of MP – Design and Construction
5. Appropriateness of Approved Performance Standards

Quality Assurances

- AAR Workgroup – FILO and Consultants
- IPRT – University Staff
- USACE – Oversight and Approval



AAR Quality Assurance and Communication Structure





After Action Review - AAR

General Purpose

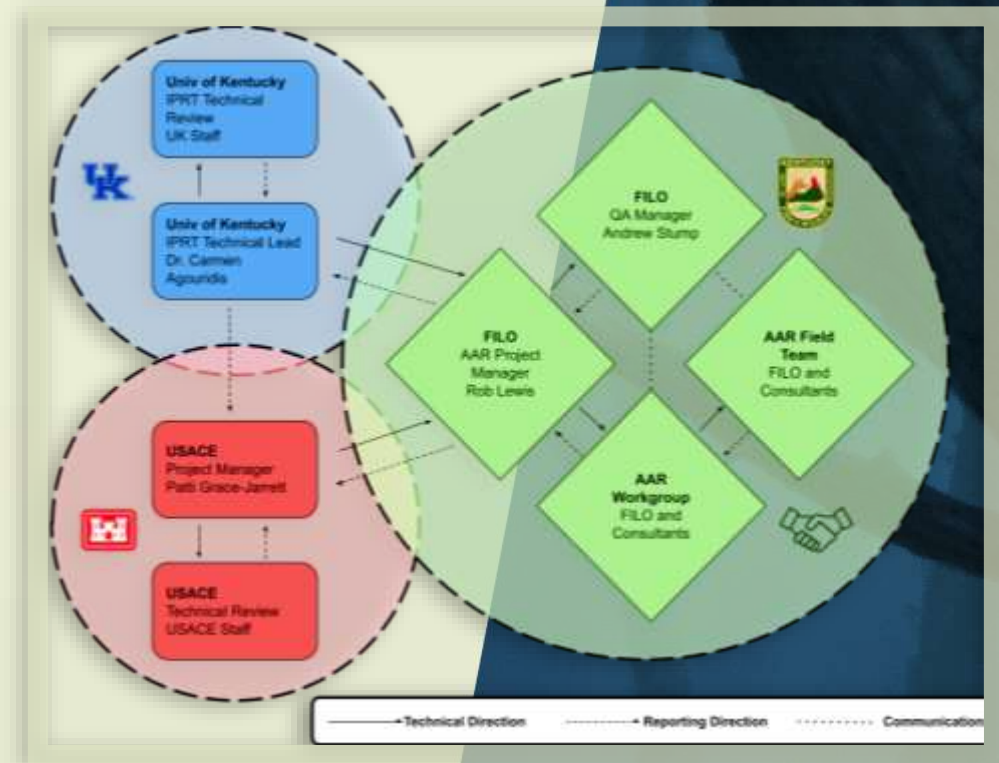
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AAR Quality Assurance and Communication Structure



A dark, atmospheric photograph of a bat perched on a large, textured rock. The bat is the central focus, with its wings partially spread. The background is a dense, dark forest with some foliage visible on the left side. The overall color palette is monochromatic, dominated by dark blues and greys.

Identifying Projects to Assess

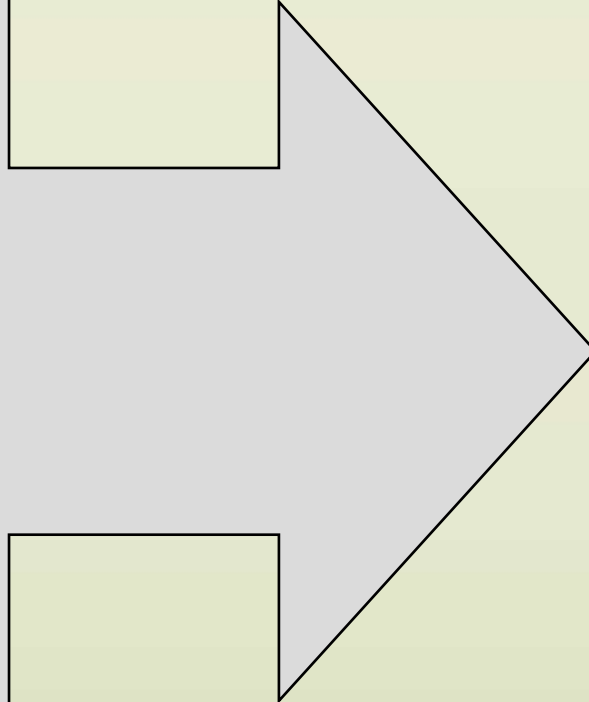
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After Action Review - AAR

Project Selection:

- 3 yrs post “As-Built” phase
- Defined goals and objectives
- Site protection on both banks with ≥ 25 ft easement and prioritized if ≥ 50 ft
- Stream length ≥ 1000 ft and prioritized if ≥ 3000 ft
- Projects with only preservation were excluded



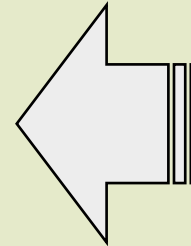
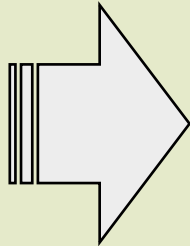
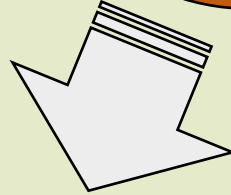
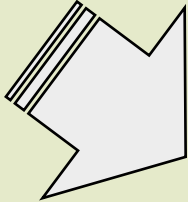
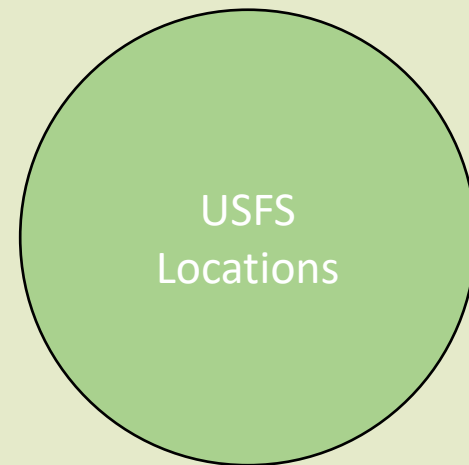
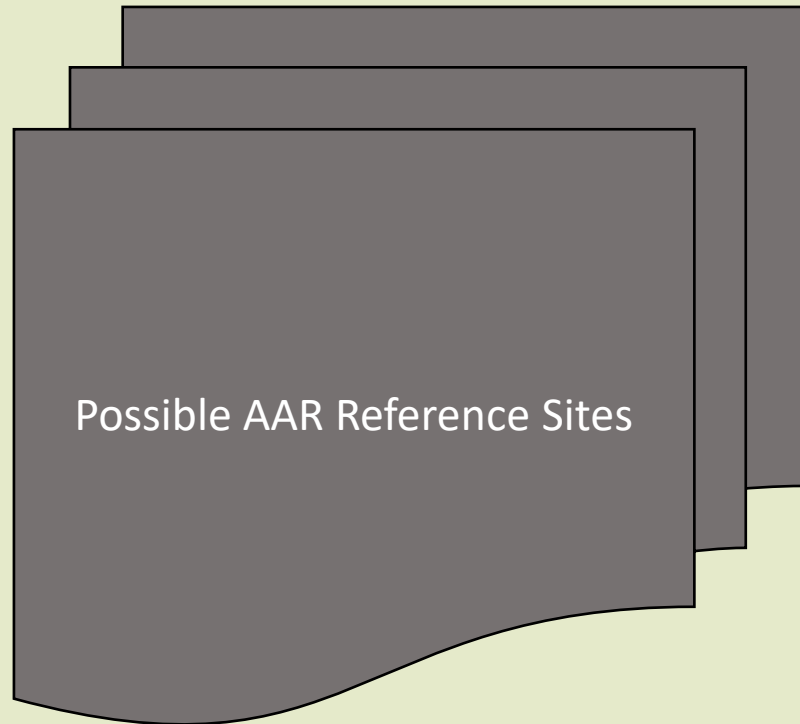
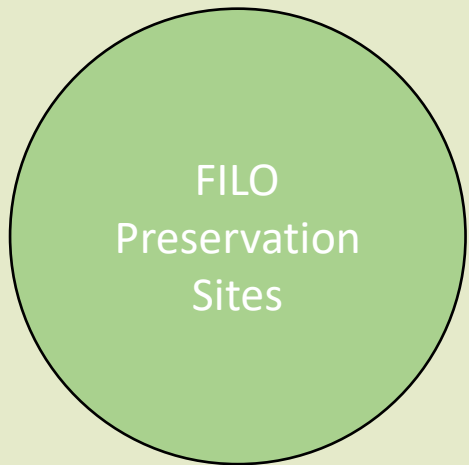
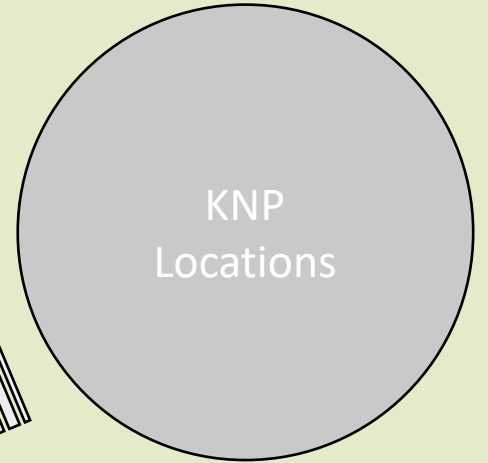
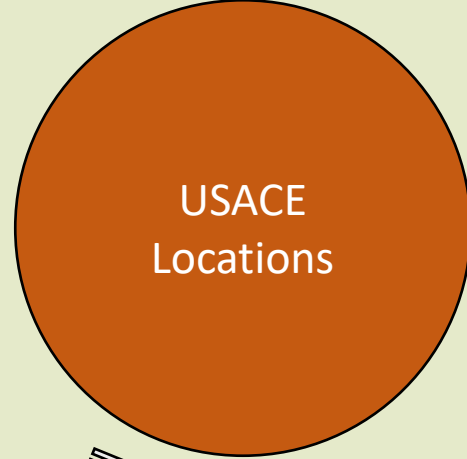
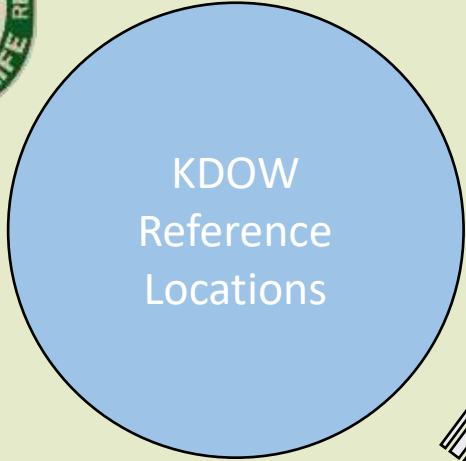
Twelve Projects

Obion II
Eagle Creek Tributaries
Elm Fork
Minors Creek
Red Oak (Drainage C)
Roger’s Gap
Myers Station
Big Farm
Slabcamp-Stonecoal
Old Trace Creek
Ross Creek I & II
Elisha Creek



Compiling Potential Reference Sites

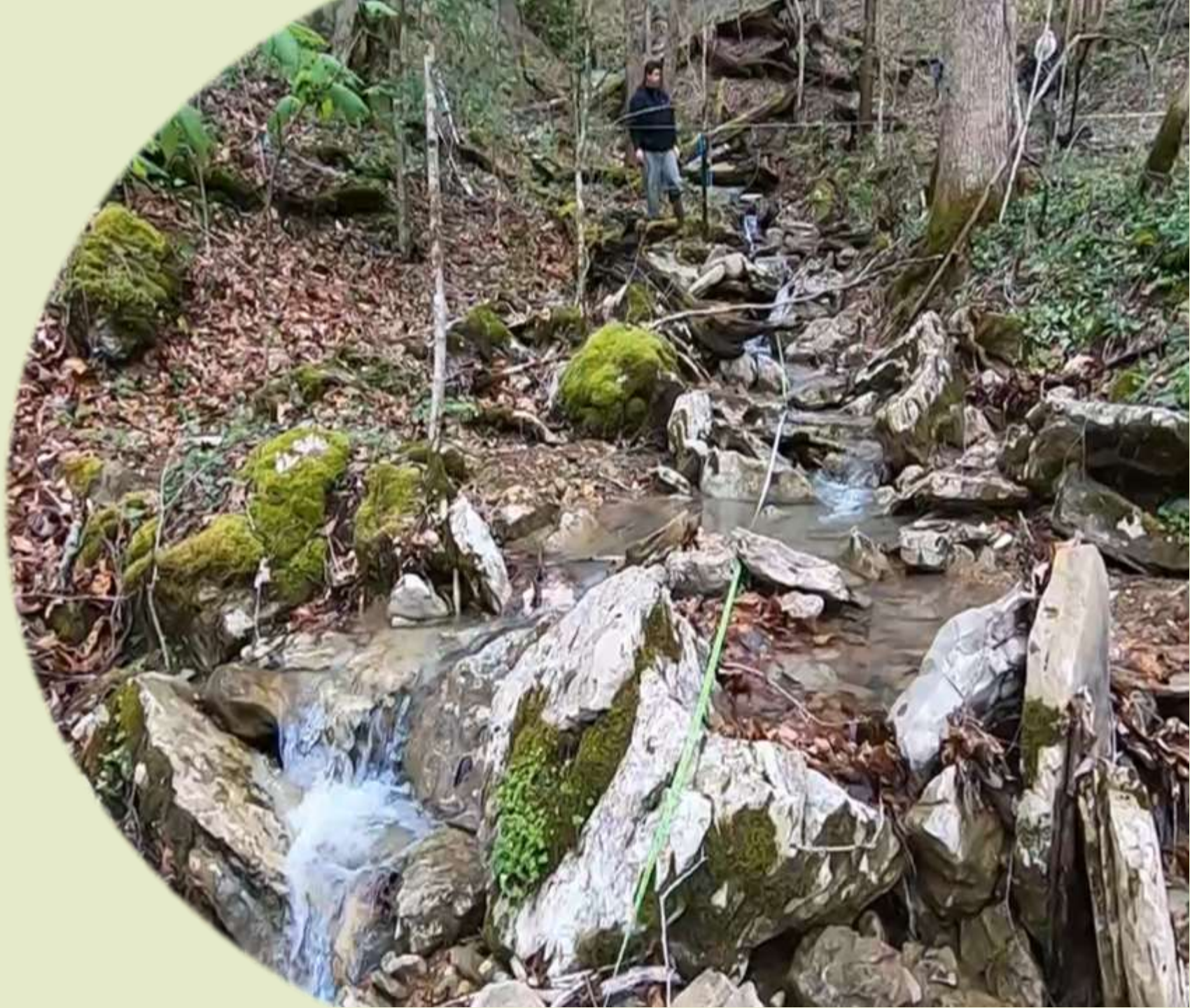
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Least Disturbed (LDC)

- A high-quality functional system.
- No adjacent impacts that may affect natural stream functionality.
- Stable hydraulics and geomorphology suggesting long-term stability.





Best Attainable (BAC)

- A high-quality, functional system.
- Impaired in some way that disqualifies it as a least disturbed site.
- Given the impacts in the region, these are likely the best of what is available.





Composite Sites (COMP)

- A composite of individual characteristics.
- Only used if no overall reference examples exist.
- May not provide reliable targets

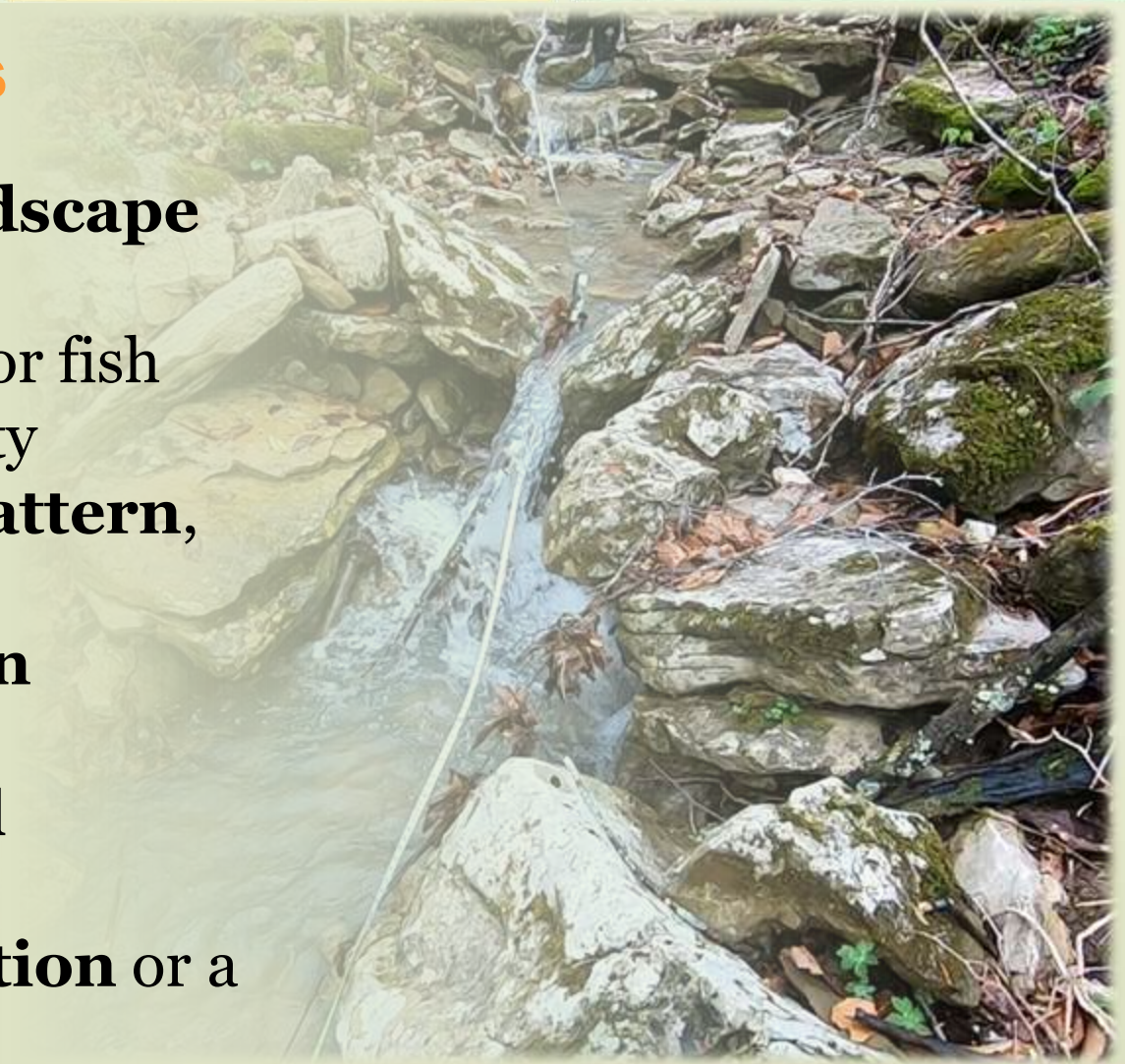





Site Specific Considerations

General Guidance:

- Appropriate for the **landscape setting**
- High **quality habitat** for fish and invertebrate diversity
- Natural **Dimension, Pattern, and Profile**
- Well developed **riparian vegetation**
- Limited/non-recent **soil disturbance**
- Displays **climax condition** or a slow rate of evolution





Building a Biogeographic Filter

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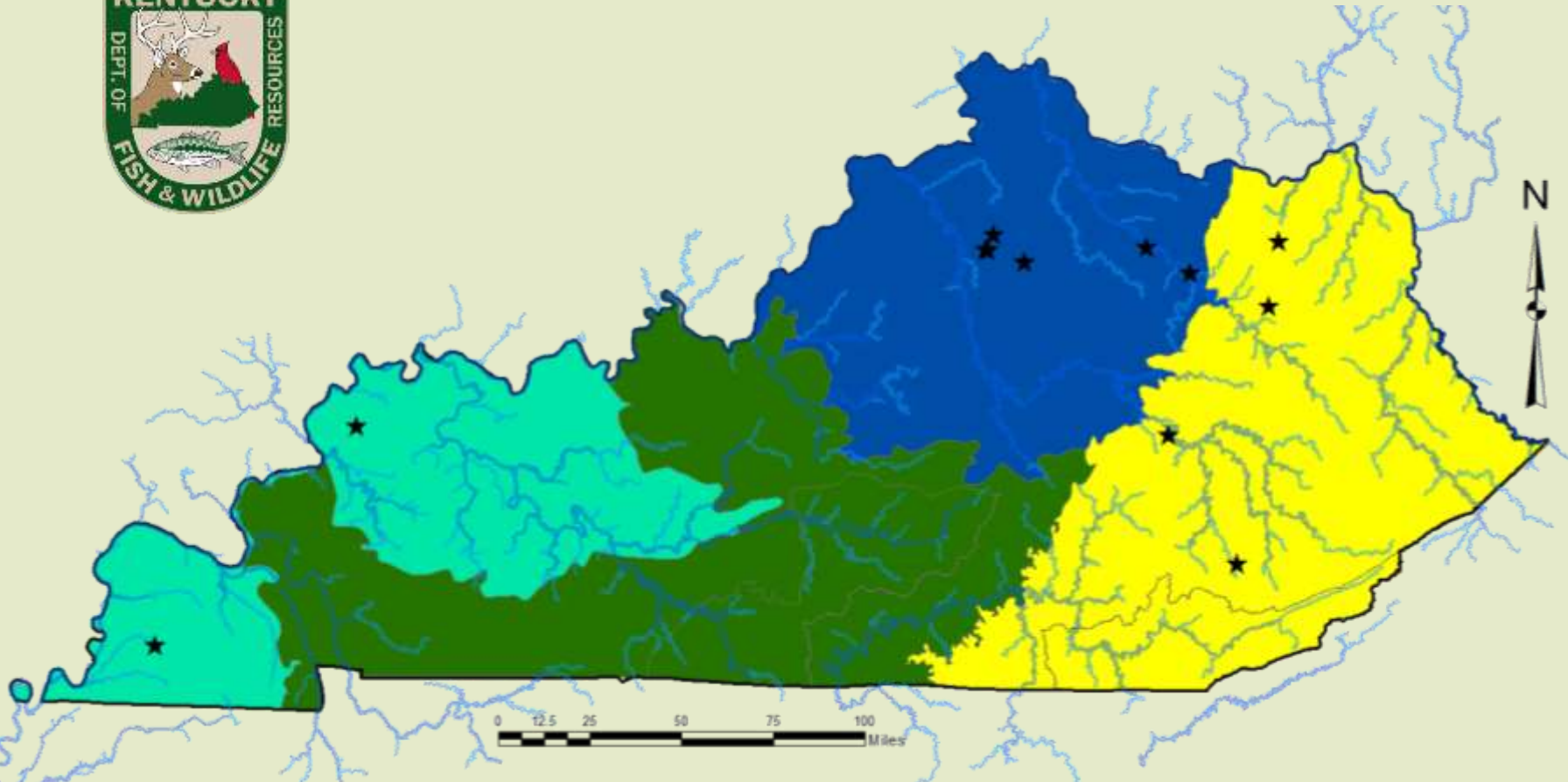
9 Biogeographic Aggregations

- BioRegion – Habitat information developed through DOW sampling across the state
- EcoRegions – Geophysical and vegetative patterns on a national scale
- Watersheds – Biological groupings by contiguous watershed characteristics



Project	BioRegion	EcoRegionIII	EcoRegionIV	Basin	HUC8
Obion Creek II	Mississippi Valley Interior River	Mississippi Valley Loess Plains	Loess Plains	Mississippi River/Minor Tributaries	Bayou De Chien-Mayfield
Eagle Creek Tribs	Mississippi Valley Interior River	Interior River Valleys and Hills	Green River-Southern Wabash Lowlands	Ohio River/Minor Tributaries	Lower Ohio-Bay
Elm Fork	Bluegrass	Interior Plateau	Hills of the Bluegrass	Kentucky River	Lower Kentucky
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Big Farm Indian Creek	Bluegrass	Interior Plateau	Outer Bluegrass	Licking River	Licking River
Slabcamp Stonecoal	Mountains	Western Allegheny Plateau	Northern Forested Plateau Escarpment	Licking River	Licking River
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Elisha Creek	Mountains	Central Appalachians	Dissected Appalachian Plateau	Kentucky River	South Fork Kentucky

After Action Review – Habitat

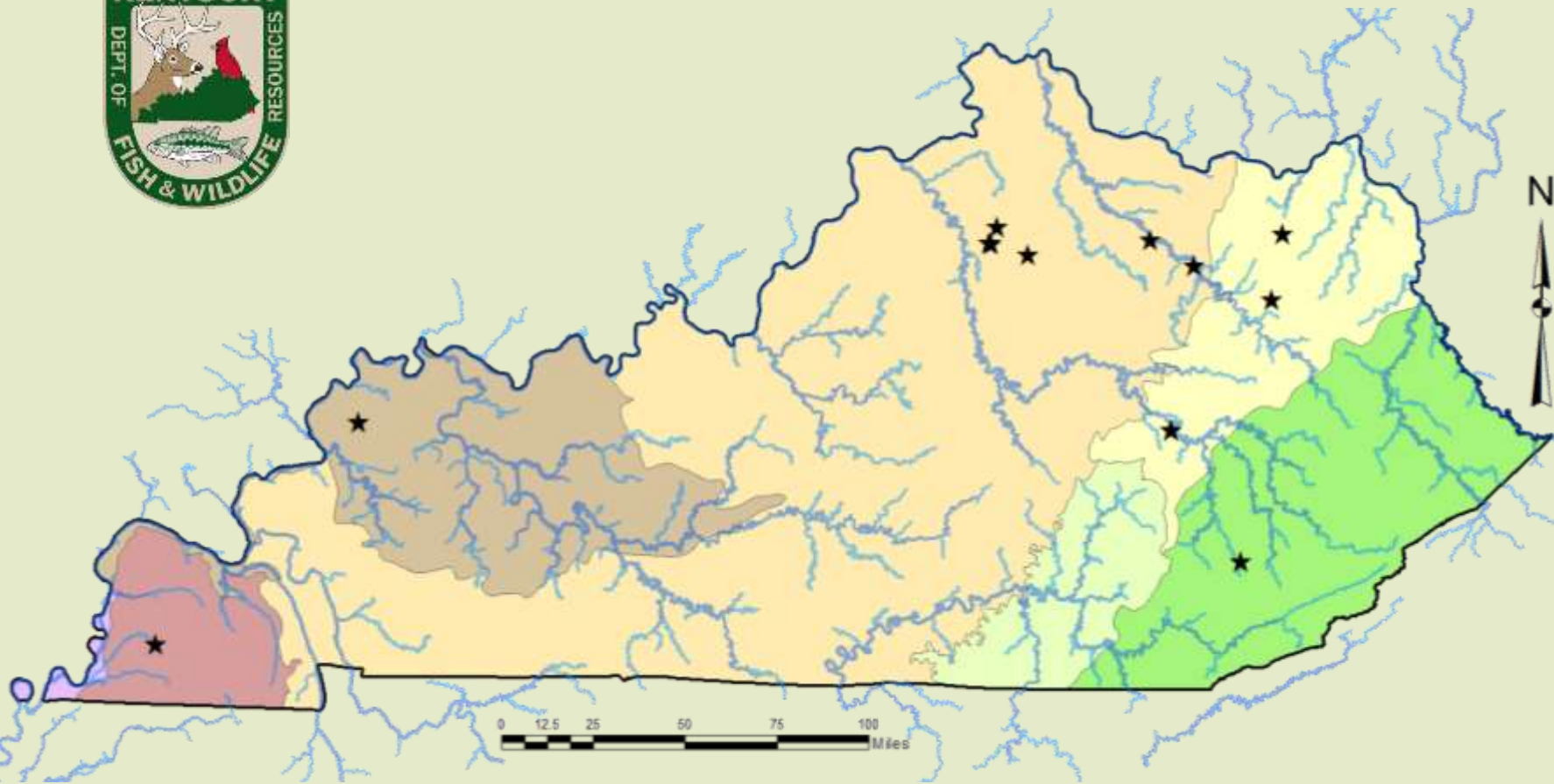


Project Landscapes:

- Mountains
- Bluegrass
- Mississippi Valley
- Interior Rivers

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After Action Review – L3

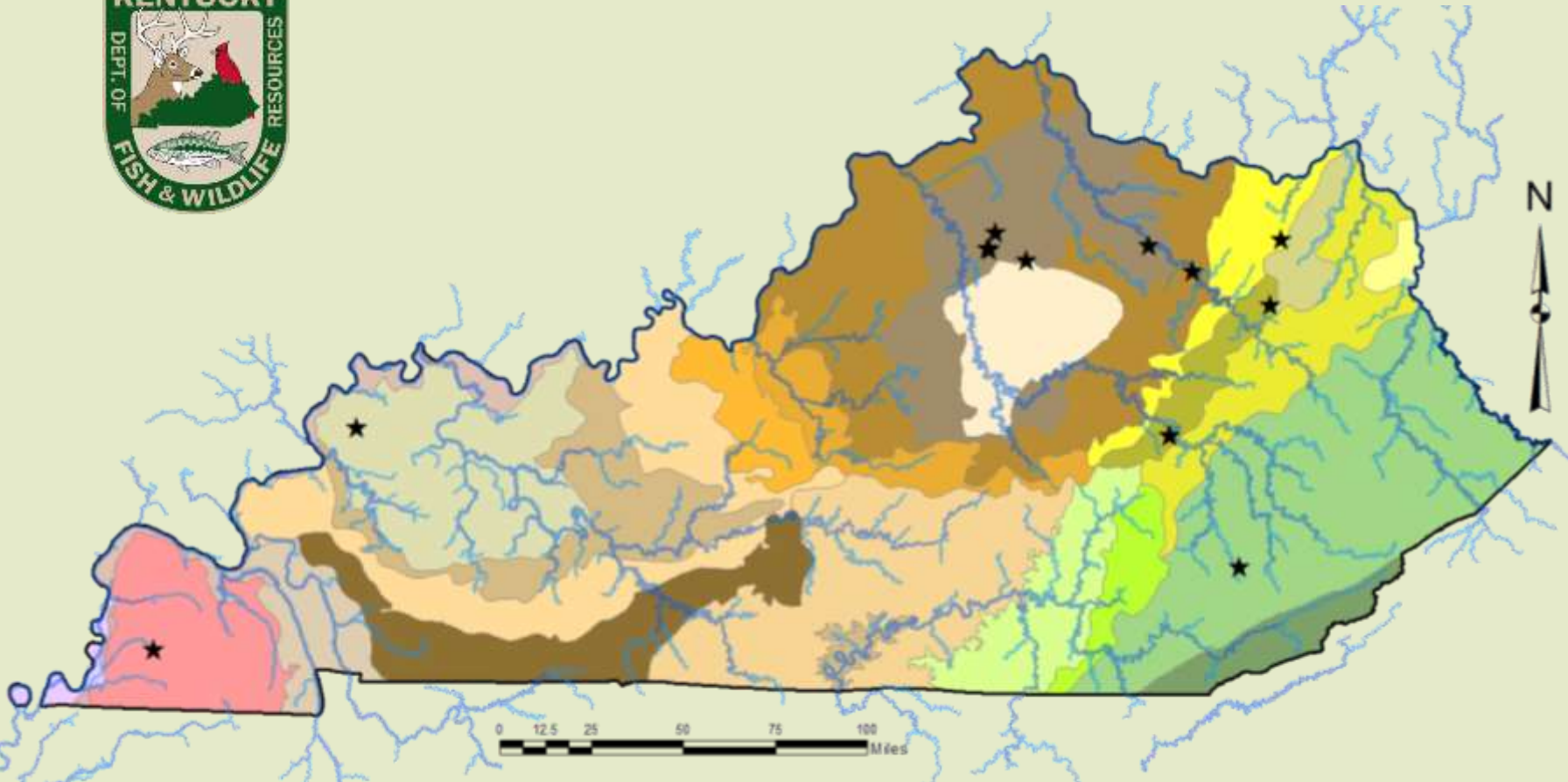


Project Landscapes:

- Mississippi Valley
Loess Plains
- Interior River Valleys
and Hills
- Interior Plateau
- Western Allegheny
Plateau
- Central Appalachians

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After Action Review – L4



Project Landscapes:

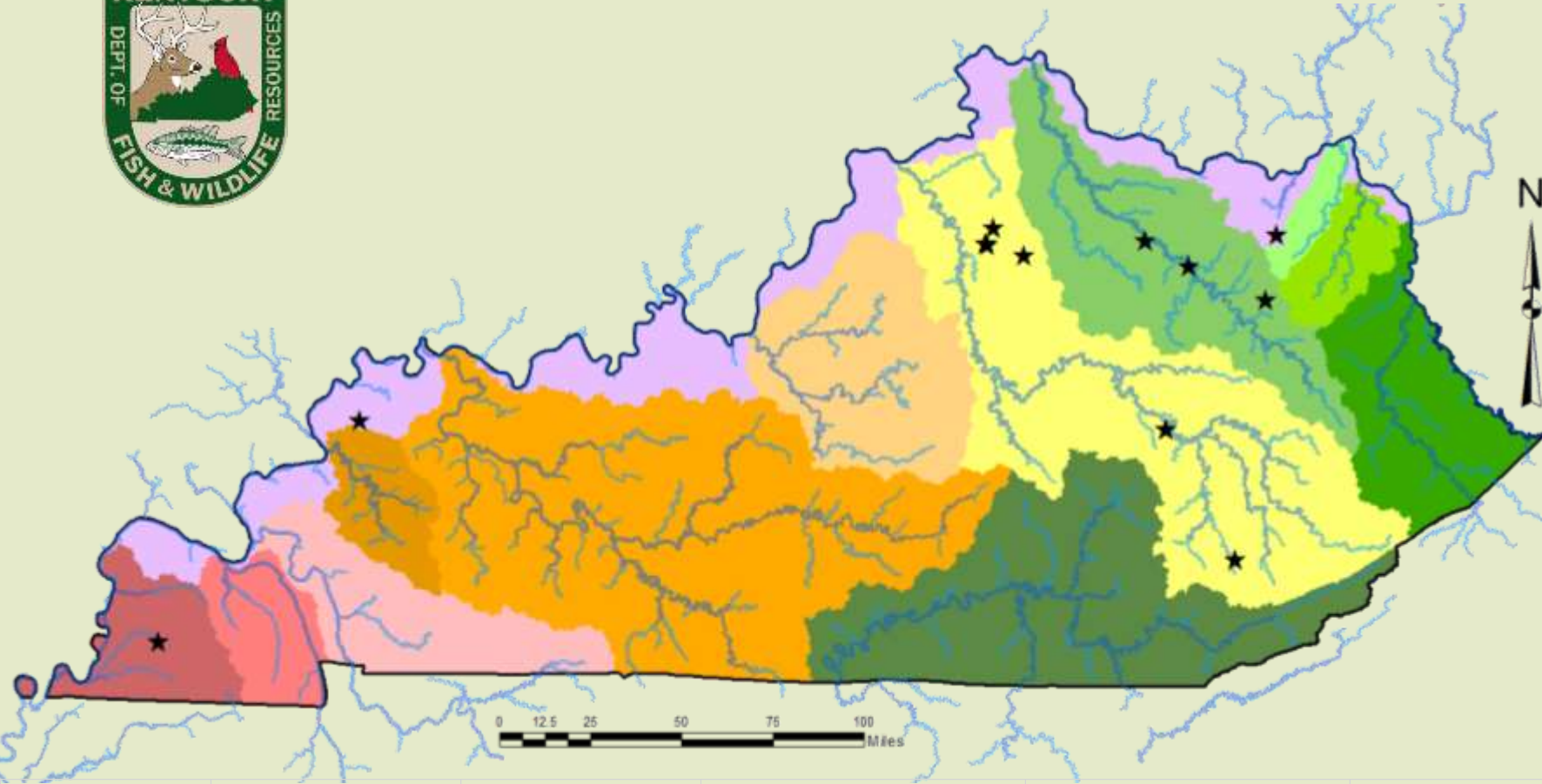
- Loess Plains
- Green River-Southern Wabash Lowlands
- Hills of the Bluegrass
- Outer Bluegrass
- Northern Forested Plateau Escarpment
- Knob-Lower Scioto Dissected Plateau
- Dissected Appalachian Plateau

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After Action Review - AAR

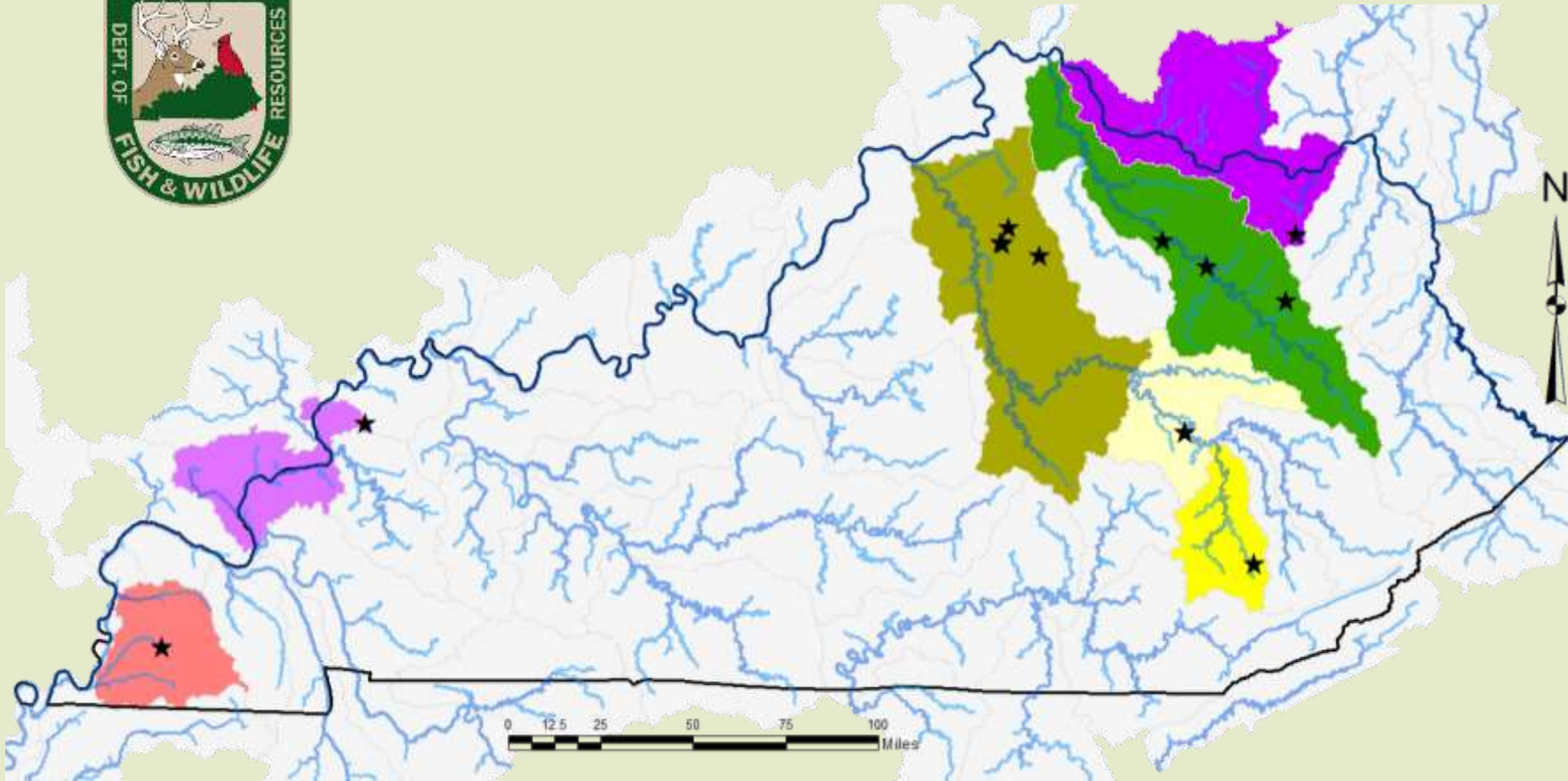
Project Landscapes:

- Ohio River - Minor Tributaries
- Licking River
- Kentucky River
- Mississippi River - Minor Tributaries



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After Action Review - AAR



Project Landscapes:

- Bayou De Chien – Mayfield
- Lower Ohio – Bay
- South Fork Kentucky
- Upper Kentucky
- Lower Kentucky

• Licking River

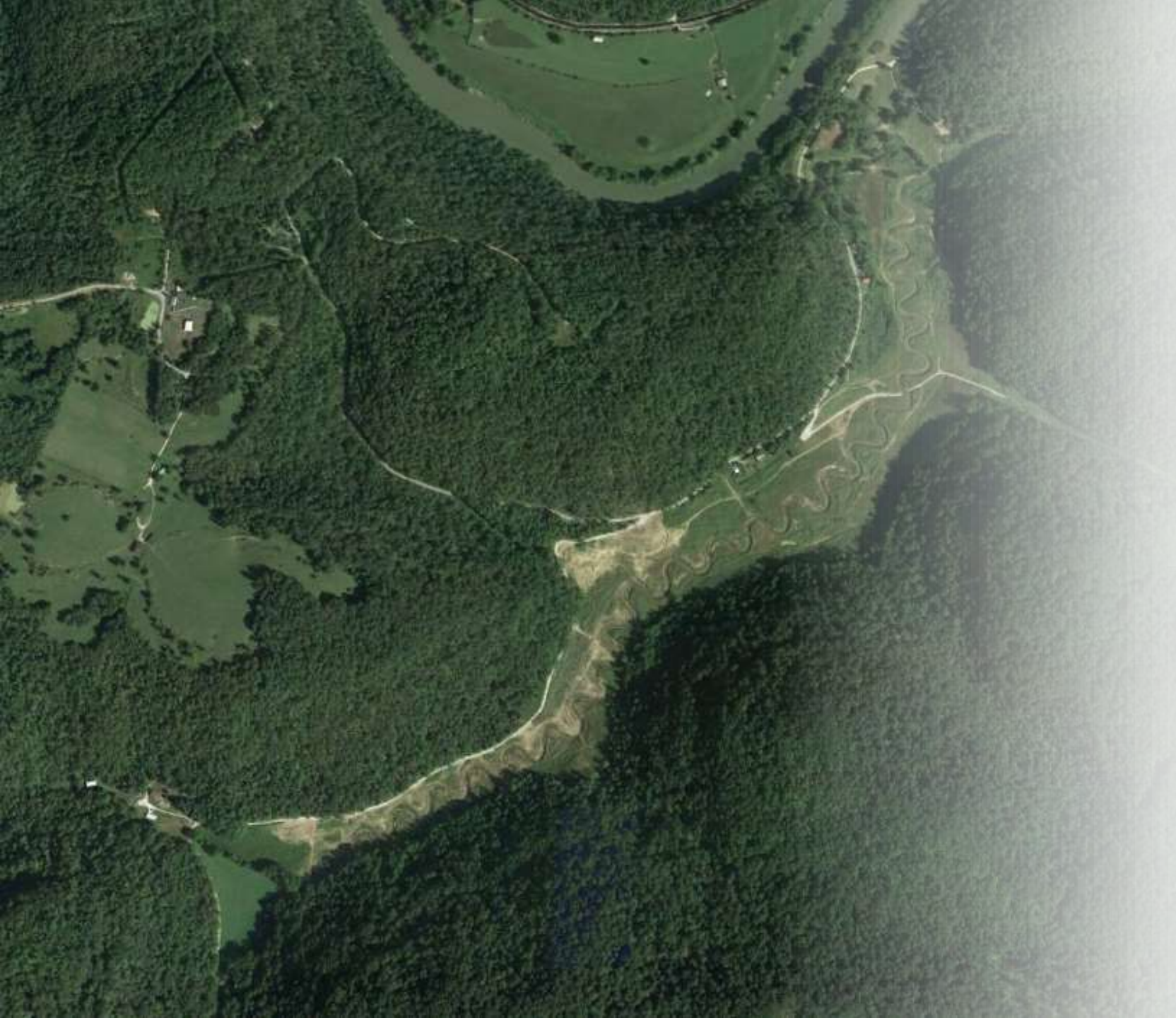
• Ohio Brush – Whiteoak

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The background is a green-tinted image. It features a large, detailed fish, possibly a cichlid, with its head and scales visible. In the lower-left corner, there is a smaller, more colorful insect-like creature, possibly a damselfly nymph, with red and green markings. The overall scene is set against a dark green background with some faint, darker green lines suggesting a natural habitat.

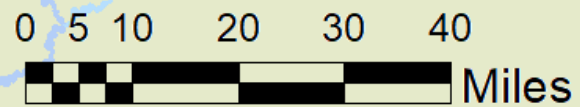
Using Biogeographic Filters For Prioritization

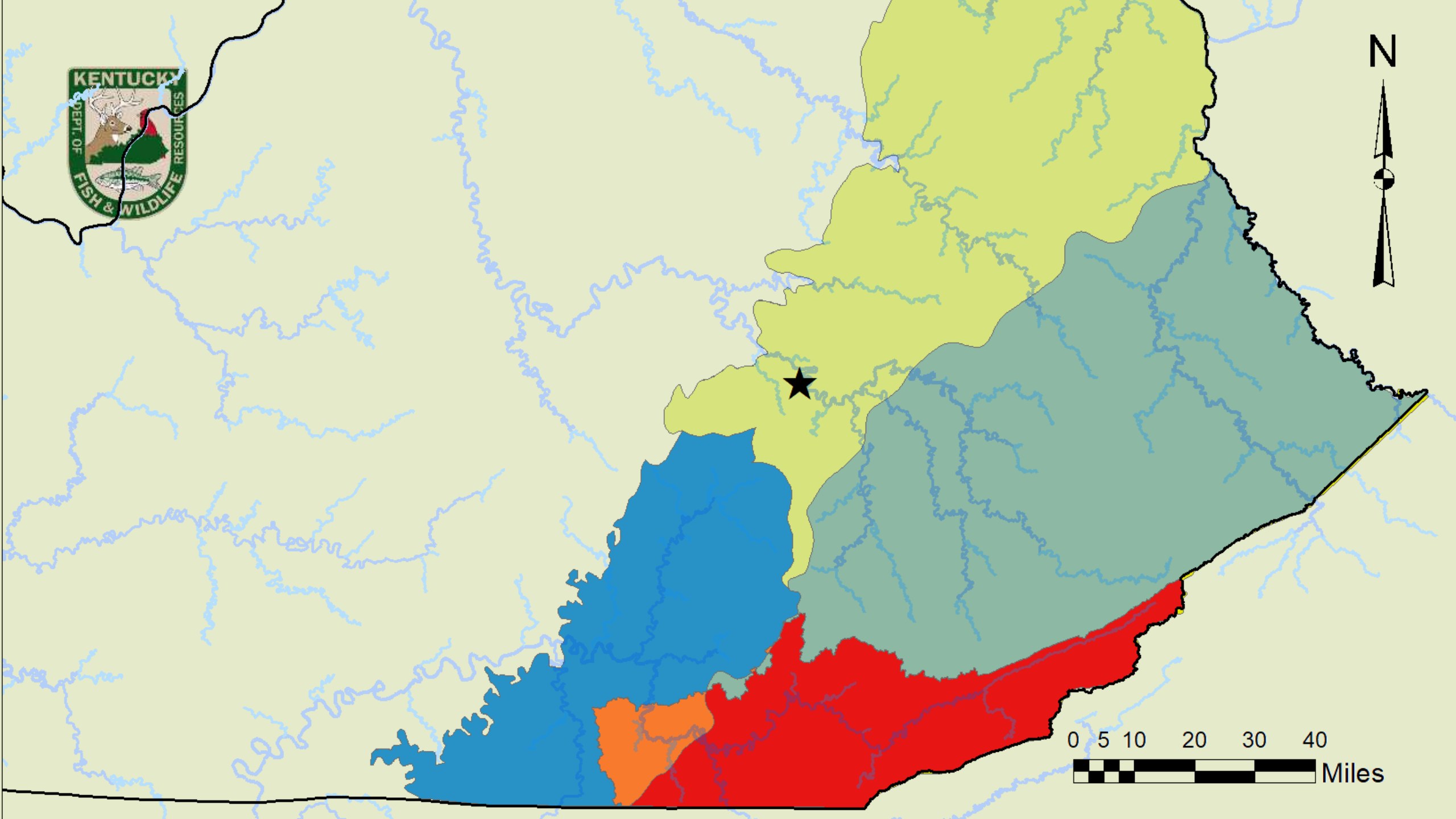
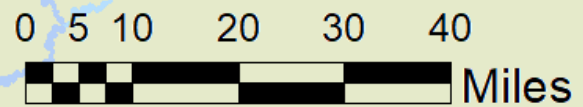
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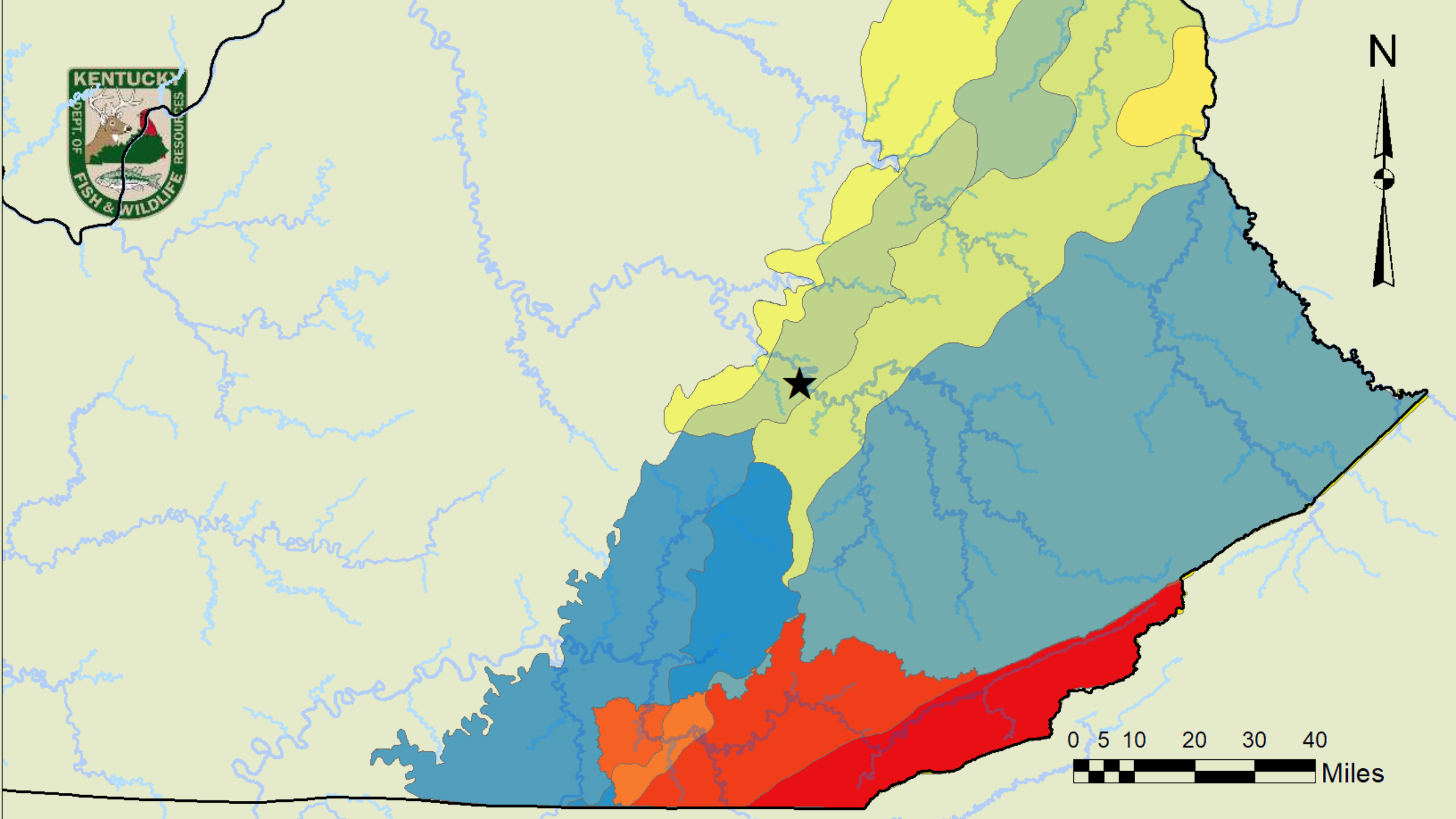
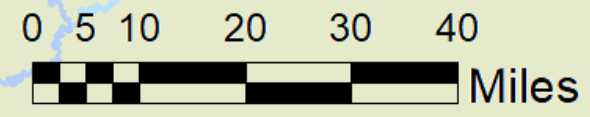


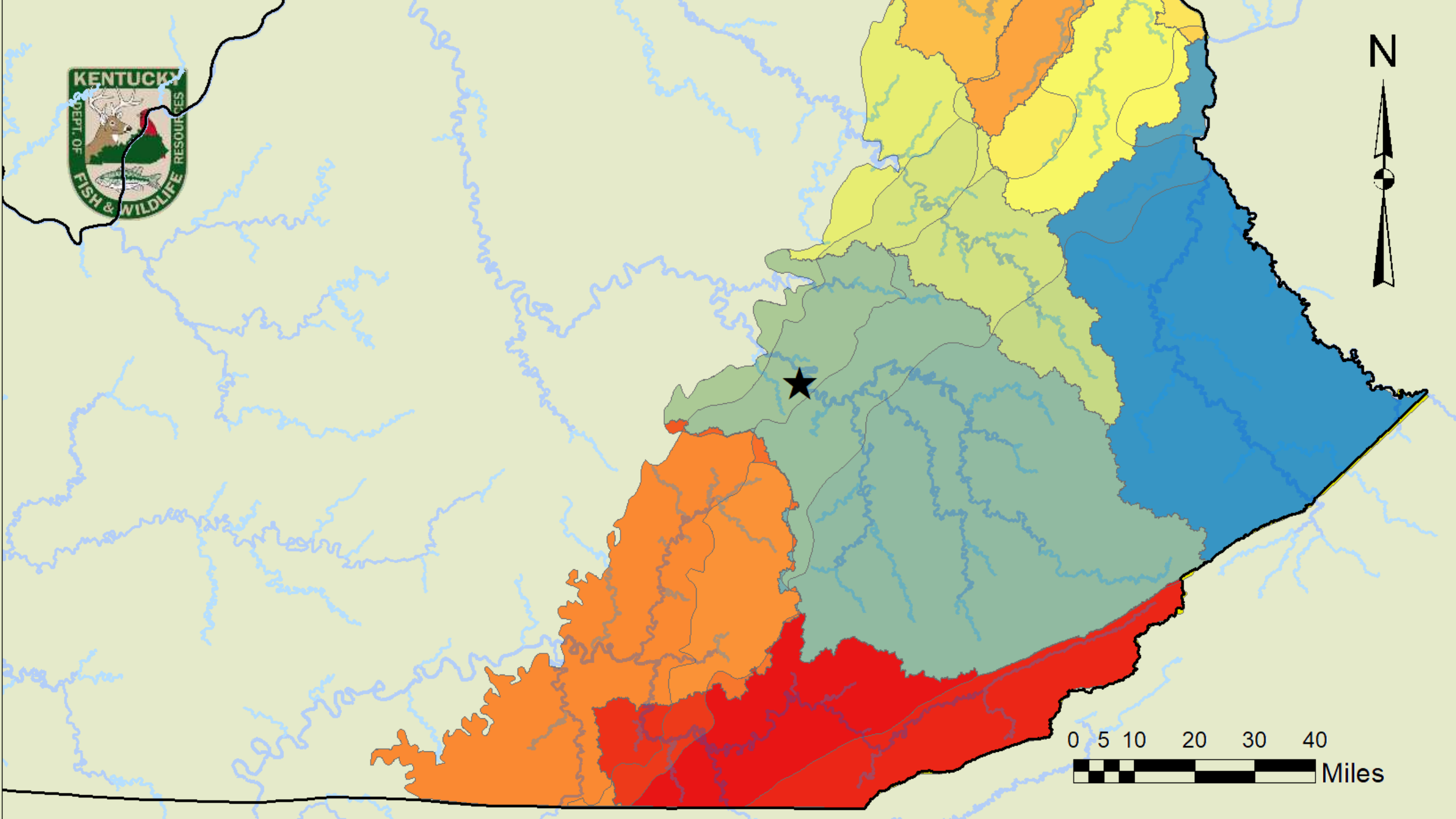
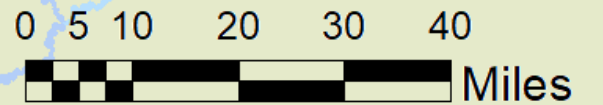
Filter Example Ross Creek

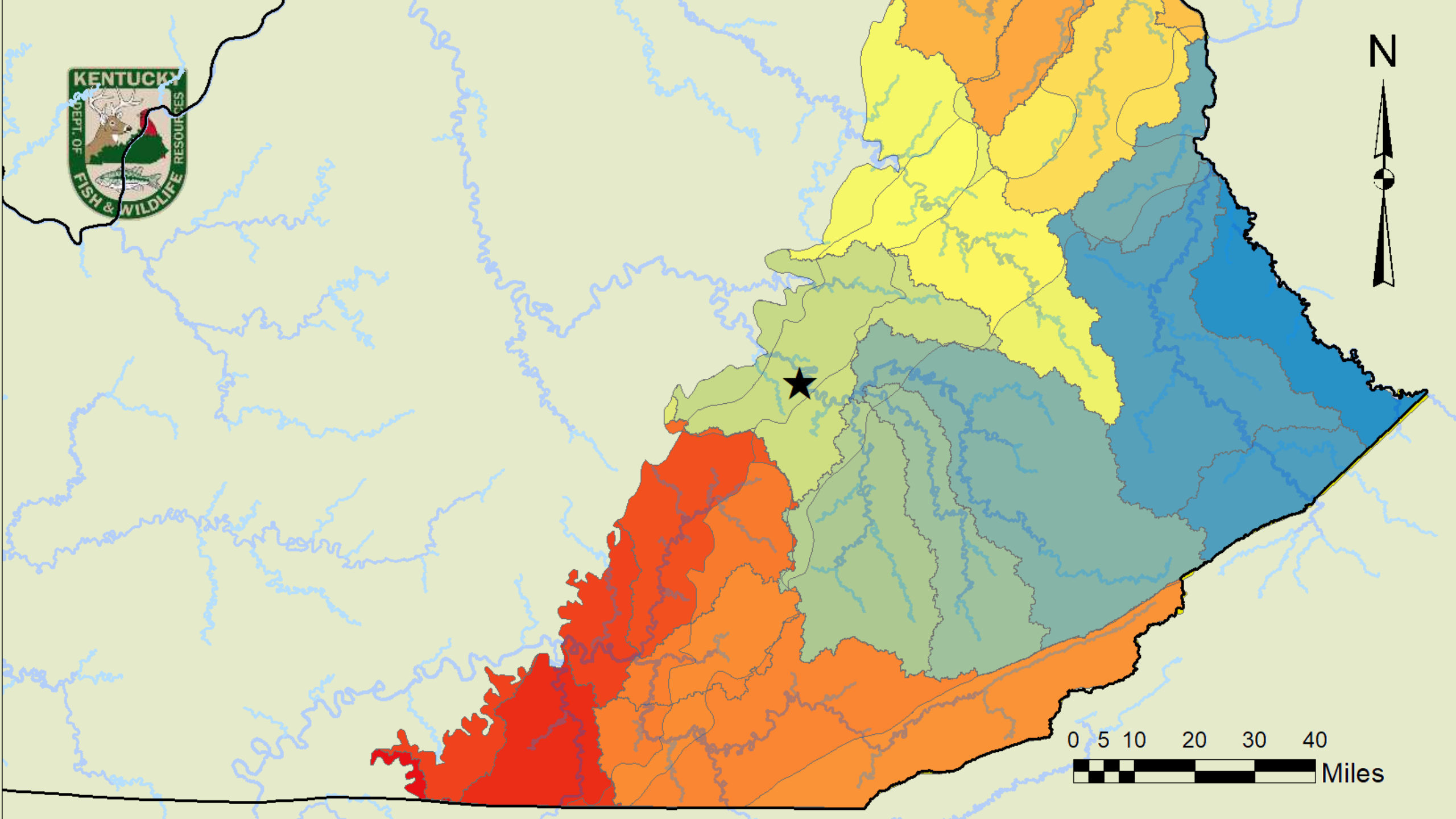
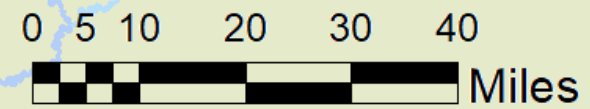
- Site Characteristics:
 - Upper Kentucky HUC8
 - Northern Forested Plateau Escarpment
 - Western Allegheny Plateau
 - Main Stem DA
11.65 sq mi
 - Tributary DA
0.12 – 0.44 sq mi
 - Stream Types
 - Aa, A, B, C, E





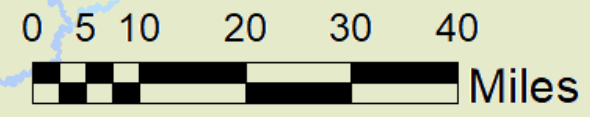
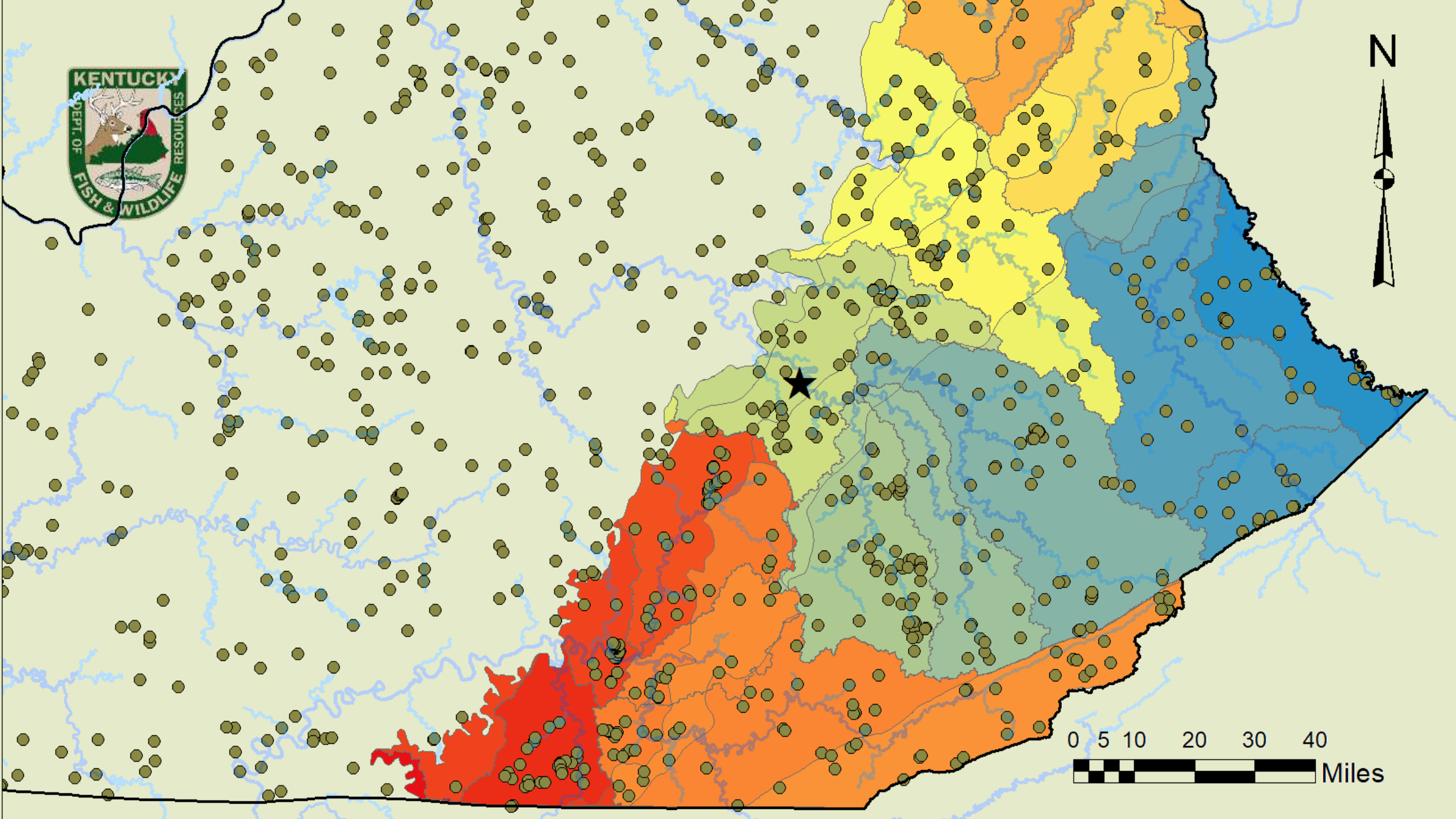


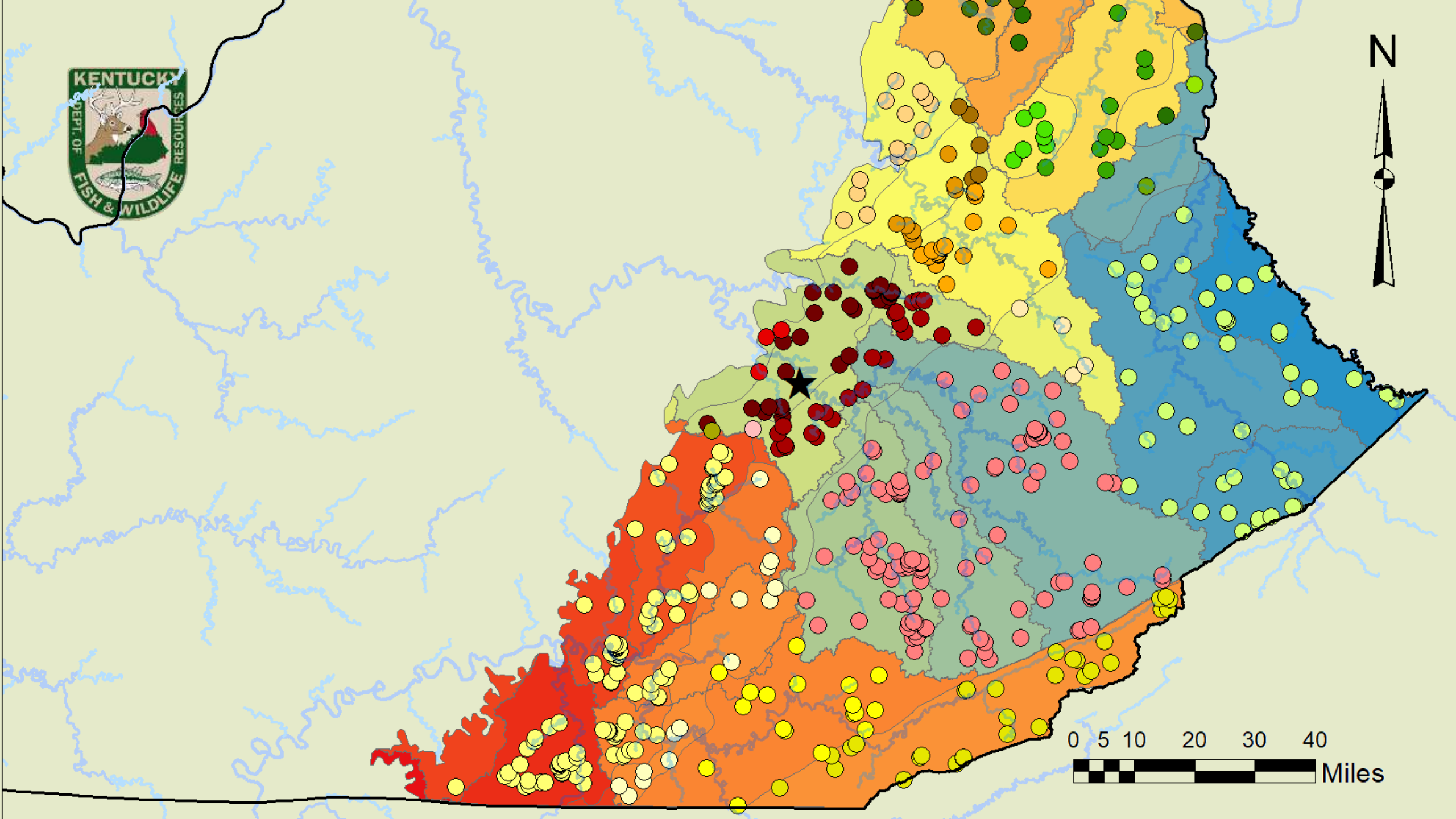
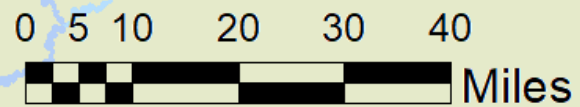






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Ross Creek

Location: 37.60122, -83.85533

Drainage Basin: 0.10 sq mi

Flow Type: Intermittent

Habitat Score: Optimal

Rosgen Classification: Aa+

Slope: ~14%

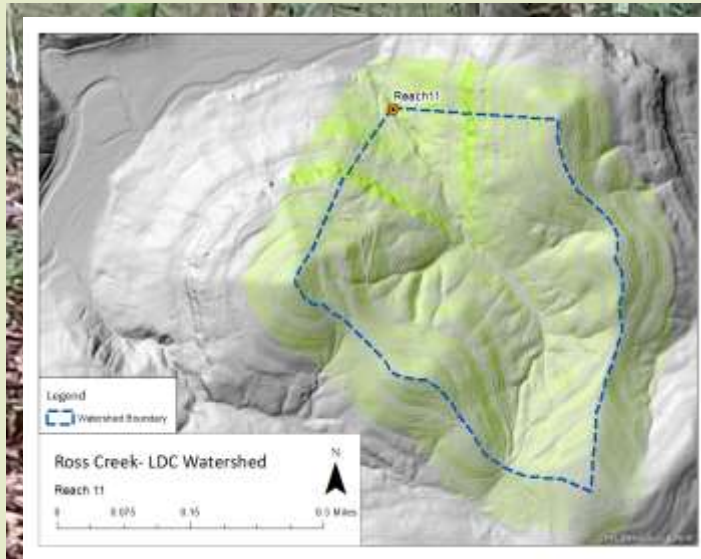
Entrenchment: 2.4

W/D Ratio: 12

Canopy: Fully Closed

Riparian Veg:

- Seven Distinct Species
- 261 Stems > 3" DBH per acre
- 58 Stems > 12" DBH per acre





Questions?

KDFWR FILO Program

Andrew J Stump – andrew.stump@ky.gov

ERDC – Reference Concepts in Ecosystem Restoration

Least Disturbed Condition

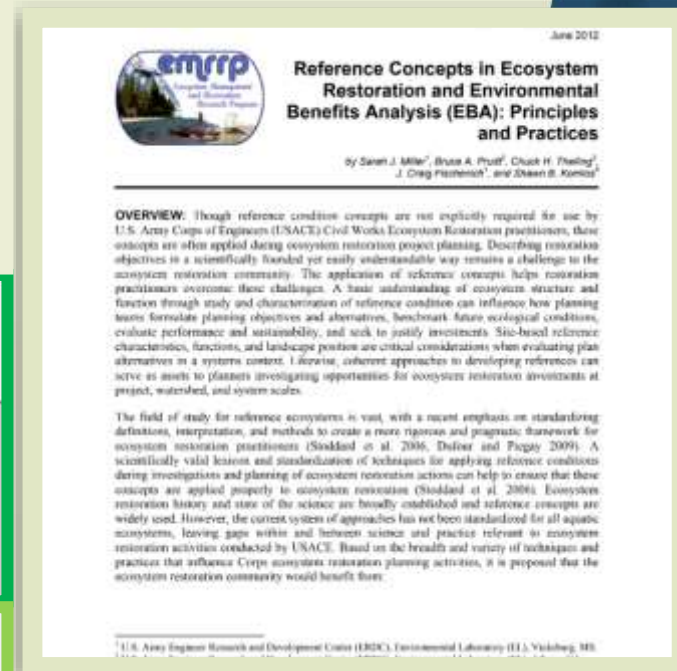
Prior to major impact or specific alteration or disturbance in an ecosystem (DuFour and Piegay 2009)

A condition representing the absence of local human disturbance, while recognizing that minimal disturbance may be present due to human activities affecting regional/global processes (e.g., climate change, deposition of atmospheric contaminants below the threshold required to have measurable impact on an ecosystem, etc.).

Best Attainable Condition

A condition representing the least amount of human disturbance or alteration in the current landscape context. In other words, “the best of what is left.”

The BAC represents a potential condition that could be achieved following the implementation of all available best management practices at a site. The BAC reflects a desired future condition given current constraints; thus, it differs from the other reference conditions.



Miller, S., et. al., 2012

