

Using Green Infrastructure Buffers to Protect Natural Areas

**Alabama Headwaters:
Ecosystem Services and Urban Impacts**

Alabama Chapter of the American Planning Association
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- Headwater streams and wetlands
 - Smallest part of the river network
 - Often make up 75-95% of the streams in a watershed.
 - Furthest from the river's endpoint or confluence with another stream.
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- Headwater streams
 - Ephemeral
 - Intermittent
 - Perennial
- Headwater wetlands



Alabama headwaters: Ecosystem services and urban impacts

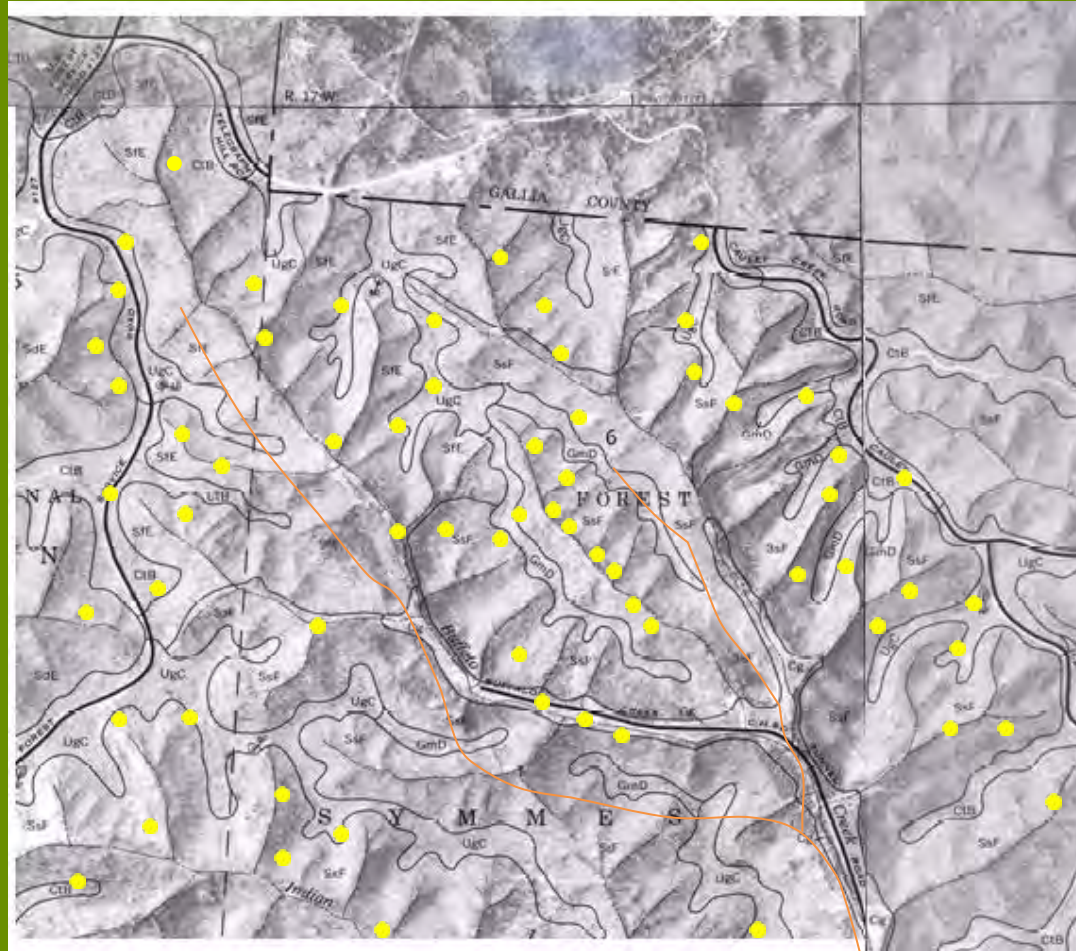
Introduction • Ecosystem Services • Urban Impacts • Summary



Portions of 1:15 840 United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) maps from Lawrence and Gallia Counties, OH illustrate the upper reaches of Buffalo Creek in Wayne National Forest (McCleary and Hamilton 1998).

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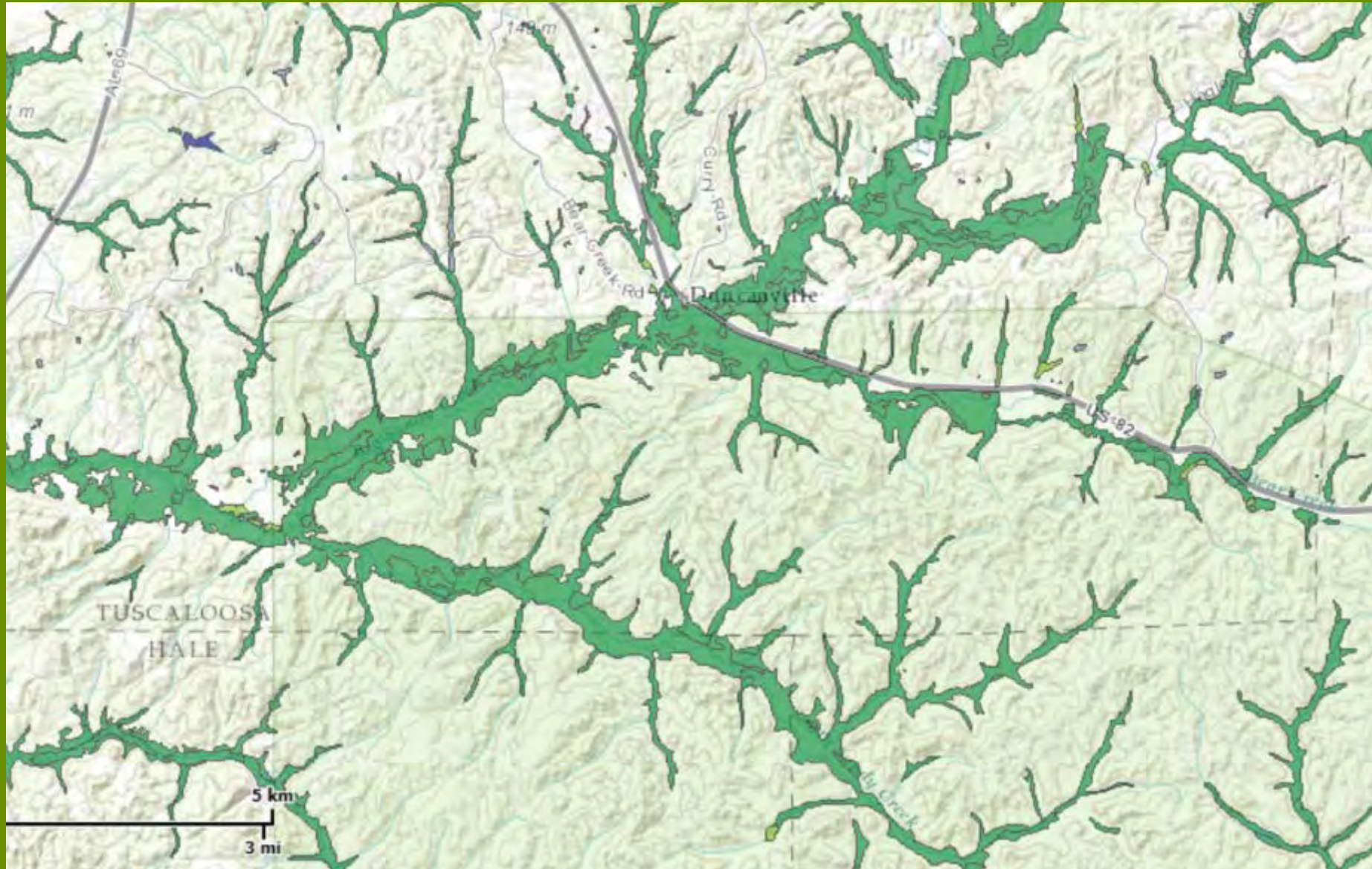
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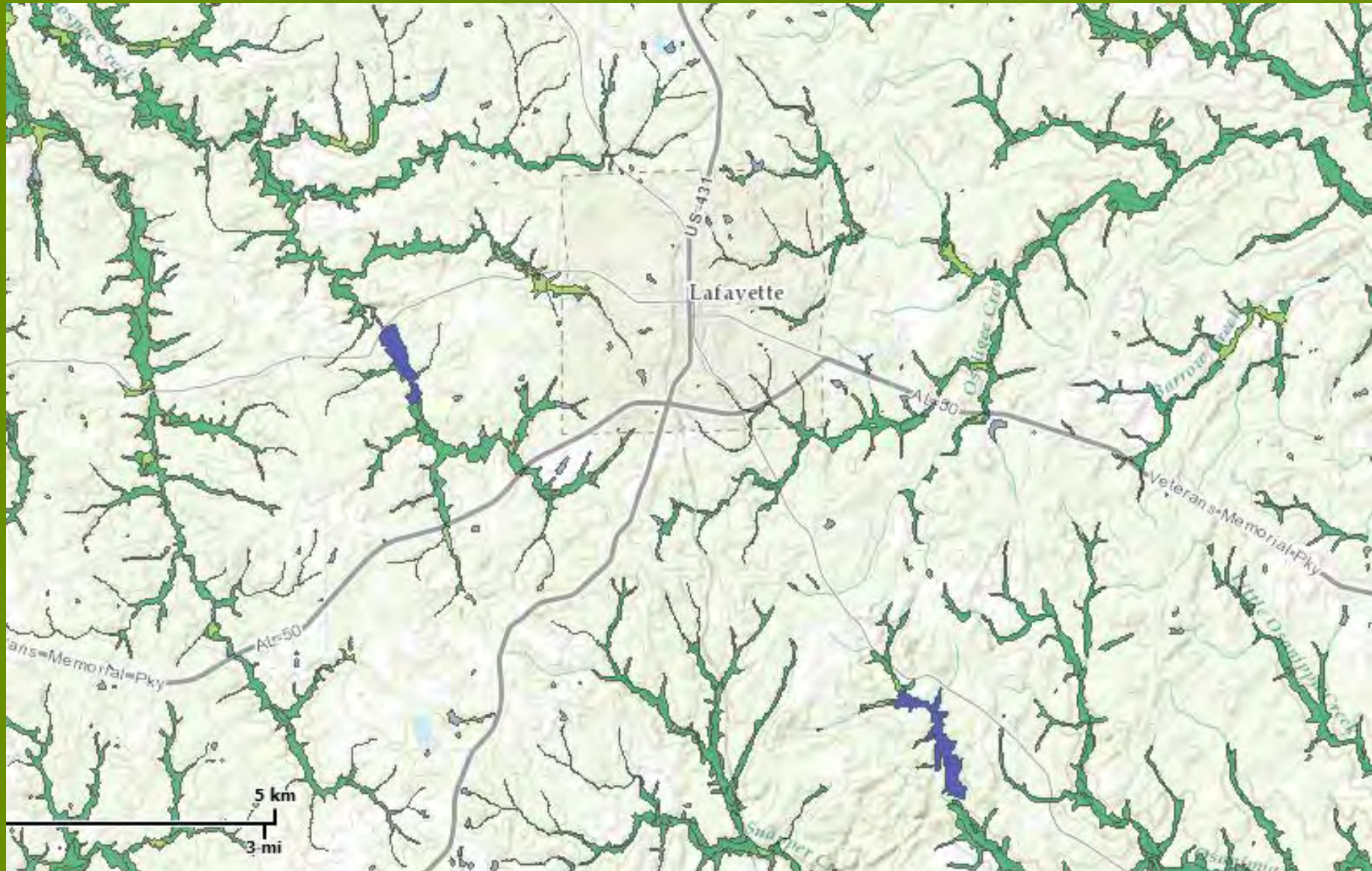
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NWI and topography for the area of Duncanville, AL

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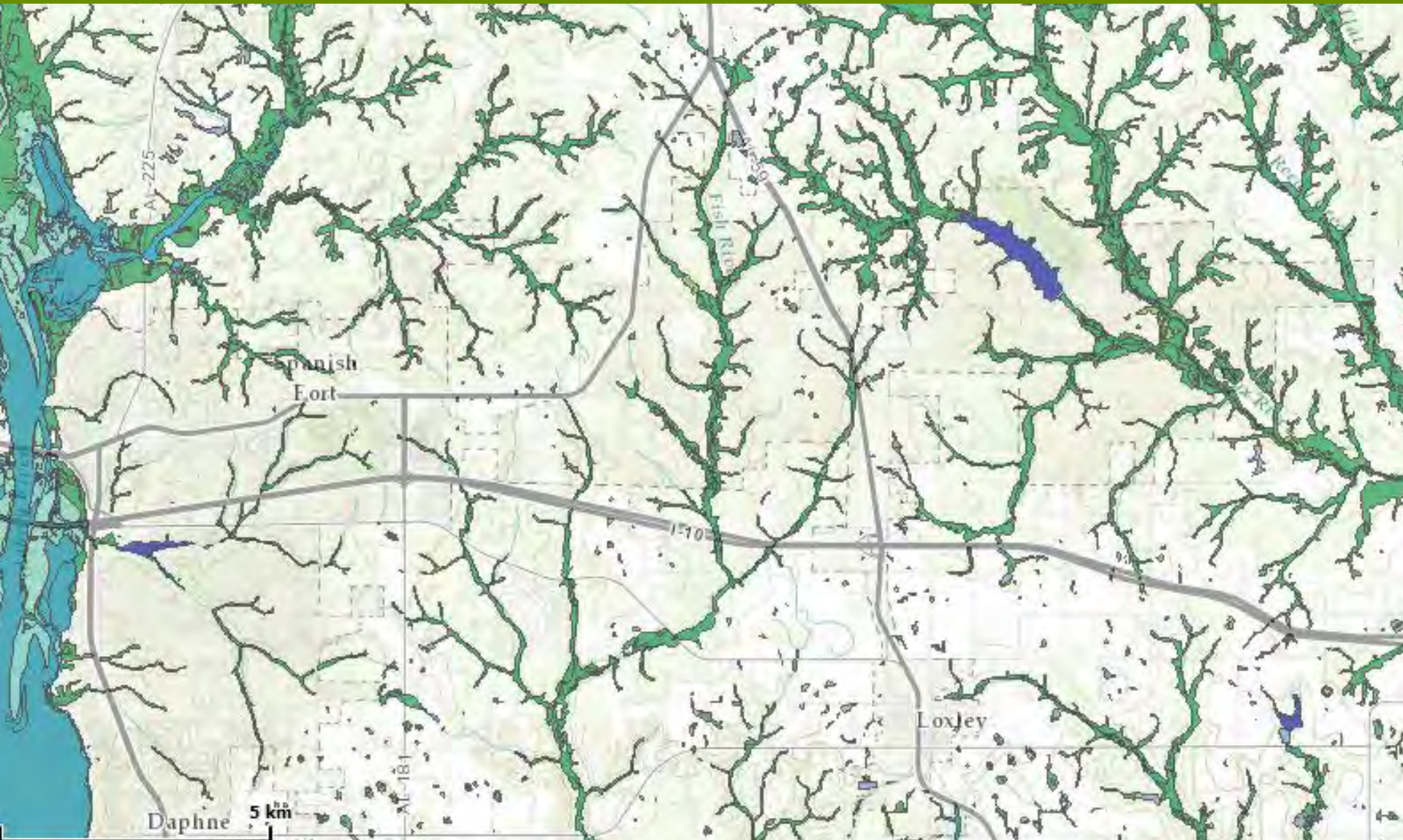
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NWI and topography for the area of Lafayette, AL

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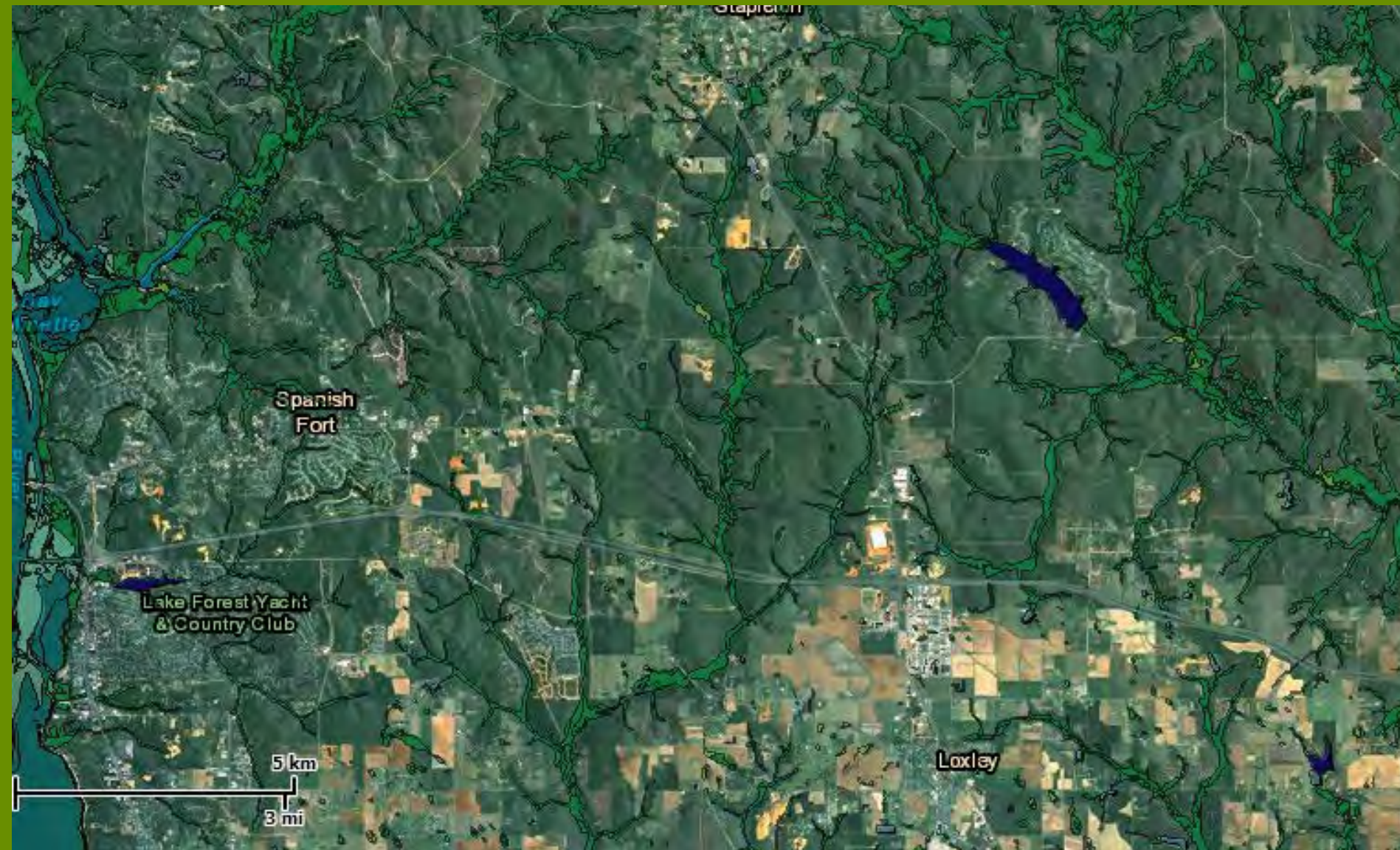
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NWI and topography for the area of Spanish Fort, AL

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- Ecosystem services provided by headwaters
 - Water quality, sediment control
 - Water storage
 - Habitats



- Headwater ecosystem services
 - Reduced nutrients/pollutants downstream
 - BENEFITS:
 - Reduced water treatment costs, human health risks and degradation of downstream waters



- Ecosystem services
 - Controls sediment loads downstream
 - BENEFITS:
 - Reduced dredging costs, water treatment costs, and reduce the siltation of larger stream habitats



- Ecosystem services
 - Water storage
 - BENEFITS:
 - Reduced local and downstream flooding

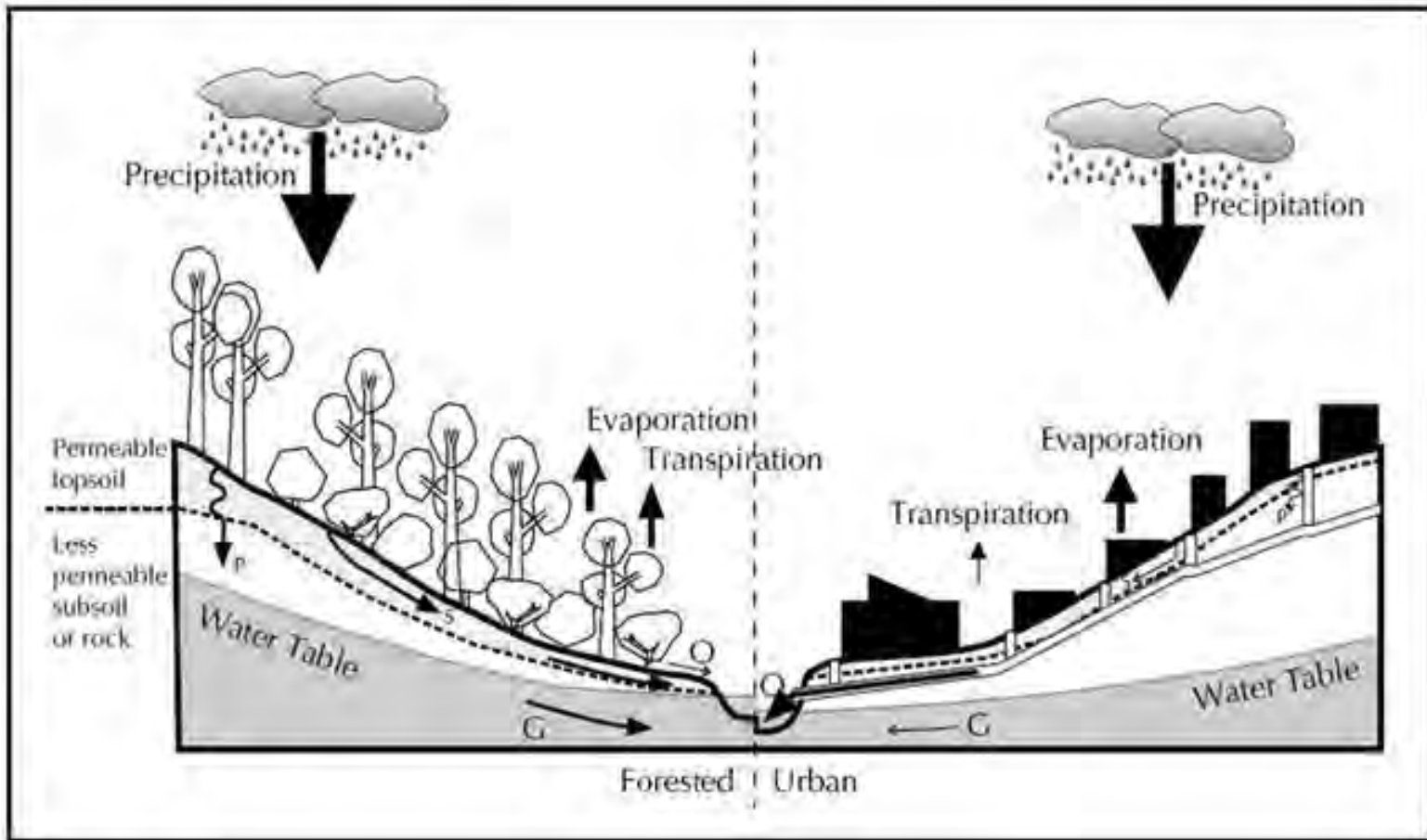


- Ecosystem services
 - Provides important wildlife habitat
 - BENEFITS:
 - Increased or maintained biological diversity
 - Improved opportunities for hunting and fishing

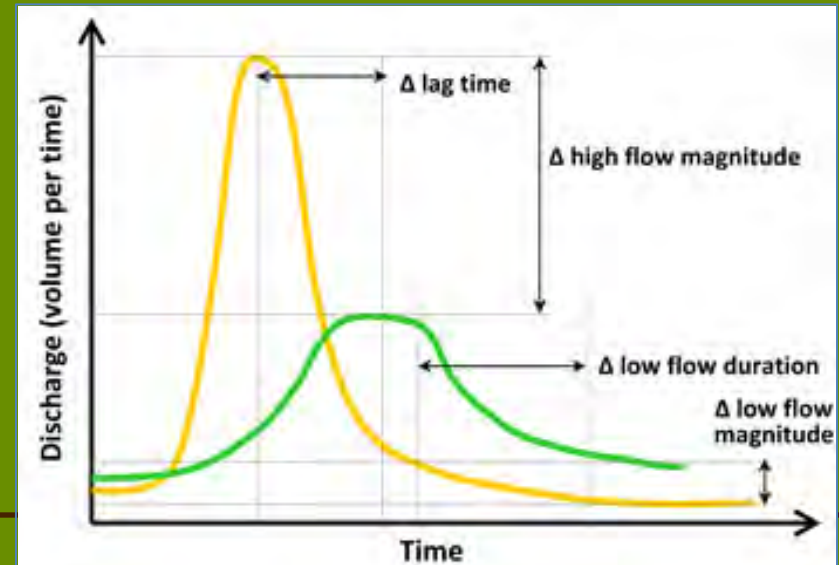


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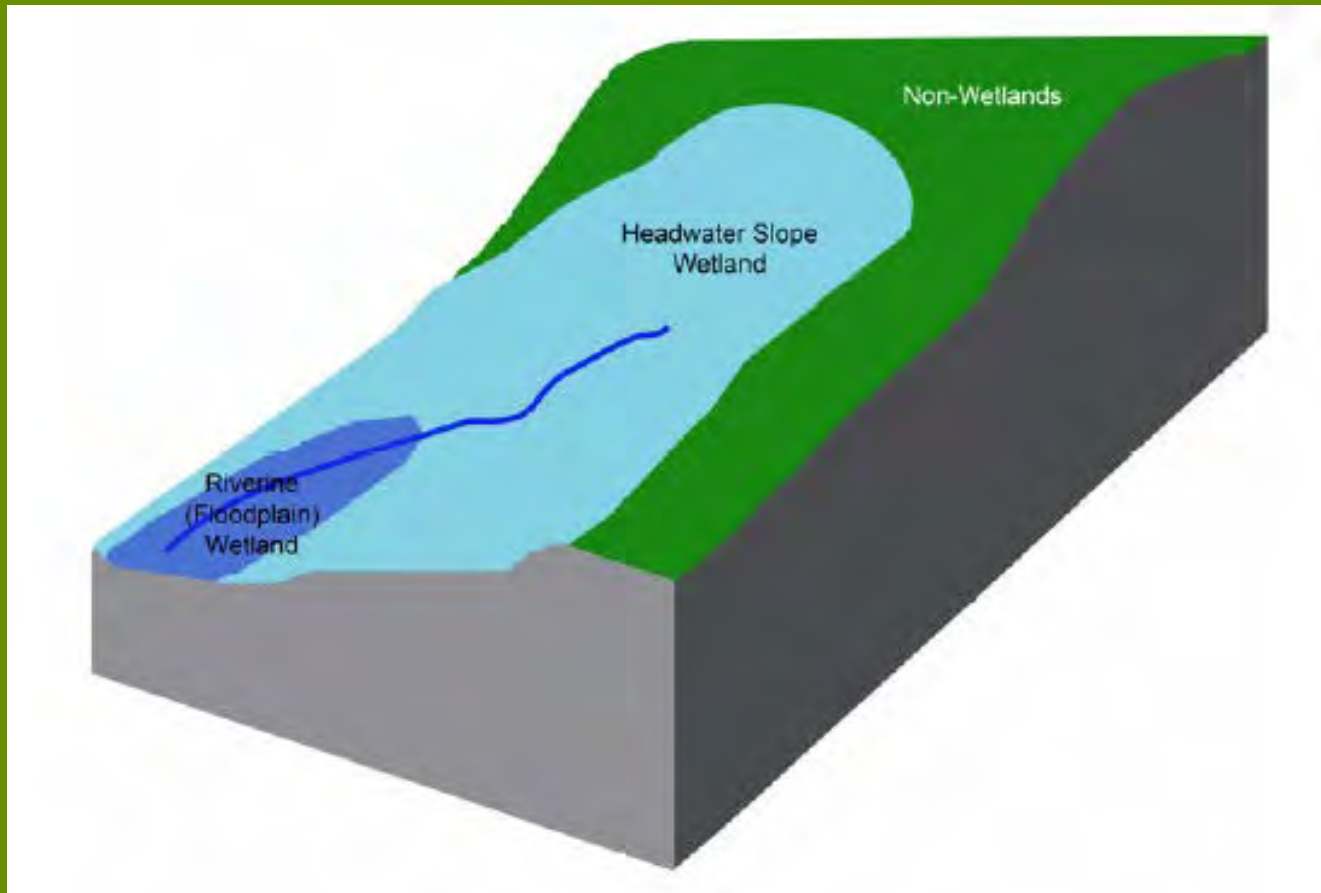
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- Urban alterations to headwater drainage
 - Changed flow patterns to streams
 - Changed velocity
 - Reduced water quality

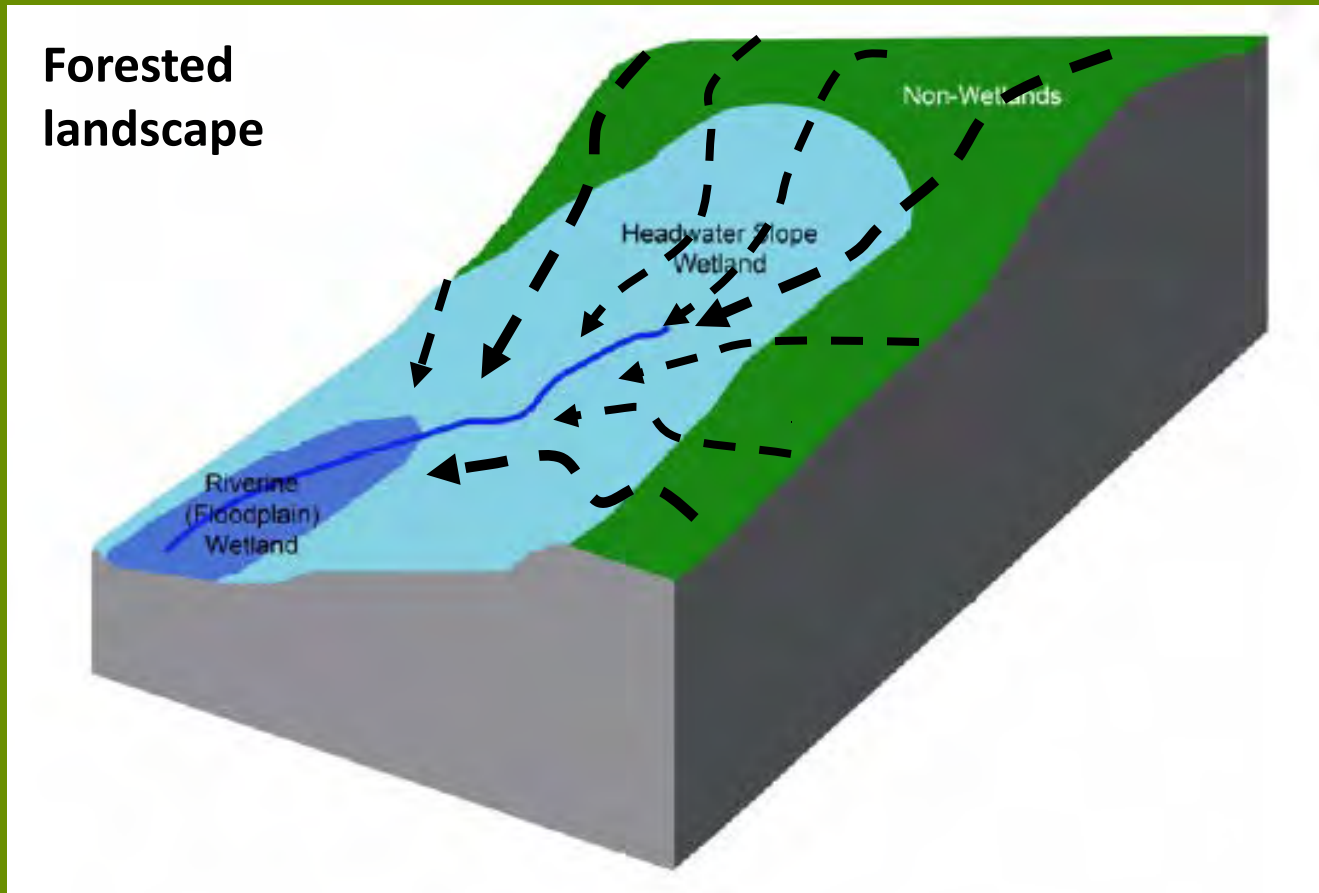


Headwater slope wetlands



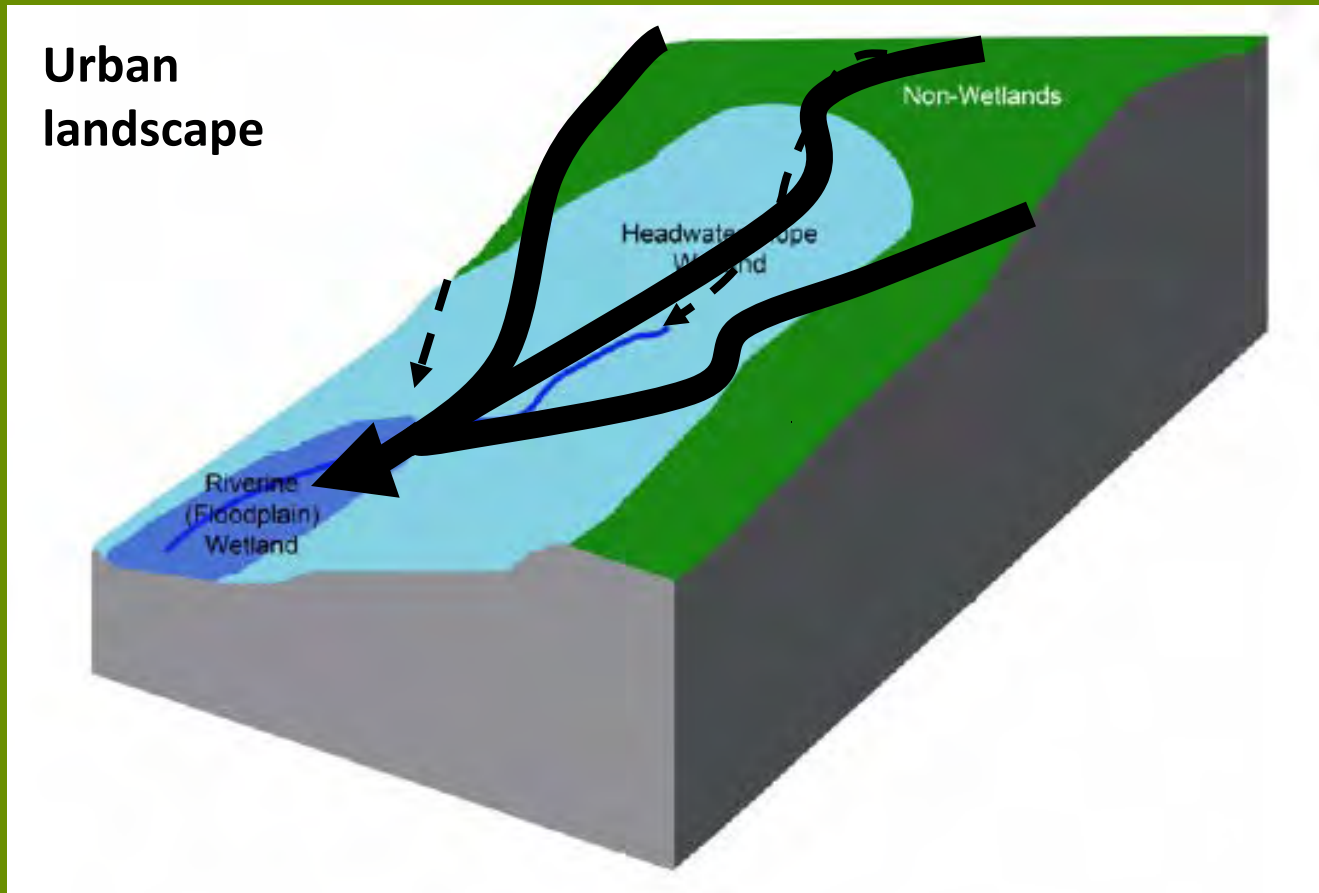
Landscape position of headwater slope wetlands (from Noble et al. 2007).

Headwater slope wetlands



Landscape position of headwater slope wetlands (from Noble et al. 2007).

Headwater slope wetlands



Landscape position of headwater slope wetlands (from Noble et al. 2007).

- Urban alterations to stream morphology
 - Straightened, cemented or culverted
 - Impoundments
 - Gully formation



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COE, Yazoo Basin in northwest Mississippi

- **Summary**
 - Headwater streams and wetlands are common landscape features that have historically been ignored for their benefits.
 - Headwaters are important for their numerous ecosystem services and societal values.
 - Urban development has been shown to reduce/eliminate their value by altering drainage patterns.



Thank you