USGS
science for a changing world

Effects of Urban Development on Stream Ecosystems

National Water-Quality Assessment Program

U.S. Department of the Interior
U.S. Geological Survey

Excerpt from the first sanitation law in Virginia in 1610

Ther shall no man or woman, Launderer or Launderesse, dare to wash any uncleane Linnen, drive bucks, or throw out the water or suds of fowle cloathes, in the open streete, within the Pallizadoes:…. Nor shall any one aforesaid, within lesse than a quarter of one mile from the Pallizadoes, dare to doe the necessities of nature, since by thse unmanly, slothfull, and loathsome immodesties, the whole Fort may bee choaked, and poisoned...

Source: Virtual Jamestown

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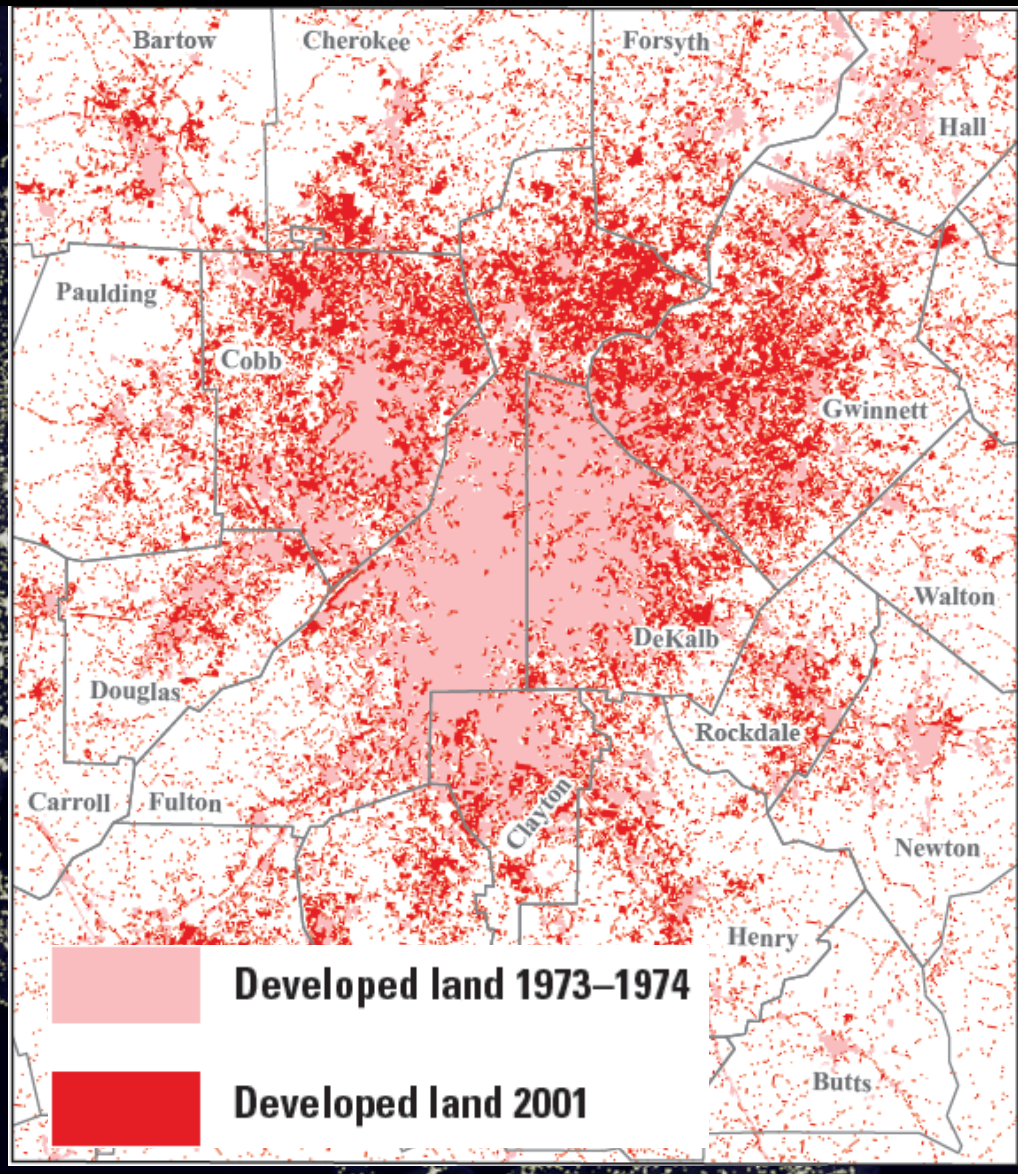
The Urban Footprint Is Expanding




Drawing by Frank Ippolito, Production Post Studios, 110 North Fulton St., Bloomfield, N.J.

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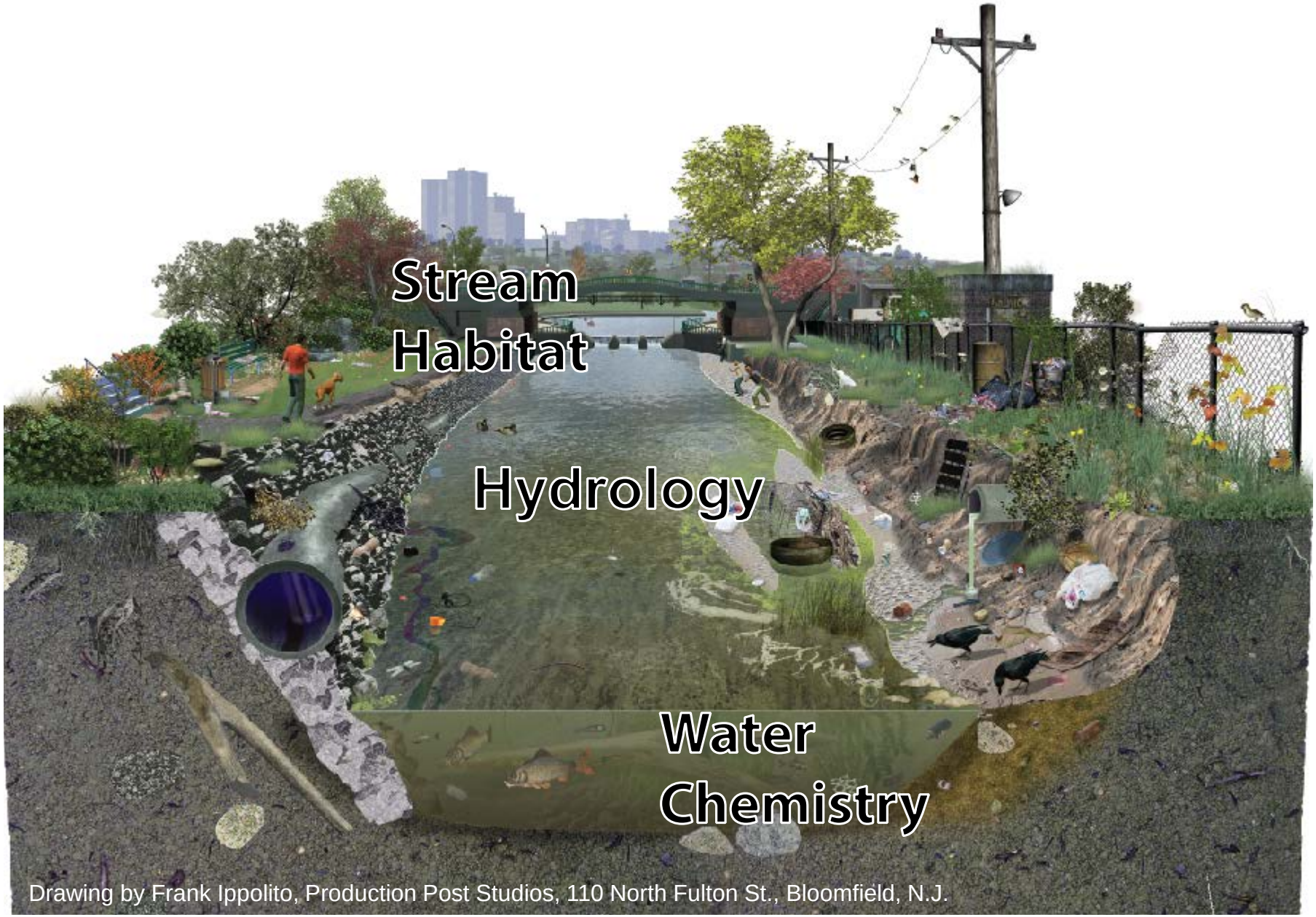

Drawing by Frank Ippolito, Production Post Studios, 110 North Fulton St., Bloomfield, N.J.

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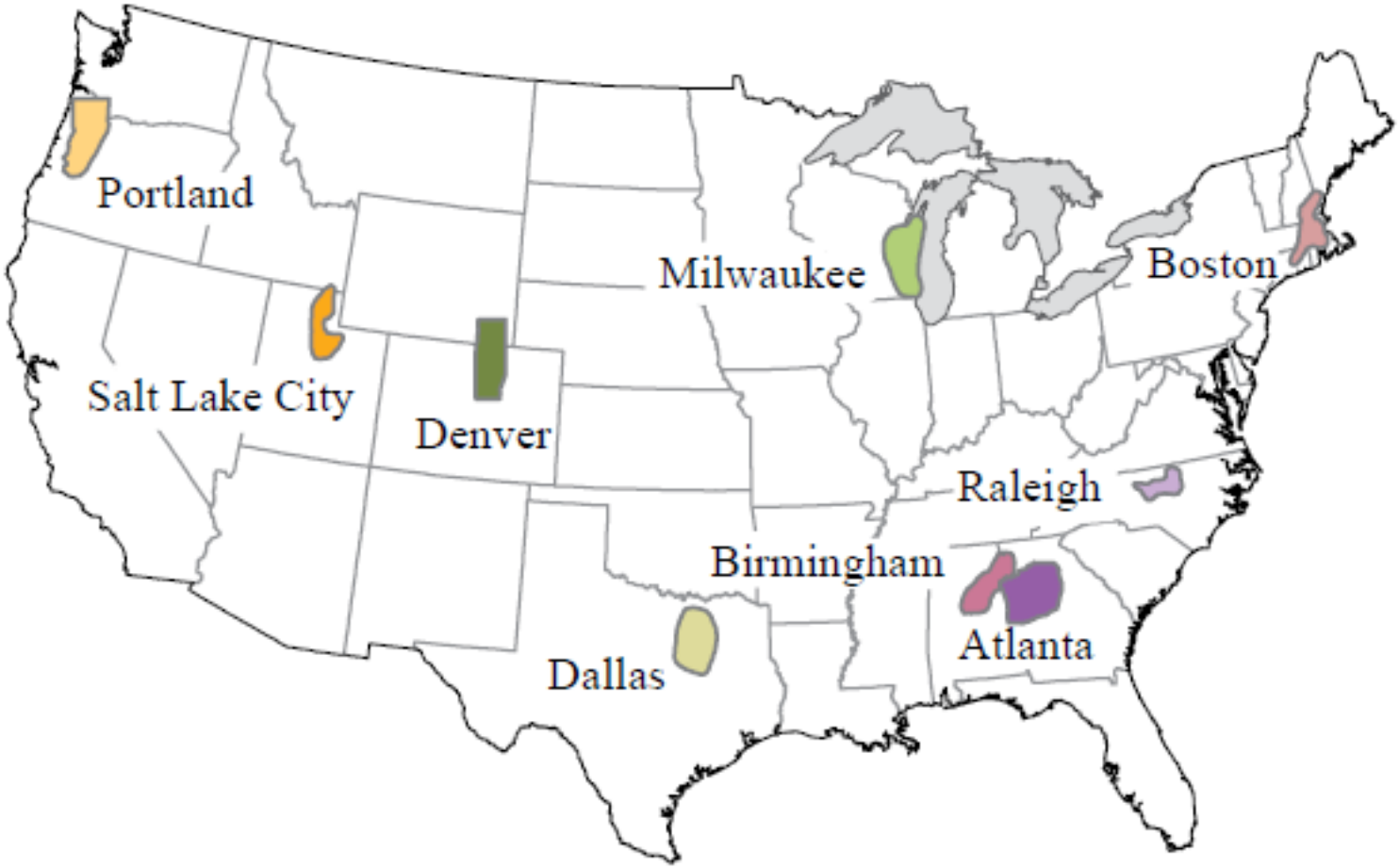
This study provides a unique vantage point on the effects of urbanization



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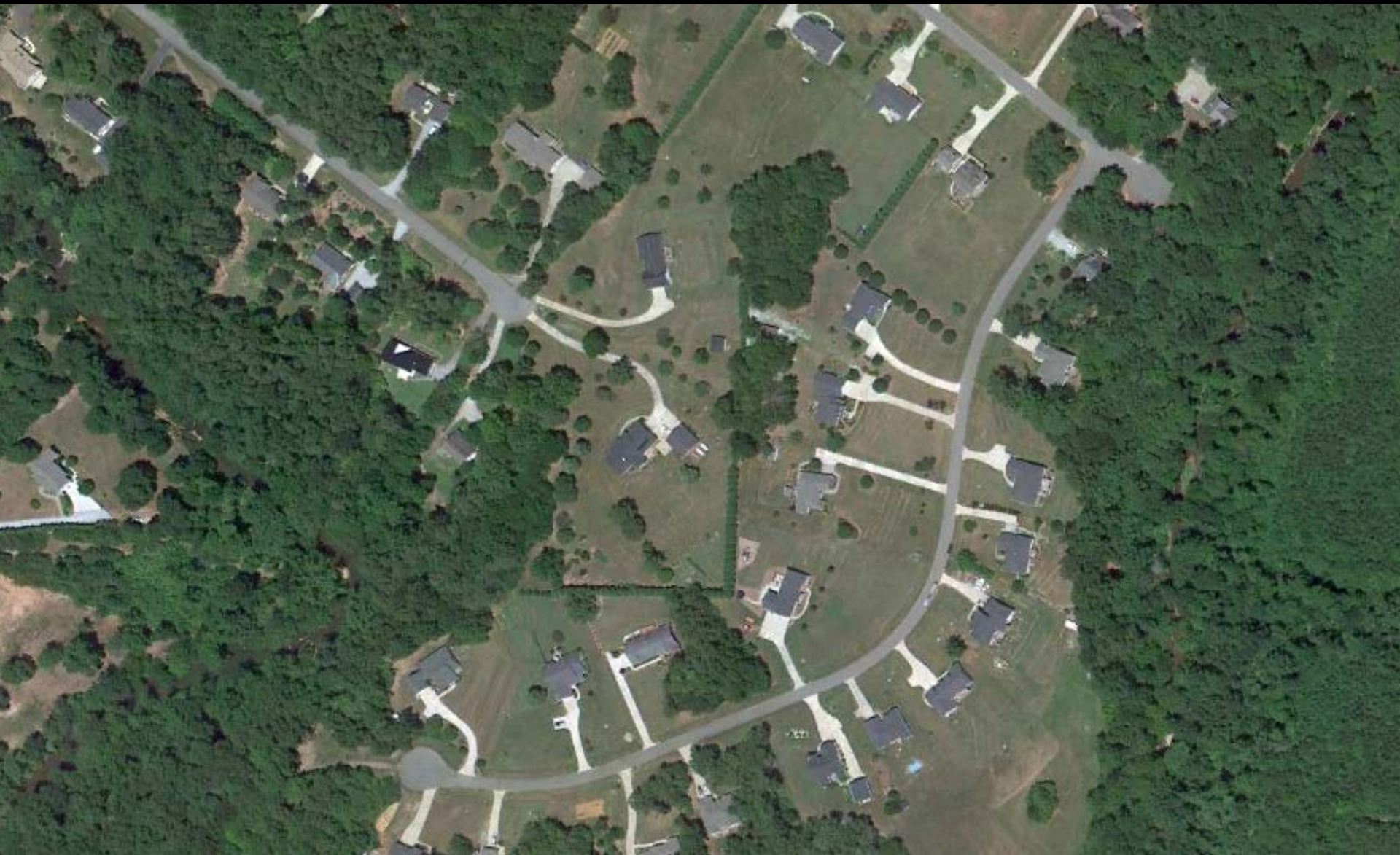
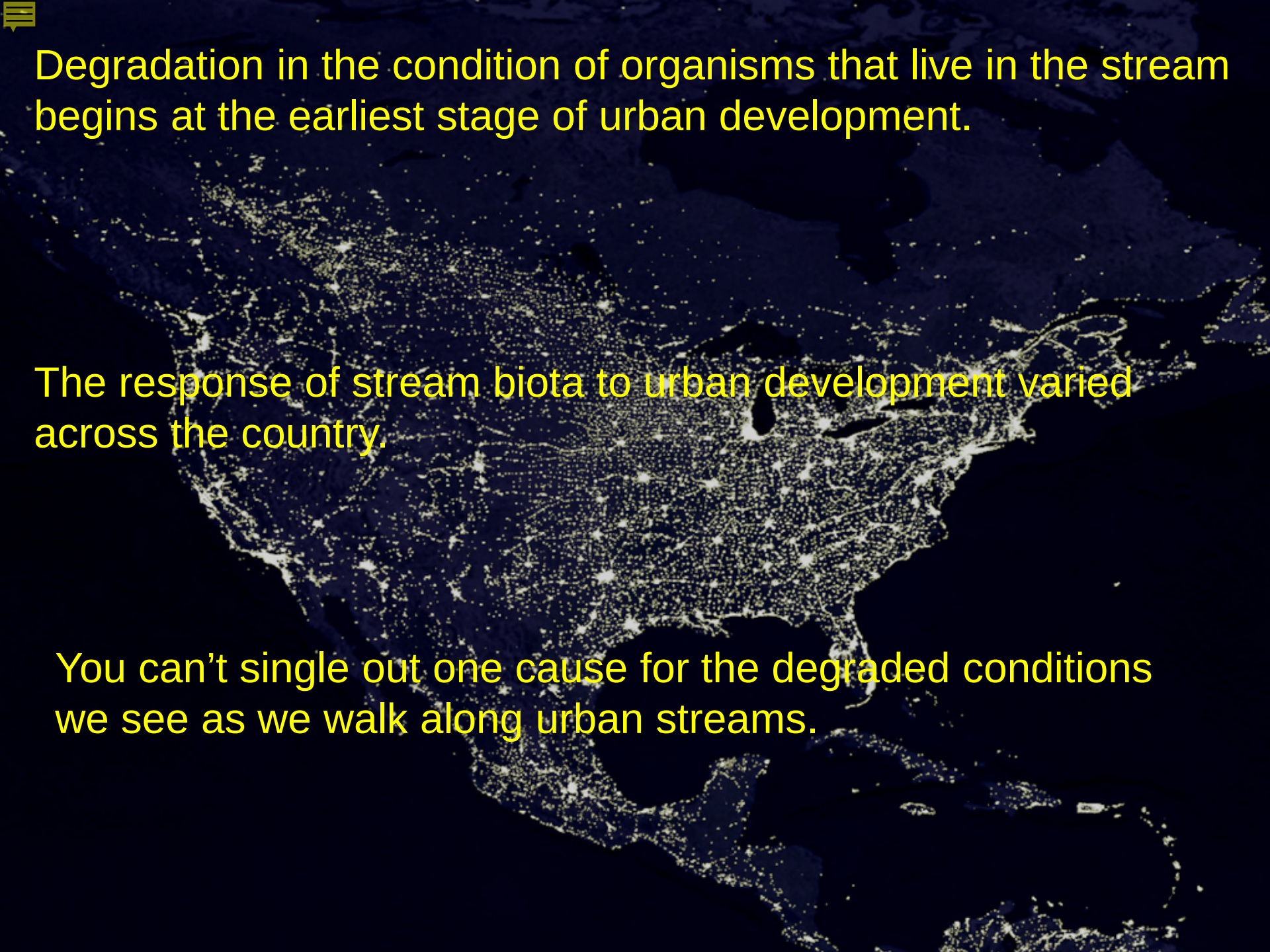
Low Urban Development

(less than 20 percent urban development)



High Urban Development
(more than 60 percent urban development)

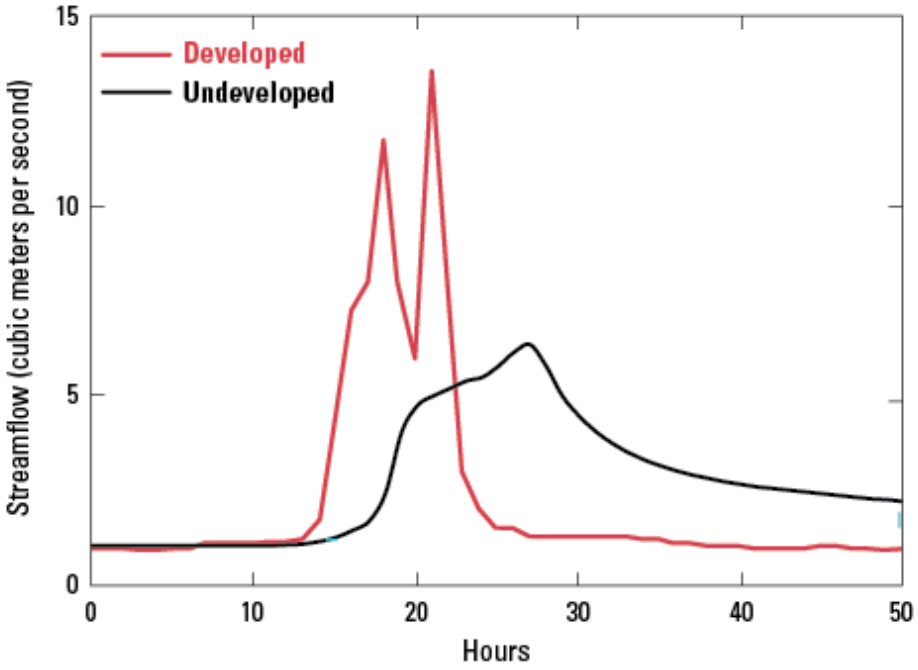


Degradation in the condition of organisms that live in the stream begins at the earliest stage of urban development.

The response of stream biota to urban development varied across the country.

You can’t single out one cause for the degraded conditions we see as we walk along urban streams.

Urban Development Increased Streamflow Flashiness



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Urban development often resulted in stream channel deepening and widening

Urban Development Increased the Number and Concentrations of Insecticides

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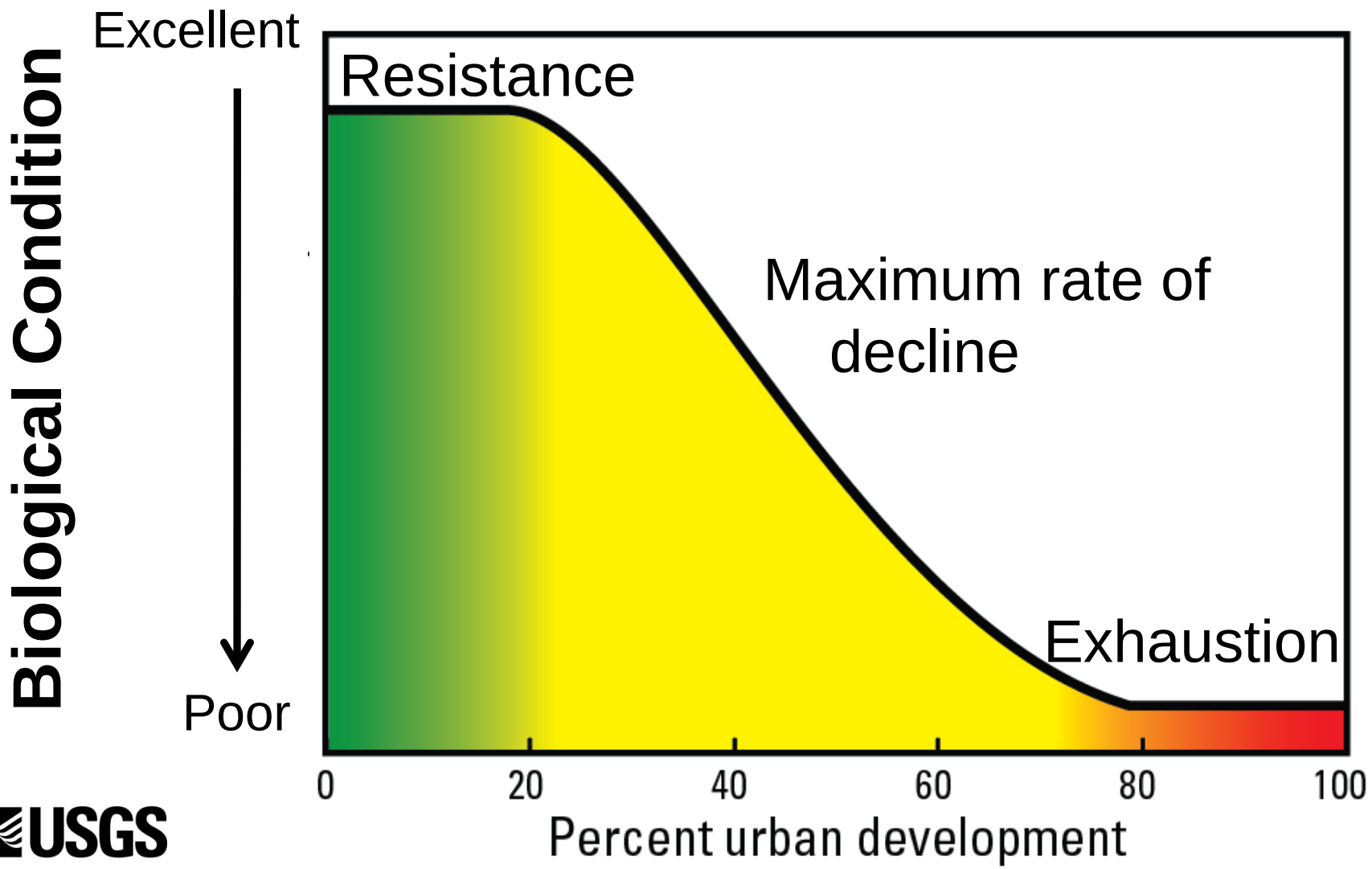
What did we think would happen?



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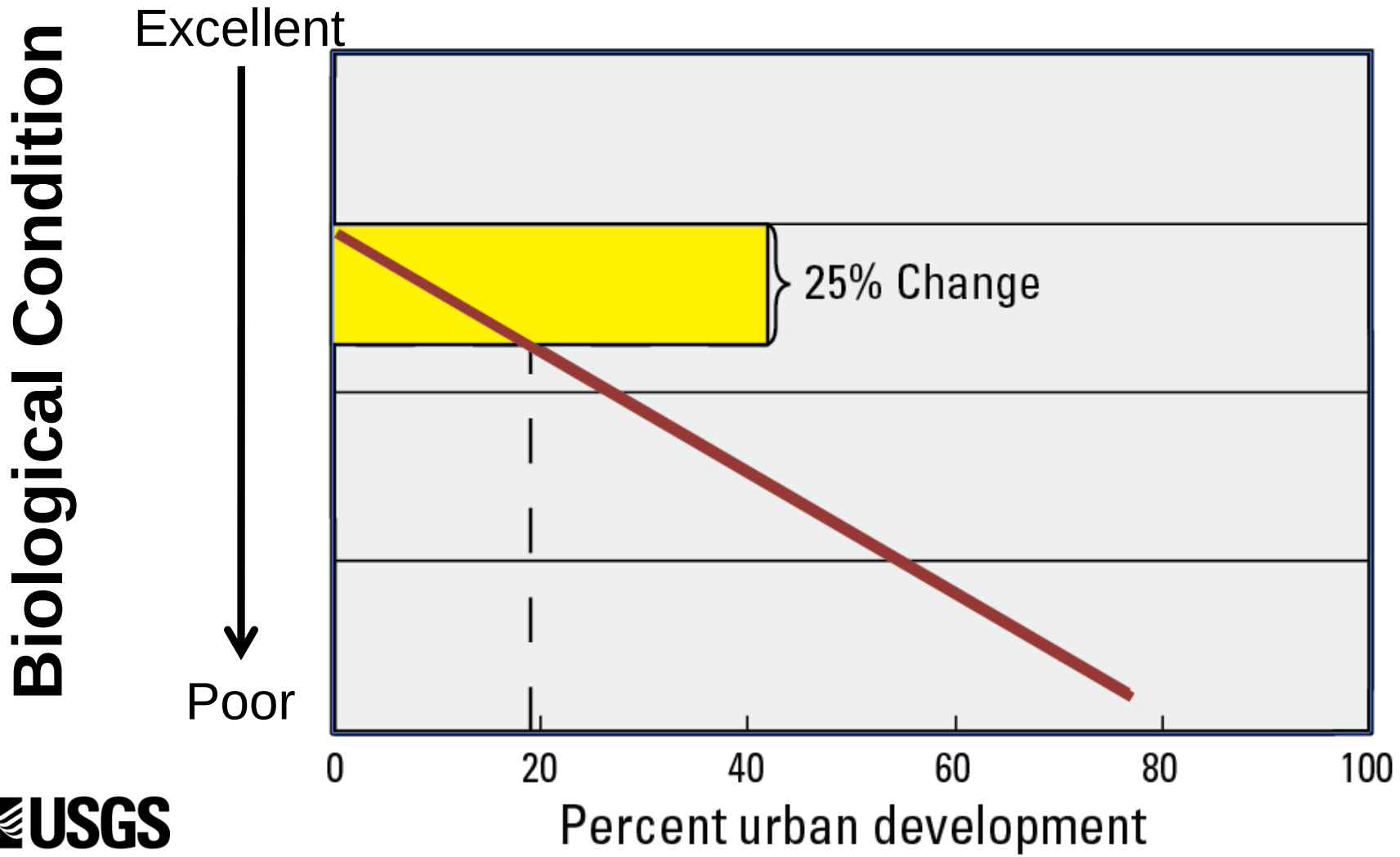
There is no “safe zone” of urban development



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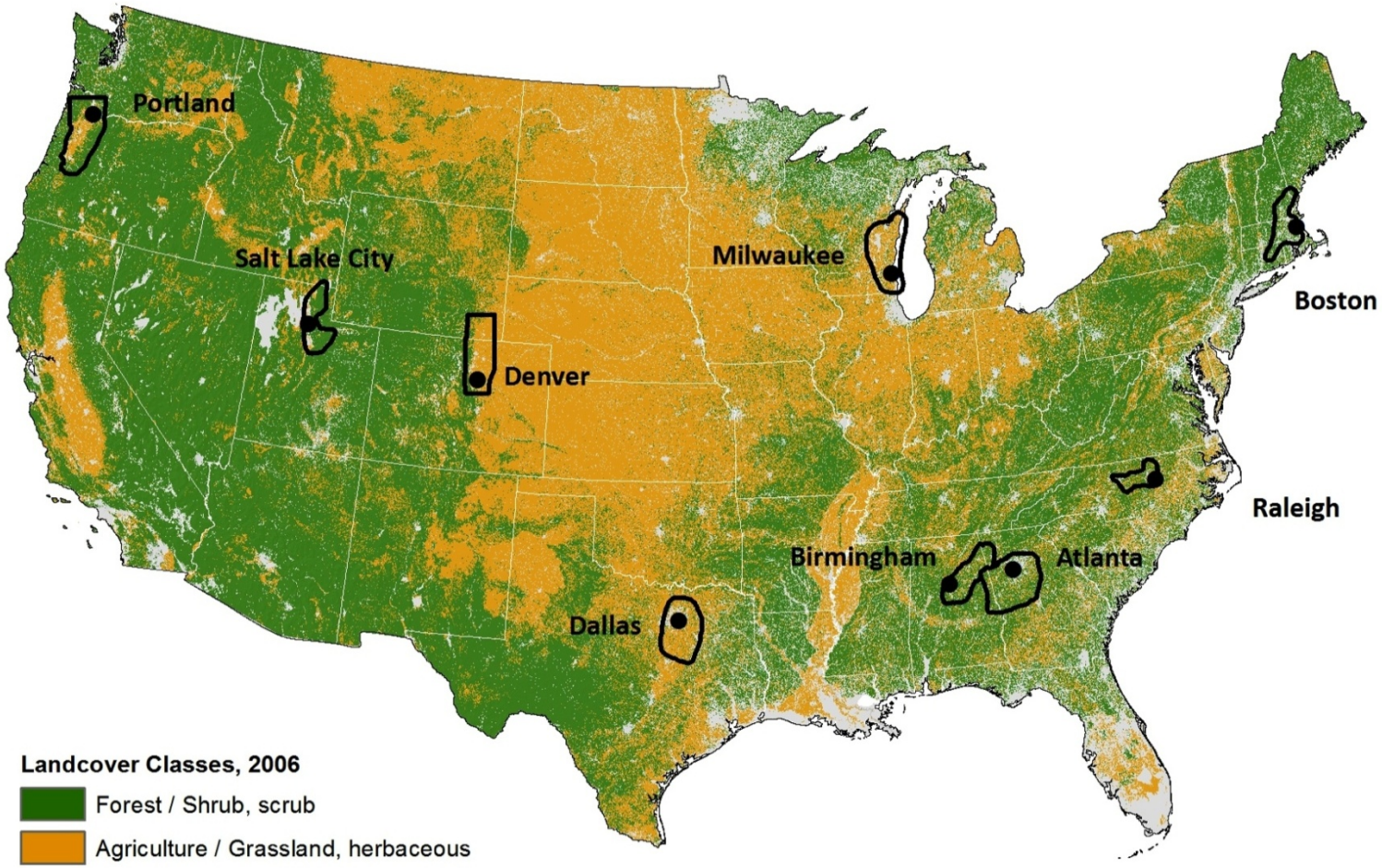
Impacts of Urban Development Vary by Region



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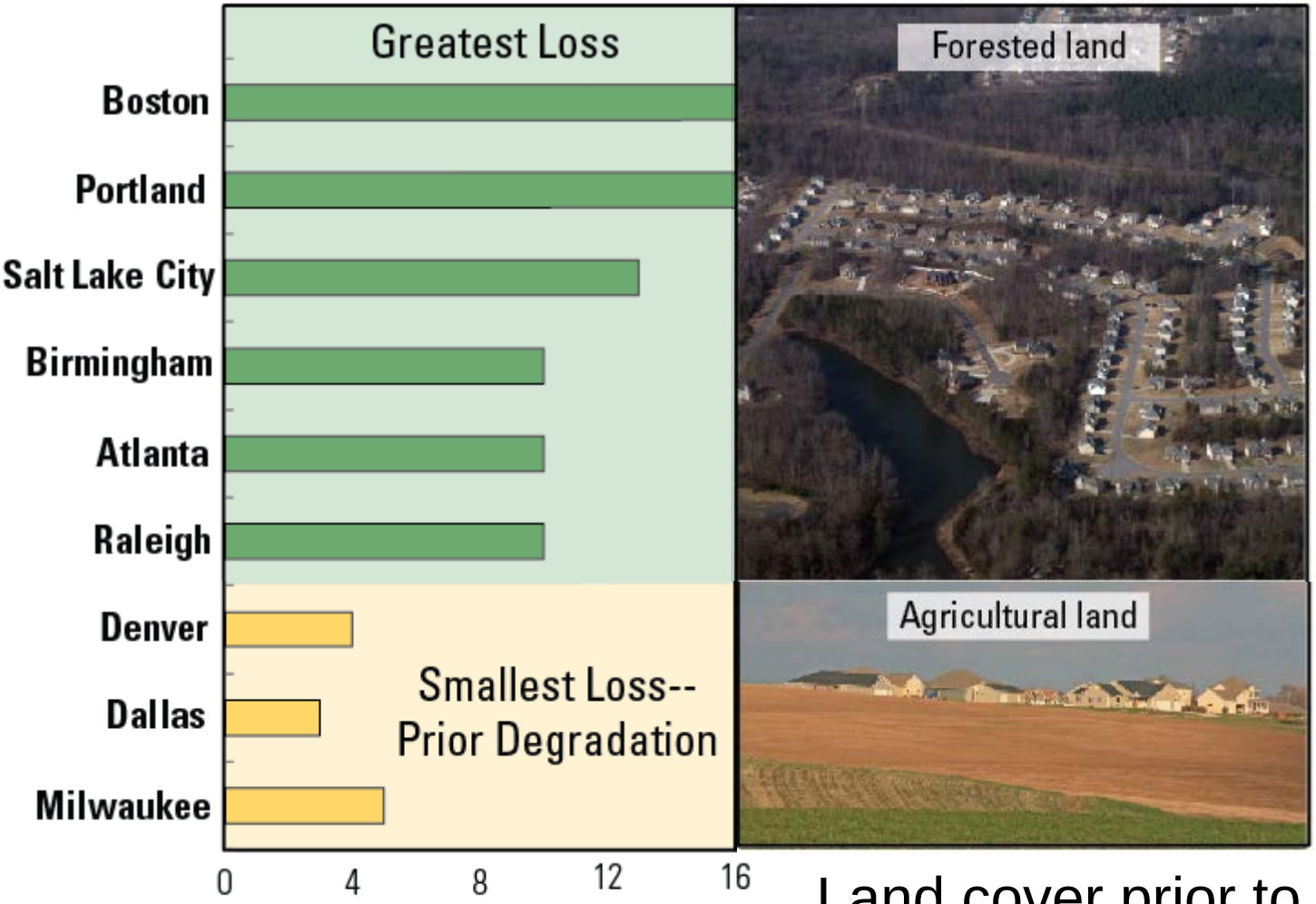
Pre-urban land use affects the response to urban development



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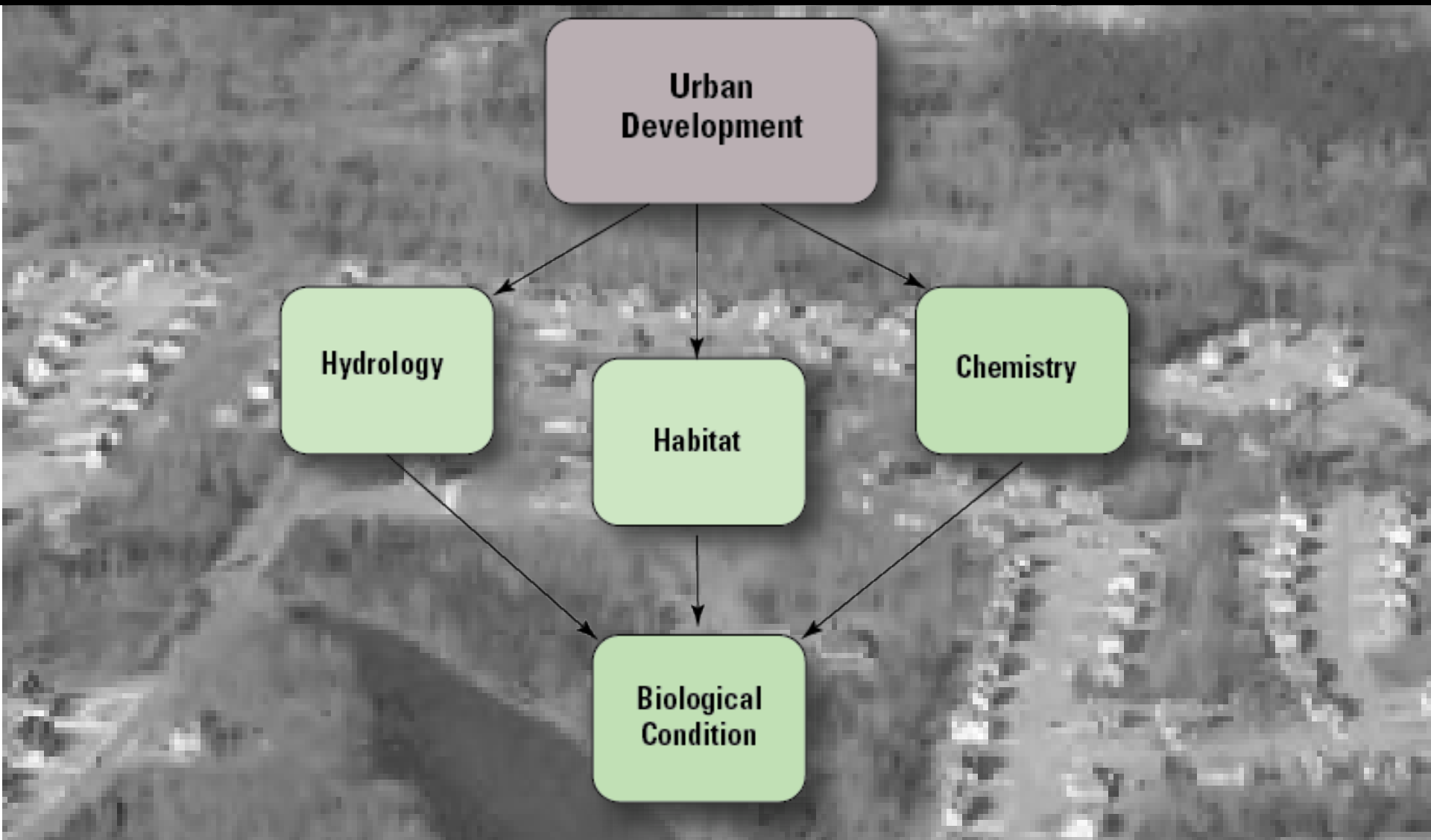
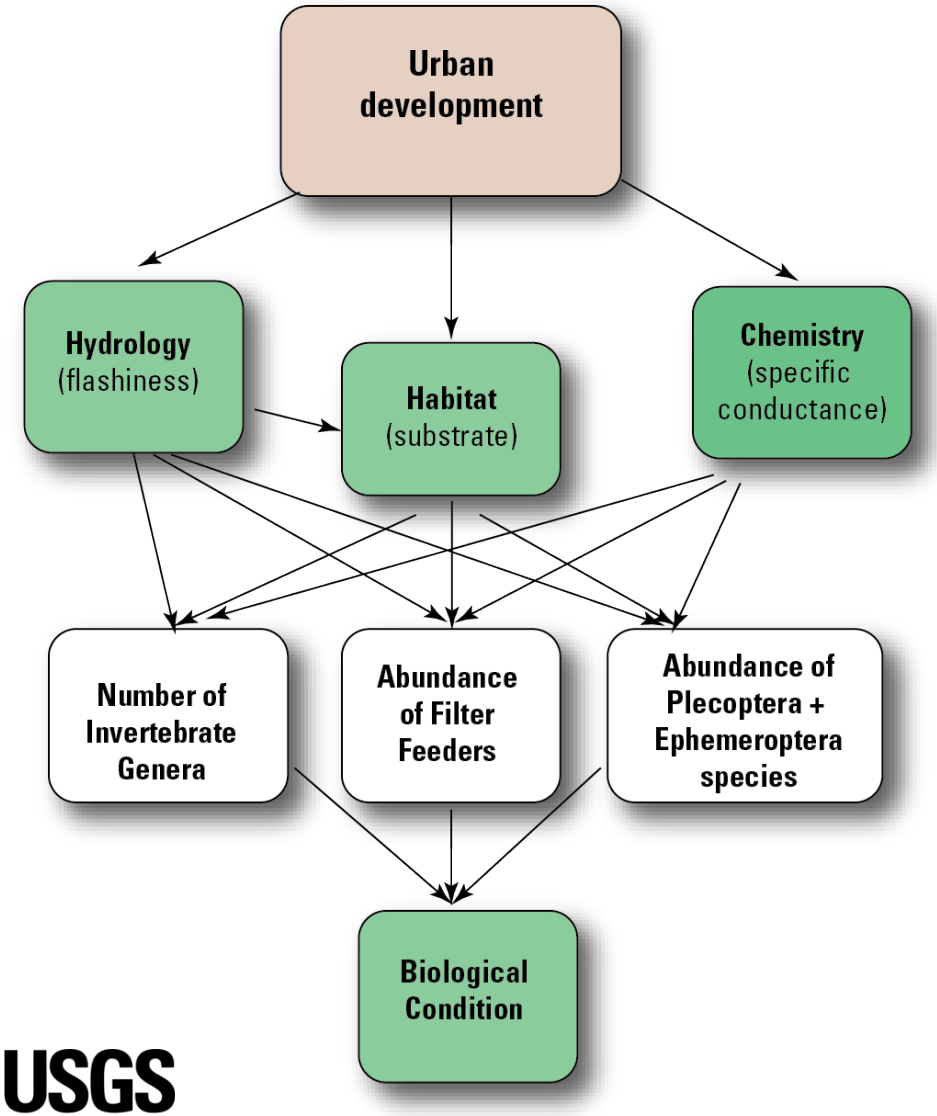
No Single Environmental Factor Was Universally Important in Explaining the Effects of Urban Development



Linking Science with Management Needs



Passing the "so what?" test:

- Science findings are understandable
- Account for multiple stressors
- Describe uncertainty levels
- Evaluate multiple management options
- Easily updated with new information

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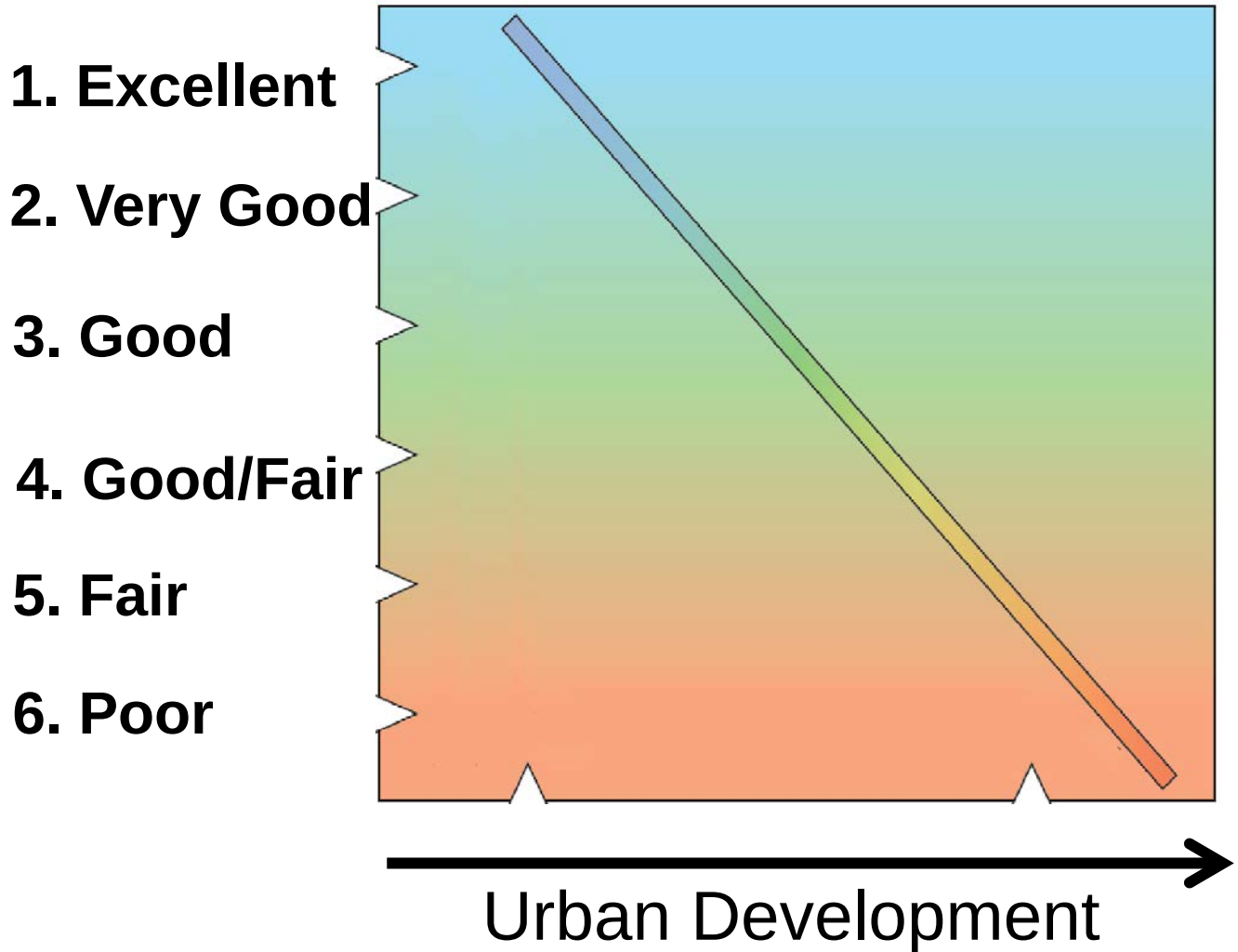
Biological Condition

an understandable and science-based indicator of stream health

Categories of Biological Condition



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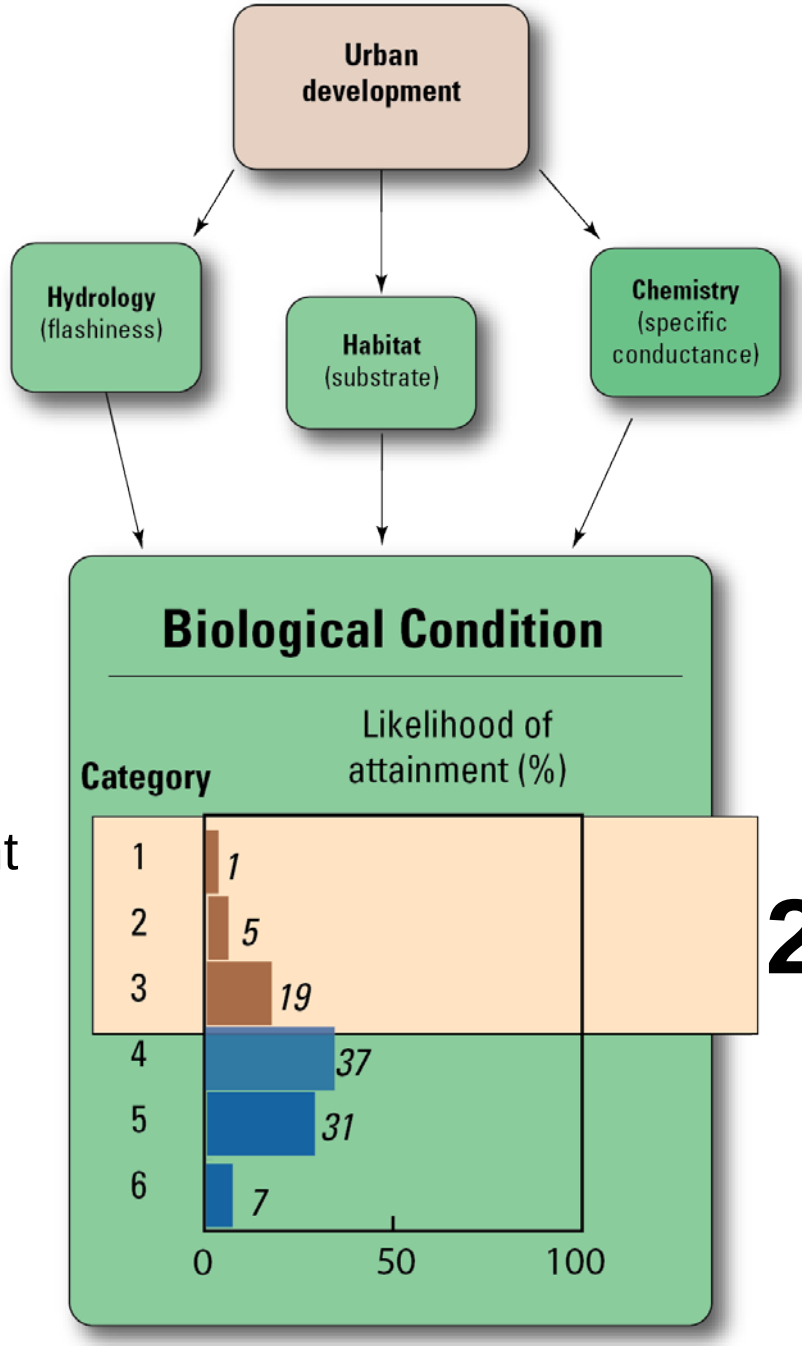
Likelihood of meeting water quality conditions

Excellent

Poor



25%

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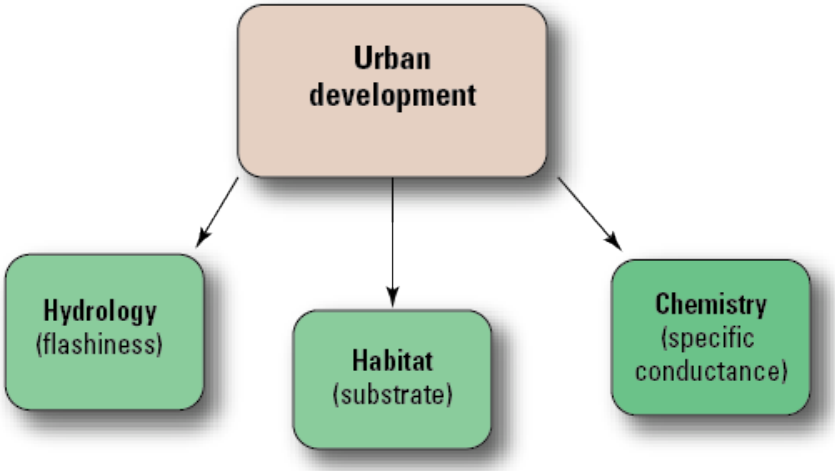
What if best management practices are introduced into the watershed?



Reduce Flashiness

Improve Water Quality

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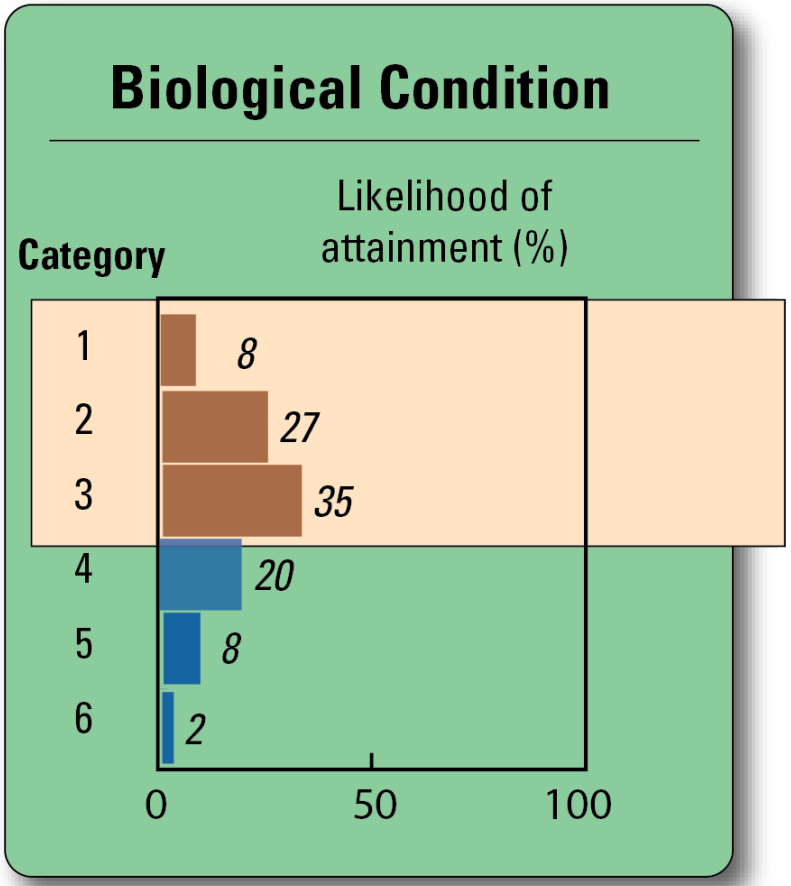
Assessing the effects of BMPs on meeting water quality standards

Reduce Flashiness

Improve Water Quality

Excellent



Poor

70%

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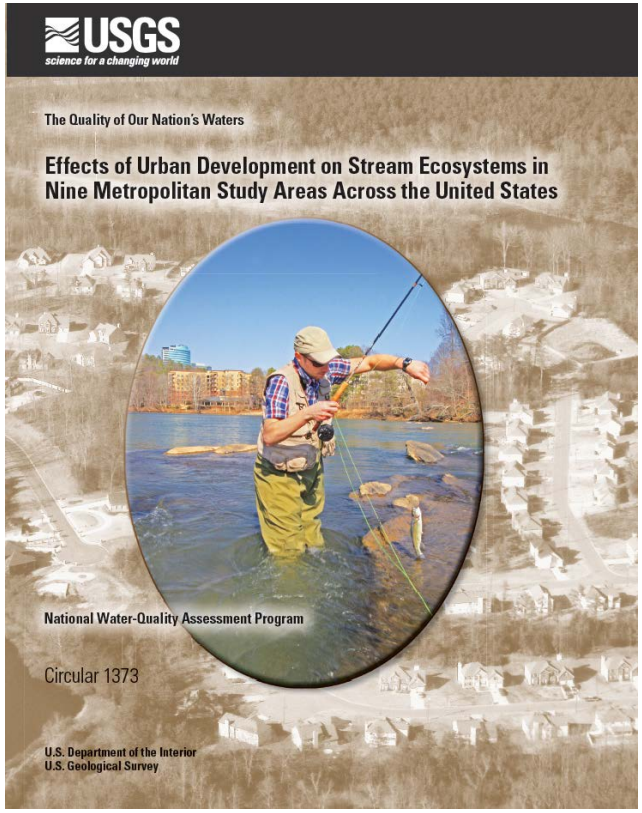
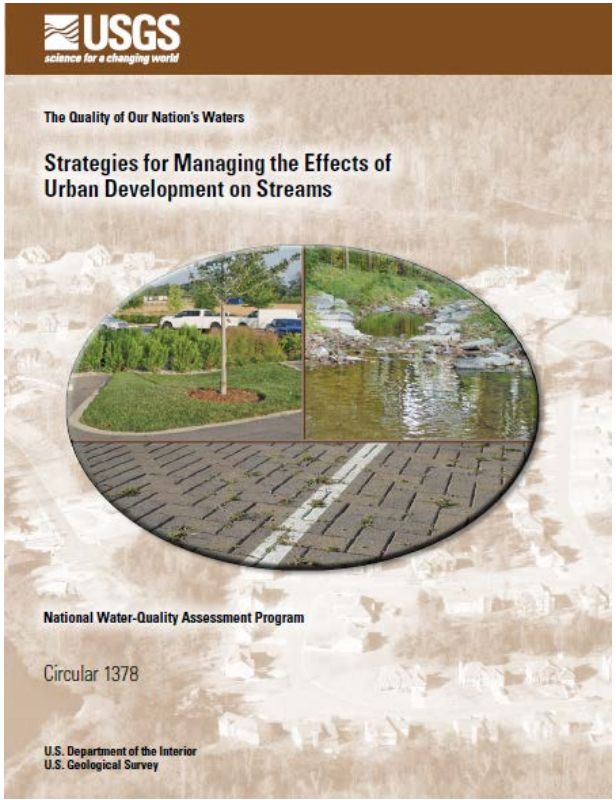
For More Information

Impacts of Urban Development on Stream Ecosystems



Urban Watershed Management Actions



Videos

USGS

http://water.usgs.gov/nawqa/urban