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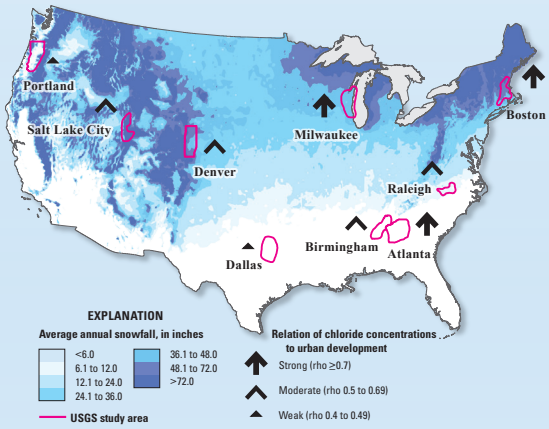
Milwaukee and Green Bay Metropolitan Areas

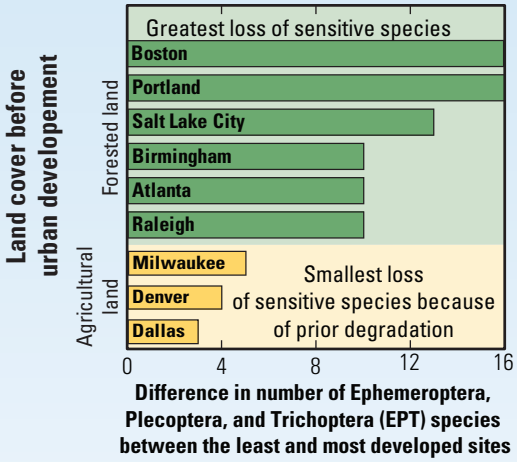
This information sheet highlights selected findings of a comprehensive assessment by the National Water-Quality Assessment Program of the U.S. Geological Survey of the effects of urban development on stream ecosystems in nine metropolitan study areas. These are a few of the findings from the study in the Milwaukee and Green Bay Metropolitan Areas.

Concentrations of Contaminants in Water Increased With Urban Development



Concentrations of contaminants, including chloride, and hydrophobic contaminants such as polycyclic aromatic hydrocarbons (PAHs), increased with urban development. An increase in chloride concentrations relative to urban development was observed in all nine study areas, even in areas with warm climates where deicing chemicals are used infrequently, which suggests additional sources of chloride other than road salt. Increases in chloride concentrations can result from leaking sewage pipes and septic tanks, fertilizer use, and the use of water softeners, bleach, and swimming pool chemicals.

The most frequently detected hydrophobic contaminants were PAHs. PAHs in the environment are largely a result of the incomplete combustion of petroleum, oil, coal, and wood. Emissions, such as from industrial processes, power plants, home heating, and vehicles, and runoff from parking lots with coal-tar-based pavement sealants are considered to be the principal sources to the environment. PAHs are of environmental concern because they are toxic to aquatic life and because many are probable or suspected human carcinogens.



Regional Differences in the Types of Land Undergoing Urban Development Influenced the Response of Aquatic Biota

In the Denver, Dallas, and Milwaukee study areas, the pre-urban land cover (grassland and agriculture) was an important factor in how the biological communities responded to urban development. In these three study areas, the decline in biological communities was consistently less than in the other study areas. The reason for this difference was not because biological communities in these regions were more resilient to stressors from urban development but because the biological communities already had lost sensitive species to stressors from preurban agricultural land-use activities. Thus, the biological communities had been degraded before the onset of urban development.

Urban Development Leads to Increased Variability in Streamflow

Urban development typically increases the amount of water entering a stream after a storm and decreases the time that it takes for the water to travel over altered land surfaces before entering the stream. Efforts to reduce flooding by draining water quickly from roads and parking lots can result in increased amounts of water reaching a stream within a short period of time, which can lead to stream flashiness and altered stream channels. Additionally, rapid runoff reduces the amount of water available to infiltrate the soil and recharge the aquifers, which often results in lower sustained streamflows, especially during summer. Furthermore, when the hydrology of a stream is altered, the physical habitat of a stream often becomes degraded from channel erosion or lower summer flows that reduce spawning, feeding, and living spaces of the aquatic biota.

Urban development can alter stream habitat directly, such as with engineered channel and riparian modifications (left), or indirectly, such as from flashier streamflows that reshape the channel and flow patterns (right). These pictures are both from Honey Creek near Wauwatosa. The left picture also shows a sewer vent that was originally buried in the stream bed.

Streams that were sampled in the Milwaukee and Green Bay Metropolitan Areas

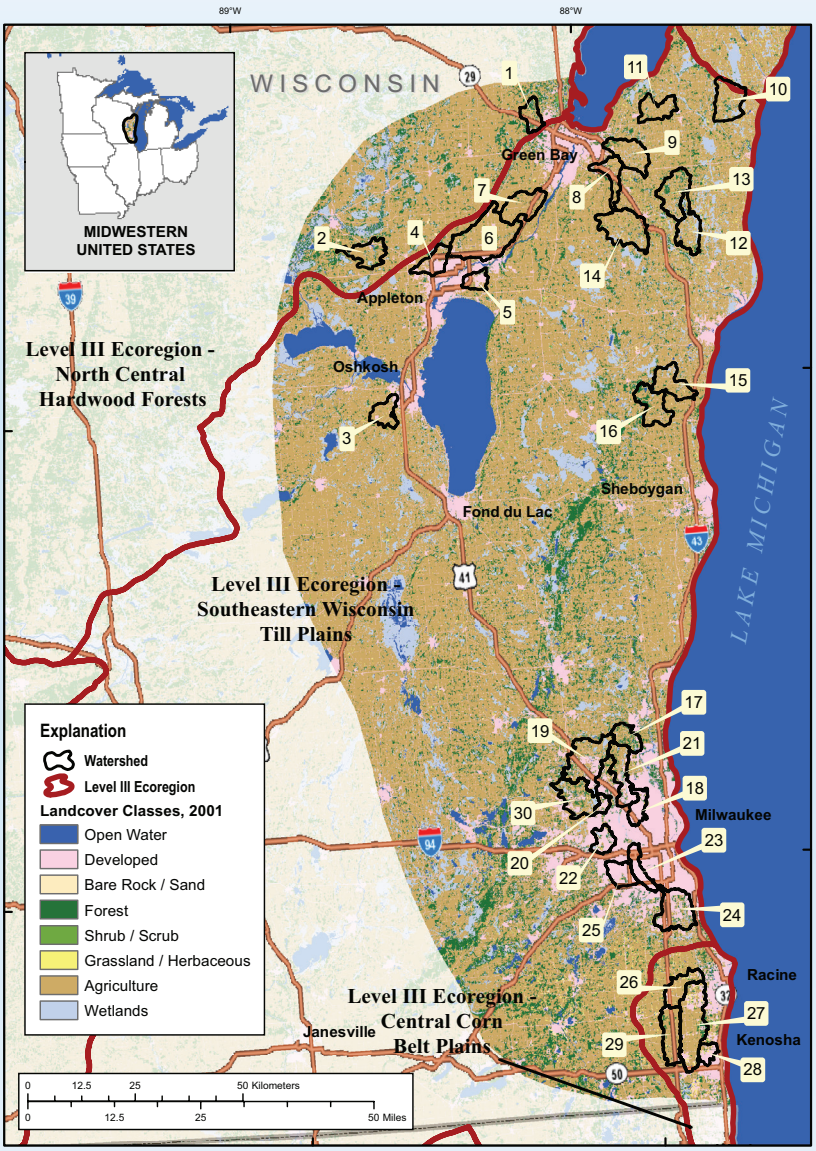


Figure Number	USGS Station Name
1	Lancaster Brook at Shawano Avenue at Howard, Wis.
2	Black Otter Creek near Hortonville, Wis.
3	Sawyer Creek at Westhaven Road at Oshkosh, Wis.
4	Mud Creek at Spencer Road at Appleton, Wis.
5	Garners Creek at Park Street at Kaukauna, Wis.
6	Apple Creek at Sniderville, Wis.
7	Ashwaubenon Creek at South Bridge Road near DePere, Wis.
8	Bower Creek Tributary at Lime Kiln Road near Bellevue, Wis.
9	Baird Creek at Superior Road at Green Bay, Wis.
10	Rio Creek at Pheasant Road near Rio Creek, Wis.
11	Kewaunee River Tributary at Lowell Road near Luxemburg, Wis.
12	Jambo Creek at Jambo Creek Road near Mishicot, Wis.
13	Black Creek at Curran Road near Denmark, Wis.
14	Devils River at Rosencrans Road near Maribel, Wis.
15	Point Creek at Ucker Point Road near Newton, Wis.
16	Meeme River at Washington Road near Cleveland, Wis.
17	Pigeon Creek at Williamsburg Drive at Theinsville, Wis.
18	Lincoln Creek at 47th Street at Milwaukee, Wis.
19	Menomonee River at Menomonee Falls, Wis.
20	Lily Creek at Good Hope Road near Menomonee Falls, Wis.
21	Little Menomonee River at Milwaukee, Wis.
22	Underwood Crk at Watertown Plank Road at Elm Grove, Wis.
23	Honey Creek near Portland Avenue at Wauwatosa, Wis.
24	Oak Creek at South Milwaukee, Wis.
25	Root River at Layton Avenue at Greenfield, Wis.
26	Hoods Creek at Brook Road near Franksville, Wis.
27	Pike River at Cth A near Kenosha, Wis.
28	Pike Creek at 43rd Street at Kenosha, Wis.
29	Kilbourn Ditch at 6Oth Street near Kenosha, Wis.
30	Fox River at River Road near Sussex, Wis.

Information on the effects of urban development on stream ecosystems is available in the following publications:

Coles, J.F., and others, 2012, Effects of urban development on stream ecosystems across the United States. (Available at *http://pubs.usgs.gov/circ/1373/*.)

Cappiella, Karen, and others, 2012, Strategies for managing the effects of urban development on stream. (Available at *http://pubs.usgs.gov/circ/1378/*.)

Videos, podcasts, articles, and fact sheets describing the USGS assessment of the effects of urban development on stream ecosystems in nine metropolitan areas of the United States are available at *http://water.usgs.gov/nawqa/urban/*.

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