



# Duluth Urban Area Streams

## Watershed approach

Minnesota has adopted a watershed approach to address the state's 80 "major" watersheds (denoted by 8-digit hydrologic unit codes, or HUCs). This approach looks at the drainage area as a whole instead of focusing on lakes and stream sections one at a time, thus increasing effectiveness and efficiency. This watershed approach incorporates the following activities into a 10-year cycle:

- Water quality monitoring and assessment
- Watershed analysis
- Public participation
- Planning
- Implementation
- Measurement of results



The Duluth Urban Area Streams Watershed (DUASW) process began in 2014 with the collection of stream flow and water quality data from six trout streams, covering the urban area from the southeast at Mission Creek to the northwest at the Lester River (west and east in local parlance). The DUASW Watershed Restoration and Protection Strategy (WRAPS) was conceived of as a way to recognize the complexity of a region where two major watersheds converge in an urbanized setting near a 12,000-acre Lake Superior estuary.

## Watershed characteristics

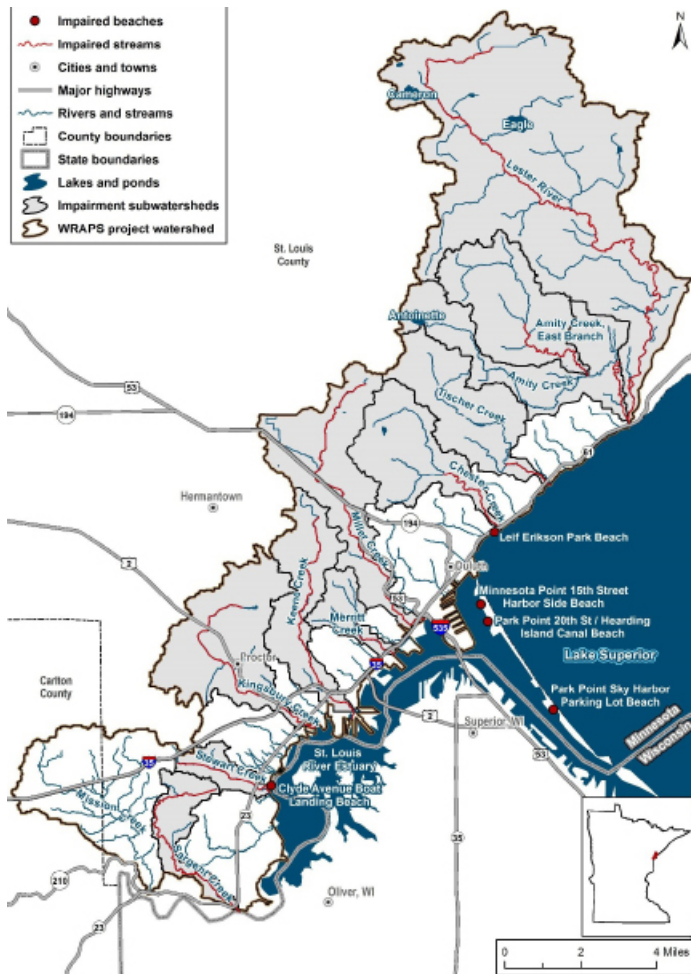
- Size: 141 square miles or 90,240 acres
- Water: 16 state-designated trout streams and more than 43 other named streams
- Counties: St. Louis, Carlton
- Ecoregion: Northern Lakes and Forests
- Land use: Predominantly low-density residential; forests provide the largest land cover
- Metro-area population: 279,601
- Duluth Urban Area Stream's 8-digit Hydrologic Unit Codes include 04010102 and 04010201

## Assessments: Are waters meeting standards and providing beneficial uses?

During the first phase of the project, Minnesota Pollution Control Agency (MPCA) and local partners collected data about biology, water chemistry and stream flow. The analysis revealed that 11 of 16 state designated trout streams were considered impaired by turbidity, chloride, *E.coli* bacteria, temperature and/or have poor biological diversity or health. Three public beaches were also impaired due to the presence of *E.coli* bacteria. A sizable number of smaller catchments or streams draining to the St. Louis River and Lake Superior were not evaluated because they are not perennial streams or classified as public waters. Contributions from these streams were considered as part of a watershed model completed in June 2016-2019.

The following map shows impairments requiring development of total maximum daily load (TMDL) studies to establish reductions needed to meet water quality standards. Lake Superior beaches and waters impaired by certain pollutants were deferred due to a lack of information required for TMDL development.

## Duluth Urban Area Streams watershed impairments, stressors



The biological health, physical condition and water quality of any stream or wetland are a representation of natural conditions, history, and individual human actions that alter the system's natural equilibrium. Restoration to a stable state may be permanently constrained by these changes and impacted by ongoing watershed alterations.

The DUASW is defined by a series of small watersheds draining directly to the St. Louis River and Lake Superior. Streams like Lester River and Amity Creek located in the watershed's northwestern region discharge sediment loads directly to Lake Superior without the typical river delta formation. Whereas, streams like Stewart Creek and Sargent Creek in the watershed's southeastern area fall precipitously, meander through a large former lake bottom, and then drop out sediment before discharging to St. Louis Bay. With exception of the Lester River, average streamflow values are so low these systems are easily disrupted by drought and reduced groundwater inputs.

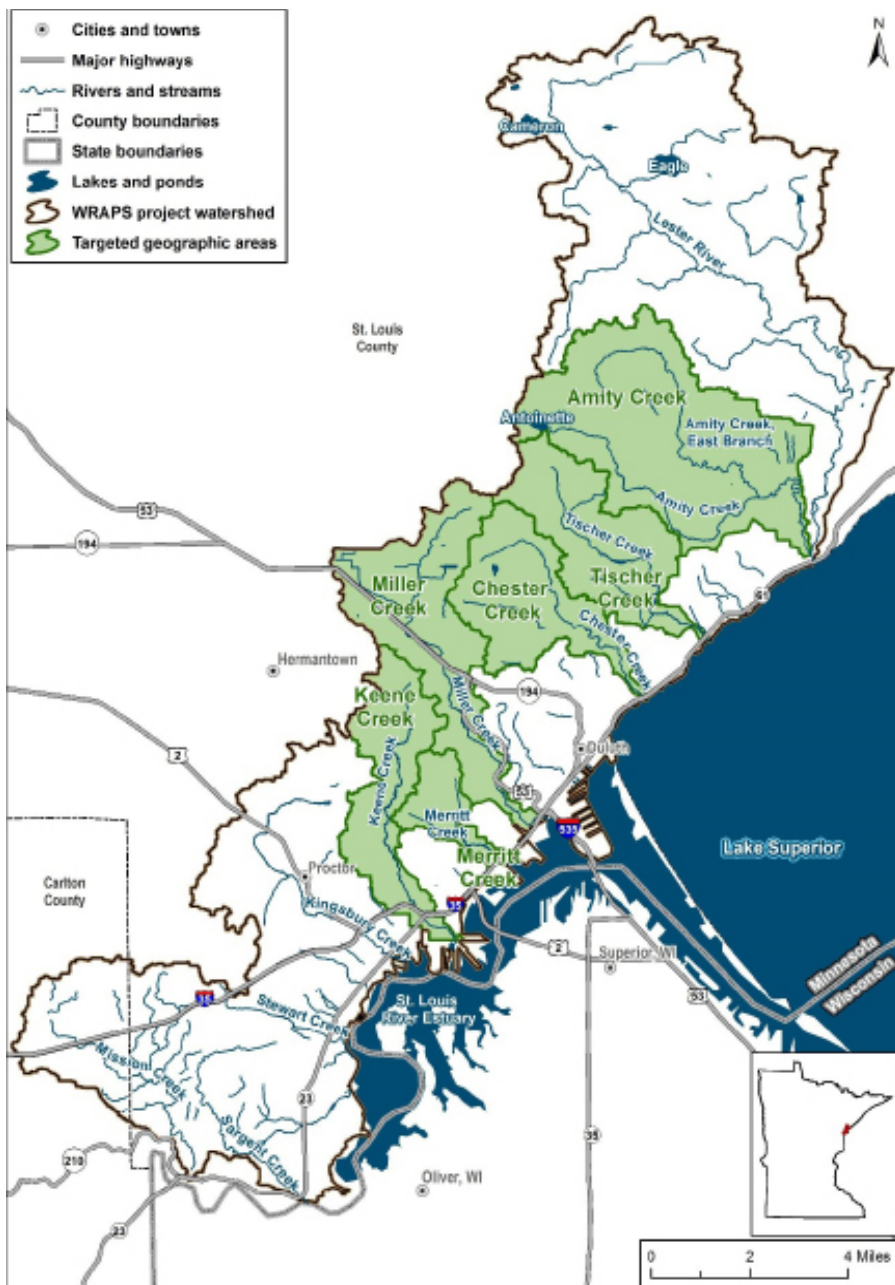
## Restoration strategies

The MPCA, Minnesota Sea Grant and the University of Minnesota convened an advisory committee of area municipalities to help establish a regional structure for urban watershed management. This organizational emphasis is routine elsewhere in the state. However, there are almost no formal watershed organizations in northeastern Minnesota. This regional watershed committee is envisioned as a key player in WRAPS implementation and in restoring the watershed's 11 impaired streams.

Turbidity and *E.coli* bacteria are two areas of emphasis. Most streams impaired by turbidity must reduce loads by 60% reductions to meet state standards. These reductions are challenging because urbanization alters watershed hydrology. Changes in hydrology ripple through a watershed scouring channels and destabilizing stream banks. *E.coli* bacteria, while it has different origins, is efficiently delivered to streams by the same hydrologic alterations causing elevated levels and impairing recreation.

Naturally, one of the key strategies is to reduce runoff by improving water storage in soils, floodplains, wetlands and forests. Other strategies include natural channel restoration to reduce stream channel bank erosion, channel scour and bank slumping, repairs to leaking wastewater lines or compromised septic systems and better park/green space management with regard to wildlife populations.

## Protection strategies



Protection is a key principle of the WRAPS process. While there are 11 impaired streams, few metropolitan areas can boast of having 16 state-designated trout streams. These streams still support viable brook trout populations, offer aesthetic and scenic amenities and recreational values to residents and visitors. Accordingly, protection of cold-water sources, intact stream reaches, forests and wetlands are key actions.

Conservation tools such as easements and restrictive covenants are tools available to protect these areas, as well as in less-developed watersheds such as Amity, Lester and Sargent's Creeks.

The map at left indicates restoration and protection priorities for the next 10 years.

## Next steps and measuring results

The DUASW WRAPS/TMDL reports are an important step in an evolutionary process of managing streams and understanding watersheds in a region defined by water. Historical development patterns stripped the area of its forests, compacted soils, changed drainage patterns and buried streams to accommodate buildings, industrial activity and roads. Some streams and watersheds will never return to their former state. Nevertheless, it is imperative to protect and restore the resource value of these streams for thousands of urban residents who use and coexist with these streams.

The WRAPS initiated a number of key steps for measuring watershed health, including creation of a detailed watershed model, establishment of a citizen science streamflow monitoring program and stream assessments led by the South St. Louis Soil and Water Conservation District (SWCD) and U.S. Geological Survey. The SWCD also developed a unique Amity Creek stream geomorphic restoration plan.



## Key remarks and conclusions

- Lake Superior is the sink for all of the streams that drain the Duluth Metropolitan area. It is also the drinking water source for most urban residents.
- The sub-watersheds of the DUASW are part of the life blood of Lake Superior. Whatever befalls these watersheds, befalls Lake Superior.
- The WRAPS report provides a foundation for development of a One Watershed, One Plan process.
- Protection of forests, wetlands and places to store water are critical to urban watershed health.
- Aging wastewater and stormwater infrastructure and nuisance populations of animals are challenges to clean recreational waters.
- Climate change is and will continue to be a significant challenge to streams already under duress. Approximately 10 trout streams are predicted to have mid-century July stream temperatures lethal to brook trout.
- A wide range of tools are available to protect watersheds. These tools include actions like stream bank and channel stabilization, minimizing lawns and impervious areas, planting trees and shrubs and establishing conservation easements.



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### Full report

Full report and supporting documents can be found at <https://www.pca.state.mn.us/water/total-maximum-daily-load-tmdl-projects>

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