

Number of CSO Outfalls

168

Combined Sewer Service Area

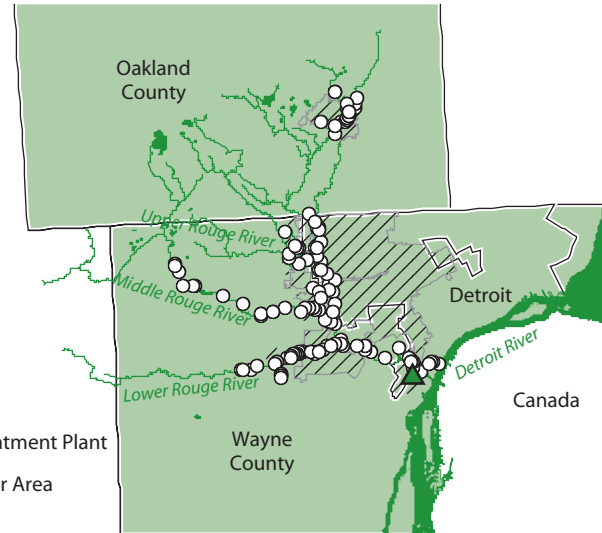
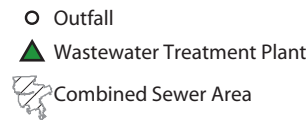
93 square miles

Wastewater Treatment Capacity

1,700 mgd (primary)
930 mgd (secondary)

Receiving Water(s)

Rouge River and tributaries



Controls

- CSO control activities in the Rouge River Watershed are focused on sewer separation and construction of local retention treatment basins.
- The NMC have been implemented for all uncontrolled CSOs for which the construction of permanent control facilities is not imminent.
- Under its NMC program the City of Detroit installed outfall control gates at seven CSOs to eliminate CSO discharges during small events.
- A total of 10 retention treatment basins and one tunnel represent the major new CSO facilities that are planned, under construction, or in operation.



Photo: Retention basin under construction in Dearborn, MI.
Courtesy of EPA

Program Highlights

- The Rouge River National Wet Weather Demonstration Project coordinates CSO implementation in 16 CSO communities in conjunction with other non-CSO restoration efforts on a watershed basis.
- About 30 miles of the Rouge River that were CSO-impacted in 1994 are now completely free of uncontrolled CSO discharges.
- The amount of combined sewage captured for treatment has increased due to construction of CSO retention treatment basins.
- Untreated overflows in excess of 50 times per year have been reduced to treated overflows occurring one to seven times per year where retention treatment basins have been implemented.
- Monitoring indicates improved dissolved oxygen conditions associated with the implementation of CSO controls in the Rouge River.

Background on Rouge River Watershed CSOs

The Rouge River Watershed occupies 438 square miles in southeastern Michigan. The south and east portions of the watershed are highly urbanized and include parts of Detroit and its suburbs. The Rouge River Watershed is home to approximately 1.5 million people spread across 48 communities and 3 counties. The Rouge River itself extends for more than 100 miles, with 50 miles flowing through accessible public parklands. The Rouge River discharges to the Detroit River and affects water quality conditions in that water body as well as Lake Erie. Congress appropriated money through EPA and Wayne County, Michigan in 1992 for the Rouge River National Wet Weather Demonstration Project (Rouge Project). The Rouge Project is a comprehensive program to manage wet weather pollution to restore the water quality of the Rouge River. This cooperative watershed management effort between federal, state and local agencies is supported by multi-year grants from the federal government with additional funding from local communities.

As of 1994, there were a total of 168 permitted CSOs discharging into the Rouge River and its tributaries. These outfalls, owned and operated by Wayne County, the City of Detroit, and 14 other CSO communities, are concentrated in the lower portions of the watershed. Several of the permitted outfalls are reported to be overflow structures which discharge to interceptors, which then discharge into the Rouge River or one of its tributaries. There are 40 CSO outfalls that discharge to the Detroit River that are not included in the Rouge River case study. The combined sewer area comprised 20 percent of the watershed in 1994, or 60,000 acres. All dry weather flows and some wet weather flows from these CSSs are delivered to the Detroit POTW along with other flows from outside the watershed. The Detroit POTW has a primary treatment capacity of 1,700 mgd and a secondary treatment capacity of 930 mgd.

Status of Implementation

Michigan's equivalent to the NMC has been implemented for all uncontrolled CSOs for which the construction of permanent control facilities is not imminent. The most significant NMC capital expenditure was the construction of outfall control gates at seven combined sewer outfalls in the Rouge River watershed owned by the City of Detroit. During wet weather events, these gates have eliminated CSO discharges during small rain events by maximizing the use of in-system storage. Other measures have not required significant capital expenditures.

Each CSO community with uncontrolled CSOs has taken measures to prevent the occurrence of dry weather overflows. Each CSO community reports CSO discharges to the Michigan Department of Environmental Quality (MDEQ), which provides public notification by posting the reported information on a website. State law also requires CSO permittees to self-report to downstream communities and one major local newspaper.

LTCs are implemented in three phases as established through NPDES permits:

- Phase I— elimination of raw sewage and the protection of public health for approximately 40 percent of the combined sewer area.
- Phase II— elimination of raw sewage and the protection of public health for the remaining combined sewer area.
- Phase III— meet water quality standards in the Rouge River.

Under Phase I, six communities separated their sewers and nine communities constructed a total of 10 retention treatment basins. Each of these retention treatment basins is sized for different design storms, and several employ innovative technologies. These facilities also incorporate a variety of additional features or variations in compartment sizing and sequencing in order to improve their effectiveness. The retention treatment basins capture most wet weather flows for later conveyance to the Detroit POTW for treatment. Flows from very large wet weather events that are not captured by the retention treatment basins receive screening, skimming, settling, and disinfection prior to discharge. These projects have effectively eliminated or controlled the discharge of untreated sewage from approximately half of the watershed's CSOs.

Working with the CSO communities, MDEQ established rigorous "Criteria for Success in CSO Treatment" to evaluate whether the CSO basins met the Phase I goals of elimination of raw sewage discharges and protection of public health. MDEQ established a work group that included state personnel, CSO permittees and consultants to assess the evaluation process.

A detailed evaluation study of the CSO retention treatment basins constructed thus far is underway to examine the performance of the facilities and the water quality impacts of their discharges. Basin influent and effluent flow and water quality are monitored for at least two years at each facility. In addition, river monitoring is performed to identify

benefits associated with CSO control. The results of the evaluation study, coupled with efforts to control storm water and other pollution sources in the watershed, will provide the basis for the Phase II and Phase III CSO control program to address the remaining water quality issues. The information gained from the evaluation of design storms and control technologies will also be useful nationwide in determining cost effective CSO controls to meet water quality standards.

It is important to note that MDEQ has concluded that all six of the CSO treatment facilities that have completed data collection are currently meeting the Phase I criteria of the elimination of raw sewage and the protection of public health. In addition, the first three CSO basins evaluated are achieving the Phase III goal of meeting water quality standards at times of discharge, except for meeting the yet-to-be-evaluated total residual chlorine standard.

Costs and Financing

CSO-related capital expenditures are funded by a combination of federal and local funding sources, with some communities using state revolving loan funds. Local funding is being generated by sewer rate increases, or issuance of general obligation bonds that are repaid through property taxes. Capital expenditures for Phase I CSO projects in the watershed total about \$350 million, with another \$5 million spent annually on CSO-related O&M. Another \$1.3 billion of capital expenditure is needed to complete implementation of LTCP facilities in the watershed, along with \$15 million annually for additional CSO-related O&M.

Water Quality Issues

Before implementation of CSO controls began in 1994, excursions of the water quality standards for dissolved oxygen and bacteria occurred frequently in CSO-impacted reaches of the Rouge River and its tributaries. Evidence of raw sewage was visible in the river during wet weather events, and visible on river bank vegetation and woody debris after events. Implementation of the NMC, the Phase I CSO control projects, and other watershed management measures has resulted in significant improvement in river conditions. In river reaches now free of uncontrolled CSOs, exceedances of the dissolved oxygen standard have been almost eliminated, the amount of bacteria in the river during wet weather events has been greatly reduced, and visible evidence of raw sewage has been eliminated. However, completion of the LTCP will not result in complete compliance with water quality standards due to other pollution sources within the watershed.

Enforcement Issues

Several enforcement actions have been taken by MDEQ relative to the Phase I CSO control projects:

- One project was aborted due to construction problems, and MDEQ issued an administrative consent order requiring the community to complete a revised CSO control project. This project is currently under design.
- One project is not yet complete due to construction delays and an enforcement action was initiated to ensure its timely completion.
- An amended federal consent judgment was issued in part for the failure to complete three projects on schedule. These projects are now complete and operational.

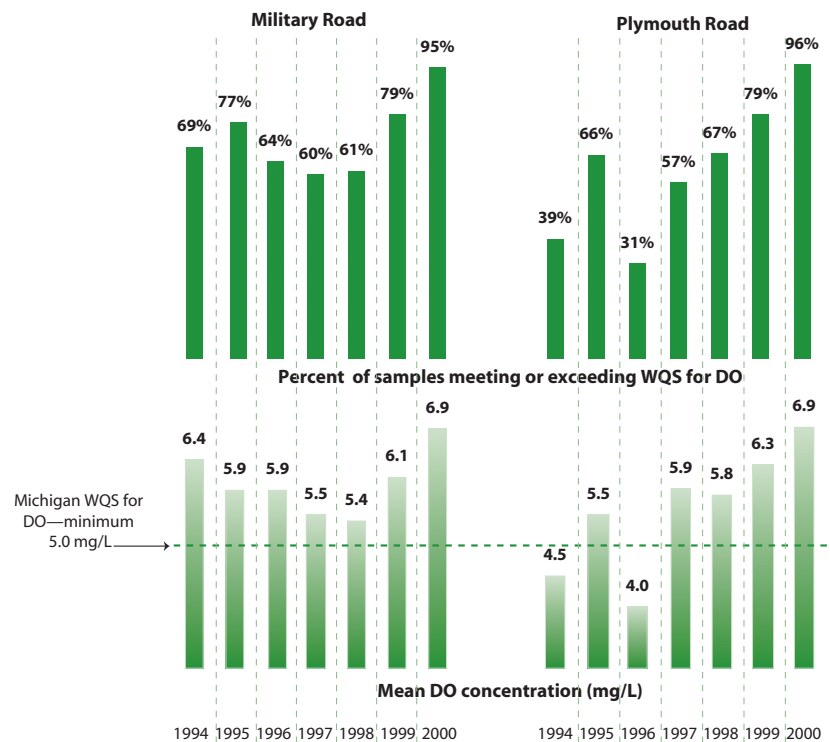
Results

Some of the key results and accomplishments of the Rouge Project are as follows:

- About 30 miles of the Rouge River that were CSO-impacted in 1994 are now completely free of uncontrolled CSO discharges.
- Two years of performance monitoring data for the first six CSO basins shows the following:
 - About 72 percent (933 million gallons) of the combined sewage that previously went to the river was captured and treated at the Detroit POTW.
 - Untreated overflows in excess of 50 times per year have been reduced to treated overflows occurring one to seven times per year.
 - Even in areas with remaining uncontrolled CSOs upstream, continuous dissolved oxygen data are showing dramatic improvements in river conditions due to upstream CSO control projects and other watershed management measures/changes.

As shown in the figure below, on the Main Rouge River (Military Road monitoring station) the percent of continuous dissolved oxygen levels meeting or exceeding water

Dissolved Oxygen Increases at Main and Lower Rouge Monitoring Stations



quality standards increased from less than 60 percent in 1998 to 95 percent in 2000. On the Lower Rouge River (Plymouth Road monitoring station) the percent of continuous dissolved oxygen levels at or above water quality standards increased from less than 30 percent in 1994 to 96 percent in 2000 (see figure, below).

Work groups have reached consensus with MDEQ that the first six CSO retention treatment basins evaluated are meeting MDEQ-defined criteria for protecting public health and eliminating raw sewage. Additionally, work groups have reached consensus with MDEQ that the first three CSO basins evaluated are achieving MDEQ-defined criteria for achieving water quality standards at times of discharge, except for meeting the yet-to-be-evaluated total residual chlorine standard.

In addition to the above, the aesthetics of the Rouge River and its tributaries are greatly improved, and there is evidence of aquatic habitat improvement. Recreational use of the Rouge River is increasing.

References

Ed Kluitenberg, Applied Science, Inc. Personal communication with Limno-Tech, Inc. staff on details of the combined sewer overflow plan and program. Summer 2001.

Rouge River Project Web Site (<http://www.wcdoe.org/rougeriver/>).