

ROUGE RIVER WATERSHED MANAGEMENT PLANNING THE MAIN 3-4 SUBWATERSHED PLAN

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INTRODUCTION

In 1992, the EPA provided \$46 million to Wayne County, Michigan to fund the development of a watershed-wide approach to addressing the problems of an urban river. In May 2001, seven Subwatershed Management Plans were submitted to the Michigan Department of Environmental Quality. This paper describes the most urban of those plans: The Rouge River Main 3-4 Subwatershed Plan.

The Rouge River, a tributary to the Detroit River in southeastern Michigan, has been documented as a significant source of pollution to the Great Lakes system. The Rouge River Watershed covers 438 square miles of southeast Michigan (metropolitan Detroit) and is home to more than 1.5 million people in parts of three counties – Wayne, Oakland and Washtenaw. All of this area drains through the Main 3-4. Unlike its neighboring subwatershed to the north and subwatersheds to the west that include Rouge River headwater areas, a high proportion of the Main 3-4 Subwatershed is covered by impervious surfaces such as roads, rooftops and parking lots. This subwatershed is completely built out and has been developed into residential (56%) and commercial and industrial (30%) land uses.

The residents of the Main 3-4 Subwatershed have accomplished a great deal of water pollution control over the past 30 years. In the 1960s, the Main 3-4 section of the Rouge River was an example of the worst river stretches in the nation. It flooded regularly and was oil-covered and sludge-laden, with offensive odors. The watershed plan is a key component of proceeding in a coordinated manner. For three years, the communities that comprise the Main 3-4 Subwatershed Advisory Group (SWAG) met monthly to determine what actions should be taken to address impairments in their section of the Rouge River Watershed. The work of the Main 3-4 SWAG was done both to support the communities' applications for voluntary general storm water permits from the State of Michigan and to address storm water pollution to the Rouge River.

The high percentage of impervious surfaces in the Main 3-4 has contributed to the large variations in the River's flow. In addition to erratic flows, which cause stream bank erosion, sedimentation and reduction in wildlife habitat, this subwatershed is plagued by the same problems that degrade the Rouge River as a whole. These problems include high bacteria counts from untreated sewage entering the river and low dissolved oxygen. In addition, a portion of the Rouge River below Michigan Avenue has been channelized to control flooding and trees and shrubs on the streambank have been eliminated.

In the past, combined sewage systems contributed untreated sewage to the River when the systems overflowed. By 1998, four retention/treatment facilities were constructed in the Main 3-4 subwatershed at a cost of \$106 million to address these combined sewer overflows (CSOs). The four constructed basins alone serve an area over 16,000 acres. In addition, a \$1 billion Long Term CSO Control Plan spearheaded by the City of Detroit will further reduce CSOs discharging to the Rouge River.

The communities that share the most downstream portions of the Rouge River have experienced the worst aspects of environmental damage as a result of urbanization and industrialization. As a result they have paid the price with lost recreational opportunity. More importantly, they have paid the tremendous financial costs associated with retrofitting their older urban infrastructure into a system that fulfills the goals of the federal Clean Water Act. The costs to date have been substantial but the anticipated costs over the next ten years will be staggering.

The Main 3-4 communities are all committed to complying with the Clean Water Act. Their efforts alone, however, will not restore the uses of the Rouge River. They must rely on their upstream neighbors to also commit to restoring the river. Thus, with the Rouge Remedial Action Plan (RAP) serving as the framework, the communities of the Main 3-4 have prepared their watershed plan as a tool to coordinate and guide the water quality management effort in their communities.

The two year process began with the communities of the Main 3-4 subwatershed developing goals for the subwatershed management plan. They then developed a list of long-term and short-term actions to address these goals. The Rouge Program Office provided pilot project funding, public involvement assistance, extensive monitoring data, expertise on Best Management Practices and technical advice. Most recently, communities developed Storm Water Pollution Protection Initiatives that identify specific actions, with timeframes and cost estimates, to implement the Subwatershed Plan.

SUBWATERSHED CHARACTERISTICS

Land Use: According to 2000 census data, approximately 593,324 people live in the Main 3-4 Subwatershed. The Rouge River watershed includes the Upper, Lower, Middle and Main Branches and drains an area of 438 square miles. The Main Branch of the Rouge River flows through the Main 3-4 Subwatershed which has a drainage area of 91.37 square miles and includes portions of the cities of Detroit, Highland Park, Dearborn, Dearborn Heights, Redford Township, Melvindale, Allen Park and River Rouge. Based on 1995 land use data there is little to no open space left in the Main 3-4 subwatershed and a high proportion of the subwatershed is covered by impervious surfaces such as roads, rooftops, and parking lots. This subwatershed has been developed into residential (56%) and commercial and industrial (30%) land uses. The high percentage of impervious surfaces has contributed to the large variations in flow in the river. In addition, a portion of the Rouge River below Michigan Avenue has been channelized to control flooding and trees/shrubs on the streambank have been eliminated.

Dissolved Oxygen (DO) And Temperature Data: DO and temperature sampling began in 1993 and continued through 2001 at various sites throughout the Main 3-4 Subwatershed. DO and temperature measurements were taken during dry weather; wet weather and some stations were monitored continuously. Several significant changes have occurred in the subwatershed in recent years. Since three new CSO basins in Detroit became operational in 1999, DO has improved significantly since 1998 with 2000 being the best year on record. Mean DO has increased from 5.4 mg/l in 1998 to 6.9 mg/l in 2000. The percent of DO readings below the 5 mg/l State Standard dropped from 40 percent in 1998 to 5 percent in 2000.

Aquatic Habitat: In 1996, RPO staff evaluated aquatic habitat quality at 12 locations in the Main 3-4, using Michigan Department of Environmental Quality protocol. Two of the locations were determined to have "Fair" aquatic habitat quality; and the remaining 10 locations had "Poor" habitat. Identified habitat problems included excessive flow variation, excessive siltation, lack of streamside vegetation and cover, and a lack of pool and riffle habitat. In addition, in stream habitat downstream of

Michigan Avenue to the river mouth is extremely poor, due to a concrete-lined channel, poor water quality, contaminated sediments, and loss of riparian wetlands and forests. These conditions greatly inhibit the movement of fish between the Rouge River and the Detroit River.

Fish Consumption Advisory: The Michigan Department of Natural Resources and the Michigan Department of Community Health (MDCH) have established fish consumption advisories for the fish listed in Table 1. The MDCH defines “general population” as men, boys older than 15, and women beyond childbearing years. “Women and children” are defined as women who are pregnant or breastfeeding, women who intend to have children, girls older than 15, and all children under 15. There is a fish consumption advisory for PCBs in the southernmost part of the subwatershed.

Toxic chemicals in water and sediment: Toxic chemicals were found in four recent studies of the Main Branch of the Rouge River. In 1996, the RPO measured the concentrations of potentially toxic metals and organic compounds in water and sediment at two locations in the Main 3-4, and performed water and sediment toxicity tests. Significant zinc was found in the water upstream of the University of Michigan-Dearborn Dam as well as significant lead & zinc in the sediment. Downstream at Rotunda Drive significant amounts of PCBs were found in the water and significant PAHs were found in sediment. The MDEQ collected and analyzed 84 sediment grab and core samples in the lower portion of the Main 3-4 in 1997-98 and found elevated concentrations of PCBs and total PAHs and many metals.

Impaired Uses: The Rouge Remedial Action Plan Advisory Council (RRAC) summarized the impaired uses of the Main 3-4 as impaired or severely impaired for water contact, warm water fisheries, habitat degradation, aesthetics degradation, aquatic life and wildlife degradation and navigation.

Prioritized Pollutants: In order to reach goals on a subwatershed basis, it is important to identify the pollutants or threats that are detrimental to designated and desired uses. To restore the subwatershed, there needs to be a good understanding of the sources and causes of the pollutants or threats. Pollutants were prioritized based on various factors such as the SWAG prioritization, a consideration of the magnitude of the source in the subwatershed, as well as review of past studies that indicate which source may be contributing the most problems in the subwatershed. This prioritization has assisted the SWAG in identifying and prioritizing which pollutant should be addressed first and with which best management practices. They are:

1. *E.coli* bacteria
2. Total suspended solids
3. Nutrients
4. Land Use Change/Loss of Natural Features
5. Flow Variability
6. Increased Temperature
7. Toxics/Heavy Metals

PROGRESS TO DATE

CSO Control Efforts: Discussed previously.

Gateway Project: The Rouge River Gateway project is exploring solutions to restore the area's natural landscape with riverfront parks and removal of portions of the concrete channel. If successful, the re-naturalization of the river's banks will enhance aquatic life, habitat and aesthetics. The Gateway Project is initiating a detailed master plan in coordination with the Rouge Program Office. Funding is being made available through stakeholder donations and the Rouge Project.

Rouge River Water Festival: Since 1998, the Wayne County Rouge Program Office and the University of Michigan/Dearborn have sponsored a Water Festival for fifth-graders from schools around the watershed. The Water Festival is a one-day event designed to teach students about the numerous ways in which water affects their daily lives. Some 1500 students attended the 2001 Water Festival.

Native Wild Flowers and Grasses: The Rouge Project has funded two projects in Detroit parks in the Main 3-4 Subwatershed. Nearly three acres of wildflowers such as Purple Coneflower, Blackeyed Susan, Wild Lupine and Butterfly Weed were planted at Eliza Howell Park in the fall of 2000. In nearby Rouge Park, the largest park in the City of Detroit, nearly 15 acres of wet meadow plants, prairie grasses and wild flowers were planted.

LONG TERM GOALS AND ACTIONS FOR THE MAIN 3-4 SUBWATERSHED

The Main 3-4 SWAG considered the subwatershed impairments and data, public comment, the results of a public survey, and the watershed impairments and created the following goals and actions:

1. Improve water quality in the Rouge River and restore impaired uses.
 - Reduce pollutant loading in storm water.
 - Reduce solids loading to the river.
 - Reduce contribution of nutrients.
 - Increase dissolved oxygen.
2. Remove sources of pollution that threaten public health
 - Finalize plans and schedules for addressing remaining CSOs.
 - Develop detailed plans and approved schedules for satisfactorily addressing known SSOs.
 - Identify and remove illicit discharges and illicit connections.
3. Educate the public regarding their impact on the River and the River's existing and future potential as a community asset and recreational resource.
 - Conduct public education and public participation programs.
 - Encourage riparian landowners to manage their waterfront as an asset to enhance property values.
 - Encourage use of parklands adjacent to the river.
 - Inform residents of the costs and benefits involved in restoring the river.
4. Improve the water quality of the river to increase recreational opportunities and remove fish consumption advisories.
 - Address concrete channel (as much as possible) to improve habitat for fish and wildlife.
 - Reduce flood and bank erosion damage to riparian properties and destruction of fish and wildlife habitat.
5. Enhance and preserve habitat, especially next to the river, for fish and wildlife compatible with subwatershed land uses.

- Continue to seek grants to implement projects such as:
U of M Dearborn Environmental Interpretive Center and Programs
Melvindale park and trail
Henry Ford Museum Oxbow restoration
 - Provide more fishing opportunities as water quality and habitat improves
 - Maintain and protect identified meadows and wildlife corridors
 - Establish a vegetative buffer to protect riparian habitat along the River and its tributaries.
 - Protect wetlands and other natural features that serve to store water during storm events.
 - Stabilize banks that are significant sources of sediment loading to the river.
6. Reduce water volumes and velocities in the river during a storm event to minimize bank erosion and flooding.
- Reduce flood and bank erosion damage.
 - Require on-site detention/retention of storm water and snow melt for new commercial, multi-family residential and industrial developments and redevelopments. (where possible)
 - Encourage innovative site designs for new developments to reduce impermeable surfaces and encourage infiltration of water.

MANAGEMENT ALTERNATIVES

Action Plans By Main 3-4 Communities:

Individual action plans were established on a community-by-community basis. To establish an action plan, each community evaluated the water quality concerns in its community and proposed a series of actions to address these concerns. These actions were then grouped with the actions of other communities and matched with the management alternative. This allowed the SWAG members to estimate the level of improvement that would be expected should all of the actions be implemented.

In general SWAG members developed a list of management actions that included actions currently being carried out, planned actions and new initiatives. Short term actions are defined as those to be completed by 2005. The proposed actions were tabulated and became the foundation of the subwatershed plan. The proposed actions were also used by each community to develop a Storm Water Pollution Prevention Initiative (SWPPI).

Below is an example of a Management Action List prepared by the City of Dearborn, which makes up nearly a quarter of the subwatershed.

City of Dearborn Management Action List

NUMBER	ACTION	SHORT TERM	LONG TERM	NEW INITIATIVE?
D1	Ford Field bridge replacement	7/01		X
D2	Streambank stabilization/Ford Field multiple sections Brady to Military	10/03		X
D3	Ford Field pond restoration	10/03		X
D4	Storm dispersion at Military spread out southwest through woods	4/02		X
D5	Mailing to riparian land owners on BMPs with Rouge Repair Kit, 1,000 mailings at \$3	4/01		X
D6	IDEP testing/study	11/01	X	
D7	H/H modeling for bank stabilization	12/00		
D8	TV inspection for storm drain	12/05	X	X
D9	GIS – storm sewer database	10/02	X	X
D10	Public education Web site	4/01	X	X
D11	Increase Infiltration in Ford Field	7/01	X	X
D12	Study of Streambank in city-owned golf course			X
D13	-Buy/rent/Menzie muck -In-house manpower with volunteers	11/03 11/03		X
D14	Repair/restore erosion at major drainage structures	10/05	X	
D15	Catch basin cleaning/repair	X	X	
D16	Street sweeping	X	X	
D17	Leaf removal	X	X	
D18	HHW program	X	X	
D19	Build new salt storage facility	Complete		X
D20	Yard waste composting program	X	X	
D21	Rain barrel project FOTR grant	Current		X
D22	Maintain green roof on city hall	X	X	
D23	CSO -Cured in place lining (in situ form)	X		
D24	TV inspection of CSO	X	X	X
D25	CSO – A, B and Roulo Creek			
D26	Dearborn share of DWSD – CSO			
D27	Down spout disconnection program/ordinance	X	X	X
D28	SSO identification	X	X	

BEST MANAGEMENT PRACTICES (BMPs)

BMPs are a vital component of a storm water management program. BMPs address specific storm water pollution issues and can be implemented individually or in series. Some are better suited to newly developed communities, while others will work as retrofits on existing systems. The following is a brief summary of each BMP that is included in this management plan and will consequently be used in the community Storm Water Pollution Prevention Initiatives. The BMPs were organized in the following categories: reduce peak flows, reduce sediment loads, reduce sanitary wastewater pollution,

preserve/increase habitat, enhance recreational activities, reduce chemical pollutants and educate the public. Following the development of subwatershed goals, the SWAG identified and selected the BMPs that would address these rather broad goals.

MATRIX OF ACTIONS VERSUS GOALS

The next challenge was to compare the list of proposed actions identified by each SWAG community with the short- and long-term goals identified by the SWAG as a whole, as well as a list of Best Management Practices. Questions that needed to be addressed included:

- Have all the goals been addressed at some level?
- Collectively, will the actions identified “solve” the problem?
- Should additional goals be included?
- What other actions can be accomplished through collaboration among communities?
- What actions can/should be accomplished by others such as Michigan Department of Transportation, Wayne County Parks and the Michigan Department of Environmental Quality, etc?
- Have the communities controlled their storm water to the maximum extent practicable?
- Are water quality standards going to be met?

PROCESS FOR REVISING THE PLAN

The main purpose of the Subwatershed Management Plan (SWMP) is to identify and implement actions needed to restore designated uses and resolve water quality and quantity concerns. As stated in the permit language, the long term goals of this voluntary permit “shall include protection of designated uses of the receiving waters as defined in Michigan’s Water Quality Standards”. These designated uses are as follows:

- Agriculture
- Industrial water supply
- Public water supply at the point of intake (not applicable to Rouge)
- Navigation
- Warmwater fishery or cold water fishery (Johnson Creek)
- Other indigenous aquatic life and wildlife
- Partial body contact recreation
- Full body contact recreation between May 1 and October 31.

The SWMP must be reviewed and revised (if necessary) 2 years after it is submitted. Although the SWMP does not need to be formally approved by MDEQ (as the SWPPIs do) communities will not be eligible for CMI funds unless their WMP is formally approved by the MDEQ. Revision of the SWMP does require additional public involvement.

If the SWMP needs revision the Subwatershed Advisory Groups will meet to develop the revised plan. EPA and MDEQ view the application of the Maximum Extent Practicable (MEP) standard as an iterative process. As stated in the Phase II Storm Water Permit Text: “Successive iteration of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards.” In many cases the process of meeting water quality standards may take two to three permit terms (10-15 years).

Each community (permittee) will submit an annual report to the MDEQ. This should include an explanation of progress towards goals listed in the SWMP and the status of actions listed in the SWPPI. It should also include discussions of proposed revisions/modifications to the original goals/action in the SWMP and/or SWPPI that may be needed.