

2004 Rouge River Remedial Action Plan Revision



Thank You!

The 2004 RAP is dedicated to two RRAC members who passed away during its development: Mr. Charles Moon and Mr. John Donohue. The leadership, advice and support of these exceptional attorneys will be missed by all who had the pleasure of working with them.

The Rouge River Advisory Council would like to thank the many agencies, organizations and individuals who contributed to the completion of this document.

The following are those who have served on the drafting and review teams:

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Finally, RRAC wishes to express their gratitude to Rich Badics, RRAC Chair from 1996 through 1999, Kurt Heise, Chair, and Bill Craig, Vice Chair, from 2000 through 2004; for their outstanding and steadfast support, guidance and commitment throughout the development of this document.

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"A river is a reflection of the community through which it flows."

*Orin Gelderloos,
Director of the Environmental
Interpretive Center at the
University of Michigan - Dearborn*



Figure 1: Rouge River Watershed Location in Michigan





Glossary

The following is a glossary of acronyms and abbreviations for this report to assist the reader in understanding this document:

AOC	Area of Concern - IJC designated water body that significantly contributes to the pollution of the Great Lakes. There are 43 AOCs in the Great Lakes region, 14 in the State of Michigan, including the Rouge River.
BMPs	Best Management Practices - Practices used to control pollution caused by storm water runoff.
BUI	Beneficial Use Impairment
CDF	Confined Disposal Facility
CLEAN	Corporate Leaders' Environmental Affiliates Network
CMI	Clean Michigan Initiative
CSO	Combined Sewer Overflow - Overflows from older combined sewer systems designed to carry both sanitary sewage and storm water to a wastewater treatment plant.
CSO Basin	Concrete structure used to relieve high wastewater flows in combined sewer systems
CWCSA	Central Wayne County Sanitation Authority
DO	Dissolved Oxygen
DWSD	Detroit Water and Sewerage Department
EIC	Environmental Interpretive Center - Located on the campus of the University of Michigan-Dearborn
FCAs	Fish Consumption Advisories
FLOW	Forest Lake Outlet Watershed
FOTR	Friends of the Rouge
GIS	Geographic Information System
GLWQA	Great Lakes Water Quality Agreement - A bi-national agreement that agreed "to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem."
HHW	Household Hazardous Waste
HNPA	Holliday Nature Preserve Association
IDEP	Illicit Discharge Elimination Plan
IJC	International Joint Commission - A United States and Canadian binational organization charged with water quality oversight in the boundary waters.
MDEQ	Michigan Department of Environmental Quality AQD - Air Quality Division ESS - Environmental Sciences and Services Division GLMD - Geological and Land Management Division RRD - Remediation and Re-development Division WD - Water Division WHMD - Waste and Hazardous Material Division SWQAS - Surface Water Quality Assessment Section
MDNR	Michigan Department of Natural Resources
NPDES	National Pollutant Discharge Elimination System - Name of the permit program required for discharges to surface waters.
NPS	Nonpoint Source Pollution - A group of pollutants that originate from diverse, uncontrolled, sources and are often carried by storm water.
NRCS	Natural Resources Conservation Service
OCDC	Oakland County Drain Commission
OCHD	Oakland County Health Department
OSDS	Onsite Sewage Disposal System(s)

PAHs	Polynuclear Aromatic Hydrocarbons - A class of toxic chemicals. Also called PNAs.
PCBs	Polychlorinated Biphenyls - A class of organic chemicals that was a commonly used additive for various types of oils
PCNs	Polychlorinated Naphthalenes - A class of toxic chemicals
PEP	Public Education Plan
PPP	Public Participation Plan
RAP	Remedial Action Plan - Cleanup plan developed for a Great Lakes Area of Concern.
REP	Rouge Education Project - FOTR's school-based, interdisciplinary watershed education and monitoring effort.
RPO	Rouge Program Office
RRAC	Rouge Remedial Action Plan Advisory Council - Multi-stakeholder committee formed to assist with the update and implementation of the Rouge River RAP.
RRBO	Rouge River Bird Observatory - Located on the campus of the University of Michigan-Dearborn.
RRNWWDP	Rouge River National Wet Weather Demonstration Project - Multimillion dollar project to determine the effects of wet weather discharges to the Rouge River and demonstrate various control measures. The project is being implemented by the Wayne County Department of Environment under a grant from the federal government.
RTB	Retention Treatment Basin
SEMCOG	Southeast Michigan Council of Governments
SESC	Soil Erosion and Sedimentation Control
SMLC	Southeast Michigan Land Conservancy
SOCORA	Southeastern Oakland County Resource and Recovery Authority
SOCWA	Southeastern Oakland County Water Authority
SOD	Sediment Oxygen Demand
SPAC	Statewide Public Advisory Council - Council made up of one member from each AOC in Michigan formed to share ideas and coordinate activities between various watersheds.
SRF	State Revolving Fund
SSO	Sanitary Sewer Overflow - The discharge of raw or inadequately treated sewage from municipal separate sanitary sewer systems, which are designed to carry sanitary sewage but not storm water.
SWAG	Storm Water Advisory Group
SWPPI	Storm Water Pollution Prevention Initiative
TMDL	Total Daily Maximum Load
U of M-D	University of Michigan - Dearborn campus
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Service
WCDOE	Wayne County Department of Environment
WCEHRD	Washtenaw County Environmental Health Regulation Department
WCHD	Wayne County Health Department
WDM	Woody Debris Management - The process of determining whether to move, remove or add woody debris to the river, and how best to do that work.
WHC	Wildlife Habitat Council
WTUA	Western Townships Utilities Authority
WWTP	Wastewater Treatment Plant - Facility that receives and treats wastewater prior to discharge to surface waters.
YCUA	Ypsilanti Community Utilities Authority

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Rouge RAP Preface

Rouge Remedial Action Plan Advisory Council

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Kurt Heise, Chair
Bill Craig, Vice Chair

Dear Friend of the Rouge:

As Chair of the Rouge River Remedial Action Plan Advisory Council (RRAC), it is my pleasure to welcome you to the new Rouge River Remedial Action Plan, or "Rouge RAP."

The Rouge RAP process began in 1989, as an effort throughout the Great Lakes basin's Areas of Concern to address the causes and solutions to water quality problems. While many of these problems persist, great progress has been made. These successes, and our remaining challenges, are thoroughly described in the new RAP.

The Rouge River Watershed is the largest in Michigan, in terms of residential population, and the progress and challenges in the watershed have been borne by unique partnerships between many stakeholders - local and state governments, private business, education, dedicated volunteers, and ordinary citizens. These constituent groups must continue to build on their progress, and find the political and social will to implement the remaining goals of the new Rouge RAP. The cost for these improvements will be great, and each of us will need to make the necessary sacrifices if we truly want to enhance the quality of life for our future generations.

This 2004 Rouge RAP will serve as a road map to the better water quality goals which we all share. It will serve as a recommending report to the Michigan Department of Environmental Quality (MDEQ), and it will be a benchmark for the progress that is sure to come. We have made great strides in this past decade, thanks to many good people, and citizens like you who share a desire for a better future.

I would like to thank the many volunteer members of the RRAC for their expertise, input, and tremendous assistance with the RAP, and especially to Allison McCormick and Joe Rathbun of the MDEQ Water Division for their extraordinary efforts and dedication in making this report possible.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kurt L. Heise'.

Kurt L. Heise
RRAC Chair

Executive Summary



Friends of the Rouge canoe outing on the Lower 2.



Rouge Oxbow Restoration at The Henry Ford after one year.

Background

The Rouge River was once part of a healthy and diverse ecosystem. By the mid-1980s, increasing urbanization and industrialization severely degraded the river. The main pollution sources were combined sewer overflows (CSOs), industrial discharges and storm water runoff.

The citizens of Southeast Michigan demanded that the Michigan Department of Natural Resources (now the Michigan Department of Environmental Quality) do something to clean up the Rouge River. In response, the state developed the Rouge River Basin Strategy that was adopted by the State Water Resources Commission on October 1, 1985. A key portion of this strategy called for the development of a cleanup plan, or Remedial Action Plan (RAP), consistent with the commitments made under the bi-national Great Lakes Water Quality Agreement (GLWQA). The agreement between the United States and Canada required that RAPs be developed for the Rouge River as well as for 41 other pollution "hot spots," or Areas of Concern (AOC), within the Great Lakes Watershed. The Michigan Department of Environmental Quality (MDEQ) is responsible for the development and implementation of RAPs for the 14 AOCs in Michigan.

The Remedial Action Plan (RAP)

In 1989, the Rouge River RAP, a 20-year clean-up plan, was developed. The 1989 RAP primarily focused upon "point" source industrial pollution and raw sewage, which made the river unhealthy for humans.

In 1994 the Rouge RAP was updated to include non-point source pollution and to begin to address the negative impacts to fish, other animals, aquatic insects and associated habitats. The 1994 RAP focused upon updating the goals and recommendations to restore impaired uses. A 1998 "progress report" was prepared to catalogue progress made since 1994, and celebrate the successes "in an effort to sustain the momentum required to address the next phase of restoration of the Rouge River." However, the Progress Report said that many issues were not being adequately addressed such as: the pressures of increasing urbanization which destroys habitat and decreases fish, wildlife, and other aquatic populations; preservation of critical habitat and storm water pollution.

Why Revise the RAP Now?

In 1999, the Rouge River Remedial Action Plan Advisory Council (RRAC) once again began the process of revising the RAP. The decision to revise the RAP was based on the need to recognize: 1) the innovative development of subwatershed plans undertaken by local governments, 2) the successes achieved, and 3) the remaining challenges. Drafting the RAP included input from stakeholders: citizens, business and government.

The 2004 Rouge River RAP modifies many of the 1994 goals and recommendations based on new knowledge. An effort was made to keep the document short and non-technical so it would be available to a wide audience. The 2004 Rouge River RAP will serve as another asset in the ongoing effort to restore the Rouge River.

Purpose of the 2004 Rouge River RAP

The 2004 Rouge River RAP defines an ambitious 20-year program of actions needed to realize the vision of:

A Rouge River Watershed that is aesthetically pleasing, clean and safe, that supports a healthy, diverse fish and wildlife community, and that provides an enriching variety of recreational experiences.

The 2004 RAP is intended to:

1. Applaud and highlight past efforts and accomplishments, of which there have been many.
2. Support ongoing efforts and inspire new activities, of which there needs to be many, and,
3. Summarize existing watershed conditions, as well as current restoration and protection efforts to achieve beneficial uses and improve the quality of life.

Through the Voluntary Watershed-based General Storm Water Permit process, the 11 Rouge subwatersheds identified in the original RAP have been consolidated into seven subwatershed management areas. The 2004 RAP recognizes the new management areas and adopts the subwatershed management plan goals and actions, including the 41 community Storm Water Pollution Prevention Initiatives (SWPPIs). The 2004 RAP goes further by identifying additional goals and recommended actions that RRAC encourages the Michigan Department of Natural Resources (MDNR), the Michigan Department of Environmental Quality (MDEQ), Rouge cities, townships, counties and all other stakeholders to adopt.

2004 Rouge RAP Findings and Recommendations

Delisting Beneficial Use Impairments

In addition to establishing a format for the development of RAPs for 42 specified waterways including the Rouge River, the Great Lakes Water Quality Agreement (GLWQA) as amended in 1987, included agreement by the United States and Canada "to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem." The GLWQA defines "use impairments" as changes in chemical, physical or biological integrity of the Great Lakes System. These use impairments have become the template for determining the extent to which the river or harbor is degraded and for measuring progress toward its ultimate cleanup. Once a beneficial use has been restored, it can be "de-listed," using the International Joint Commission's (IJC) criteria.

In December, 2001, after extended discussions among all the U.S. RAP participants, the United States Policy Committee published "Restoring United States Great Lakes Areas of Concern -- De-listing Principles and Guidelines." These guidelines allow for the de-listing of individual use impairments in the entire AOC or in individual subwatersheds, under the following circumstances:

- When locally derived de-listing targets have been met;
- When the use impairment is due to natural rather than manmade causes;
- When the use impairment is not limited geographically to the AOC, but rather is typical of regional conditions;
- When the source of the use impairment is outside the boundaries of the AOC, and,
- When the beneficial use cannot be fully restored, even when all practical remedial actions have been implemented.

The RRAC believes that six of the 13 use impairments identified for the Rouge AOC should be de-listed in the near future. They are:

- Fish consumption advisories
- Bird or animal deformities
- Restrictions on dredging
- Fish tumors or other deformities
- Tainting of fish and wildlife flavor
- Restrictions to navigation

A summary of the reasons the six use impairments should be de-listed is addressed later in Chapter 1: Introduction.

Major Findings: Successes

Not all areas of the Rouge River are degraded. Much of the public parkland floodplain remains intact and available for restoration. Many of the headwater areas and tributary streams are in good condition.

Significant Water Quality Improvements are being realized

- Dissolved Oxygen (DO) concentrations measure the amount of oxygen dissolved in water. A certain concentration or above is necessary to sustain healthy aquatic life. DO levels are steadily improving, and the percent of DO readings above the State's waters quality standard of 5 mg/l are increasing; approaching 100 percent compliance.
- Bacteria counts are lower*:

<i>Counts/100mL</i>	<i>1988</i>	<i>2000</i>
% sites > 10,000	10%	0%
% sites > 1,000	70%	43%
% sites < 1,000	30%	57%

*The state water quality standard for bacteria is 1,000 counts/100 mL for wading/canoeing and 130 counts/mL for swimming.

- Toxic chemicals are no longer considered a major concern for the Watershed except near the river mouth. Sediments downstream of the concrete channel do have elevated levels of certain organic contaminants and metals. The input of these materials into Lake Erie continues to be a concern.

All Major Sources of Pollution are now under NPDES permit

- Voluntary Watershed-based General Storm Water Permits - The 1989 RAP recommended that all Rouge communities obtain municipal Voluntary Watershed-based General Storm Water Permits, but at the time a permit did not exist. Today, 41 Rouge communities and counties are actively complying with their Voluntary Watershed-based General Storm Water Permit. This compliance is well ahead of schedule for the federal storm water program. Rouge communities have a Voluntary Watershed-based General Storm Water Permit, a Combined Sewer Overflow (CSO) permit or both.
- CSOs are a combination of storm water, sewage and industrial waste that discharge directly to the River. In 1992, MDEQ issued final CSO discharge permits to all Rouge communities with CSOs. The permits allowed for a phased approach for the control or elimination of CSOs. Phase I, with the exception of the Dearborn facility, CSO Demonstration Control Projects are complete. Phase II and Phase III requirements still need to be met.
Total Cost: >\$375 million
- Sanitary Sewer Overflows (SSOs) are discharges of raw or inadequately treated sewage from municipal separate sanitary sewer systems. These systems are designed to carry sanitary sewage but not storm water. When an SSO occurs, sewage is released into areas such as city streets and streams rather than being transported to a treatment facility. They are illegal and often constitute a serious environmental and public health threat. Sewage discharges into basements may also occur. Sanitary sewer capacity improvements recommended in the 1989 RAP have been completed.
Total Cost: >\$543 million.

Illicit Connections (illegal connections to storm sewers or directly to the river) are being identified and eliminated

- Since the inception of Wayne County's Illicit Discharge Elimination Plan (IDEP) in 1987, inspections have been performed at 5415 commercial facilities with a total of 1,447 illicit connections found at 500 facilities. The corrections have eliminated the discharge of an estimated 16 million gallons of sanitary wastewater to the Rouge River.
- In Washtenaw County, the Field Inspection Division completed inspection of Rouge River Watershed drains during 2002. Since 1986 Washtenaw County has been ensuring that there are no releases of polluting materials in over 150 facilities through its Pollution Prevention program.
- The Oakland County Drain Commissioner (OCDC) Storm Water Action Team (SWAT) continues to identify and eliminate illicit discharges. OCDC SWAT has inventoried 3,834 storm water outfalls throughout the Watershed in Oakland County.
- Washtenaw and Wayne Counties passed ordinances and are implementing a "time of sale" evaluation and inspection program for septic systems. Failures are being identified at a rate of 19-26 percent of inspections performed.

There is an increased focus on the health of habitat and wildlife inventories

- Results for the 2001 Frog and Toad Survey conducted by the Friends of the Rouge (FOTR) show that in the headwaters as many as 7-8 species of frogs and toads are present.
- Located at the University of Michigan-Dearborn, the Rouge River Bird Observatory (RRBO), founded in 1992, conducts bird banding and other studies to determine the significance of urban natural areas to migrant, breeding, and resident birds. The importance of this oasis as a migratory stopover is demonstrated by the banding of over 20,000 birds of 136 species.
- In 1995, MDNR conducted a watershed-wide fisheries survey at 32 locations. The headwater tributaries contained the most diverse fish communities, while the Middle Branch impoundments had the best game fish populations.
- In 1996, the Rouge Program Office (RPO) conducted an aquatic habitat survey at 83 locations throughout the Watershed.
- Terrestrial habitat surveys have just begun, primarily in Johnson Creek (Middle Branch) and the Oakland County portion of the Main Branch.
- In May 2001, FOTR began training volunteers to sample the headwaters for benthic macroinvertebrates. Volunteers now sample in the spring, fall and winter.

- A 2000 survey by MDEQ found macroinvertebrate communities in most of the headwater tributaries were more diverse and contained more sensitive organisms than those in the downstream portions. Scores for aquatic habitat condition followed a similar pattern.
- Wetland mapping and assessment has been completed in the Lower 1 and Middle 1 subwatersheds. Approximately 300 wetlands were evaluated and the results presented in a format adaptable to planning decisions. Wetlands were ranked for their value for fish and wildlife habitat, floodwater storage, water quality protection, recreation and aesthetics. The assessments are valuable for developing wetland resource protection plans.
- In 2003, the Michigan Department of Community Health lifted the ban on eating carp, channel catfish and largemouth bass from Newburgh Lake for the general population. There are still advisories in place that limit consumption of those species for women and children.

Public Education and Involvement activities are informing the public and bringing more people to the River

- Thousands of students participate each year in Rouge River educational activities through the FOTR Rouge Education Project (REP) and the Rouge River Water Festivals at the University of Michigan-Dearborn and Cranbrook Institute of Science.
- The Annual Rouge Rescue/River Day continues to bring hundreds of volunteers to the River. Focus is evolving from clean up/log jam removal to woody debris management and habitat restoration.
- Citizens are involved in outreach and leadership training programs such as Master Composters, Ecological Gardening and River Stewards.
- The Main 1-2 Subwatershed Public Education Committee publishes a bi-annual riparian newsletter that is sent to all the identified riparian landowners within the subwatershed.
- Ford Motor Company sponsors an Annual Rouge Cleanup with Ford employees and other volunteers.
- Hundreds of FOTR volunteers conduct the Frog and Toad Survey and benthic macroinvertebrates sampling.
- All three Rouge River Watershed counties conduct seminars, workshops, point-of-sale education and publicity to educate the public about best management practices related to nutrient reduction, soil erosion control and hazardous materials management.
- Hundreds of participants attend watershed bus tours, Healthy Garden tours, workshops on river-friendly lawn care, streambank stabilization and backyard wildlife habitat.
- Dozens of road signs identifying Rouge River tributaries and boundaries have been installed throughout the Watershed.

Watershed Management and Cooperation

- Communities in the Rouge River Watershed are leading the state and the nation in the level of cooperation and financial investment in comprehensive watershed management and resource restoration. Total cost to date: > \$920 million (SSO, CSO, polluted storm water, etc.)
- Subwatershed Management Plans for each of the seven Rouge subwatersheds have been developed, approved and are being implemented.
- The Rouge Assembly has been created to provide permit-related services to watershed local governments and counties and to facilitate transition from federal to local funding over a three-year period.

Major Findings: Challenges

Land Use/Suburban Sprawl

Land use and suburban sprawl are one of the most important issues and challenges facing the Rouge River Watershed.

- In the last decade, concern over Michigan's land use policies has dramatically increased. The Governor's Michigan Land Use Task Force report, developed by the Michigan Farm Bureau, Michigan Department of Agriculture and many local organizations have documented extensive loss of farmland and open spaces to suburban sprawl.
- Older urban core communities continue to lose population and tax base (Ready for Change, August 2000). Citizens and communities have and will continue to feel the financial and environmental impact of inefficient land use patterns.
- Public health cannot be protected through the elimination of untreated sewage discharges alone. Polluted storm water runoff must also be addressed.
- Existing development practices will eliminate good environmental conditions in the headwater areas and will reverse recent gains in water quality experienced downstream.

Flow (velocity and volume)

Flow has emerged as perhaps the most critical, technically and politically, difficult pollutant challenge for restoration and protection.

- River flows after storm events are 2-3 times higher than they should be to support healthy fish communities.
- The volume and velocity of the flow exacerbates sediment and nutrient pollutant levels by accelerating stream bank erosion.
- Even minor increases in flow in smaller headwater streams can have significant negative impacts to the stream's water quality and aquatic life. It can severely change the course of the River causing property damage and flooding of downstream properties.
- Absent a significant reduction in flood volumes and velocities, restoration of aquatic habitat and preferred fish populations and reduction in property damage will not be possible.
- The cumulative impacts of many small increases in flow upstream are causing tremendous negative impacts downstream through increased sedimentation, nutrient input, flooding and erosion.

Funding

Major investments will be necessary to comply with CSO permits, Voluntary Watershed-based General Storm Water Permits and SSO corrective action agreements, habitat restoration and preservation, public education and monitoring. Phase II CSO control alone is estimated to cost an additional \$700 million. The funding challenges are driven by forces beyond the control of local units of government including:

- The economic downturn and cuts in state revenue sharing have all communities reacting to budget deficits resulting in cost-cutting measures including project delays and cancellations, service reductions, layoffs and elimination of new initiatives.
- Available state and federal grant funding options are diminishing. The state budget deficit has delayed Clean Water Grants under the Clean Michigan Initiative (CMI). The new State Loan Program may also be delayed due to the budget crisis. Federal Rouge River National Wet Weather Demonstration Project grant dollars are coming to an end. Many of the proposed federal grant projects were relying on state CMI grants for implementation.
- The tax base within the Watershed is shifting from the older urban core communities (which critically need it for CSO and SSO infrastructure improvements) to the newer, rapidly developing headwater communities. There may be a net loss of tax base as more and more citizens and businesses leave.

It is critical to expand networking efforts with other Areas of Concern (AOCs) and the Statewide Public Advisory Council (SPAC) to continue lobbying for adequate funding and laws to ensure implementation of Remedial Action Plans (RAPs). Alternative creative funding sources and low cost initiatives and increased volunteer recruitment should be identified.

RAP Goals

The 1989 and 1994 Rouge River RAPs focused on human health and remediating the consequences of bacteria in raw sewage, toxics from abandoned dumps, and historical industrial activities. Today, SSO and CSO control is underway. The issue of toxics in sediments and water has been investigated and found to be less of a problem than previously believed.

The 2004 RAP's primary goal is to: Achieve the protection of public health, the restoration of beneficial uses and the de-listing of the Rouge River as a Great Lakes Area of Concern by 2020.

To accomplish this goal, the 2004 RAP has adopted by reference the goals of the Rouge Subwatershed Management Plans and has established the following 42 additional goals. The goals address specific pollution sources, beneficial use impairments and further define the intent of the primary goal.

Caring for Water

1. Eliminate or provide adequate treatment and control for all wet weather overflows from separate sanitary sewers.
2. Eliminate or provide adequate treatment and control for all combined sewer overflows.
3. Conduct routine inspections, and ensure regular maintenance and correction of failing onsite sewage disposal systems.

4. Reduce the incidence and impacts of illegal dumping by conducting local, county and state illegal dumping reporting, enforcement and compliance activities.
5. Implement systematic and ongoing illicit connection detection and elimination inspections (similar to OSDS inspections and water supply cross-connection inspections).
6. Eliminate sources of contaminants to sediments.
7. Reduce contaminants in sediments so that: a) they contain only background concentrations of metals such as arsenic, copper, and zinc b) they contain nontoxic concentrations of man-made chemicals such as PCBs and pesticides, and c) they exhibit naturally low sediment oxygen demand, which only rarely lowers dissolved oxygen concentrations in the overlying water.
8. Eliminate or control the impacts of storm water discharges to the maximum extent practicable using a watershed-wide approach.
9. Preserve the natural flow in headwater areas.
10. Reverse the trend of increasing frequency, duration, and intensity of flood flows.
11. Reduce the percentage of impervious surfaces.
12. Reduce bank erosion to natural rates.
13. Determine that healthy fish and benthic populations are returning.
14. Minimize upland soil erosion and its effects on water quality.

Caring for Nature

15. Adopt the guiding principle of "no net loss" of aquatic and terrestrial habitats.
16. Achieve a healthy watershed ecosystem of suitable habitats to sustain diverse and abundant populations of indigenous benthos, fish, birds, insects and wildlife.
17. Adopt the principles and techniques of Riparian Corridor Management (including woody debris management) as the standard operating procedures for Rouge Rescue, public agencies and riparian landowners.
18. Meet the de-listing criteria in order to de-list the use impairment "Loss of fish and wildlife habitat."
19. Confirm through appropriate field-validated studies that a healthy, sustainable population of indicator species are present in appropriate numbers and diversity (including indigenous fish, amphibians and target breeding and migratory birds).
20. Meet the delisting criteria and de-list the use impairment; "Degradation of Wildlife Populations."
21. Confirm that fish communities consist of the variety of species, appropriate to the permanent flowing reaches of the River, in numbers sufficient to maintain sustainable populations.
22. Meet the delisting criteria in order to de-list the use impairment "Degradation of Fish Populations."
23. Achieve a rating of at least "acceptable" (as defined by MDEQ) for benthic macroinvertebrate communities upstream of the concrete channel. That is, communities will include large numbers of pollution-sensitive species and not be dominated by pollution-tolerant species.
24. Meet the delisting criteria in order to de-list the use impairment "Degradation of Benthos."
25. Reduce nutrient loadings such that eutrophic conditions (algae blooms, excessive aquatic plant growth, etc.) do not occur; and State Water Quality criteria (when available) will be met.
26. Meet delisting criteria in order to de-list the use impairment "Eutrophication."

Caring for Community

27. Increase watershed awareness.
28. Increase storm water awareness.
29. Increase public awareness about how individual actions impact the river.
30. Educate local officials about watershed and storm water issues.
31. Coordinate the Public Education and Participation Plans (PEP and PPP) within and between the Subwatershed Advisory Groups (SWAGs).
32. Increase school-based, Rouge-specific environmental educational programs.
33. Identify human resources and adequate funding for implementation of public education goals.
34. Develop mechanisms for obtaining input and advice from technical experts to staff responsible for education efforts.
35. Develop and expand recreational opportunities, including fishing.
36. Improve river aesthetics.
37. Create more opportunities for access to the river.
38. Meet the delisting criteria in order to de-list the use impairment "Restrictions on Swimming and Other Water-related Activities."

Taking Responsibility

39. Implement strong local, state and federal coalitions to ensure that ongoing actions to restore the Rouge River continue.
40. Expand partnerships between government, business, educational institutions, other agencies and environmental groups in order to ensure that all stakeholders continue to work together to restore and protect the Rouge River.
41. Establish scientifically rigorous, financially stable and cost-efficient monitoring programs to assess trends and inform resource managers and the public about water quality and flow, biological communities and aquatic and terrestrial habitats. The programs should consider both professional and volunteer monitoring efforts.
42. Implement cooperative and proactive solutions to meet the serious funding challenges faced by the Rouge community.

RAP Recommendations

The 2004 RAP recommends a phased approach to river restoration. The RAP also identifies goals and actions to address critical issues. Detailed below are actions that the RRAC recommends to continue the Rouge River restoration efforts.

Recommendation: Headwater Protection

In the rapidly developing headwater regions the ethic of stream protection and land stewardship must immediately be adopted. Success across the Watershed depends on it. We must be able to protect what is healthy. That which will help regenerate other degraded areas.

Integrated Resource Planning and Development

Communities and other stakeholders, must work together to (1) aggressively implement development design standards that maintain pre-development runoff volumes and velocities; and (2) re-visit community master plans to inventory and identify critical resource areas for preservation, protection and/or enhancement.

RRAC recognizes the importance of the Washtenaw and Wayne County Storm Water Ordinances and Regulations but urges all efforts of the counties, townships and cities to go beyond the current standards in these critical headwater areas. RRAC recognizes expanded use of innovative Best Management Practices.

Public Education, Awareness and Involvement

Every effort must be made to continue and expand education underway to inform and involve citizens in the importance and methods of stream protection and restoration. Reminding the public of its connection and contribution to restoration and protection is important to the preservation of their local stream and community.

Recommendation: Downstream River Restoration

The mistakes of the past must be reversed, not repeated. Significant investments must continue to be made to eliminate untreated discharges of sewage. In addition to pollution control, the ethic of stream restoration must be adopted. Brownfield re-development should be encouraged wherever feasible.

Continuous Improvement through CSO and SSO Controls

CSO and SSO control efforts alone will not achieve public health water contact standards and full restoration of beneficial uses. It is important to develop innovative approaches that allow communities and agencies to balance CSO and SSO corrective programs with storm water and other watershed management projects in terms of schedule, budget and level of control.

RRAC anticipates that by 2020 all untreated CSOs or SSOs will be eliminated, public health protection will be achieved, and the Rouge River use impairment "restrictions on swimming and other water-related activities" will be ready to be de-listed.

Continuous Improvement through Storm Water Retrofits, Collaborative Planning and Financing

The Rouge communities should consider the following: "In the quest for watershed protection and restoration, professionals are constantly seeking new tools for controlling storm water runoff and associated adverse impacts. Storm water retrofits are among the most promising of these tools. Retrofits are structural storm water management measures for urban watersheds designed to help minimize accelerated channel erosion, reduce

pollutant loads, promote conditions for improved aquatic habitat, and correct past mistakes. Simply put, these best management practices (BMPs) are inserted in an urban landscape where little or no prior storm water controls existed.

"Retrofits come in many shapes and sizes from large regional retention ponds that provide a variety of controls to small on-site facilities providing only water quality treatment for smaller storms. Usually at least some kind of practice can be installed in almost any situation. But fiscal restraints, pollutant removal capability, and watershed capture area must all be carefully weighed in any retrofit selection criteria. (From An Eight-Step Approach to Stormwater Retrofitting: How to Get Them Implemented by Richard A. Claytor, Jr., P.E., Center for Watershed Protection)

Communities and other stakeholders must work together to: (1) aggressively implement redevelopment design standards that improve post redevelopment runoff volumes and velocities; (2) revisit community master plans to inventory critical resource areas for preservation, restoration and/or enhancement; and (3) work across community boundaries to plan and finance projects aimed at appropriate storm water retrofits, including regional detention.

Again, the RRAC recognizes the importance of the Washtenaw and Wayne County Storm Water Ordinances and Regulations and encourages all efforts of the townships and cities to adopt and go beyond these current standards to preserve, create, reclaim and interconnect the vital green and open spaces within their communities. The RRAC recognizes the Gateway Initiative and Partnership, particularly the Greenfield Village Oxbow reconnection.

Public Education, Awareness and Involvement

In addition to the recommendations under "Stream Protection through Public Education, Awareness and Involvement" above, efforts that educate the general public about watershed awareness and storm water pollution should continue. River stewardship groups and municipalities should continue to offer workshops, bus tours, and other opportunities that inform the public that individual actions impact the river. Frog and toad surveys, benthics monitoring and Rouge Rescue/River Day activities go a long way in helping the public appreciate the River. Rouge-specific environmental educational programs offered by FOTR's Rouge Education Project and at Rouge River Water Festivals should also be supported and expanded.

Recommendation: Increase Monitoring

Monitoring water quality, biological communities, and ecological conditions is essential to assessing progress in the Rouge River AOC, and eventually delisting the Beneficial Use Impairments (BUIs). RRAC urges the state to:

- Encourage and assist the communities and the Rouge Assembly to implement the monitoring actions identified in the Subwatershed Management Plans, especially those actions focused on trend monitoring and resource management.
- Encourage and assist volunteer monitoring programs, especially with confirming the accuracy of their data.
- Modify its own sampling protocols (P-51, etc.) so they provide data suitable for trend monitoring.
- Institute more fish population and fish contaminant surveys.
- Take all possible steps to ensure timely data interpretation and communication to decision makers and the general public.

Recommendation: Increase Cost Efficiencies

The RRAC has reviewed and assessed implementation of the RAP and the overall Rouge restoration effort, including the seven subwatershed management plans and the Storm Water Pollution Prevention Initiatives (SWPPIs). Through this assessment notable opportunities for cost efficiencies have been identified. The RRAC urges MDEQ to encourage all permittees to consider the pursuit, maintenance and/or expansion of the following:

- Continuance of the Voluntary Watershed-based General Storm Water Permit
- Continuance of the watershed monitoring program as developed by the Rouge Program Office for the Subwatershed Advisory Groups (SWAGs) and accepted by MDEQ. This includes the continued reliance on volunteer monitoring efforts.
- Coordinated/centralized SWAG facilitation
- Continuation and expansion of the county-implemented illicit discharge, public education and pollution prevention initiatives and programs

Recommendation: Implement Financial and Institutional Arrangements

RRAC recommends the following steps be taken to meet the serious funding challenges:

- Reduce costs through 1) collaborative infrastructure planning 2) special review of newly proposed regulations and laws affecting sewer infrastructure 3) the establishment of sewer and water rate structures with incentives for sustainable growth 4) emphasis on watershed management 5) implementation of pollution prevention 6) engagement of citizenry 7) extension of implementation schedules for remediation projects when possible, and 8) support of innovative projects that demonstrate resource protection and cost reduction.
- Increase funding through 1) federal assistance 2) an increase in the State Revolving Fund (SRF) 3) local communities' rate reviews and operation and maintenance funding assessments, and public education efforts to help rate-payers understand the need for additional financial resources.
- Brief elected officials and other decision makers on the RRAC findings regarding financial needs.

Successful accomplishment of the RAP goals and recommendations critically depends upon an informed and involved public.

The 2004 RAP calls upon the general public to:

1. Change behaviors and practices to prevent pollution
2. Participate in the process of advising decision-makers about the public interest
3. Financially support necessary infrastructure improvements

The 2004 RAP calls upon local governments to:

1. Work cooperatively and consistently to maximize cost efficiency and effectiveness
2. Foster the political will to embrace and implement concepts of Smart Growth, Greenways and low-impact development
3. Maintain and go beyond compliance with all NPDES permits

The 2004 RAP calls upon the state of Michigan to:

1. Assist with financing the efforts
2. Maintain pressure for restoration while offering flexibility between regulatory programs to facilitate a watershed approach
3. Provide adequate staffing to ensure accountability and consistency

Chapter 1

Introduction



"In an urban watershed, we easily become disconnected from rivers and other facets of the natural environment, while at the same time the river and the natural environment becomes even more dependent upon us to take care of it. People take care of what they love. Reconnecting people with the river and fostering stewardship is one of the most important things we can do - for the river and for ourselves. Our health and well-being is intricately connected with the health and well-being of the river."

**Sally Petrella, Friends of the Rouge Public
Involvement Coordinator**



History of the River

"Through the 19th century, water pollution in the Rouge River from human and animal waste was negligible due to low population densities. That changed in the early half of the 20th century, as the automobile industry drew large numbers of people to the Rouge River Watershed. Historically, sewage and industrial waste was not treated, but sent directly to the river. Streams that became too polluted were enclosed with pipes. By 1913 sewer pipes were added to direct waste away from water intake points to protect human health, not water quality.

People realized their water supply was threatened. The first Detroit Sewage Treatment Plant was completed in 1940. During the rapid suburban development of the 1940s combined sewer pipes were built to carry both storm water and sewage. As more land surface became paved in the 1950s and 60s, the increased storm water runoff caused the combined systems to be overwhelmed, dumping raw sewage in the river. Paving also led to increased soil erosion, flooding, and log jams. Industrial waste discharge was not regulated like it is today.

The most populated watershed in Michigan became the most polluted in the 1960s. Citizens and governments realized the river needed help. Since the 1970s many ongoing efforts have been directed toward the clean up of the Rouge River. Today's residents are responsible for the future of the river and the quality of life for the people to follow in the 21st century."¹

Rouge River Watershed Milestones

Presettlement: Rouge River is used by Native Americans, primarily the Potawatomi, for food, water, recreation and transportation. They called the river "misqua-sibe" or "mimosa-goink," both terms meaning "Singeing Skin River," referring to the place where game was dressed.

1670: French explorer, Robert Cavalier La Salle names the river, "St. Agnes River" because he located it on January 21, St. Agnes Day. It was later renamed the Rouge River because of its red color. The first commercial uses of the river are trapping and lumbering.

1707: Antoine de la Mothe Cadillac begins to divide the land along the river into farm grants, and because of their long, narrow shape (providing all landowners with river access), they are known as "ribbon farms."²

1770: During the period of British occupation, a shipyard is built on the Rouge River in the present day area of Woodmere Cemetery and the Ford Rouge Plant. Over the next 10 years, 20 vessels are launched on the river. The shipyard continued to operate until after World War I.³

1776: Jacques Duperon Baby opens two gristmills at the main forks of the river.³

1796: The United States gains control of the Michigan territory, including Detroit.

1824: Farmington is established in the Upper Rouge by Quakers.

1827: After the War of 1812, there is no longer a need for a Navy shipyard on the Rouge and the government offers 586 acres to the University of Michigan.²

1833: John Daniels builds a sawmill on the Rouge River in what is now Southfield. He is the first in the territories west of New York to use mules to power the mill. This earns him the title of "Mulley-Mill Pioneer of the West." A gristmill is built by Ezekial Sabins in 1837 along the banks of the Rouge River. The building of the gristmill results in the development of the village of Southfield.⁴ (88)

1875: In addition to various sawmills and gristmills, the river is the site of the Michigan Car Co. (maker of railroad cars), John Clark Shipyard and Drydock, Detroit and Lake Superior Copper Co., Baugh Steam Forge and the Detroit Glass Works.³

1886: Congress enacts the Rivers and Harbor Act deeming that all navigable rivers be public highways and orders the War Department to survey and recommend improvements to major rivers in the United States. The Rouge River is examined to determine if it should be surveyed. The report concludes that the river is "somewhat remarkable in depth of water in its lower reaches, having a channel of 11 feet at its mouth and from 13-18 feet for a distance of one and a half miles."²

1910-1920: Henry Ford dams the river to supply power to his mansion and to supply water power for small Ford factories producing automotive parts for assembly plants. A hydroelectric unit is built in 1910 in Dearborn at the proposed site of Henry Ford's Fair Lane mansion and a new larger dam is built in 1915. Six dams are built elsewhere on the Middle Branch to power factories.²



Henry Ford Estate Dam

1915: Henry Ford buys 2,000 acres along the Rouge River, west of Detroit. Over the next dozen years, the complex known as the Rouge Plant becomes the most fully integrated automobile manufacturing facility in the world.

1918: A ship-turning basin is dredged at the mouth of the Rouge north of Dix Road on what is now the Rouge Plant complex.

April, 1947: The Rouge River basin is saturated by heavy rains that melted the snow pack in its basin. The river soon covers the Michigan Avenue Bridge and the Ford Road Bridge. This is the Rouge's largest recorded flood. The Ford Motor Company Rouge Plant is flooded, Dearborn's sewage treatment plant is under water and residents of Ft. Dearborn Lodge apartments on Brady Street are removed by rowboat. This is the same flood that knocks out the power supply at Fair Lane Estate and leaves Henry Ford to die by candlelight.²

1948: Congress authorizes the Secretary of the Army to make an examination of the river for a flood control project.



Pollution Plume from Rouge into Detroit River

1968: The Rouge is flowing orange (pickle liquor wastes) and is one of several Great Lakes tributaries to catch on fire. Efforts begin to control industrial pollution.

1970: Southfield hosts the First Rouge Clean Up.

1972: The Clean Water Act is passed. The objective of the Act is to "restore and maintain chemical, physical, and biological integrity of the Nation's waters." (CWA, Section 101(a)).

1972: Michigan begins to implement its National Pollutant Discharge Elimination System (NPDES) Program, requiring extensive abatement programs. The principal contaminants are identified as raw sewage and inorganic sediment entering the river through combined and/or storm sewers.

June 1972: The U.S. Army Corps of Engineers begins to construct a four-mile long concrete-lined V-shaped flood control channel extending from Michigan Avenue in Dearborn to the turning basin at the Ford Rouge Plant. Two million cubic yards of soil are removed and over 470,000 cubic yards of concrete are placed to complete the project.²

1977: Federal Judge John Feikens begins to hear the lawsuit brought by state and federal agencies against the Detroit Wastewater Treatment Plant (WWTP).

1980: Much of the river does not meet the state's water quality standards for warm-water streams. Citizens of Southeast Michigan demand that the state clean up the Rouge River.

1983: 242 Michigan Youth Corps members clear 17 tons of debris from the Rouge River, including a broken down outhouse, three Volkswagens and 50 railroad ties.

1985: Headline: "Clearly - Blurp - Rouge River is Dying." "In an age when water pollution is a cardinal sin, or at least a federal offense, the lower Rouge River is polluted as few other rivers are allowed to be. It is flagrantly, disgustingly dirty. It stinks, it fizzes, it burps on the filth that lines its bottom. As no soul is beyond salvation, no river is beyond reclamation - but the lower Rouge comes close. The Rouge is so polluted that when the Warren Valley Golf Course sucked water out of the Middle Branch to water its greens, the grass died."⁵

1985: The Rouge River is identified as one of 42 "hot spots" or Areas of Concern (AOC) in the Great Lakes Basin. The Michigan Water Resources Council calls for a Rouge Remedial Action Plan (RAP).

1985: Washtenaw County's Pollution Prevention program begins. The program protects the public from hazards associated with toxic and polluting substances. Facilities are required to report chemical inventories and the program conducts inspections of facilities with over 55 gallons of product to ensure proper storage, handling and disposal practices. There are over 3,500 facilities in its database and conducts over 500 annual inspections.

1986: Friends of the Rouge (FOTR) is created and the First Rouge Rescue event is held.

1987: The Rouge Education Project (REP), a school-based water quality monitoring program, is started by University of Michigan Professor Bill Stapp in 16 high schools.

1988: Holliday Nature Preserve Association (HNPA) is formed (www.hnpa.org).

1988: The Southeast Michigan Land Conservancy (SMLC) is incorporated. Its first project is purchasing 40 acres in Westland adjacent to Wayne County's William P. Holliday Forest and Wildlife Preserve. The land has since been transferred to Wayne County and incorporated into a 540-acre preserve.

May 1988: A plan presented to local officials by the Southeast Michigan Council of Governments (SEMCOG) estimates that it would cost \$900 million to \$1.2 billion to keep sewage out of the Rouge River and that taxpayers in the 48 communities in the river's drainage basin would have to pay at least 60 percent of the cost. Financing the cleanup over 20 years would double the cost.



Concrete Channel



Holliday Nature Preserve Association

- June 1988:** A record 2,500 volunteers pull 4,500 cubic yards of debris from the river during Rouge Rescue.
- September 1988:** State and federal agencies share the blame in a new General Accounting Office report on the Rouge River that describes its water quality as fair at best and so poor in some areas that it is a health threat. The congressional watchdog agency criticizes the Michigan Department of Natural Resources and the U.S. Environmental Protection Agency for not enforcing federal standards to control pollution in the 126-mile river.⁵
- October 1988:** The federal government awards \$108.1 million to four long-awaited sewer projects in Southeastern Michigan, all aimed at cleaning up the Rouge River. The sum represents more than one-third of the projects' total cost of \$280 million, and is seen by local officials as a major step in addressing the problems in Wayne and Oakland counties associated with inadequate sewer facilities.⁵
- 1989:** The first Rouge RAP is published. It emphasizes public health protection through the elimination of CSOs and SSOs. The cost of improvements is estimated at \$900 million.
- May 1991:** U.S. House Appropriations Committee approves \$46 million to clean up the Rouge River.⁵
- June 1992:** First "Rouge 2000" event is held at the Henry Ford Estate on the campus of the University of Michigan-Dearborn.
- July 1992:** The U.S. House Appropriations Committee approves \$82 million - almost twice the previous year's funding - to continue the cleanup of the Rouge River.⁵
- 1992:** The Federal Court facilitates a resolution to the state-ordered correction of CSOs that results in a phased approach in which the responsible local agencies will be allowed to demonstrate cost-effective alternatives to capture and treat the discharges.
- 1992:** The Rouge River Bird Observatory is founded on the campus of the University of Michigan-Dearborn.
- 1992:** The Rouge River RAP Advisory Council (RRAC) is formed. The RRAC is charged with updating the RAP and tracking implementation.
- 1993:** The Rouge River National Wet Weather Demonstration Project (Rouge Project), and the Rouge Program Office (RPO) are created to administer several hundred million dollars in grant funding to demonstrate storm water remediation techniques in an urban watershed.
- 1993:** The City of Farmington completes its sewer separation project.
- 1994:** "Rouge River RAP Update" is published. It emphasizes the "use impairments" criteria developed by the International Joint Commission (IJC).
- 1995:** The first annual RRAC Habitat Awards are presented to the Ford Motor Sheldon Road Plant and the Western Wayne County Conservation Association for their successful efforts in habitat preservation and enhancement.
- July 1995:** The City of Wayne completes its sewer separation project.
- May 1996:** Wayne County holds its first Fishing Derby at Waterford Bend Picnic Area in Hines Park, joining Farmington and Southfield in presenting annual events.
- November 1996:** Livonia completes its sewer separation project for the entire city.
- 1997:** Three CSO treatment basins in Oakland County go online, eliminating all Oakland County CSO discharges to the Rouge River. CSO basins in Inkster, Dearborn Heights and Redford Township go online, eliminating 18 CSO outfalls.



Eastern Kingbird, photo courtesy of Julie Craves

1997: In Westland, the Morgan Drain is officially renamed Morgan Creek.

1997: The federal court, Rouge counties and communities and the Michigan Department of Environmental Quality (MDEQ) begin to develop the Voluntary Watershed-based General Storm Water Permit.

May 1998: The first annual Rouge River Water Festival is held at University of Michigan-Dearborn for 1,200 fifth graders.

October 1998: Newburgh Lake remediation, a two year project to remove PCB-contaminated sediments from the lake, is completed at a cost of \$12 million.

1998: The Rouge Project community grant program provides \$4.3 million to 61 projects for GIS, storm water, recreation, wetlands creation, on-site sewage disposal system inspection and management.

1998: First annual FOTR Frog and Toad Survey is held.

1998: Seven subwatershed advisory groups are formed and communities and other public agencies responsible for storm water work cooperatively to develop and implement plans to address sources of pollution.

1998: "Rouge RAP Progress Report" is published.

1998: Woody debris management techniques are demonstrated at Hix Park in Westland. "Log Jams: Good or Bad?" video is produced.

1998: Ford Field stream bank stabilization project begins.

1998: "No-mow" zones and grounds management for habitat restoration are implemented at Rouge Park.

April 1999: Garden City completes its sewer separation project.

April 1999: First Annual Ford "Rouge Clean Up Day" is held. Over 600 Ford employees participate.

June 1999: First Annual "River Day" (includes the Clinton, Detroit, Huron and Rouge rivers).

June 1999: Storm Water Ordinance is passed in Washtenaw County.

1999: Wayne County's Illicit Disconnection/Discharge Elimination Training Program begins.

1999: 41 Rouge communities apply for coverage under the Voluntary Watershed-based General Storm Water Permit and begin implementation of an Illicit Discharge Elimination Plan (IDEP) and Public Education Plan (PEP).

1999: "Rouge Report Card" is published by RRAC.

1999: Lift Station 1A goes online. This pump station removes sanitary water from the Rouge Valley/North Huron Valley system (which runs from Dearborn to Novi) and "lifts" it into the Detroit Water and Sewerage Department (DWSD) system for treatment.



Morgan Creek Signage



Rouge River Frog and Toad Survey



Ford Field Clean Up

1999: Dearborn Schoolyard Habitat Project begins.

1999: William McDonough is hired by Ford Motor Company to redesign the Ford Complex based on his revolutionary principles of "cradle to cradle" production.

1999: The Rouge Gateway Partnership is formed. A group of businesses, institutions and communities along the most urbanized and industrialized reach of the Rouge partner to collaborate on restoration projects.

1999: The CSO basins at Hubbell/Southfield and Puritan/Fenkell in Detroit come online, eliminating three CSO outfalls. The CSO outfall eliminated by Hubbell/Southfield is the largest CSO outfall in the Rouge River.

1999: Washtenaw and Wayne counties enact new ordinances for the inspections of on-site sewage disposal systems.

1999: There are no dissolved oxygen violations downstream of the Oakland County CSO basins and dry weather readings are above the 5 mg/l standard of the Greenfield Road monitoring site on the paved channel.

August 2000: Wayne County in partnership with the USA Triathlon Association presents the first annual Newburgh Lake Triathlon with 100 participants.

2000: The EPA endorses the Voluntary Watershed-based General Storm Water Permit as an acceptable program to meet Phase II NPDES requirements.

2000: CSO pollution has been significantly reduced.

Other sources of pollution (e.g., high flow, habitat loss, urban storm-water runoff, illicit connections, failing septic systems) are becoming a higher priority. Corrective action programs for remaining SSOs are in place.

2000: Johnson Creek Protection Group forms.

2000: The Forest Lake Outlet Watershed (FLOW) partnership forms; a group of riparian landowners from multiple lake areas, in conjunction with Bloomfield Township develops management strategies and sets long- and short-term goals in an effort to improve water quality. The FLOW group also conducts water-quality testing on several Oakland County lakes.

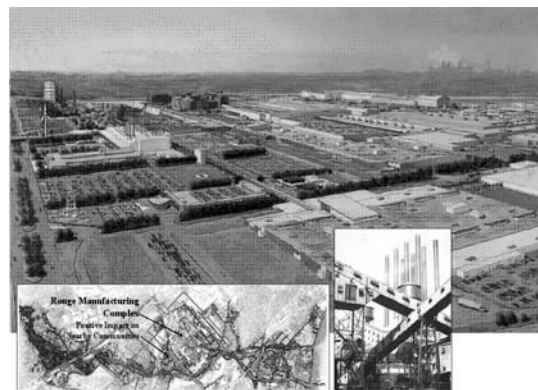
2000: The Detroit Recreation Department creates more natural areas near the Rouge River by planting two acres of wildflowers in Eliza Howell Park and 15 acres of wildflowers in Rouge Park.

2000: Blue and white signs proclaiming "The Rouge River: Ours to Protect" begin appearing at road crossings and watershed boundaries.

January 2001: The restoration of the Nankin Mills Nature Center is completed.



Howard Schoolyard Habitat in Dearborn



Re-designed Ford Rouge Center



Rouge Signage

April 2001: 150 Field Elementary students, parents, teachers and friends plant native trees, flowers and seeds along the banks of Truesdell Creek, the Canton Township tributary to the Lower Rouge River that flows through the school property.

May, 2001: Seven subwatershed management plans are completed.

May 2001: Grand Opening of the University of Michigan-Dearborn Environmental Interpretive Center.

June, 2001: 15th Rouge Rescue/River Day at 20 sites. First year philosophy of woody debris management is officially used (rather than wholesale removal of logjams.)

2001: A technical group forms to promote woody debris management.

2001: Washtenaw County completes its comprehensive handbook *Community Partners for Clean Streams*

2001: Storm water ordinance is passed by Wayne County.

2001: As part of the Rouge Gateway Project, the restoration of an oxbow lake at The Henry Ford begins.

May 2002: Nearly 3,000 fifth-graders participate in the Rouge River Water Festival at University of Michigan-Dearborn.

September 2002: Eleventh Annual "Rouge 2002" event is held at the Cranbrook Institute of Science in Bloomfield Hills. The river is meeting DO water quality standards at least 95 percent of the time.

2002: As part of the Voluntary Watershed-based General Storm Water Permit, 41 Storm Water Pollution Prevention Initiatives (SWPPIs) are approved.

2002: Farmington Hills residents start the Wood Creek Watershed Preservation Committee to protect Pebble Creek.

2002: Results from testing of fish in Newburgh Lake show low PCB and mercury contamination.

2002: The newly constructed CSO basin in River Rouge comes online eliminating one CSO outfall.

2002: \$500 million has been invested in the Rouge restoration.

March 2003: Under the Phase II requirements of the Federal Clean Water Act, "Urbanized Areas," including counties, cities, villages, and townships, are required to obtain an NPDES Permit to discharge storm water.

2003: The PCB advisory for fish in Newburgh Lake is lifted.

2003: Total projected cost of Rouge cleanup exceeds \$1 billion.

2004: Rouge River RAP Revision is completed.

2007: EPA will review the effectiveness of the Voluntary Watershed-based General Storm Water Permit.



University of Michigan-Dearborn



Oxbow Restoration at The Henry Ford

History of RAP Process

1989 RAP

The 1989 RAP presented a 20-year plan that identified what was needed to solve the river's worst pollution problems and protect public health. In order to protect public health, the plan recommended that two problems be addressed first: the elimination of raw sewage discharges and the control of toxic discharges to the river. Discharges of raw sewage were known to occur, while the distribution of toxic contaminants was largely unknown. The plan called for a three-phased approach focusing primarily upon the construction of sanitary sewer improvement projects and CSO control.

The nine-volume RAP document identified 31 primary goals and the projects and activities necessary to restore the river. The recommendations addressed the following pollution sources:

- SSOs
- CSOs
- Improper connections to storm drains, storm water runoff, and other nonpoint sources
- Municipal and industrial dischargers
- Sediment contamination
- Logjams and debris

In addition, recommendations were made on data gathering, public education, and the institutions and financing essential to successful implementation.

A shortcoming of the 1989 plan was that it did not take an ecosystem approach to the river's problems. Focusing primarily on sources of pollution, it did not specifically address broad issues such as loss of habitat or human health effects. Nor did it consider overall indicators of the river's health such as the diversity and strength of its aquatic insect populations.

1994 RAP

The 1994 Rouge River RAP Update began to integrate an ecosystem approach into the RAP and contained goals to address the RAP guidelines established in the Great Lakes Water Quality Agreement. Specifically, the goals required the inclusion of "use impairments" or barriers to using water resources. Based on the guidelines, the Rouge River RAP Advisory Council (RRAC) was formed to update the goals and recommendations of the 1989 RAP.

Why Revise the RAP Now?

The 1989 and 1994 RAPs focused on human health, and remediating the consequences of bacteria (in raw sewage) and toxics (from abandoned dumps and historical industrial activities). Today, SSO and CSO control is underway. The issue of toxics in sediments and water has been investigated and found to be less of a problem than previously believed.

The 2005 date established in the original RAP was fast approaching and the RRAC decided it was time to re-evaluate the RAP. Based upon the progress made and the challenges that still remain, RRAC members decided to address the following items:

1. Identify the mechanism for implementing a watershed management approach (defined below).
2. Update the 1989 "phases."
3. Update the progress.
4. Identify the remaining major challenges.

The Mechanism for Implementing a Watershed Management Approach⁶

Watershed management is a process of decision-making regarding uses and modifications of land and water within a watershed. The process offers the opportunity for stakeholders to balance diverse goals and uses for local resources and to consider how their cumulative actions may affect long-term sustainability of these resources.

Human modifications of land and water directly alter delivery of water, sediments, and nutrients to the river, and thus dramatically impact aquatic systems. People have varying goals and values relative to uses of local land and water resources. Watershed management provides a framework for integrated decision-making, where we (See Figure 3): (1) assess the nature and status of the watershed ecosystem; (2) define short- and long-term goals for the

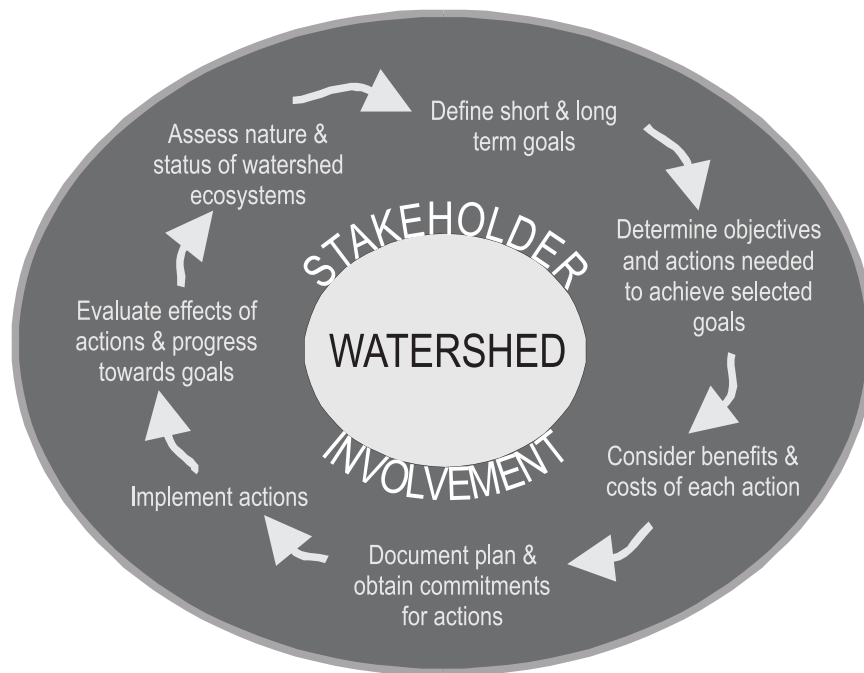
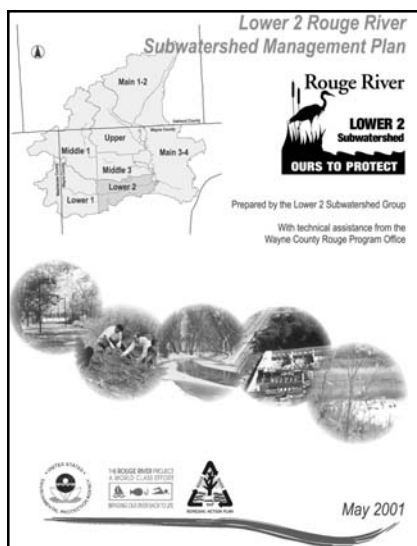


Figure 3: Evaluation Process

system; (3) determine objectives and actions needed to achieve selected goals; (4) assess both benefits and costs of each action; (5) implement desired actions; (6) evaluate the effects of actions and progress toward goals; and (7) periodically re-evaluate goals and objectives. When implementing this type of framework, watershed management becomes a means for greater efficiency and continuous improvement.

Watershed management encompasses the entire ecosystem, from uplands and headwaters to floodplains, wetlands and river channels. It focuses on the processing of energy and materials (water, sediments, nutrients, and toxics) as they down-slope through the system. Of principle concern is management of the basin's water budget-- the routing of precipitation through the pathways of evaporation, infiltration, and overland flow. The routing of groundwater and overland flow defines the delivery patterns to particular streams, lakes, and wetlands and largely shapes the nature of these aquatic systems.

Watershed management requires the use of social, ecological, and economic sciences. Common goals for land and water resources must be developed among people of diverse backgrounds and values. An understanding of the historical and current structure and function, of the



Cover of Subwatershed Management Plan

watershed system is required, so that the ecological effects of various alternative actions can be considered. The decision process also must weigh the economic benefits and costs of alternative actions with considerations of long-term sustainability of the ecosystem.

Voluntary Watershed-based General Storm Water Permit

"The Rouge River Watershed municipalities and county agencies have been pioneers in adopting a watershed management approach to river restoration. With early reports from the Rouge Project stating that the control of CSOs alone would not address all the pollution problems in the river, the Federal Court urged the 48 local public agencies within the Rouge River Watershed to adopt a more comprehensive approach. In response to the court's concerns, a group of local agencies working with the Rouge Project proposed to the MDEQ a new regulatory framework for the management of storm water and certain other pollution sources on a watershed scale. The Federal Court encouraged the

communities to pursue this approach, which was embraced by the MDEQ when it adopted the Voluntary Watershed-based General Storm Water Permit in 1997."⁷

The Voluntary Watershed-based General Storm Water Permit required that each permittee develop and implement an Illicit Discharge Elimination Plan (IDEP) and a Public Education Plan (PEP). The seven subwatershed groups worked cooperatively to draft a subwatershed management plan. After the plan was adopted and submitted to the MDEQ, each permittee developed a Storm Water Pollution Prevention Initiative (SWPPI) that commits it to specific actions and an implementation schedule consistent with the goals of the plan. The goals address issues such as public health protection, flow variation, erosion and sedimentation, habitat loss, public education, and nutrient reduction.

In March 2003, new Phase II Federal Storm Water regulations required all urbanized municipalities to obtain a permit to discharge storm water. The United States Environmental Protection Agency (U.S. EPA) has endorsed the Voluntary Watershed-based General Storm Water Permit as meeting the new Phase II requirements.

Updated Phased Approach

The 1989 RAP called for a phased approach to solving the Rouge's problems. The plan identified specific projects needed between 1990 and 2005. The RRAC recommends the following updated, phased approach.

Phase I, Comprehensive Pollution Controls and Initial Habitat Restoration Timetable - 2004 to 2007:

- Continue comprehensive pollution-control measures being implemented under NPDES permits, including storm water management and CSO control.
- Continue SSO corrective action programs.
- Target areas in the AOC for de-listing.
- Develop relationships with key watershed partners such as the Rouge Assembly.
- Complete the formation of new institutional arrangements.
- Continue strong public education programs.

- Begin expanding emphasis on habitat restoration and preservation by doing the following:
 - ◊ Adopt no-net loss of wetlands, woodlands, meadows, and riparian corridors.
 - ◊ Promote sustainable land-use alternatives.
 - ◊ Begin habitat and critical species inventory.
 - ◊ Identify potential areas for restoration.
 - ◊ Protect the headwater portions of the watershed.
 - ◊ Implement pilot projects to accomplish the above items.
 - ◊ Train municipal and agency staff and citizenry to be cognizant of sensitive areas.
- Work with the Statewide Public Advisory Council (SPAC) to standardize the delisting criteria for AOCs.
- Evaluate AOC for delisting status.

Phase II, Major Capital Investments: Sewer/Storm Water Infrastructure and Habitat Projects Timetable - 2008 to 2014:

- Reassess pollution control efforts:
- Evaluate the success of pollution source controls. In 2007, EPA will evaluate the success of the Voluntary Watershed-based General Storm Water Permit.
- Evaluate results of CSO and SSO controls and determine measures needed to meet Water Quality Standards.
- Continue major infrastructure reinvestment.
- Begin construction of regional storm water detention tunnel project.
- Complete habitat and critical species inventory.
- Expand habitat restoration projects.
- Continue strong public education program.
- Evaluate effectiveness of public education efforts.
- Evaluate AOC for delisting status.

Phase III, Operation and Maintenance/Delisting Assessment Timetable - 2015 to 2020:

- Ensure that comprehensive operation and maintenance is underway for pollution source controls.
- Monitor habitat restoration/preservation to determine progress and identify future needs.
- Continue strong public education program.
- Identify remaining challenges.
- Evaluate AOC for delisting status.

As a result of data collected in the past several years and numerous remedial actions taken, there is now a clearer picture of where to focus the efforts. Knowledge and practical experience gained is reflected in the revised plan. Based on new delisting criteria, RRAC re-evaluated the impaired uses for the Rouge River, and identified those that could potentially be delisted.

RRAC revised the 1994 RAP goals and recommendations in consideration of the progress made and the remaining challenges faced. In some cases the goals remain the same, but new recommendations have been added. Since the reality of cost is so important to successful completion of the restoration efforts, the RAP includes an expanded financial discussion.

A key factor of the revised RAP is the subwatershed management plans and the implementation of SWPPIs. Success in the next phase of the community-based, watershed approach will be dependent upon successes within the local communities. With this in mind, it was important for RRAC to consider the subwatershed management plans in conjunction with revised RAP

goals and recommendations. (See Appendix A, Summary of Seven Subwatershed Management Plans)

Public participation and input was essential. RRAC developed a strategy for obtaining public participation in the RAP revision process that included: (a) expanding RRAC membership to include more local government representation; (b) establishing an executive committee (Watershed Management) to oversee the RAP revision process; (c) reorganization of the RRAC Committees. The current RRAC Committees are: Habitat and Wildlife, Pollution Prevention, Public Education, Finance, and Watershed Management.

The Major Challenges Ahead

In the last decade, concern over Michigan's land-use policies and practices has dramatically increased. Studies have documented extensive loss of farmland and open spaces to suburban sprawl while older urban core communities continue to lose population and tax base (reference: Ready for Change, August 2000). Governor Jennifer Granholm has appointed a bipartisan commission on land use comprised of citizens and land-use and urban planning experts. The commission will develop a long-term land-use strategy, and make recommendations concerning regional cooperation, zoning laws and housing policy, and best development practices.



Historic Farm - Courtesy of Dearborn Historical Museum

Citizens and communities will continue to feel the impact of inefficient land-use patterns as long as traditional development practices threaten to eliminate existing, relatively good headwater conditions, and to reverse recent gains in water quality experienced downstream. The "watershed management approach" is an appropriate mechanism for land-use planning.

High stream flow volume and velocity after rain storms are significant challenges to restoring healthy biological communities. Absent a significant reduction in flood volumes and velocities, restoration of aquatic habitat and preferred fish populations and reductions in property damage are impossible. Without direct actions to increase storm water storage and infiltration, rapid urbanization in the remaining undeveloped headwaters will destroy existing healthy areas, while increasing flooding, flow velocities and related problems downstream.

The quality of polluted storm water runoff must be addressed. Polluted runoff contains bacteria, heavy metals, nutrients, oil and grease, pesticides, and soil particles that negatively impact the river.

The destruction of wildlife habitat and the degradation of aquatic and wildlife communities by increasing urbanization need to be addressed by working toward the following goals: achieving self-sustaining fish and wildlife populations, restoring native species, reducing invasive species, and restoring and preserving critical natural habitats. Key steps include: completing inventories of critical habitats and species, developing and implementing wildlife and habitat management plans, executing restoration projects and monitoring progress.

United under the Voluntary Watershed-based General Storm Water Permit, the Rouge communities and public agencies have demonstrated a strong commitment to working together

to accomplish the goals established in the seven subwatershed management plans. However, in an era of decreasing funding, it is a challenge to continue coordination and collaboration. These partnerships must remain in place.

In October 2001, a drafting committee formed and was charged with three tasks: 1) assessing alternative watershed organizations as potential models for the Rouge 2) analyzing the present and future costs of providing essential services to communities for the regulation of storm water discharges and 3) developing recommendations for a watershed-wide institutional arrangement. Based on the committee's findings a Memorandum of Agreement was developed for conditional approval by the communities and counties and the Rouge Assembly held its first meeting in August 2003.

A final requirement is sufficient funding to accomplish the goals of the RAP and the subwatershed management plans. Most of the Rouge communities are in financial crisis; economic recession and reductions in revenue sharing have placed all levels of government in severe economic conditions. A recent study, by the Southeast Michigan Council of Governments (SEMCOG), estimates that an additional \$14-26 billion investment is necessary by 2030 to maintain and improve Southeast Michigan's sewer infrastructure, including the Rouge River Watershed. The price of sewer improvement is only part of the cost of protecting water quality. Because of the substantial gap between available funding and sewer needs, ways must be found to simultaneously increase funding and reduce costs. For recommended actions see Chapter VII, The Challenge of Financing the Rouge RAP Goals.

Delisting Beneficial Use Impairments

Under the Great Lakes Water Quality Agreement (GLWQA), as amended in 1987, the United States and Canada agreed, "to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem." The agreement established a format for the development of remedial action plans (RAPs) for 43 waterways, including the Rouge river within the Great Lakes Watershed called Areas of Concern (AOCs). The GLWQA defines "use impairments" as changes in "chemical, physical, or biological integrity of the Great Lakes System that create barriers to the use of the water resource." These use impairments have become the template for determining the extent to which the river or harbor is degraded and for measuring progress toward its cleanup. Once a beneficial use has been restored, it can be "delisted" using the International Joint Commission's (IJC's) criteria.

In 1994, MDEQ determined that 13 uses were impaired throughout most of the watershed. Three of these required additional study. At the same time, MDEQ also decided that the use impairments "added cost to agriculture or industry," "degradation of phytoplankton and zooplankton populations" and "beach closings" were not a concern in the Rouge River Watershed. In addition, the impairment "restrictions on drinking water consumption or taste and odor problems" was not included because the Rouge River is not used as a source of drinking water.

In December 2001, after extended discussions among all the U.S. RAP participants, the United States Policy Committee published "Restoring United States Great Lakes Areas of Concern - Delisting Principles and Guidelines." These guidelines allow for the delisting of individual use impairments in the entire AOC or in individual subwatersheds under the following circumstances:

- When locally derived delisting targets have been met;
- When the use impairment is due to natural rather than man-made causes;
- When the use impairment is not limited geographically to the AOC, but rather is typical of regional conditions;

- When the source of the use impairment is outside the boundaries of the AOC; or
- When the beneficial use cannot be fully restored, even when all practical remedial actions have been implemented.

In addition, through the continued coordination by the Great Lakes Commission (GLC) and the SPAC, efforts will focus upon bringing similar AOC and appropriate experts together to develop standardized de-listing criteria.

In the opinion of the RRAC, six of the 13 use impairments identified for the Rouge River AOC could be delisted in the near future:

- Fish consumption advisories
- Bird or animal deformities
- Restrictions on dredging
- Fish tumors or other deformities
- Tainting of fish and wildlife flavor
- Restrictions to navigation

A summary of the reasons the six use impairments could be delisted is below:

Fish Consumption Advisories

Portions of all four branches of the Rouge River currently have fish consumption advisories (FCAs) for several species due to contamination by PCBs, and the lakes and impoundments have FCAs for mercury. Mercury contamination of fish in lakes is a region-wide problem, due to global atmospheric deposition. Sampling is currently underway to assess whether fish are still contaminated by PCBs. If the sampling demonstrates that the fish are no longer contaminated with PCBs, and the mercury contamination is regional and its sources are outside the AOC, this use impairment should be delisted.

Bird or Animal Deformities

There is no data for the current or historic incidence of bird or animal deformities in the Rouge River Watershed, but limited data do show that concentrations of the chemical contaminants most often associated with wildlife deformities (e.g., chemical mutagens and teratogens like PAHs, DDT, dibenzodioxins and dibenzofurans, etc.) are quite low in water and sediments throughout the river except for the contaminated sediment deposits near the river mouth.

Restrictions on Dredging

The "1994 RAP Update" states that "dredging activities are restricted due to contamination of sediments that limits where the dredged materials can be deposited" (p. 25). Given that the only acceptable disposal technique for these sediments is transport to a confined disposal facility (CDF), and that they are not and never have been contaminated enough to prevent their disposal in CDFs, this use impairment should be delisted.

Fish Tumors or Other Deformities

Fish tumors can be internal (liver, etc.) or external (skin, lip, barbell, etc.). The MDNR and MDEQ periodically survey the fish populations in the Rouge River Watershed, and routinely note the presence of external tumors. The two most recent fish surveys, conducted in 1995 and 2000, sampled fish from 38 locations, and did not find any external tumors. Comparable surveys for internal tumors have never been performed, but concentrations of the chemicals most often associated with tumors in fish (polycyclic aromatic hydrocarbons, or PAHs) are known to be low in Rouge River sediments except near the river mouth. The combination of direct

evidence for no external tumors and indirect evidence suggesting no internal tumors may be sufficient to delist this use impairment. Alternatively, it may be possible to delist six of the seven subwatersheds for this use impairment, retaining it only for the Main 3-4 subwatershed, where contaminated sediment deposits still exist.

Tainting of Fish and Wildlife Flavor

Fish and wildlife flavor tainting can be the result of natural conditions like algae blooms, or chemical contaminants like oils or phenols. Local MDNR and county environmental and public health employees report that they seldom if ever receive citizen complaints about fish flavor tainting, and wildlife hunting is forbidden in most of the watershed. The lack of reported complaints may be sufficient evidence for delisting this use impairment. An exception to this rationale may be aquatic animal harvesting by certain ethnic groups, which may be less likely to report flavor tainting.

Restrictions to Navigation

The 1994 RAP Update describes two types of navigation restrictions: sedimentation in the river channel and impoundments, and logjams in the upper reaches of the Rouge. However, the "restrictions to navigation" use impairment applies only to obstructions in man-made, maintained commercial navigations channels, and not to obstructions which may interfere with recreational water uses in the nonnavigation part of the river. Maintained commercial navigation channels exist only in the lower four miles of the Rouge River. There the river channel is too wide and receives too much ship traffic to be blocked by logs or other debris. Both natural and man-made upland and stream bank erosion contribute to sedimentation of the river channel, and periodic dredging is required to remove sediment deposits from the navigation channel. While man-made upland and stream bank erosion problems should be controlled and eventually eliminated, natural erosion will continue to fill in the man-made navigation channel at the mouth of the river and dredging will continue to be necessary. Since navigation will still be restricted due to natural causes, and dredging will still be required even after all reasonable erosion best management practices have been implemented, this beneficial use should be delisted now.

The other seven use impairments are probably years away from being delisted. RRAC has established delisting targets for these use impairments (see Table 1) and identifies recommended monitoring plans (see Table 2.)

How to Read this Document

The 2004 RAP is organized into 8 sections:

- Chapter 1: Introduction
- Chapter 2: Caring for Water - The Rouge River
- Chapter 3: Caring for Nature - Habitat and Wildlife
- Chapter 4: Caring for Community - People
- Chapter 5: Take Responsibility for the Rouge - Stewardship
- Chapter 6: Evaluating Progress: Watershed Monitoring
- Chapter 7: The Challenge of Financing Rouge RAP Goals
- Appendices

Chapters 2 through 6 include *Where We Were*, *Where We Are* and *Where We Want to Be* sections. They identify the responsible parties for recommended actions and contain an implementation timeline for the three phases described in the previous "Updated Phased Approach" section.

Table 1

Summary of Impaired Uses, Rouge River Watershed, 2003

<i>Impairment (In Rank Order)</i>	<i>Degree and Geographic Extent</i>	<i>Probable and/or Known Causes</i>	<i>Delisting Status</i>	<i>Possible Delisting Criteria</i>
Restrictions on swimming and other water-related activities	Severely impaired - all branches	Bacteria from combined/separate sewer overflows, nonpoint source pollution, point source storm water discharges, illegal discharges. Unstable stream banks, excessive flow variation	Year away	Dry weather bacteria concentrations below full body contact criteria at all recreational areas, for three consecutive summers
Loss of fish and wildlife habitat	Impaired throughout watershed, less so in headwaters	Physical alteration of habitats (channelization, enclosure or relocation of the streambed, excessive post-storm stream flows) and elimination of stream bank vegetation and woody debris in the stream channel. Nonpoint source pollution, point source pollution, and combined/separate sewer overflows. Contaminated sediments, stream flow, and illegal discharges. Loss of all natural habitats (i.g. forests, wetlands, floodplain) due to development	Years away	<ol style="list-style-type: none"> 1. No net loss of upland, riparian and aquatic habitat 2. Habitat protection/restoration/re-creation targets met 3. GLEAS aquatic habitat scores = "Acceptable" or better at all locations, for three consecutive surveys
Degradation of fish communities	Impaired throughout watershed; less so in headwaters	Stream flow, nonpoint source pollutin, point source storm water discharges, combined/separate sewer overflows, inappropriate management of woody debris and riparian corridors, contaminated sediments, illegal discharges, point source discharges	Years away	<ol style="list-style-type: none"> 1. GLEAS fish data = "Acceptable" or better at all stations, for three consecutive surveys 2. Sustainable populations of fish species predicted by Wiley/Seelbach models (especially sensitive species), based on stream size and flows
Degradation of Benthos	Impaired throughout watershed; less so in headwaters	Stream flow, nonpoint source pollution, point source storm water discharges, combined/separate sewer overflows, contaminated sediments, illegal discharges	Years away	GLEAS data = "Acceptable" or better at all stations, for three consecutive surveys

Table 1

Summary of Impaired Uses, Rouge River Watershed, 2003

<i>Impairment (In Rank Order)</i>	<i>Degree and Geographic Extent</i>	<i>Probable and/or Known Causes</i>	<i>Delisting Status</i>	<i>Possible Delisting Criteria</i>
Degradation of wildlife populations	Impairment unknown - additional studies necessary	Loss of upland, riparian and aquatic habitat	Years away	Maintain or re-establish sustainable populations of target species
Eutrophication or growth of undesirable algae	Middle Branch impoundments impaired, in summer	Nonpoint source pollution, point source storm water discharges, combined/separate sewer overflows	Years away	1. Algae species in Middle Branch impoundments characteristic of mesotrophic conditions, for three consecutive summers 2. No interference with recreational activities from algae blooms
Degradation of aesthetics	Impaired throughout watershed; less so in headwaters	Nonpoint source pollution, point source storm water discharges, combined/separate sewer overflows, excessive post-storm stream flow, illegal discharges	Years away	Possibilities include: CSO overflow frequency = design criteria . . . SSOs controlled . . . stream bank erosion reduced to natural rates
Restrictions on fish consumption	Impaired - Middle Branch downstream of Phoenix Lake; Main Branch downstream of Ford Road; Lower Branch in Wayne County; Other areas not impaired.	PCBs and mercury from historically contaminated sediments, atmospheric deposition, point source storm water discharges, nonpoint source pollution, combined/separate sewer overflows	PCBs may be delisted soon; mercury source from outside of AOC = delist in next few years?	PCB concentrations meet state human consumption standards
Degradation of phytoplankton and zooplankton	Not currently in RAP, but eutrophication problems apparent in Middle Branch impoundments	Cultural eutrophication due to fertilizer use, point and nonpoint pollution (especially phosphorus)	Years away	1. Nutrient concentrations meet state water quality standards (under development) 2. Plankton community composition appropriate for mesotrophic water bodies 3. No excessive algae blooms or macrophyte growths

Table 1

Summary of Impaired Uses, Rouge River Watershed, 2003

<i>Impairment (In Rank Order)</i>	<i>Degree and Geographic Extent</i>	<i>Probable and/or Known Causes</i>	<i>Delisting Status</i>	<i>Possible Delisting Criteria</i>
Bird or animal deformities or reproductive problems	Extent unknown	Specific organic chemicals - whose concentrations are known to be low except in sediments near the river mouth	No historic data, but chemical concentrations low = delist now?	Delist now?
Restrictions on dredging activities	No current or past restrictions	Specific organic chemicals - whose concentrations are not too high for confined disposal facility disposal	No restrictions = delist now?	Delist now?
Fish tumors or other deformities	Available data = no impairment	Specific organic chemicals - whose concentrations are known to be low except in sediments near the river mouth	No external tumors observed in '95; chemical concentrations low = delist now?	Delist now?
Tainting of fish and wildlife flavor	No known complaints	Algae blooms, specific chemical contaminants	No complaints for fish; little hunting in watershed = delist now?	Delist now?
Restrictions to navigation	No current or past restrictions	Logjams or other obstacles in the navigation channel	No obstacles to navigation	Delist now?
Added costs to industry or agriculture	Not impaired			
Restrictions on drinking water consumption, taste and odor problems	Not applicable since the river is not used as a drinking water supply			

Table 2
Monitoring Recommendations for Beneficial Use Impairment in the
Rouge River Watershed, 2003

Impairment (In Rank Order)	Delisting Status	Delisting Criteria	Recommended Monitoring & (Responsible Party)
Restrictions on swimming and other water-related activities	Years away	Dry weather bacteria concentrations below full body contact criteria at all recreational areas, for 3 consecutive summers	Dry weather bacteria sampling (County Health Department summer months' bacteria monitoring data)
Loss of fish and wildlife habitat	Years away	<ol style="list-style-type: none"> 1. No net loss of upland, riparian and aquatic habitat 2. Habitat protection/restoration/recreation targets met 3. MDEQ-Surface Water Quality Assessment Unit (SWQAS) aquatic habitat scores are "Acceptable" or better at all locations, for 3 consecutive surveys. 	<ol style="list-style-type: none"> 1. Track FOTR frog and toad survey results (FOTR) 2. Track habitat loss/preservation (Counties, Local Governments) 3. Conduct aquatic habitat surveys (MDEQ-SWQAS)
Degradation of fish populations	Years away	<ol style="list-style-type: none"> 1. SWQAS fish data are "acceptable" or better at all stations, for 3 consecutive surveys 2. Sustainable populations of fish species predicted by Wiley/Seelbach models (especially sensitive species), *ref see Table 1 based on stream size and flows 	<ol style="list-style-type: none"> 1. Watershed-wide fish survey every 5 years (MDNR) 2. More frequent trend monitoring (Rouge Assembly)
Degradation of benthos	Years away	SWQAS data are "Acceptable" or better at all stations, for 3 consecutive surveys	<ol style="list-style-type: none"> 1. Watershed-wide survey every 5 years (SWQAS) 2. Volunteer monitoring program twice a year (FOTR)
Degradation of wildlife populations	Years away	Maintain or re-establish sustainable populations of target species	<ol style="list-style-type: none"> 1. Monitor habitat loss (MDEQ, Counties, Local Governments) 2. Nesting birds' survey (Breeding Bird Atlas Project)
Eutrophication or growth of undesirable algae	Years away	<ol style="list-style-type: none"> 1. Algae species in Middle Branch impoundments characteristic of mesotrophic conditions, for 3 consecutive summers 2. No interference with recreational activities from algae blooms 	<ol style="list-style-type: none"> 1. Monitor nutrient and chlorophyll concentrations and algae yearly for 3 years (MDEQ, Rouge Assembly)
Degradation of (Governments) Aesthetics	Years away	<ol style="list-style-type: none"> 1. CSO frequency is equal to the design criteria 2. SSOs are controlled 3. Streambank erosion reduced to natural rates 	<ol style="list-style-type: none"> 1. Monitor number of CSOs, SSOs (MDEQ, Local Governments) 2. Monitor erosion with erosion pin measurements and embeddedness observations. 3. Measure flow using USGS gage station data 4. Also see "Eutrophication-Recommended Monitoring"
Restrictions on fish consumption	PCBs may be delisted soon; mercury source from outside of AOC	PCB concentrations meet State human consumption standards	<ol style="list-style-type: none"> 1. Continue existing Fish Consumption Advisories' (FCA) Surveys (MDNR, MDEQ, MDCH) 2. Expand surveys to other parts of the watershed with FCAs (MDNR, MDEQ, MDCH) <p>Delist in next few years</p>

Table 2

Monitoring Recommendations for Beneficial Use Impairment in the Rouge River Watershed, 2003

<i>Impairment (In Rank Order)</i>	<i>Delisting Status</i>	<i>Delisting Criteria</i>	<i>Recommended Monitoring & (Responsible Party)</i>
Degradation of phytoplankton and zooplankton populations	Years away	1. Nutrient concentrations meet State water quality standards (under development) 2. Phytoplankton community composition appropriate for mesotrophic water bodies 3. No excessive algae blooms or macrophyte growths	See "Eutrophication" monitoring
Bird or animal deformities or reproductive problems	No historic data, but chemical concentrations low	DELIST NOW	If not delisted, survey of deformities reported in the watershed
Restrictions on dredging activities	No restrictions	DELIST NOW	If not delisted, rely on predredging data
Fish tumors or other deformities	No external tumors observed in '95; chemical concentrations low	DELIST NOW	If not delisted, conduct tumor surveys as per the future IJC-sponsored protocols
Tainting of fish and wildlife flavor	No complaints for fish; little hunting in watershed	DELIST NOW	If not delisted, conduct flavor tainting studies using the SWQAS protocols
Restrictions to navigation	No obstacles to navigation	DELIST NOW	
Added costs to industry or agriculture	Not impaired		
Restrictions on drinking water consumption, taste and odor problems	Not applicable since the river is not used as a drinking water supply		

The 1989 RAP goal associated with each source or use impairment is located in the *Where We Were* section. The associated 1994 RAP goal to address each source or use impairment and the 2004 goal, if any, is listed in the *Where We Want to Be* section. The *Where We Are* section contains a summary of the progress made since the 1998 Rouge RAP Progress Report. It is not a comprehensive list of all activities but rather is meant to be representative of the types of activities occurring throughout the watershed.

Chapter 2, *Caring for Water - The Rouge River*, examines the source impairments associated with threats to public health and storm water runoff. They are SSOs, CSOs, Onsite Sewage Disposal Systems, Illegal Dumping and Illicit Discharges and Connections, Polluted Storm Water Runoff, Stream Flow and Erosion, and Other Nonpoint Pollution Sources, including Household Hazardous Wastes, Point Source Storm Water Discharge (Municipal, Industrial, Construction), Permitted Industrial Point Source Discharges (Wastewater), and Animal Wastes.

Chapter 3, *Caring for Nature - Habitats and Wildlife*, examines the use impairments associated with negative impacts to natural areas. They are Loss of Fish and Wildlife Habitats, Degradation of Wildlife Populations, Degradation of Fish Populations, Degradation of Benthos and Eutrophication or Growth of Undesirable Algae.

Chapter 4, *Caring for Community - People*, examines the critical role of public education and increasing awareness regarding the importance of protecting and restoring an urban watershed. It also includes a section on Recreation and Aesthetics that addresses the use impairments, Restrictions on Swimming and Other Water-Related Activities and Degradation of Aesthetics. Being able to enjoy the river recreationally increases the public's awareness of and connection to the river

Chapter 5, *Take Responsibility for the Rouge - Stewardship*, highlights the importance of cooperation and change. All stakeholders, citizens, politicians, municipal and agency personnel, businesses, developers and educators need to continue to strengthen partnerships to solve the challenges of restoring the Rouge. Local governments are key to a successful implementation of actions needed to achieve the goals of the subwatershed management plans and the RAP.

Chapter 6, *Evaluating Progress - Monitoring*, identifies the essential components of an appropriate monitoring program. Without in-stream trend monitoring there is no way to determine if the actions implemented are accomplishing the desired outcome -- a restored Rouge.

Chapter 7, *The Challenge of Financing Rouge River RAP Goals*, addresses the critical component of strong partnerships and funding mechanisms to meet the financial challenges faced by the Rouge community.

Chapter 2

Caring for Water - The Rouge River

"The Rouge River has always been a part of me. As a baby, my mother laid me down on the banks of the river. Growing up I played in one of its tributaries. As RAP Coordinator, I cared for the Rouge as it if were my own child. Now as a mother, I see the Rouge as a great learning resource for my son...the next generation. Our lives may come and go but the Rouge River lives on forever."

Cathy Bean, Livonia Citizen



"A watershed is a water collecting system, a drainage basin. In a non-urban environment, when rain falls on the land, it seeps into soils to become groundwater. The groundwater, cooled and filtered by soil, sand, and gravel, makes its way slowly into watercourses, providing the baseflow of streams. When the soil becomes saturated, rain then runs off the land, collecting in rivulets and streams drawn by gravity that follow, and also shape the topography of valleys and ravines. Tiny headwater streams lead into ever-larger tributary streams, and finally into the river, which flows into a lake or ocean.

When a watershed such as the Rouge, is urbanized, the natural water collecting system is severely altered. Parts of the stream network are buried; extensive paved areas prevent rain and snow from recharging groundwater; and storm water collection pipes, gutters, and drains turn a natural watershed into an artificial sewershed. Swollen with runoff water from the storm sewers, urban streams rise rapidly during storms, resulting in larger and more frequent floods, and bank erosion.

When rainwater and snowmelt rush off roofs, streets, and other paved areas, as well as off agricultural fields and lawns (nonpoint source pollution), the water carries everything in its path that dissolves or floats. That is why the water is often muddy, low in dissolved oxygen, exceeds bacteria limits, and polluted with oil, salt, industrial, agricultural, household and garden chemicals. Air pollution contributes to poor water quality through deposition of heavy metals from industry, airborne pesticides, and power generation. Caring for water means minimizing or even eliminating sources of pollution in order to restore or mimic the conditions of the natural hydrologic cycle."

--Paraphrased from The Report of the Don Watershed Task Force, 1994. Forty Steps to a New Don, p.36

The 1994 RAP identified pollution sources that cause use impairments in the Rouge River. Most of these pollution sources impair one or more designated uses. For example, discharges from combined sewer overflows (CSOs) can restrict swimming and other water-related recreation, degrade aesthetics, contaminate sediments, and negatively affect fish, wildlife, and benthos populations.

"Caring for Water" examines the source impairments associated with threats to public health and storm water runoff. The associated 1994 RAP goal to address each source impairment and the 2004 goal, if any, is listed in the "Where We Want to Be" section.

Sanitary Sewer Overflows (SSOs)

Some areas of the watershed are served by sewers that carry storm water and sanitary wastewater in separate sewer pipes. Although the pipes are separate, groundwater can still seep into separate sanitary systems through cracks in the sewer lines. Storm water runoff can also enter through direct connections to the sewers from residential downspout and footing drains, faulty manhole covers and improperly connected catch basins or drains. As a result, certain wet weather conditions can overburden these systems.

When a sewer system becomes overwhelmed, sewer system operators may discharge sanitary sewage directly into the river to avoid sewage backup into homes and businesses. The discharges (or bypasses) carry disease-causing organisms that are a risk to public health, and nutrients that decrease the amount of oxygen available to aquatic organisms. They are considered illegal discharges and are a violation of Act 451, the Michigan Natural Resources and Environmental Protection Act of 1994, as amended, and the Federal Clean Water Act of 1972.

Where We Were:

The 1989 RAP recommended major sewer improvement projects with an estimated cost of \$313 million. The 1994 RAP Update identified that most of these improvements have been completed and nearly all separate sewer overflows eliminated at a cost of over \$543 million. Unfortunately, this was overly optimistic.

The 1989 RAP identified major SSO problems due to inadequate sewer capacity in many areas of the watershed and established the primary RAP goal: "Protect public health by the elimination of discharges of untreated sewage and the control of discharges of toxic substances to the Rouge River." The RAP also identified the pollution control goal: "Eliminate all wet weather overflows from separate sanitary systems."

Where We Are:

SSOs are a national problem. In the Rouge, SSOs continue to be reported. In reports to the federal court, MDEQ confirms this. The Subwatershed Management Plans, developed by the local communities under the Voluntary Watershed-based General Storm Water Permit, identify SSOs as a source of nutrients, bacteria and toxics/heavy metals in the Rouge. These pollutants are serious threats to public health and water quality. The Subwatershed Management Plans propose to address these conditions by developing detailed plans and approved schedules for satisfactorily eliminating known SSOs through capital improvement projects. They advocate the identification and control of SSOs without causing basement flooding as an important management practice to protect public health.

SSOs Progress Since 1998:

- In May 2000, MDEQ released its initiative, "Strategy for the Regulatory Control and Correction of Illegal Overflows from Separate Sanitary Sewer Systems in Michigan."
- The Sanitary Sewer Overflow Task Force published, "Implementing Sanitary Sewer Overflow Corrections: An Action Strategy" that made recommendations for implementing the state's SSO strategy.
- The Michigan legislature has adopted laws requiring the reporting of SSOs and the creation of a publicly available database of overflow events.
- Auburn Hills has implemented a footing drain disconnect program.
- Projects related to SSO evaluation/control supported by the Rouge Program Office include:
 1. Dearborn - Downspout Disconnection Program
 2. Melvindale - Illicit Discharge Investigation and Elimination and Sanitary Sewer Evaluation Study
 3. Garden City - Water Quality Based Determination of SSO Design and Reduction of Excess Peak Flows Through Evaluation and Modification of In-line Storage
 4. Farmington Hills-East Lincolnshire Subdivision SSO Elimination
 5. Oakland County Drain Commissioner's Office - Farmington to Evergreen SSO Interceptor with CSO Regulator Adjustments and Edwards Relief Drain Siphon Removal
 6. Wayne County Department of Public Works - Two Balancing Chambers to Improve the Efficiency of the Lower Rouge Interceptor

Where We Want to Be:

1994 RAP Goal: Eliminate wet weather overflows from separate sanitary sewers.

2004 Goal: Eliminate or provide adequate treatment and control for all wet weather overflows from separate sanitary sewers.

How to Get There:

Phase I (2004 to 2007):

- Comply with current regulations and identify all known SSO outfalls.
- Continue SSO Corrective Action Programs.
- Complete flow monitoring and evaluation of the sanitary sewer overflow areas.
- Clarify a national and state SSO policy and work together with local communities to secure adequate funding for the timely implementation of cost-effective improvement projects.

Primary responsibility: Local Governments, MDEQ, EPA

Phase II (2008 to 2014):

- Complete basis of design, plans and specifications, and construction for all necessary sanitary sewer improvements to eliminate SSOs.
- Implement cost-effective sewer improvement projects to eliminate SSOs.
- Conduct evaluation of SSO controls and determine needed measures to meet Water Quality Standards.
- Implement programs that eliminate all extra surface flow from the sewer system (e.g., footing drain and downspout disconnections).

Primary responsibility: Local Governments, MDEQ

Phase III (2015 to 2020):

- Implement a comprehensive operation and maintenance program for SSOs.
- Determine if any additional actions are needed to prevent SSOs from occurring.

Primary responsibility: Local Governments, MDEQ

Combined Sewer Overflows (CSOs)

In many of Michigan's older urban areas, storm water, sanitary sewage and industrial wastewater are all transported to municipal wastewater treatment plants through a common sewer pipe. Combined sewer systems are designed to overflow directly into local rivers through overflow discharge points when they become overburdened by excessive storm water. Figure 4 depicts how a combined sewer system operates. The overflows are designed to prevent sewage from backing up into homes and businesses.

CSO discharges create serious environmental and public health concerns. CSOs can degrade fish and aquatic insects (or benthos) populations, contribute to fish tumors and other deformities and accelerate excessive aquatic plant growth, causing a decrease in oxygen concentrations. Discharges from CSOs can also restrict swimming and other water-related activities, degrade the aesthetic value of the river, impair fish and wildlife habitat and restrict fish consumption.

One alternative for controlling CSOs is separating combined sewers into two sewer systems. One sewer carries the storm water directly to the river and the other transports sanitary sewage to the wastewater treatment plant (WWTP). The sewer separation alternative eliminates the introduction of human wastes to the river, but does not provide any treatment for the polluted storm water runoff. Sewer separation is usually preferable in smaller, predominantly low-to-medium density residential areas. In industrial and larger, high-density residential areas, constructing new sewers and reconnecting sanitary sewers from every building is very costly. In some older areas, sewer construction activities often encounter significant conflicts with other utilities already in available rights of way.

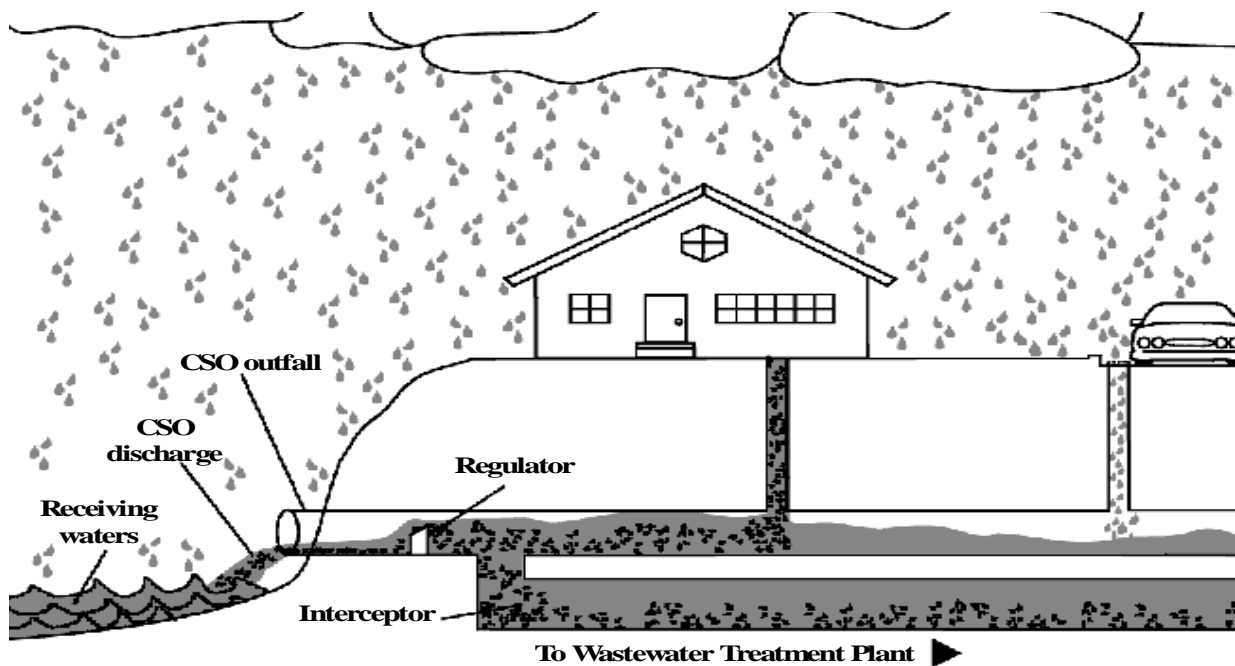


Figure 4: Combined Sewer System

Another alternative for CSO control is constructing a retention/treatment facility at the end of the CSO pipe just before it enters the river. This basin, depending on its volume, captures and stores overflows from storm events up to a specific size. These overflows will eventually be discharged back into the main sewers when capacity is available. During significant rainfalls, the combined sanitary and storm water flows will go into the treatment basin but may eventually overflow into the river when the capacity of the basin is exceeded. Before discharge the waste receives the equivalent of “primary treatment”, any floating materials are screened or skimmed out. Additionally, disinfectant (normally a chlorine product) is added as the water flows through the basin.

Although the treatment basin alternative allows some treated sanitary sewage to overflow into the river, a large portion of sanitary flow and polluted storm water is directed to the WWTP for full treatment. Treatment basins are often less costly than sewer separation in larger drainage areas or those areas with high population density.



Combined Sewer Overflow

Where We Were:

In 1989 the Rouge RAP estimated that 7.8 billion gallons of combined sewage was discharged into the river annually via CSOs. The original RAP recommended that CSO permits be issued to CSO owners and contributing municipalities. The permits required that discharges of untreated sewage from CSOs be eliminated using a phased approach.

The first phase, which included numerous sewer separation projects and construction of demonstration basins of various capacities to determine what constitutes "adequate treatment"

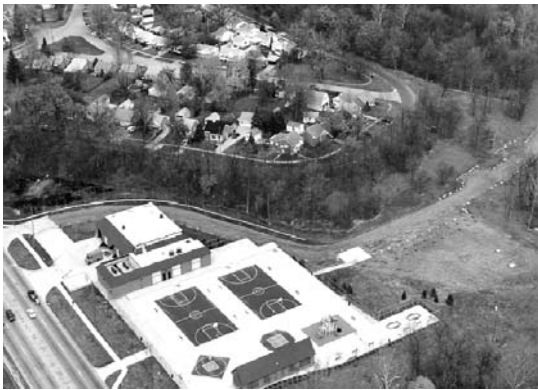
has been completed. Seventy-seven of 157 CSO outfalls are under control (CSO retention/treatment basins) or have been eliminated (sewer separation).

The 1989 RAP called for the completion of Phase II requirements by 2005. Phase III calls for the evaluation of CSO controls and the initiation of planning and implementation of further improvements necessary to meet Water Quality Standards.

The 1989 RAP established the primary goal: "Protect public health by the elimination of discharges of untreated sewage and the control of discharges of toxic substances to the Rouge River." The RAP also identified the Pollution Control goal: "Eliminate all combined sewer overflows to the extent practicable."

Where We Are:

Working with the local communities, the MDEQ established rigorous "Criteria for Success in CSO Treatment" to evaluate whether the CSO basins meet the Phase II goals of elimination of raw sewage discharges and protection of public health.



Inkster CSO Basin

The Oakland County retention treatment basins (RTBs) are Acacia Park, Birmingham and Bloomfield Village. The Wayne County RTBs are Inkster, Redford Township and Dearborn Heights. The Detroit RTBs are Hubbell-Southfield, Puritan-Fenkell and Seven Mile. A tenth RTB, in River Rouge, became operational in August 2002.

MDEQ has certified that nine of the ten operating basins meet the Phase II "Criteria for Success in CSO Treatment" for the elimination of raw sewage discharges and protection of public health. The River Rouge basin will only need routine performance monitoring because it was not a demonstration project.

CSOs Progress Since 1998:

- Ten CSO retention treatment basins have been completed. The basins are controlling overflows at a rate of approximately four billion gallons per year resulting in improvements in water quality.
- Of the 127 miles of the larger streams and tributaries in the Rouge, 89 are free of adverse impacts from CSO discharges, a 51 percent reduction in the past seven years.
- Average Dissolved Oxygen (DO) concentrations have improved and the percent of DO readings above the state standard of 5 mg/L has increased and is approaching 100 percent compliance.
- Control programs for all remaining CSOs outfalls in the watershed were recently defined in reissued NPDES permits that generally require the completion of Phase II control by October 2008.
- Rather than a joint tunnel project between Detroit and Dearborn, Dearborn has decided to pursue an independent CSO project with possible participation by Redford, Dearborn Heights and Inkster. MDEQ is working with Detroit and Dearborn to establish acceptable independent projects that meet applicable CSO requirements.
- Construction of additional outfalls to existing basins in Dearborn Heights and Inkster began the design phase in 2002.

- The Rouge CSO control program was summarized in a report and was included as a case study by USEPA in their recent "Report to Congress" on the nationwide CSO control efforts.
- Livonia, Plymouth Township, Wayne, Westland, Bloomfield Hills and Garden City have completed sewer separation projects. As a result, 19 CSO outfalls are now under control.
- Improvements at the DWSD Baby Creek facility are planned to ensure sufficient capacity for Allen Park, Dearborn, Melvindale and Wayne. The project will provide screening and disinfection for CSOs. The facility is currently under design. A completion date of 2005 is anticipated.

Where We Want to Be:

1994 RAP Goal: Eliminate or provide adequate treatment and control for all CSOs in the Rouge River Watershed.

2004 Goal: Remains the same

How to Get There:

Phase I (2004 to 2007):

- Continue to monitor and maintain compliance with CSO NPDES permits and schedules.
- Work together to secure adequate funding for the timely implementation of cost-effective projects.
- Eliminate improper discharges of toxic pollutants to the combined sewer system from material storage areas, floor drains and other sources.

Primary responsibility: Local Governments, MDEQ, EPA, DWSD, industrial users

Phase II (2008 to 2014):

- Complete Phase II CSO control programs.
- Evaluate results of CSO controls and determine measures needed to meet Water Quality Standards.

Primary responsibility: Local Governments, MDEQ

Phase III (2015 to 2020):

- Implement a comprehensive operation and maintenance program for the prevention of CSOs.
- Complete Phase III CSO programs.

Primary responsibility: Local Governments, MDEQ

On-Site Sewage Disposal Systems (OSDS)

When properly sited, constructed and maintained, on-site sewage disposal systems (OSDS), commonly called septic systems, can provide effective wastewater treatment for many years, offering an alternative to sewers and municipal wastewater treatment plants in rural and semirural areas. However, when septic system failures occur, the results are adverse impacts to surface and ground water and a threat to human health. Sewage in surface water depletes oxygen, harming fish and aquatic organisms. Sewage in groundwater can contaminate drinking water wells. Sewage on the ground or backing up into homes can expose people and pets to contagious organisms and result in odor and insect nuisances.

A number of communities in the watershed use septic systems to dispose of wastewater. A few of these areas are rural. Others were once rural and are now urban. In the latter case, sewers

were not installed in some areas for a variety of reasons (such as difficult terrain, no available funding, etc.)

Although proper siting and installation are crucial to the success of on-site disposal systems, failure to properly maintain the system by the property owner is considered the major cause of system failure and the resulting environmental degradation.⁹

Where We Were:

In the past OSDS have not been subject to inspections. Failure rates of septic systems in some communities in Oakland County were documented at 39 to 52 percent. The "time of sale" regulations being implemented in Washtenaw and Wayne counties have found failure rates of 19 and 21 percent respectively.

In 1998, the RRAC Onsite Sewage Disposal Systems Committee developed a Model Regulation/Ordinance, "Evaluation and Maintenance of Onsite Sewage Disposal Systems." The model outlined procedures for the inspection of buildings with OSDS every five years or at the time of sale of the building. It identified three levels of inspection, provided for certification of inspectors and included suggested wording for enforcement. In addition, "Guidance for the Inspection of On-Site Sewage Disposal Systems," and forms for use in making an evaluation were prepared by the committee. These materials were used in the development of OSDS evaluations in Wayne, Washtenaw and Oakland counties.



Ponded effluent from a failed septic field

The 1989 RAP established the primary goal: "Protect public health by the elimination of discharges of untreated sewage and the control of discharges of toxic substances to the Rouge River."

Where We Are:

Although significant volumes of raw sewage have been eliminated through CSO and SSO control, most of the Rouge River still does not meet the Michigan water quality criteria for human contact during dry or wet weather conditions. Failing septic systems have been identified as a contributing source of bacteria.

The Washtenaw County Board of Commissioners, the Wayne County Commission and the Wayne County Executive recognized that failing septic systems are contributing to both point and non-point pollution. In 1999, Washtenaw County's "Time-of-Sale Ordinance" and Wayne County's "Wayne County" On-Site Sewage Disposal System Evaluation and Maintenance Ordinance" were adopted. The ordinances require that prior to sale or transfer, the owner of a property containing an OSDS must have the system evaluated. The ordinances further require that any failure be corrected or assurance be given that remediation work acceptable to the health department will be completed.

At the time of evaluation, septic tanks are pumped out and inspected. The absorption systems are dug into and are examined. An exterior review of the disposal system and property are conducted. An internal review of the homes plumbing system is made. A report that includes a sketch of the disposal system location is completed. Homeowner education materials must

be provided. All reports are submitted to the health department for processing. Non-failed systems are given "Authorization for Sale or Transfer." Failures are given "Failure Notices" which require corrective action.

Since the adoption of the OSDS ordinances, 3,500 inspections have been performed in Washtenaw County with a 19% failure rate and approximately 450 evaluations have been done in Wayne County with a 26% failure rate. In Washtenaw County over 66 percent of failed systems have completed acceptable corrective action. In Wayne County, 90 percent have completed action. Waiting for sewer extension is the most common reason for delaying a corrective action.

The ordinances rely on private registered OSDS evaluators to perform the necessary field evaluations. There are currently more than 40 registered OSDS evaluators in Washtenaw and Wayne counties. The Wayne County Health Department Division of Environmental Health also is available to perform these evaluations.

Oakland County has proposed an OSDS inspection program that requires inspection at time of sale and not less than every five years. The responsibility for administering the program has been given to the Office of the Oakland County Drain Commissioner (OCDC). To fund the program the OCDC has suggested the use of Chapter 20 of the Drain Code.

OSDS Progress Since 1998:

- Washtenaw and Wayne counties developed and are implementing a time-of-sale inspection OSDS ordinance.
- Oakland County has proposed an OSDS ordinance.
- Salem Township has built and is utilizing a package treatment facility.
- Franklin Village sewer construction is complete. As septic system failures occur that are not repairable, they are connected to the pressure sewer system. An ongoing monitoring program detects failures.
- Westland has adopted an ordinance to require all remaining homes with OSDS to connect to the sewer system.
- A new septage receiving station has opened in Waterford. This location provides 24-hour operation seven days a week.
- Southfield requires regular inspection of OSDS. Twenty-five failing residential OSDS were discovered. Southfield is working directly with the Oakland County Health Department to correct the problem.
- West Bloomfield Township has adopted a local time-of-sale inspection OSDS ordinance.

Where We Want to Be:

1994 RAP Goal: Contamination from failing on-site sewage disposal systems has been eliminated.

2004 Goal: Conduct routine inspections and ensure regular maintenance and correction of failing on-site sewage disposal systems.

How to Get There:

Phase I (2004 to 2007):

- Identify and survey all on-site sewage disposal systems. Develop a database based on the survey, create a Rouge OSDS map, and determine active systems. Identify areas with failing septic systems and institute corrective action for improperly functioning systems.

- Design community land-use planning and zoning so that the appropriate siting of septic systems is an integral part of the process.
- Encourage the continued development of programs for the regular inspection of on-site sewage disposal systems. Mandatory ordinances for the proper maintenance, monitoring and inspection of these systems should be made a part of the total watershed management plan.
- Educate homeowners regarding the proper maintenance for their OSDS, including regular pumping of their septic tank.
- Monitor septage haulers to insure proper disposal.
- Evaluate the failure rate of OSDS based on age, soils and size to determine the best design for new and replacement systems.

Primary responsibility: Local Governments, County Health Departments, private septage haulers

Phase II (2008 to 2014):

- Evaluate the management of OSDS to determine if regular inspections and septic tank pumping should be required of all septic systems (e.g., every five years) based on data from the Wayne and Washtenaw County OSDS Ordinances.
- Ensure adequate sewer system capacity is available during wet weather flows.

Primary responsibility: Local Governments, Counties, MDEQ

Phase III (2015-2020):

- Build additional and more accessible facilities for septage disposal by septage haulers.
- Develop a watershed-wide plan for addressing sewer hookup and OSDS repair hardship cases.
- Research design standards and the relationship of aging systems and failure rates.

Primary responsibility: Local Governments, County Health Departments

Illegal Dumping, Illicit Discharges and Connections

Sometimes individuals or businesses illegally dump or discharge pollutants into the Rouge River. A truck may dump illegal wastes into a stream or a business may be improperly connected to a storm drain that discharges directly to the river. A variety of pollutants can reach the stream including sewage, oil, gasoline, paints and other waste chemicals. These types of materials can degrade populations of fish and aquatic insects, cause fish tumors and other deformities, restrict recreational use, degrade aesthetics and lead to the loss of fish and wildlife habitat.

Where We Were:

The 1989 RAP included improper connections as part of nonpoint source pollution. It recommended that illicit connections to storm drains be eliminated wherever polluted storm water runoff was identified as a major cause of impairment.

Where We Are:

A requirement of the Michigan General Storm Water Discharge Permit is for each community to develop an Illicit Discharge Elimination Plan (IDEP). Forty-one permittees in the Rouge River Watershed have begun IDEP implementation. Typical activities include dry weather outfall surveys, sampling of storm sewer discharges and receiving waters and inspection of properties. Most communities have established a complaint line for reporting suspicious dumping or discharges.

Illegal Dumping Progress Since 1998:

- Wayne, Washtenaw, and Oakland counties each have illegal dumping ordinances.
- In 2000, Wayne County adopted a "Municipal Civil Infractions Ordinance" which allows the county to assess civil penalties for illegal dumping in lieu of the more time-consuming and difficult process of pursuing criminal prosecution to assess fines and penalties for incidents of illegal dumping.
- Wayne County has established an Illegal Dumping and Environmental 24-hour hotline (888-223-2363) for citizens to report incidents of illegal dumping or suspicious discharges. Since 1999, Wayne County has received and responded to over 2,300 complaints or pollution inquiries.
- Oakland County has established a 24-hour Environmental Pollution Hotline (248-858-0931) for citizens to report leaking septic systems and suspicious dumping. Washtenaw County has established a 24-hour Pollution Response Line through its emergency management 911 phone system.

Illicit Discharges and Connections Progress Since 1998:

- From January 1998 through December 2002, Wayne County inspected 2,075 facilities. Of these, 137 were found to have 774 improper connections to the storm sewer system.
- The Oakland County Drain Commissioner (OCDC) Storm Water Action Team (SWAT) continues to identify and eliminate illicit discharges. Three major municipal drains were identified as receiving illicit discharges. One has been eliminated and two are under investigation. Illicit discharges from two commercial establishments were identified and eliminated. SWAT has completed inventory of all OCDC drains in the Rouge River Watershed (approximately 450 outfalls).
- Washtenaw County Drain Commissioner's Field Inspection Division completed inspection of the Rouge drains. This resulted in a single referral for further investigation to the Washtenaw County Environmental Health Division.
- Wayne County created and implemented an Illicit Connection/Discharge Elimination Training Program in 1999 and since that time has trained over 780 municipal and agency staff in Southeast Michigan. In 2001, the Advanced Investigations module was completed. A fifth module was added and the development of two specialty sessions was completed. The intent of the program is to provide training for county and local community staff responsible for locating and eliminating illicit discharges to surface waters. A key goal of the training program is to facilitate partnerships with other local agencies to provide united, comprehensive and cost-effective efforts to reduce improper discharges.
- As part of their permit requirement to implement an IDEP, most Rouge communities have completed their first round of dry weather screening activities and will continue conducting surveys at a rate of at least 20 percent per year.



Illicit Discharge

Where We Want to Be:

1994 RAP Goal: Minimize any adverse impacts from spills and accidental discharges through effective containment, response, and remediation.

2004 Goals:

- Illegal Dumping - Reduce the incidence and impact of illegal dumping by conducting local, county and state illegal dumping reporting, enforcement and compliance activities.
- Illicit Connections - Implement systematic and ongoing illicit connection detection and elimination inspections (similar to OSDS inspections and water supply cross-connection inspections).

How To Get There:

Phase I (2004 to 2007):

- Continue ongoing, proactive IDEPs to locate suspicious discharges.
- Request that Storm Water Permit Annual Progress reports include information on incidents of illegal dumping reported and enforcement actions taken.
- Perform a comprehensive review of permittee IDEP programs and share their findings with RRAC and all Rouge communities and permittees.
- Continue to promote hot-line reporting of illegal dumping activities.

Primary responsibility: Local Governments, Counties, MDEQ

Phase II (2008 to 2014):

- Cooperate to identify and implement funding and management mechanisms to sustain, expand and coordinate the dye-testing inspection program initiated by Wayne County.

Primary responsibility: Local Governments, Counties, MDEQ

Phase III (2015 to 2020):

- Enact local ordinances and/or state law to require the dye testing of facilities to identify and eliminate illicit connections if bacteria levels are still problematic.

Primary responsibility: Local Governments, Counties, MDEQ, State Legislature

Contaminated Sediments

Sediment becomes contaminated when certain persistent pollutants, such as metals or PCBs, and other organic chemicals are released into the environment. These pollutants adhere to suspended sediment particles and eventually settle to the bottom of the river. Contaminated sediments can degrade water quality and cause direct toxic effects to organisms. While previous editions of the RAP overestimated the extent and magnitude of contaminated sediments, they are still a problem in the lower few miles of the river.

Where We Were:

In presettlement times, Rouge River sediments contained only background concentrations of natural elements like arsenic, copper and zinc, and were uncontaminated by man-made chemicals like PCBs and pesticides. Rouge River sediments also exhibited naturally low sediment oxygen demand (SOD), which only rarely lowered dissolved oxygen concentrations in the overlying water.

The 1989 RAP identified the Water Quality goal, "Eliminate sources of sediment contamination in the Rouge Basin."

Where We Are:

Based on extensive RPO sampling, sediments in most of the river are relatively uncontaminated; concentrations of metals, PCBs and polycyclic aromatic hydrocarbons (PAHs derived from

petroleum) are below those known to cause toxic effects in aquatic organisms. Concentrations of these contaminants do increase in the downstream portions of all four Branches. A historically contaminated sediment deposit in Newburgh Lake (Middle Branch) was remediated in 1998.

The remaining known major deposits of contaminated sediments are in the lower few miles of the river, adjacent to the navigation channel downstream of the channelized concrete-lined portion of the Main Branch. These sediments contain high concentrations of PCBs, PAHs, polychlorinated naphthalenes (PCNs), dioxins and furans, and the endocrine disrupting chemical nonylphenol. They are suspected to be contaminated by metals. Sediments in the concrete channel also exert a significant SOD, often resulting in low dissolved oxygen concentrations in the summer. SOD in this part of the river is primarily due to microbial decomposition of human wastes originating from CSO and SSO discharges.

Contaminated Sediments Progress Since 1998:

- The cleanup of contaminated sediments in the Newburgh Lake impoundment (Middle Branch) was completed in 1998. Subsequent sampling of game fish in 2003 by MDEQ has lifted the PCB fish consumption ban for the general public on carp, channel catfish and largemouth bass caught in Newburgh Lake.
- MDEQ completed a survey of sediment contamination in the lowermost few miles of the river. Elevated concentrations of PCBs, PAHs, PCNs, dioxins, furans and nonylphenol were found. At least a portion of these sediments will be dredged, as planned in 2004.



31 Inch Pike Caught in Newburgh Lake
Photo by Michael Precious

Where We Want to Be:

1994 RAP Goal: Reduce the impact of sediment contamination on fish and other aquatic life by remediating contaminated sediments and eliminating any new sources contributing to sediment contamination.

2004 Goals:

1. Eliminate sources of contaminants to sediments.
2. Reduce contaminants to sediments so that: a) they contain only background concentrations of metals such as arsenic, copper, and zinc b) they contain nontoxic concentrations of man-made chemicals like PCBs and pesticides and c) they exhibit naturally low sediment oxygen demand, which only rarely lowers dissolved oxygen concentrations in the overlying water.

How to Get There:

Phase I (2004 to 2007):

- Continue to minimize CSO and SSO discharges to the maximum extent practicable.
- Continue to comply with and enforce current NPDES permits regulating the discharge of storm water and industrial wastewater.

Primary responsibility: Local Governments, Counties, MDEQ, Industries

Phase II (2008 to 2014):

- Excavate known deposits of contaminated sediments and dispose of them in an environmentally responsible manner.

- Investigate the distribution of contaminated sediments within the concrete channel.

Primary responsibility: MDEQ, U.S. Army Corps of Engineers

Phase III (2015 to 2020):

- Periodically survey sediment deposition areas for known and new contaminants of concern.

Primary responsibility: MDEQ, USEPA

Polluted Storm Water Runoff

Storm water quality and quantity are major problems. Storm water quality in urban areas is often poor, due to the oils, metals, salts, fertilizers, soil, bacteria and other pollutants picked up as water flows across developed landscapes. Sewage inputs from CSOs and SSOs have also



Storm Water Runoff

been a major problem. Storm water quantity, or volume, is unnaturally high in urban areas because a very high percentage of the rain water from a given storm immediately runs directly off impervious surfaces (roofs, paved streets and parking lots) into the river, rather than soaking into the soil and percolating slowly into the groundwater (a process known as infiltration.) Excessively high storm water quantities erode stream banks, scour streambeds, flood or destroy riparian property, and degrade aquatic habitat by filling in pools, burying riffles and creating unnaturally high stream flow rates. Storm water runoff problems often occur when more than 10 percent of the land surface is impervious and directly connected to the river.

Where We Were:

Prior to development, storm water quality was higher and runoff to the river was slower. Impervious surfaces were nonexistent, and wetlands and uncompacted porous forest and prairie soils absorbed large amounts of storm water, cleansing it and slowing its transport to the river. Stream bank erosion, streambed scour, and seasonal flooding did occur, but at lower, natural rates. Aquatic habitats were intact and heterogeneous, with natural proportions of pools and riffles, undercut banks, woody debris, etc.

The 1989 RAP identified storm water as a major contributor to use impairments. The RAP recommended that all communities and subwatersheds develop and implement subwatershed management plans and that MDEQ issue municipal storm water permits by 1993. The recommendation failed to materialize because no regulatory framework existed that provided for a regional, or watershed, storm water management program.

Where We Are:

Impervious surfaces cover large amounts of the watershed - over 50 percent in some locations - and are often directly connected to the river through storm drains. Peak stream flow volumes, immediately after rain storms, are unnaturally high and can double flows in much of the watershed. Stream bank erosion and aquatic habitat degradation from high peak flows are widespread, and are a major cause of poor fish and macroinvertebrate populations. In 1999 the Rouge communities started to address these problems under Voluntary Watershed-based General Storm Water Permits, through a combination of physical best management practices, land use regulations and environmental education.

Polluted Storm Water Runoff Progress Since 1998:

- Washtenaw County has in place a nationally recognized storm water detention standards ordinance.
- Wayne County has in place a Storm Water Ordinance, and some of the Rouge communities (e.g., Canton and Salem townships) have their own ordinances to better manage storm water. Ongoing discussion and action are occurring to identify and implement improvements to these ordinances in order to promote cooperation and consistency and avoid duplicity.
- Oakland County is reviewing existing storm water drainage standards in order to minimize water quality impacts.
- In 1999, 41 Rouge communities and agencies received coverage under the Michigan NPDES Voluntary Watershed-based General Storm Water Permit.
- In May 2001, seven subwatershed management plans were submitted to MDEQ as part of the Voluntary Watershed-based General Storm Water Permit requirements.
- In 2002, 41 Rouge communities and agencies began implementation of their Storm Water Pollution Prevention Initiatives (SWPPIs).

Where We Want To Be:

1994 RAP Goals:

- Reduce negative impacts of storm water discharges by controlling these sources using a watershed-wide approach.
- Educate builders, developers, contractors and local officials about the importance of protecting the river, and what they can do to minimize the negative impacts associated with development.

2004 Goal: Eliminate or control the impacts of storm water discharges to the maximum extent practicable using a watershed-wide approach.

How to Get There:

Phase I (2004 to 2007):

- Incorporate best storm water management practices in local ordinances and design and construction requirements.
- Implement the Voluntary Watershed-based General Storm Water Permit requirements.
- Involve the public in decisions about protecting the river.
- Continue CSO/SSO control measures.
- Identify and eliminate illicit discharges to the river.
- Develop local and regional processes to retain storm water runoff and utilize best management practices in public works operations.

Primary responsibility: Local Governments, Counties, MDEQ

Phase II (2008 to 2014):

- Continue to implement BMPs to reduce storm water runoff from impervious surfaces.
- Adopt local storm water ordinances.

Primary responsibility: Local Governments, Counties

Phase III (2015 to 2020):

- Evaluate the effectiveness of storm water management activities and determine what has been successful and where improvement is needed.

- Implement a comprehensive operation and maintenance program for continued control of sources of storm water pollution.

Primary responsibility: Local Governments, Counties

Stream Flow

Two factors strongly affect stream flow in the Rouge River. The first, geology, establishes the slope of the river's stream channel and the permeability of the soils. The Rouge River headwater areas (where the river begins) are contained in the hilly, glacial moraines left by glaciers. The streams in these areas have steep slopes, are swift-moving, and have gravel in their sediments. Cool groundwater seeps through the porous soils to feed the river, making good habitat for many cool water fish species such as mottled sculpin. The greater portion of the river, however, flows through relatively impermeable clay soils. Low grade, slow, meandering, clay-bottom streams characterize these areas. Red clays give the Rouge River its characteristic "cloudy" appearance, and its name. Surface water runoff, generally warmer and potentially carrying more pollutants, is primarily what feeds the river in these downstream reaches.

The second factor, which has a more significant negative impact, is the ever-increasing amount of impervious surfaces within the watershed. Urban amenities such as parking lots, paved streets and rooftops prevent rainwater from soaking into the soil. Instead, it runs into the river in greater volumes in a shorter period of time and does not recharge groundwater.

Excessive post-storm peak flows scour stream channels and banks, reduce populations of fish, aquatic insects and benthos, cause loss of fish and wildlife habitat, restrict recreational use, degrade aesthetics and restrict recreational navigation.

Where We Were:

In the presettlement period, the Rouge River Watershed contained abundant wetlands and areas of permeable soils that reduced the frequency and intensity of floods caused by snowmelt and rainstorms. The river has always been subject to some flooding, particularly in the lower portions due to the soil types and relatively low gradient. However, many of the headwater areas historically had relatively stable flows and clear, cool water as was evidenced by the siting of the federal whitefish and trout hatchery in Northville in the late 1800s in the headwaters of the Middle Branch of the Rouge.

The 1989 RAP established the "Resource Development" goal: "Improve the natural hydraulics of the river system"; and the "Pollution Control" goal: "Reduce the impact of increased, high flow storm water discharges that cause scouring, erosion, and sedimentation in the stream channel."

Where We Are:

Much of the river's natural floodplain still exists as parklands and, in certain areas of the headwaters and tributaries, riparian habitat quality is relatively good. Unfortunately, in-stream aquatic habitats have been damaged by unnaturally high peak flows. Wetland areas for the storage of water have also been significantly reduced.

Storm water and snowmelt, once infiltrated into the ground or stored in wetlands, now flows rapidly to the river, creating severe flooding, erosion and sedimentation. The frequency, duration, intensity, and volume of flood flows have steadily increased and threaten to vertically disconnect the river from its floodplain. The volume and velocity of flood flows increases bank erosion and sedimentation and scours the bottom of the river destroying aquatic habitat. It

also creates property damage. Total annual volumes in the river have nearly doubled in some areas; peak flows have more than doubled as more and more of the total flow occurs immediately following storm events or major snowmelts.

Without a significant reduction in flood volumes and velocities, the restoration of aquatic habitat and preferred fish populations and the reduction in property damage will not be possible, in spite of improvements expected in water quality. Without direct actions to increase storm water storage and infiltration, rapid urbanization in the remaining undeveloped headwaters will destroy existing healthy areas while increasing flooding, flow velocities and related problems downstream.

Based on the recognition of flow as a source impairment and due to the fact that many communities have been experiencing an increasing amount of stream bank erosion and flooding along the river, local communities are addressing this issue as part of their subwatershed management plans.

Several of the 2001 Subwatershed Management Plans ranked flow as the second highest priority, behind only the protection of public health. The more urban subwatersheds noted that the management of storm water flows in existing developed areas is one of the greatest challenges in restoring the river. Even with total control of pollution sources, the biological and physical attributes of the river cannot be fully restored without significant reduction in the impacts caused by the increased frequency, duration and size of flows following storm events.

Communities are also addressing the issue of flow through their Storm Water Pollution Prevention Initiatives (SWPPIs). The SWPPIs include evaluation and implementation of pollution prevention best management practices to minimize the impacts of new development and redevelopment on storm water flows.

Stream Flow Progress Since 1998:

- RPO will reassess the existing fishery-based stream flow targets in each subwatershed using updated hydrologic data. This information will allow each subwatershed to calculate the volume of storm water retention and infiltration needed to restore healthy aquatic habitats and fish communities.
- All seven subwatershed management plans identify a goal to reduce excessive river flows. One objective is to evaluate the effectiveness of current design requirements for on-site storm water management in the permit and site plan approval process.
- In their SWPPIs, many communities adopted management practices that include reducing directly connected impervious surfaces, slowing storm water runoff, constructing and maintaining wet detention ponds and storm water infiltration devices.
- RPO continues to implement a seasonal in-stream flow-monitoring program. Flow levels are continuously monitored at 13 stations for six to nine months each year. Together with data from rainfall gauges, RPO has used the flow monitoring information to define wet weather responses and hydrologic models.

Where We Want To Be:

1994 RAP Goals: Reduce the impact of erratic stream flows that cause scouring, erosion, sedimentation, loss of habitat, degradation of aesthetics and restricted navigation.

2004 Goals:

- 1) Preserve the natural flow in headwater areas.
- 2) Reverse the trend of increasing frequency, duration and intensity of flood flows.

- 3) Reduce the percentage of impervious surfaces.
- 4) Reduce bank erosion to natural rates.
- 5) Determine that desirable fish and benthic populations are returning.

How to Get There:

Phase I (2004 to 2007):

- Implement the goals and actions identified in the seven subwatershed management plans and the SWPPIs. Such actions include reducing runoff from new developments and new road construction through the use of on-site retention, created wetlands and increased use of swales and other best management practices. Pilot projects such as off-channel storage of storm water should be completed in already developed areas.
- Continue fixed station monitoring including flow.
- Adopt consistent, countywide ordinances requiring on-site retention for storm water for new developments.
- Continue stream-monitoring programs to evaluate trends in the effectiveness of storm water management.
- Identify and maintain existing wetlands and floodplains that provide natural storm water detention.
- Fund efforts to restore and create wetlands.
- Develop educational training for residential, commercial and industrial site developers, designers, and owners on the availability of best management practices and the management of property to reduce runoff and increase infiltration.
- Determine an achievable base flow and flow variability regime. Use this determination as a target for control measures.
- Determine retention and detention measures that can be implemented to achieve the base flow and variability target for the river. Infiltration practices should be used where possible; especially in upstream and headwaters areas.

Primary responsibility: Local Governments, Counties, MDEQ, Detroit Edison, DWSD

Phase II (2008 to 2014):

- Assess flow management efforts and determine what further measures are necessary.

Primary responsibility: Local Governments, Counties, MDEQ

Phase III (2015 to 2020):

- Continue to expand riparian corridor and floodplain and wetlands restoration/preservation efforts in order to increase infiltration and slow runoff.
- Monitor flow control efforts and determine the next steps.

Primary responsibility: Local Governments, Counties, MDEQ

Erosion

Erosion from stream banks destroys valuable and shrinking habitat for aquatic life. Erosion is caused by a variety of activities including construction, removal of vegetation within the watershed and along stream banks and erratic stream flow.

Erosion creates two major problems. The first is the physical destruction of the banks which causes trees to fall into the river, resulting in excessive logjams, aesthetic problems and property damage. The second problem is sedimentation. Sediment is a major pollutant in rivers and lakes. Sediment also carries pollutants such as phosphorus that can stimulate aquatic

plant growth that decreases nighttime DO concentrations. Low concentrations of oxygen make it nearly impossible for many forms of aquatic life to survive. In addition, suspended solids directly affect aquatic life by clogging fish gills, smothering eggs of aquatic insects and fish, and destroying the microhabitats of mayfly nymphs and other aquatic insects.

Where We Were:

In the past, local and county enforcing agencies had fewer soil erosion inspectors and enforcement was not as high a priority. Soil Erosion and Sedimentation Control (SESC) programs were inconsistent and did not get the attention needed to be effectively managed.



Streambank erosion

The 1989 RAP identified the goals, "Reduce the impact of increased, high flow storm water discharges that cause scouring, erosion and sedimentation in the stream channel," and "Determine and reduce the impact of in-place pollutants (primarily sediments) on fish and other biota in the Rouge River."

Where We Are:

Local and county SESC programs, in general, now have more staff and can devote more attention to running effective programs. Several agencies participated in the Rouge Soil Erosion Core Group and have worked toward better and more uniform SESC programs.

In January of 2001, Michigan amended Part 91, 1994 Act 451 as amended, the Soil Erosion Law and Sedimentation Control Act. Under the amended act all county and local enforcing agents must be recertified as soil erosion inspectors. All personnel are retrained every five years. Authority to correct violations was given to the state and enforcing communities as they adopt the new law. Fines have increased for violations to a minimum of \$2,500 and a maximum of \$25,000.

Erosion Progress Since 1998:

- Wayne County is implementing a Storm Water Management Ordinance that includes minimizing flooding problems, erosion and loss of or damage to natural resources.
- Farmington Hills, West Bloomfield Township and the RPO completed the Pebble Creek Watershed Erosion and Sedimentation Control (ESC) Study in order to identify measures to enhance performance and proper use of silt fencing. This was accomplished by reviewing current erosion and sedimentation control programs, identifying other practices and methods that may be substituted or used in conjunction with silt fencing, implementing and observing some of these methods in the field, and compiling results.
- The Soil Erosion CORE group, made up of staff from state, county, and local enforcing agencies, approved public agencies and private industry, sponsored three soil erosion control workshops for the enforcing agencies and the regulated communities, including developers, contractors and road workers.
- Wayne County has developed a handout for homeowners explaining the importance of maintaining soil erosion measures at their new homes.
- With the assistance of the Natural Resources Conservation Service (NRCS) and the Ford Motor Company, Dearborn continues to implement stream bank stabilization at Ford Field using soft engineering techniques.

- In the fall of 1999, Salem Township conducted workshops and implemented river-bank stabilization in partnership with Washtenaw County and technical assistance from NRCS.
- Progress is underway to update the Wayne County soil survey, including soil mapping of Detroit for the first time. Federal grant money is in place and completion is pending the identification of local match money.
- The RPO is funding numerous river restoration projects ranging from the Caddell Drain Erosion Stabilization Project (OCDC), Stream bank Stabilization using bioengineering (Novi), Nankin Mills Stream bank Stabilization (Wayne County Parks), and Erosion Control Using Biodegradable Blankets (Novi and Rogell Golf Course in Detroit), to evaluate various watershed management techniques.
- In the spring of 2001, Birmingham completed a stream bank stabilization project along a half-mile stretch of the Rouge River that flows through the Springdale Golf Course. The project consisted of bioengineered, vegetative stabilization techniques along with minimal hard armoring where necessary. Post construction evaluation has shown that the vegetation is filling in nicely and that the project is successfully controlling erosion. The city has received positive feedback on the aesthetics of the project.



Springdale Golf Course (before)



Springdale Golf Course (after)

- Farmington Hills received CMI grant funding to construct a dual-celled detention basin. One of the project goals is to reduce peak flows in the Upper Rouge via the Tarabusi Creek system and reduce stream bank erosion downstream.
- Southfield received CMI grant funding to install a system of vegetated swales in a residential neighborhood with the goal of increasing storm water detention resulting in reduced in-stream peak flows and stream bank erosion in the Main 1-2 branch.
- Dearborn received CMI grant funding to replace an existing culvert bridge with a wider and longer bridge and to stabilize eroding stream banks at Ford Field.
- Northville Township received CMI grant funding to reduce channel velocities and stabilize the stream banks of an 800-foot section of the Quail Ridge Drain. This tributary of the Middle Rouge was redesigned to reduce sediment input to the river and Swan Harbour Lake.
- MDEQ has begun a study of stream geomorphology in the Rouge versus comparable reference streams elsewhere in the state.
- In 2002, Birmingham conducted an innovative dredging project. At Quarton Lake, 30,000 cubic feet of muck was removed from the lake bottom.



Quarton Lake Dredging

Where We Want to Be:

1994 RAP Goal: Reduce erosion and its effects.

2004 Goal: Minimize upland soil erosion and its effects on water quality.

How To Get There:

Phase I (2004 to 2007):

- Continue working with all local and county enforcement agencies to improve a uniform soil erosion and sedimentation control program, including better compliance. It is understood that local conditions may require flexibility. This program should include the following:
 1. Encourage limiting the maximum area exposed at one time for construction activities.
 2. Require storm water basins that treat runoff for removal of sediments as well as to control the rate of discharge in projects larger than 10 acres in total size.
- Educate builders, developers, contractors and local officials about the importance of protecting the river and what they can do to minimize negative impacts associated with development.
- Determine the effectiveness of SESC programs, where they have been successful and where improvement is needed.

Primary responsibility: Local Governments, Counties, MDEQ, MDOT

Phase II (2008 to 2014):

- Evaluate the effectiveness of stream bank stabilization and flow reduction projects.
- Continue to support and fund new projects for minimizing soil erosion.
- Continue to audit SESC programs.
- Identify additional SESC projects.

Primary responsibility: Local Governments, Counties, MDEQ

Phase III:

- Continue to support and monitor SESC programs to ensure that erosion and sedimentation have been greatly reduced.
- Implement appropriate operation and maintenance plans for stream bank stabilization and flow reduction projects.
- Implement additional SESC projects.

Primary responsibility: Local Governments, Counties, MDEQ

Other Nonpoint Pollution Sources

Nonpoint source (NPS) pollution is the contaminated water discharged from a widespread area or from a number of smaller sources. Examples of this type of pollution include runoff from urban and agricultural areas, highways and roads, industrial stockpiles, old solid waste and hazardous waste landfills, and erosion from construction projects. NPS pollution is a major cause of impairment in most areas of the Rouge River Watershed. The two most important types of pollution within this category are polluted storm water runoff and erosion.

NPS discharges differ from most point sources in that they are not continuous, do not come from a designated pipe and are highly variable in amount and type of pollutant. Urban and rural runoff occurs primarily during wet weather, when water moving over the land surface picks up pollutants deposited from the atmosphere or derived from activities related to land

use. This makes the runoffs difficult to assess and control. NPS pollution can contribute to the restriction of fish consumption, degradation of fish and aquatic insect populations, formation of fish tumors and other deformities, acceleration of eutrophication or undesirable algae, restriction of swimming and other water-related activities, degradation of aesthetics, and loss of fish and wildlife habitats.

The 1989 RAP identified the pollution control goal, "To reduce the discharge of pollutants from storm water runoff and other nonpoint sources."

The 1989 RAP identified NPS pollution as an important contributor to use impairments and called for control of storm water runoff, soil erosion, household hazardous waste, and improper connections to storm sewers. The document focused primarily on point source controls that were more readily assessed and regulated.

The 1994 RAP offered a more detailed focus upon the following specific NPS sources:

- Household hazardous waste
- Air deposition
- Waste and Hazardous Materials Division regulated facilities
- Contaminated sites
- Point source storm water discharges
- Permitted industrial point source dischargers (wastewater)
- Animal waste

The following provides a brief update of these sources.

Household Hazardous Waste (HHW)

Household Hazardous Waste (HHW) includes many commonly used chemicals such as paint thinners, car battery acid, various cleaners, polishes, pesticides and glues. If not disposed of properly, HHW can cause impairments to fish and aquatic insect populations, contribute to formation of fish tumors and deformities and degrade the aesthetic value of the river.

According to the EPA, the average U.S. household generates more than 20 pounds of HHW per year. Concerns over both the illicit disposal and the transporting, landfilling or incineration of HHW in the same manner as typical nonhazardous household waste have led many communities to develop programs to properly handle, process, recycle and/or dispose of HHW.

Under the Voluntary Watershed-based General Storm Water Permit, communities are implementing the requirement to educate the public on the availability, location and requirements of facilities for disposal or drop-off of household hazardous wastes. Many communities conduct annual (or more frequent) household waste collection days. Another option is an ongoing hazardous waste drop-off program, such as the one found at the Southeast Oakland County Resource Recovery Authority (SOCRRA) in Royal Oak. The Central Wayne County Sanitation Authority (CWCSA) is planning to build a household hazardous waste drop-off site. The Friends of the Rouge continues its storm drain stenciling and decaling project to eliminate dumping of household hazardous waste into storm sewers.

Air Deposition

Air deposition is a continuous phenomenon of pollution deposited from the atmosphere to ground surfaces, including water bodies. Pollutants such as mercury and other toxics discharged into the air by industries and automobiles can enter the Rouge River when, as particles in rain and snow, they are carried down to the earth. The toxic chemicals, commonly

referred to as Persistent, Bioaccumulative Toxics (PBTs) include PCBs, Dioxins and Furans, Mercury and many pesticides, such as DDT and Lindane, among many others. The list of adverse effects these chemicals cause in humans and wildlife is long and includes cancer, as well as immune, reproductive, and mental dysfunction. Tracing the pathway from release of these chemicals into the air to atmospheric transport, deposition, sedimentation and re-volatilization, bioaccumulation, exposure, and ultimately health effects is a complicated matter." (for more information visit the Great Lakes Air Deposition Program website at http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3713-10780--,00.html.) Fish consumption advisories in the Rouge due to mercury remain in effect. One obstacle in eliminating pollution from airborne sources is that it can be carried hundreds or even thousands of miles. Airborne pollutants can impair fish and benthic populations, restrict fish consumption and contribute to fish and animal deformities.

Waste and Hazardous Materials Division Regulated Facilities

MDEQ's Waste and Hazardous Materials Division (WHMD) regulates hazardous waste generators and transporters, nonhazardous liquid industrial waste transporters, landfills, waste transfer stations, waste processing plants and hazardous waste Treatment, Storage and Disposal (TSD) facilities. Potential impacts from these facilities include the illegal discharge of liquid waste or leachate to the surface water or groundwater, storm water runoff that may be contaminated if not properly managed and refuse that blows away from an active landfill area.

Contaminated Sites

River banks and floodplains have been used historically as dumpsites for all types of waste, from construction debris to hazardous waste. The river has eroded into some of these old "dump" sites as it meanders and changes course, and previously dumped waste has eroded into the river. Most of the known dump sites contain household refuse. This waste type may never have contained significant amounts of hazardous chemicals and the chemicals that were present have probably leached out of the dumped materials long ago. However, an RPO survey of 18 abandoned dumps did find some leachate seeps, gas seeps, stressed vegetation and insufficient fill cover. These sites warrant further investigation.

The largest known contaminated site in the watershed, the metal- and PCB-contaminated soils and sediments at Newburgh Lake in the Middle Branch, was remediated in the late 1990s. Subsequent testing found very low PCB and metal concentrations in the soil and sediments and rapidly declining PCB concentrations in the fish in the lake.

Sites of environmental contamination are addressed by various programs of the MDEQ-Remediation & Redevelopment Division (RRD). MDEQ has many interactive and data-driven lists that can be accessed at the following website: <http://www.michigan.gov/deq>. The online lists will show locations of such things as the Part 201 hazardous waste sites, leaking underground storage tanks, hazardous waste treatment, storage, and disposal facilities in Michigan and their status, Superfund sites, etc. These lists, available by county, are kept current by MDEQ and therefore provide the latest available information. Another relevant information source is the Rouge website: <http://www.rougeriver.com/techtop/nonpoint/other/sites.html>.

Point Source Discharge (Storm Water): Industrial, Municipal, and Construction Sites

Under the 1987 Clean Water Act Amendments, certain storm water discharges are now regulated as point sources by National Pollutant Discharge Elimination System (NPDES)

permits. These discharges differ from nonpoint sources in that they are discharged from a specific pipe or conveyance. Storm water runoff, which carries pollutants such as heavy metals, nutrients and oils, is considered one of the most significant point sources of pollution.

USEPA Phase I storm water regulations, effective October 1, 1992, require that a discharge permit be obtained for storm water discharges from certain industries (specified in federal regulations). Communities over 100,000 in population and construction sites over five acres are required to have an NPDES permit.

As of March 2003, all municipalities within the Rouge River Watershed are required to have NPDES permits under the Federal Phase II Storm Water Requirements. After March 2003, all construction sites more than one acre are required to have NPDES permits.

MDEQ trains and certifies storm water operators to carry out storm water control for construction and industrial sites. Rouge communities are identifying ways to control storm water runoff for all developments. Regional basins are being considered to slow water volume and velocity by a number of communities.

Permitted Industrial Point Source Discharges (Wastewater)

Under federal and state law, it is illegal to discharge treated or untreated wastewater to surface waters in Michigan without a NPDES permit. The MDEQ Water Division administers the NPDES permit program in Michigan. Facilities discharging waste to the river through a designated sewer pipe are considered "point source" dischargers. A list of permitted point source dischargers within the Rouge River Watershed is at http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3713-10780—,00.html.

Many of the point source industrial facilities discharging to the river are permitted for non-contact cooling water discharges only. Non-contact cooling water is uncontaminated water used for cooling purposes. Significant pollutants may be released when an industrial facility has an illegal or unauthorized spill of chemicals used in processing operations.

Most industries in the watershed do not discharge directly to the river. Rather, they discharge to the Detroit Water and Sewerage Department (DWSD) and Ypsilanti Community Utility Authority (YCUA) collection systems. DWSD and YCUA are required by their NPDES permits to administer an Industrial Pretreatment Program (IPP) for these industrial dischargers. The IPP requires that these discharges be treated to meet established DWSD, YCUA and USEPA pretreatment standards so they do not adversely impact the collection systems, the wastewater treatment plants or the receiving streams.

PCB discharges from industrial users in the DWSD collection system have been reduced to below the level of detection. DWSD has proposed a "non-detect" Sewer Use Ordinance limit for mercury. DWSD reports a general decrease in the levels of mercury discharged from most area hospitals as a result of its "Mercury Minimization Program for Hospitals."

Animal Waste

Excessive amounts of animal waste from pets, ducks, geese, horses, cows and other animals can cause many water quality problems. Unhealthy levels of bacteria and nutrients can be carried in storm water from horse or cattle farms or pond areas where birds feed. Increased populations of animals and birds can be traced to loss of natural predators, and wildlife feeding both direct (feeding geese in a park) and indirect (deer feeding in a garden). Waste from pets can also be a problem. Animal waste left on paved surfaces can enter the river through storm

drains. Excessive animal waste creates high bacteria levels and concentrated nutrients, and results in a reduction in available oxygen and degraded stream bank aesthetics.

Educating the public on the impact of excessive animal waste to water quality is a key component in reducing the amount of waste reaching the river. Actions to increase public awareness are underway in the watershed. Signs have been posted in parks asking visitors not to feed the wildlife. As part of the requirements of the Public Education Plan of the Voluntary Watershed-based General Storm Water Permit, Rouge communities must include education regarding the proper disposal of animal wastes.

When feasible, bacteria "fingerprinting" (DNA testing, antibody resistance, etc.) should be conducted to determine the amount of animal waste contributing to bacteria problems. Results of these studies can be used as a public education tool.

Chapter 3

Caring for Nature - Habitat and Wildlife



"I see opportunities to preserve, maintain, create and protect properties vital for wildlife habitats."

Bill Craig, Holliday Nature Preserve



Loss of Fish and Wildlife Habitat

"Caring for nature means, first, protecting the natural landforms such as streams, valleys, moraines, ravines and plains that are the basis of living communities. Second, it means protecting healthy, diverse habitats, the plants and animals that live there and the network of corridors that link habitats. Third, caring for nature means re-establishing, regenerating, and sometimes creating lost or degraded landforms, habitats and linkages.

These elements constitute our natural heritage. In a highly urbanized watershed such as the Rouge, the natural heritage exists as fragmented stream and valley corridors and generally



Johnson Creek

isolated remnants of original habitat. Protecting and/or enhancing the habitats and linkages of our natural heritage system should play a significant role in all planning decisions, including road-building, infill and new development, storm water management, and even small, backyard projects."¹⁰

Where We Were:

During the presettlement period, the headwaters provided relatively stable flows of clear, cool water. Tributaries flowed through a complex mosaic of abundant upland forests, meadows and various types of wetlands that provided food, shelter and breeding places to maintain a rich diversity of

plants, animals and birds. The extensive network of riparian corridors, forested wetlands and rich floodplains supported a diverse fishery. Rain and snowmelt were absorbed by expansive forests and fields. Groundwater was recharged, which maintained steady stream flow. The minimal amount of surface runoff was detained in wetlands and the floodplain. While estimates of the amount of original forest cover vary, most experts believe as much as 80 percent of the watershed was forested prior to European settlement.

Expansive agricultural development transformed forests and meadows into farm fields. Intensive farming and urban development reduced the riparian corridors and wetlands were drained and filled. The modern period of industrialization, urbanization and the accompanying pollution severely degraded and depleted the inventory of natural habitats.

The 1989 RAP established the "Resource Development" goal: "Preserve lands adjacent to the Rouge River such as wetlands and floodplains that are needed to enhance the river's water quality and recreational potential."

Where We Are:

Forests, meadows, wetlands, riparian corridors and floodplains are now extensively altered. We no longer have abundant habitats to provide food, shelter and breeding grounds for a rich diversity of fish and wildlife. We no longer have adequate permeable soils and deep root systems to allow infiltration of large amounts of water from rainfalls and snowmelts. Based on 1995 land use cover data, 23.1 percent of the Rouge River Watershed has been transformed into impervious surfaces that cause significant runoff problems. We now have unstable, erratic and destructive water flows that are warm and polluted. Fish, animal and insect diversity and abundance are declining. Natural habitat diversity has declined. Floodwater storage has been reduced while flow volumes and flow velocity have doubled. In-stream habitat and riparian corridor habitat are degraded by increasing erosion and sediment loads.



Sprawl density



Holliday Nature Preserve

Michigan Resource Information System (MIRIS) data from 2000 indicates less than 12,000 acres of wetlands remain in the watershed. Forests account for fewer than 22,000 acres. Most of the larger tracts of forest and wetland exist only in the headwaters areas, which are under increasing development pressure. Fewer than half of the 912 miles of Rouge River system have any significant buffer of riparian vegetation. In developed areas, the majority of open space is parks, golf courses, schoolyards, churchyards, corporate grounds and local government grounds that have highly managed lawns of little habitat value and can be hazardous to wildlife.

Loss of fish and wildlife habitat is considered an impairment in all branches and tributaries. Land areas and streams are often altered to conform to the design of each new development. The little remaining suitable habitat is being reduced in area, disconnected as safe corridors for wildlife movement and degraded by human pressures.

Invasive exotic species are displacing native species and altering the environment. Within the waterways, zebra mussels, common carp and Eurasian milfoil pose threats. Zebra mussels have been present in Walled Lake and at the mouth of the Rouge for several years. In 2002, they were found at the mouth of the Johnson Creek and as far downstream in the Middle Branch as Ann Arbor Road. It is only a matter of time before they will be found throughout the river, displacing native mussels. Common carp are present in all four branches, stirring up sediments. Eurasian milfoil is clogging many of the impoundments in the Middle Rouge. Gobies, ruffe, sea lampreys, rusty crayfish, and two new carp species (bighead and silver) are not yet known to be a problem in the Rouge, but it is likely some of them will appear soon.

Exotic plants are becoming an increasing nuisance in the Rouge. Non-native invasive plants such as common buckthorn, phragmites and garlic mustard have invaded much of the floodplain forest. Garlic mustard is displacing native spring ephemerals and is considered a threat to the West Virginia white butterfly that cannot find its larval plant food that is buried under all the garlic mustard. The "purple menace," purple loosestrife, now dominates many wetlands, lakes and impoundments in the Rouge. Friends of the Rouge, the E. L. Johnson Nature Center in Bloomfield Hills, the Environmental Interpretive Center in Dearborn and Douglas Evans Nature Preserve in Beverly Hills have begun organizing volunteers to remove these plants. Exotic invasive plant removal is now a common activity for Rouge Rescue/River Day volunteers. It will take many years of concentrated effort to make a dent in the populations of these plants.

There are opportunities to protect existing habitat areas as well as to create and restore wetlands, woodlands and meadows. Over 300 miles of healthy riparian corridor can be protected and damaged streamside habitats can be restored. The Canadian Wildlife Service suggests that healthy watersheds have 10 percent of their land as wetlands. The Rouge River Watershed has less than 4 percent wetlands.

Invasive Species:



Garlic Mustard (Plant Conservation Alliance)



Common Buckthorn



Purple Loosestrife

Native Rouge River Watershed Plants:



Butterfly weed



Jack-in-the-pulpit



Trillium

The International Joint Commission (IJC) Areas of Concern program has targeted 30 percent forest cover for healthy watersheds, while the World Wildlife Fund suggested 25 percent. The Rouge River Watershed has less than 7 percent forest land. It will be difficult to attain such recommendations. Nevertheless, there must be a vision for the watershed and restoration and preservation goals must be set.

Many use impairments share the same cause. Eliminating a common cause makes improvements in several impairments. The majority of effort and money is being invested in eliminating contamination of the Rouge River by bacteria and oxygen-consuming substances. Eliminating this one cause will help conditions for almost all fish and wildlife. Essential habitats must be maintained. Serious efforts must be made to restore the biological integrity of the Rouge River.

Loss of Fish and Wildlife Habitat Progress Since 1998:

- All seven Subwatershed Management Plans developed under the Voluntary Watershed-based General Storm Water Permit identify habitat restoration/preservation as a goal.
- To date, the Southeast Michigan Land Conservancy (SMLC) has protected 922 acres in and around the Rouge River Watershed (460 in the watershed and 462 near the Rouge

headwaters in Superior and Salem townships). The protected properties include forested riparian corridors, wetlands, meadows, upland forests and farm land. Species noted on SMLC properties include mink, weasel, red fox, coyote, salamanders, eight species of frogs and over 90 species birds. Also found are a wide variety of native plants and wildflowers, including some rare and threatened species. More information can be found at www.landconservancy.com.

- In June 2002, Lathrup Village, in partnership with the Southeast Oakland County Water Authority (SOCWA), installed a demonstration rain garden. Rain gardens are designed to collect and filter storm water and create habitat.
- Superior Township has purchased property with sensitive areas in order to protect it. The Superior Land Conservancy with the assistance of the Southeast Michigan Land Conservancy has helped with this ongoing process. The township adopted a millage to purchase the property.
- Several communities implemented stream bank stabilization projects utilizing soil bioengineering, riparian buffer zone plantings and some woody debris management. These include (dates indicate commencement of project, many of which are continually expanding):
 - ◊ Ford Field Streambank Stabilization Project, Dearborn, Fall 1998
 - ◊ Johnson Creek Streambank Stabilization Project, Northville, June 2001
 - ◊ Plymouth Township Recreational Park Streambank Stabilization and interpretive signage, November 2001
 - ◊ Pebble Creek Streambank Stabilization Project, Farmington Hills, April 2002
 - ◊ Firefighters Park Streambank Stabilization Project, Troy, June 2002
 - ◊ Rogell Golf Course in Detroit, November 2002



Firefighters Park Streambank Stabilization Before



Firefighters Park Streambank Stabilization After

- Habitat restoration projects underway:
 - ◊ Rouge Park, Detroit, native prairie restoration project, fall 2000
 - ◊ Eliza Howell Park, Detroit, Native Wildflowers Project, fall 2000
 - ◊ Northville Prairie Restoration, July 1999
 - ◊ Birney Middle School, Southfield, fall 1998
 - ◊ Booth Park, Birmingham, spring 2000
 - ◊ Acacia Park/Douglas Evans Nature Preserve, Beverly Hills, 1997
- Riparian Corridor Management Work Group: several agencies - MDEQ, Wayne County Department of Environment, Friends of the



Rouge Park

Rouge, and Holliday Nature Preserve Association - have begun to formulate a plan for managing the riparian corridor in a more comprehensive and environmentally friendly manner. This plan includes recommendations for extending and naturalizing riparian buffer zones, "soft" stream bank stabilization procedures, and environmentally sensitive logjam maintenance. Ultimately, this group will include county drain commissioners and parks staff, the MDNR, and the Natural Resources Conservation Service.

- Individuals in Salem Township have donated properties with sensitive areas to the



Woody Debris Management Demonstration



Demo of Kayak through Minimal Removal

Washtenaw Land Trust and a conservation easement has been donated by an individual to the Southeast Michigan Land Conservancy.

- FOTR Workshops:
 - ◊ Backyard Wildlife Habitat in Salem Township and Dearborn Heights
 - ◊ River Friendly Lawn Care in Dearborn Heights and Farmington Hills
 - ◊ Bus tours in the Middle 1 Headwaters Tour, Footwaters Tour, Gateway Tour, Main 1-2 Tour, and Middle 3 Tour for elected officials
 - ◊ Rain gardens in Westland
 - ◊ Tours at Inkster Wetlands
 - ◊ Stream bank stabilization/riparian corridor management in Dearborn (rain barrels also), Livonia, Farmington Hills demonstration project and workshop, and Canton Township, for municipal employees
 - ◊ Canoe trips in the Lower Branch in Wayne and the Main Branch in Southfield.
- Ford Motor Company conducts an annual "Rouge Clean Up" event with several community organizations. Hundreds of Ford employees, students and citizen volunteers participate in activities including garlic mustard and buckthorn removal at the University of Michigan-Dearborn natural areas and Ford Field Park, native riparian plantings, stream bank stabilization, construction/installation of nest boxes, bat boxes and butterfly houses and schoolyard habitat establishment.



Backyard Habitat in Dearborn



Ford "Rouge Clean Up"

- Wayne County and the Ford Motor Company have partnered in the reconstruction of Miller Road from Dix Avenue to Rotunda Drive in front of the Ford Rouge Center. Wayne County is coordinating the pavement and drainage construction. The Ford Motor Company is responsible for all the landscaping within the swale, between the curb and walk and outside of the right-of-way. The habitat improvements result from less pavement, more pervious surfaces, vegetative swale filters, storm water retention and mechanical runoff treatment. Approximately 22 acres of landscaping is being planted along the mile-long section including several species of native trees, wildflowers and grasses.
- RRAC Habitat Committee members and the Southeast Michigan Group of the Sierra Club continue to provide input to Wayne County's Wetland Mitigation Bank program.
- The Rouge Oxbow Restoration Project is located at The Henry Ford adjacent to the Main Branch of the Rouge River in Dearborn. The storm water collection system was rehabilitated using best management practices. A major storm drain was redirected from direct discharge to the river into a wetland habitat in the area of the former Oxbow. The main objective of the project is to restore valuable fish and wildlife habitat within the Rouge River and to restore functioning riverine wetlands that have been lost due to channelization of the river. Secondary objectives include improvement of water quality, increased floodplain storage, educational and interpretative opportunities and improved aesthetics.
- Accomplishments of the Johnson Creek Protection Group include:
 - ◊ A wet meadow creation workshop
 - ◊ Johnson Creek Day celebration
 - ◊ A technical advisory committee monitors and comments on development plans in the watershed
 - ◊ Native plant rescue program
 - ◊ Alien plant removal (garlic mustard)
 - ◊ Volunteer Natural Features Inventory
- Cosponsored by SOCWA Healthy Lawn and Gardens, the Oakland Land Conservancy, Friends of the Rouge, Oakland County, Birmingham, Beverly Hills, and Southfield, the "Rouge Green Corridor" program focuses on the recognition and preservation of natural resource treasures in the watershed. A 2002 botanical and aquatic survey of several Main Branch parks in Oakland County found near-old growth oak and hickory trees, twinleaf (a wildflower on the "Species of Special Concern" list), and healthy mussel populations at several locations.
- Since 1998, the RRAC Habitat and Wildlife Committee has been recognizing habitat restoration/preservation projects through its annual awards program.
- Ford Motor Company has certified wildlife habitat programs with the Wildlife Habitat Council (WHC) at the Ford Rouge Center, Henry Ford II World Center, Research and Engineering Center and Fairlane Business Park. WHC Corporate Lands for Learning programs have also been certified at the Ford Rouge Center and Research and Engineering Center. These programs include the establishment of schoolyard habitats at several local schools.



Landscaping along Miller Road



Old Growth Oak

- The City of Wayne implemented woody debris management techniques on the Lower Rouge.
- In March 1999, SEMCOG published the document "Best Management Practices for Sustainable Development."

Where We Want to Be:

1994 RAP Goal: Minimize the negative human effects on existing fish and wildlife habitats.

2004 Goals:

1. Adopt the guiding principle of "no net loss" of aquatic and terrestrial habitats.
2. Achieve a healthy watershed ecosystem of suitable habitats to sustain diverse and abundant populations of indigenous benthos, fish, birds, insects and wildlife.
3. Adopt the principles and techniques of Riparian Corridor Management (including woody debris management) as the standard operating procedures for Rouge Rescue, public agencies and riparian landowners.
4. Meet the delisting criteria in order to delist the use impairment "Loss of fish and wildlife habitats." (See Table 1).

How to Get There:

There are no state or federal fish and wildlife management plans for the Rouge River Watershed. All stakeholders need to participate in creating meaningful and achievable management goals. Appendix B, "Schematic Relationship of Mechanism to Provide Resources to Reduce Impairments Degrading Fish and Wildlife Populations," is an explanation of a model decision-making process. The following actions play a role in that process:

Phase I (2004 to 2007):

- Conduct an inventory of riparian corridor, aquatic and terrestrial habitats for wildlife, natural features and aesthetics. Create base line GIS maps in each subwatershed. Identify and prioritize critical habitats for input to the management plan.
- In all Rouge communities develop local land-use ordinances that require minimum setbacks from flood plains, river banks and wetlands to protect fragile habitats from all new development and redevelopment.
- Promote redevelopment, including brownfield sites.
- Preserve, protect, restore and create natural habitats through the use of appropriate land-use planning, zoning ordinances, site plan design and other best management practices.
- Implement riparian corridor management, including buffer strips, reduced mowing, native planting, nutrient management and woody debris management.
- Preserve riparian corridor on private lands by encouraging conservation easements.
- Preserve, restore and enhance county and community parklands.
- Promote riparian corridor revegetation, restoration and maintenance pilot projects.
- Monitor water temperature to evaluate riparian corridor for warm water fishery requirements.



Habitat and Wildlife Award



City of Wayne Woody Debris Management

- Expand the practice of woody debris management.
- Create 75 miles of managed riparian corridor.

Primary responsibility: Local Governments, Counties, MDEQ, GIS and Michigan Natural Features Inventory, Universities, FOTR, Volunteer Groups, Land Conservancies

Phase II (2008 to 2014):

- Expand to include 150 miles under riparian corridor management.
- Implement "daylighting" of stream enclosures demonstration projects.
- Complete wetland inventory.
- Complete a wildlife corridor management plan.
- Coordinate urban forestry programs with GIS.
- Implement riparian corridor maintenance routinely by trained staff based on woody debris management as a best management practice.
- Complete the Rouge River Watershed natural features inventory.
- Link public lands, parks and preserves as wildlife corridors.

Primary responsibility: Local Governments, Counties, MDEQ, MDNR, FOTR, Michigan Natural Features Inventory

Phase III (2015 to 2020):

- Demonstrate through GIS that no net loss or possibly gains in natural habitat acres is occurring.
- Conduct monitoring to determine what remedial actions remain to delist the use impairment "Degradation of Fish and Wildlife Habitat."

Primary responsibility: Local Governments, Counties, MDEQ, FOTR, Michigan Natural Features Inventory

Degradation of Wildlife Populations

Many animals and plants make their home in the Rouge River Watershed. Their presence, absence, diversity and abundance will be the true indicator of success.

Degradation of wildlife populations can significantly change the balance of an entire ecosystem. The diversity of species and the number of individuals provide a good indicator of habitat quality across a landscape. Some species are habitat specialists and their presence or absence is a meaningful indicator of the health of associated habitat types. Consequently they are known as "indicator species." Other species are "area sensitive." Their success requires large areas of contiguous habitat.

Many species of mammals, birds, amphibians and reptiles (e.g. frogs and turtles) make their home in the Rouge River Watershed. There are 49 species of amphibians and reptiles associated with the Rouge River or its wetlands (Appendix C).¹¹ Frogs indicate the presence of clean, still waters, which all amphibians need during their egg and tadpole stages. As adults, frogs spend much of their lives foraging for food between wetland and upland habitats; consequently, their presence indicates the existence of important linkages, or "corridors," between quality wetland and upland habitats.

Much of the river corridor is contained within the public park system. It is home to mammals that use the water during some portion of their lives (Appendix D)¹¹. Many "urban" mammals, such as raccoons and opossums, live in the watershed. There are also some species associated



Fox Climbing Tree

with more pristine environments, such as mink, red and gray fox, and flying squirrels. Other rare or unique natural features (plants, mammals, habitats) are listed in Appendix E.¹¹

Where We Were:

The Rouge River Bird Observatory (RRBO) was founded in 1992 to explore an understudied yet increasingly important area of research: the significance of urban natural areas to migrant, breeding and resident birds (Appendix F)¹¹. Located at the University of Michigan-Dearborn, an isolated remnant of natural habitat in a region so closely associated with industrialization in North America, RRBO offers a unique opportunity to study the importance of urban natural areas to birds. Approximately 120 species of birds have been identified as having had regularly nesting populations within Wayne County and that number may be considered representative of the bird populations expected to be in the watershed.

Good historical data does not exist on past frog populations in the Rouge River Watershed. But since frogs are impacted by urban development, undoubtedly there were more frogs in the past. Anecdotal reports note a decline in frog and toad populations in recent decades.

Population data for other wildlife species is also lacking, though it is probable that some species have flourished with increasing urbanization, (e.g. deer, starlings, raccoons), while others have declined (e.g. warblers, cavity-nesting birds, carnivorous mammals).

The 1989 RAP did not directly address the degradation of wildlife populations.

Where We Are:

At the present time, insufficient studies have been conducted to determine if wildlife populations have been degraded. Therefore the status of this impairment is considered to be unknown. Widespread degradation is suspected, however, largely due to generally poor water quality and the loss of fish and wildlife habitat.



Julie Craves, RRBO Avian Supervisor

Increasing urbanization results in the reduction of wildlife populations by destroying or fragmenting habitats and increasing mortality and predation. According to a recent study¹², nearly half of the 55 turtle species native to the United States are declining. Car and truck collisions are partly to blame. Turtles wander daily to find food, and migrate seasonally to lay eggs or escape climate extremes such as drought or freezing temperatures.

The study results suggest that roads threaten both land turtles and large pond turtles. In many regions more than 5 percent of these turtles are likely to die while crossing roads. This is more than the populations can sustain. Turtle mortality on roads is particularly high in the Northeast, Southeast and Great Lakes-Big Rivers region. To help protect pond turtles from collisions in developed areas, the researchers recommend establishing buffer zones

around aquatic habitats. Because they need large areas of contiguous habitat, protecting land turtles will require larger buffer zones. In areas where buffer zones and large roadless areas are not feasible, turtles could be protected from collisions by building road crossings. Researchers plan to address this issue for amphibians, but the results are expected to be similar for all herpetologic species. For more information on turtle and amphibian studies see Appendix G, under David Misfud.



Box Turtle



Snapping Turtle

Compared to the period 1880-1915, 82 (68 percent) of the 120 nesting bird species have significantly decreased breeding populations or no longer breed in Wayne County. (Craves, J.A., "Historical Changes in the Breeding Bird Populations of Wayne County, Michigan." Rouge River Bird Observatory, University of Michigan-Dearborn, in press.)



Scarlet Tanager (Photo Courtesy of Julie Craves)



Singing Toad



Screech Owl finds its way into a building

According to results of the Rouge River Watershed Frog and Toad Survey, ten species of frogs and toads inhabit the Rouge River Watershed. As of 2003, after six years of surveying, the state special concern Blanchard's cricket frog had not been heard and is probably no longer present in the watershed. The headwaters of the Middle, Lower and Main branches contain the highest diversity of species while the downstream urbanized portions have fewer remaining species and are dominated by the more tolerant American toads and green frogs.

Destruction of wildlife habitat also has a significant impact on wildlife populations and is discussed in detail in the previous section, "Loss of Fish and Wildlife Habitat."

Degradation of Wildlife Populations Progress Since 1998:

- The University of Michigan-Dearborn's Rouge River Bird Observatory (RRBO) continues to study the importance of urban natural areas to birds, especially as migratory stopover sites. RRBO projects include banding more than 118 species of birds; surveys of migratory birds, nesting species, and winter populations; cooperative research projects; and public education.
- RRBO has worked with the Farmington Area Naturalists, Farmington Hills, and the Ford Motor Company's Sheldon Road Plant in tracking eastern bluebirds that nest on their properties.
- RRBO is a major sponsor of the Michigan Breeding Bird Atlas II, coordinating field work in Wayne County that identifies the status, abundance, and distribution of breeding bird species in the county.
- FOTR continues to involve volunteers in collecting data about populations of frogs and toads. In 2003, more than 700 people signed up to participate in the survey.
- The Johnson Creek Protection group has trained 20 volunteers to conduct a natural features inventory. They focus on identifying flora, fauna and landscape features. This has resulted in the surveying of 20 properties in Northville, Plymouth and Salem townships.
- In the fall of 2002, DTE Energy sponsored the owl-banding program at the Rouge River Bird Observatory.
- For the past several years, a pair of peregrine falcons has spent winters at the Detroit Edison River Rouge Power Plant. Plant employees have been working with the MDNR Detroit Peregrine Coordinator, Judy Yerkey, to document the birds' activities. DTE is researching the possibility of providing a nesting platform to encourage the birds to nest in the area.
- OCDC is investigating the potential for reintroducing the otter to the Rouge River.



Wilson's Warbler (Photo Courtesy of Julie Craves)

Where We Want to Be:

1994 RAP Goal: Protect and enhance wildlife populations within the Rouge River Watershed with special emphasis on protection of rare, threatened, or endangered species.

2004 Goals:

1. Confirm through appropriate field-validated studies that a healthy, sustainable population of indicator species (including indigenous fish, amphibians and target breeding and migratory birds) is present in appropriate numbers and diversity.
2. Meet the delisting criteria and delist the use impairment; "Degradation of Wildlife Populations." (See Table 1)



FOTR Frog & Toad Training

How to Get There:

Phase I (2004 to 2007):

- Preserve, protect, restore and create natural areas through the use of appropriate land-use planning, zoning ordinances, site plan design and other best management practices focusing especially on maintaining or creating adequate corridors between habitat patches.

- Continue and expand bird and frog and toad surveys.
- Perform studies/inventories to determine wildlife diversity and populations in each subwatershed.
- Establish survey methods, secure funding, recruit volunteers and promote efforts in each subwatershed to complete inventories and monitor trends in numbers and distribution of wildlife indicator species.
- Identify appropriate additional indicator species in order to conduct field-validated studies that determine the health and status of that species.
- Provide technical input on proposed development that may have a negative impact on wildlife.
- Encourage the installation of safe "turtle crossings" in high mortality areas as roadwork and drain work are conducted near roadways. For example, where roads and areas of new development separate wetlands, drains, streams or areas of high amphibian and reptile populations, short fences could be constructed along the roads to guide the animals to an under-road crossing and/or steer them away from the road.
- Monitor any known endangered, threatened, rare or wildlife species of concern.

Primary responsibility: Local Governments, Counties, MDEQ, MDNR, FOTR, MDOT, Developers, Environmental Groups, Universities, Michigan Natural Features Inventory

Phase II (2008 to 2014):

- Establish a monitoring regime for contaminants in wildlife food (fish and insects) and habitats (sediments).
- Develop and begin implementation of a wildlife management plan to encourage/enhance desired wildlife species and protect existing species.

Primary responsibility: Local and County Parks Departments, MDNR, MDEQ

Phase III (2015 to 2020):

- Continue implementation of the wildlife management plan.
- Survey for target species to verify that habitat preservation/restoration has resulted in increases in both population size and target species richness.
- Determine which endangered, threatened or rare species can be reclassified or delisted.
- Conduct monitoring to determine what remedial actions remain in order to delist the use impairment "Degradation of Wildlife Populations."

Primary responsibility: MDNR, MDEQ, U.S. Fish and Wildlife Service, FOTR, Educational Institutions, Environmental Groups

Degradation of Fish Populations

Most of the Rouge River has always been a "warm water" fishery, dominated by limited numbers of game fish like largemouth bass, northern pike, suckers and catfish. Both the number and variety of fish species have declined over the last century due to poor water quality, degraded in-stream and riparian habitats, and habitat fragmentation by dams and the concrete channel. Ongoing efforts to solve storm water-related problems - preventing sewage from entering the river from CSOs and SSOs, and reducing unnaturally high peak stream flows after rain storms - and improving the physical habitat of the concrete channel and fish passage around dams, should eventually increase fish diversity and populations.



DNR Fish Stocking

Where We Were:

Available data indicate that the Rouge River was formerly home to over 60 species of fish. Natural conditions which shaped, and in many ways limited, the historic fish community include:

- Connection to the Great Lakes via the Detroit River
- Small ground water component to its base flow (resulting in a warm-water fishery in most of the river)
- Narrow, shallow, shaded stream channels (resulting in limited pool habitat, and small fish stocks)
- Fine-grained sediments in most of the river (resulting in limited riffle habitat)

Populations of game fish (northern pike, walleye, channel catfish, largemouth bass, smallmouth bass) were always limited, and found mostly in the lower reaches of the Main Branch. The one cold-water tributary, Johnson Creek, probably never supported native brook or rainbow trout, although stocked European brown trout survive there today.

The 1989 RAP identified the pollution prevention goal, "Determine and reduce the impact of in-place pollutants (primarily sediments) on fish and other biota in the Rouge River," and the resource development goal, "Develop fisheries where appropriate in the Rouge River system."

Where We Are:

The most recent watershed-wide fish survey (1995) found 53 species. Game fish (northern pike, largemouth bass, various sunfishes) were largely restricted to the Middle Branch impoundments, and to the pool below the Ford Estate dam in Dearborn. Great Lakes game fish like smallmouth bass, walleye and sturgeon were lacking, probably due to the channelization of the lower four miles of the Main Branch and the dam at the Ford Estate blocking fish migrations above that point. Species lost from the historic fish community are primarily those originating in the Great Lakes, and certain species requiring low-turbidity water.

Three headwater tributaries - Johnson Creek, Seeley Creek, and Minnow Pond Drain - are currently home to a Michigan threatened species, the redbreasted dace. The headwaters are also home to the best populations of several other sensitive fish species, including northern hog sucker, mottled sculpin, rock bass, and brook lamprey.

Water quality and quantity are the two principal factors limiting current fish populations. Historically poor water quality - low dissolved oxygen concentrations, high nutrient concentrations, high turbidity - have seriously affected fish populations in much of the river. Recent data suggests that dissolved oxygen concentrations downstream of the CSO basins are improving. Just as important are excessive water velocities and volumes after rainstorms and excessive sedimentation from streambank and upland soil erosion, which destroys in-stream habitat. Habitat fragmentation by the 62 dams in the river also limits fish movements and spawning migrations.

Common carp are present throughout the river. European brown trout have been stocked in Johnson Creek since 1992. They are currently reproducing in low numbers, though this is not

a self-sustaining fishery. Limited numbers of introduced Pacific Ocean salmonids (steelhead and Chinook salmon) migrate into the lower Main Branch each year, but cannot reproduce successfully due to naturally warm water temperatures.

Degradation of Fish Populations Progress Since 1998:

- A river meander ("oxbow") in the lower portion of the Main Branch that was disconnected from the river channel during the installation of the concrete channel in Dearborn, has been reconnected to the river. Excavation and habitat restoration should recreate riparian habitat suitable for fish and waterfowl.
- A proposed project to "soften" the edge of the concrete channel by removing the concrete down to the low water line will provide additional riparian habitat.
- Remediation of contaminated sediments in the Newburgh Lake impoundment (Middle Branch) resulted in better fish habitat- deeper holes, improved spawning substrate - and restocking has currently changed the dominant species from carp and suckers to game fish like pan fish, largemouth bass and northern pike.
- Construction of several CSO basins, which intercept sewage discharges after rain storms, have in many cases resulted in improved dissolved oxygen concentrations, which previously had limited the fish community in many sections of the river.
- Wayne County Department of Environment and MDEQ have collaborated on more river-friendly protocols for managing woody debris (logjams) and stabilizing stream banks.



Brown Trout, Johnson Creek



Phoenix Lake Dam

Where We Want to Be:

1994 RAP Goal: Protect and enhance fish populations.

2004 Goals:

1. Confirm that fish communities consist of the variety of species appropriate to the river in numbers sufficient to maintain sustainable populations.
2. Meet the delisting criteria in order to delist the use impairment "Degradation of Fish Populations." (See Table 1).

How To Get There:

Phase I (2004 to 2007):

- Take all available steps to ensure protection of the headwater tributaries, including the various county drains.
- Reduce soil erosion from upland sources by rigorous enforcement of soil erosion and sedimentation control regulations, especially in the less developed headwater areas.
- Implement environmentally sensitive fertilizer application programs.
- Maintain existing riparian vegetation buffers and encourage restoration of degraded vegetation buffers.

- Increase effort to monitor fish populations.
- Lower post-storm peak water flows to the extent necessary to protect in-stream habitat conditions favorable to a diverse fish and benthic macroinvertebrate community.
- Reduce inputs of nutrients, especially phosphorous, to levels that will not cause eutrophic conditions.

Primary responsibility: Local Governments, Counties, MDEQ, MDNR, FOTR

Phase II (2008 to 2014):

- Begin removing, or build fish passageways around, as many dams as possible.
- Maintain summer water temperatures that are below state water quality standards by: 1) maintaining or restoring riparian vegetation 2) requiring low-flow, cool-water discharges from storm water retention basins 3) maximizing infiltration of runoff into groundwater aquifers.
- Fully implement programs to eliminate uncontrolled CSO, SSO, and storm water discharges.

Primary responsibility: Local Governments, MDEQ, MDNR, USACOE

Phase III (2015 to 2020):

- Reduce stream-bank erosion to natural rates after excessive peak flows have been controlled.
- Meet and maintain State Water Quality Standards for dissolved oxygen sufficient to sustain pollution-sensitive species through a reduction of inputs of oxygen-consuming substances, including human and animal feces, fertilizers, and chemical wastes.
- Remove contaminated sediments from the river reaches in and downstream of the concrete channel.
- Conduct monitoring to determine what remedial actions remain to delist the use impairment "Degradation of Fish Populations."

Primary responsibility: Local Governments, Counties, MDEQ, MDNR, FOTR, USACOE, USEPA

Degradation of Benthos

Benthic macroinvertebrates (benthos) are bottom-dwelling aquatic organisms that are large enough to be seen with the human eye and that live in the water for at least part of their lives. Examples include the larvae of many insects such as mayflies, dragonflies, and damselflies, as well as snails, mussels, crayfish and leeches. They are an important food source for many fish species, and play a significant role in cycling organic matter (leaves, etc.) in streams and lakes. Because they are sensitive to physical and chemical changes in their habitat, live in the water for months to years and cannot escape pollution as easily as most fish can, they are useful indicators of a river's quality. Although healthy benthic communities are present in a few of the headwater areas, benthos are considered to be impaired throughout most of the Rouge River Watershed. Benthos species on the Michigan Endangered and Threatened Species List (mussels and aquatic insects) are not known to occur in the Rouge, except for the slippershell mussel, a species of special concern. The original Rouge RAP did not directly address the degradation of benthos populations.

Where We Were:

The benthic community typically found in a watershed like the Rouge River is highly variable, with specific organisms dominating particular sections of the stream, depending on factors like current, turbidity, substrate, nutrients, and channel size. The composition of the benthic

community prior to urbanization is entirely speculative, but very likely included large numbers of sensitive organisms like mayflies, caddisflies, stoneflies and mussels. Community diversity would have been high, benefiting from good water quality, natural amounts of woody debris, varied pool and riffle habitats and connections to seasonally flooded riparian forests and wetlands.

The 1989 RAP identified the pollution prevention goal, "Determine and reduce the impact of in-place pollutants (primarily sediments) on fish and other biota in the Rouge River."

Where We Are:

Benthos populations have been degraded by many factors, including erratic stream flows, point and nonpoint source pollution, storm water discharges, CSOs, SSOs, siltation from upland and stream-bank erosion, illegal spills and discharges, municipal and industrial discharges, and contaminated sediments. Degradation of in-stream habitat caused by excessive peak flows and poor water quality has the greatest negative impact on the benthos community. Certain general patterns are present in all four branches:

Lower Portion of the Watershed: Much of the lower Rouge River is devoid of significant benthos populations. Channelization and the concrete lining in the lower portion of the Main Branch has eliminated physical habitat, and non-channelized portions of all the branches suffer from excessive flow variation due to storm water runoff.

Mid-Reaches of the Watershed: Areas below SSOs and the remaining CSO discharges still exhibit periodically poor water quality. Much of the mid-reaches are also impacted by excessive peak flows after storms. Benthos populations here are also quite small and degraded and are dominated by tolerant species.

Headwater Areas: Significant portions of the headwater areas still support a diverse benthic community including sensitive groups like mayflies, caddisflies, stoneflies, alderflies and mussels. Water quality is still good in most of the headwater areas, although changes in flow regime, turbidity and nutrient concentrations due to continuing development is a growing threat.

Degradation of Benthos Progress Since 1998:

- In 2000, MDEQ conducted a survey of benthic organisms at 39 sites, mostly in the headwaters. Important findings included:
 - ◊ Macroinvertebrate communities at most locations were rated "acceptable."
 - ◊ Upstream sites generally had higher benthic community scores than downstream sites, in all four branches.
 - ◊ The Lower Branch had less diverse benthic communities than the other branches.
 - ◊ Notable improvements compared to earlier data were observed at Evans Ditch in the Main Branch (two taxa in 1989, 14 taxa in 2000), and also at three locations in the Lower Branch. This may be related to base flow augmentation by the YCUA treatment plant discharge.
- MDEQ is also conducting a survey of freshwater mussel populations. The largest and most diverse populations are in the Oakland County portion of the Main Branch, and in the Middle Branch upstream of Wayne Road. After three years of the four-year study, eight species have been found. This is far fewer than the 20 species reported in the 1930s. One of



Slippershell

the species found in Johnson Creek, the slippershell, is a "species of special concern." The exotic zebra mussel has also been found in the Middle Branch, including Johnson Creek. This does not bode well for the native mussels in that branch.



FOTR Bug Hunt Volunteers

- Wayne County - DOE and MDEQ have collaborated on more river-friendly protocols for managing woody debris (logjams) and stabilizing stream banks.
- FOTR conducts three annual "bug hunts," including a winter stonefly search, during which volunteers search for macroinvertebrate populations at various locations.

Where We Want to Be:

1994 RAP Goal: Benthic macroinvertebrate communities throughout the Rouge River Watershed should routinely achieve a rating of at least "good" (or slightly impaired) as defined by MDEQ.

2004 RAP Goal:

1. Achieve a rating of at least "acceptable" (as defined by MDEQ) for benthic macroinvertebrate communities upstream of the concrete channel. That is, communities will include large numbers of pollution-sensitive species and not be dominated by pollution-tolerant species.
2. Meet the delisting criteria in order to delist the use impairment "Degradation of Benthos." (See Table 1).

How to Get There:

Phase I (2004 to 2007): (Also see "Degradation of Fish Populations" for other applicable "How to Get There" recommendations.)

- Increase effort to monitor benthos populations. Include the use of volunteers.
- Continue inclusion of macroinvertebrate sampling in volunteer-based and school-based monitoring and education programs.

Primary responsibility: Local Governments, FOTR, MDEQ.

Phase II (2008 to 2020): See *Degradation of Fish Populations*

Phase III:

- Conduct monitoring to determine what remedial actions remain to delist the use impairment *Degradation of Benthos*.

Primary responsibility: MDEQ, FOTR

Eutrophication or Growth of Undesirable

Eutrophication is the accumulation of nutrients (phosphorous and nitrogen) in water bodies that increases the amount of algae and larger aquatic plants. Seasonal die-off of plants gradually converts a lake into a wetland. Under natural conditions it takes hundreds to thousands of years for eutrophication to fill in a lake. Human activities can significantly accelerate eutrophication by adding excessive nutrients. This is called "cultural eutrophication."

Sources of excessive nutrients include fertilizers, animal wastes, leaking septic systems, any other source of sewage (CSOs, SSOs, etc.), permitted municipal and industrial discharges,

illegal discharges, decay of vegetation and desorption from soils. Symptoms of cultural eutrophication include algae blooms, excessive aquatic plant growths, murky water, low dissolved oxygen concentrations, high ammonia concentrations and fish kills. Once eutrophication takes place, it is difficult, costly and time-consuming to reverse.

Where We Were:

While no specific data quantifies eutrophic conditions in the river prior to intensive and extensive development in the last 100 years, it is clear that cultural eutrophication has impacted many lakes, wetlands and watercourses in the last 50 years.



Fish Kill

The original RAP document did not directly address eutrophication nor did it consider criteria to delist this as an impairment.

Where We Are:

Phosphorous concentrations high enough to cause eutrophication are found throughout the river in both dry and wet weather. Eutrophic conditions have been observed at least since the 1970s in many lakes in the watershed, including the impoundments along the Middle Branch. Eutrophic conditions are less evident in the headwater areas, though excessive nutrient concentrations may be adversely impacting benthic macroinvertebrate and fish communities.

Eutrophication Progress Since 1998

- Studies by RPO have clarified several aspects of the eutrophication problem:
 - ◊ Chlorophyll concentrations and the kinds of algae found in the Middle Branch impoundments are indicative of eutrophic conditions and have been consistent since at least the 1970s.
 - ◊ Nuisance algae and aquatic plant growths in the impoundments in the Middle Branch are limited by phosphorus, not nitrogen. So controlling phosphorus inputs will most directly affect the eutrophication problem.
- On an annual basis, the majority of the phosphorus inputs to the Rouge occur during wet weather events, even though these events only occur during a small portion of the year. This suggests that nonpoint sources (soil erosion, animal wastes, storm water runoff) are the major sources of phosphorus to the river, not point sources (industries or waste water treatment plants).
- Throughout Oakland County, SOCWA conducts Healthy Lawn Care Workshops designed to reduce fertilizer use.
- In Bloomfield Township, the Forest Lake Outlet Watershed Workgroup (FLOW) is monitoring the water quality and eutrophication status of lakes.
- Washtenaw County's "Community Partners for Clean Streams" Program recommends the use of soil testing for the proper application of fertilizers.

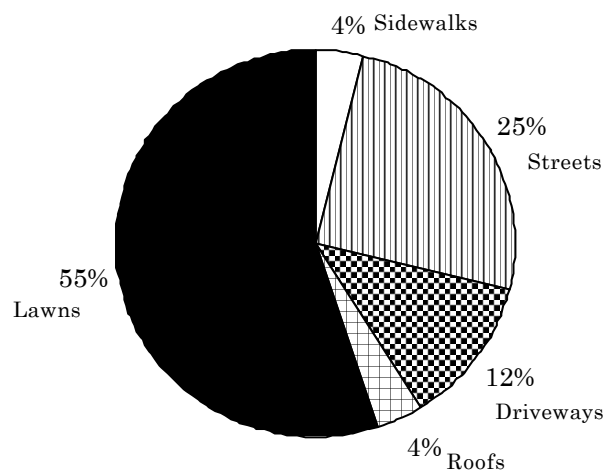


Figure 5: Sources of Phosphorus from medium residential housing areas in Madison, Wisconsin

- Washtenaw County also addresses nutrient loading in two new guides:
1) "Homeowners Association Handbook" includes a section on Landscaping Near the Water's Edge
2) "Guide to Rural Living."
- In 2002, Wayne County successfully launched its Nutrient Reduction Campaign.

Where We Want to Be:

1994 RAP Goal: Eliminate cultural eutrophication or undesirable algae.

2004 Goals:

1. Reduce nutrient loadings such that eutrophic conditions (algae blooms, excessive aquatic plant growth, etc.) do not occur and State Water Quality criteria (when available) are met.
2. Meet delisting criteria in order to delist the use impairment "Eutrophication." (See Table 1).

How to Get There:

Phase I (2004 to 2007):

- Perform a Total Maximum Daily Load (TMDL) analysis for phosphorous where monitoring data indicates concentrations are high enough to cause eutrophication.
- Strictly enforce soil erosion laws, especially on construction sites.
- Emphasize protection of headwater streams, which are especially effective at taking up nutrient inputs before they can cause problems downstream.
- Continue regular nutrient monitoring in dry and wet weather to track progress in reducing nutrient concentrations.
- Continue periodic monitoring to evaluate trophic condition of lakes and impoundments (algae blooms, aquatic plant growths, nutrient and chlorophyll concentrations, etc.).
- Encourage landscaping techniques that minimize goose populations, soil erosion and storm water runoff.
- Preserve and restore riparian wetlands.
- Establish quantitative nutrient criteria for Surface Waters of the State.
- Establish fertilizer ordinances or resolutions encouraging soil testing and the use of slow-release nitrogen and low-phosphorous fertilizers.

Primary responsibility: Local Governments, Counties, MDEQ

Phase II (2008 to 2014):

- Establish mowing management programs in floodplains and along riparian zones.
- Develop ordinances to protect and restore riparian vegetation buffers.
- Establish goose population control programs, including maintenance of vegetation buffers along water bodies.
- Develop and implement ordinances or resolutions in every community, mandating healthy lawn care practices, including soil testing and slow-release fertilizer, by private, commercial and government land-owners and commercial lawn care providers.

Primary responsibility: Local Governments, Counties, MDNR

Phase III (2015 to 2020):

- Continue nutrient reduction programs.
- Conduct monitoring to determine what remedial actions remain to delist the use impairment "Eutrophication."

Primary responsibility: Local Governments, Counties, MDEQ

Chapter 4

Caring for Community - People

"In my vision for Wayne County, caring for families is a top priority. We want them to view Wayne County and its natural environment, its water resources such as the Rouge River, as desirable places. We want to be accountable and responsible stewards of the Rouge. Caring for the river and our watershed make a difference in the quality of life not only for citizens today, but also for the families and youngsters of tomorrow."

Robert A. Ficano, Wayne County CEO



Public Education

The Rouge River Watershed is home to humans as well as fish and wildlife. However, because buildings and streets have replaced forests and wetlands, and drains and pipes have co-opted some of the functions of open streams, it is easy to feel cut off from nature and the river. Some people are unaware that the Rouge River is worth visiting and protecting, unaware even that we live in a watershed or that local streams are a part of the larger Rouge system. Reconnecting humans to nature in urbanized areas requires increasing the awareness that human health and a watershed's health are interdependent.

Citizens are the stewards of the Rouge River Watershed. A strong consistent public education program for both adults and children is critical in promoting citizen stewardship of the river and the surrounding natural areas.

Public Understanding, Community Stewardship and School-based Education

Stewardship requires accepting moral responsibility for the careful use of natural and human resources, such as land, water, air, time, talent and money, especially with respect to the principles and needs of a community. There are three key steps needed to build public involvement: 1) citizens must be aware they live in the Rouge River Watershed, 2) citizens need to be informed about actions they can take to improve watershed health, and 3) citizens must be motivated to move from "understanding" to action.

Where We Were:

The original RAP identified Public Information and Education as an effective way to encourage citizens and public officials to support the many projects needed to clean up the river. In the late 1980's the Friends of the Rouge and the University of Michigan partnered to teach middle and high school students and teachers about the watershed and water quality. From this program, the use of video tapes and public information via local cable companies began.



Rouge Bus Tour



Learning about compost

The topic of storm water has been elusive to many citizens. For some, basement flooding forced awareness. For others, interest came as a result of information disseminated by those concerned about the river. But for most citizens, the ultimate discharge point of the storm drain at the end of their driveway was not known.

Knowledge of the Rouge River Watershed and its network of rivers and streams running through 48 communities in Southeast Michigan, did not change significantly between a 1993

survey and one taken in 1999 (61 percent in 1999 said they were somewhat or very familiar with the Rouge and its tributaries). However, the public's perception of pollution sources did change. Respondents ranked the major pollution sources (industrial and municipal waste discharges, combined sewer overflows and storm water) relatively evenly in 1999. In 1993, 42 percent of respondents incorrectly believed that industrial waste was the largest contributor to the problems in the Rouge River. This supports the idea that people are less likely to blame industry for water pollution problems. There is also a greater awareness by citizens about the work being done to restore the Rouge River. In the 1999 survey, more than 40 percent of respondents had heard of the Rouge Project, compared to only 9 percent in 1993.

In 1992 the EPA and Wayne County established the Rouge River Wet Weather Demonstration Project. This project provided grant funds for cleanup of the Rouge River. In the beginning there was little money available for funding of public education projects and events. Most of the grant money went for construction-related projects.

In 1999 grants were made available through the EPA to local governments to fund the implementation of the Public Education activities required by the Voluntary Watershed-based General Storm Water Permit. At that time many communities pooled their resources and began to develop successful public education programs. They understood that by working together with neighboring communities, education efforts can have a much larger impact on the general public and in some cases reduce expenditures.

The 1989 RAP identified the implementation process goal, "Educate and involve the public to build understanding and support for restoration of the Rouge River."

Where We Are:

All permitted communities have begun to implement their education programs utilizing various media, including newsletters, websites and cable message boards. Additionally, displays have been created and set up in public locations, videos have been created and many communities have hosted watershed-awareness workshops.

The efforts to educate citizens and decision-makers have been extensive concerning not only ultimate discharge point, but also other storm water related issues including, nonpoint source pollution, volumes and velocities and how they affect the river in terms of erosion and habitat loss. Communities have been very active in developing materials and programs that address these issues.



Kids exploring the forest floor

As part of their permit requirement, each community has developed a Storm Water Pollution Prevention Initiative (SWPPI) that incorporates public education as a significant component of the plan. Most of the SWPPI activities have been approved by their local councils or administrations. Many local governments have hired additional staff to help with their permit obligations. Oakland, Wayne, and Washtenaw counties have taken a lead in providing staff and services to local community governments.

Public Education Progress Since 1998:

- The Main1-2 SWAG created the Public Education Subcommittee to develop a regional approach to educational issues. The group has been working in coordination with Oakland

County on projects such as cable advertising, print ads, material distribution, and riparian education and community outreach. They have produced public service announcements on car washing and septic system maintenance.

- The Salem Elementary/South Lyon School Outdoor Environmental Education Lab Project was designed and created by parents, teachers and school officials. The project demonstrates the value of wetlands to schools, scouts and residents.
- The Johnson Creek Protection Group continues to flourish and sponsors volunteer activities as well as a yearly Johnson Creek Appreciation Day.
- Wayne and Oakland counties installed watershed signage and stream/road crossings throughout their jurisdiction.
- The RPO completed a public information phone survey that measured the effectiveness of the public information that has been disseminated.
- Washtenaw County has a weekly radio program entitled "Issues of the Environment."
- In May 2003, nearly 3,000 fifth-grade students attended the Rouge River Water Festival at the University of Michigan-Dearborn to participate in hands-on activities promoting water resource education and stewardship. In September 2003, nearly 1,500 fifth-grade students attended the Rouge River Water Festival at Cranbrook Institute of Science.
- Washtenaw County has developed a comprehensive handbook, *Community Partners for Clean Streams*.
- Wayne County's "Storm Drains Aren't Garbage Cans" slogan has been widely used by many communities on various media including brochures, magnets, and on displays.
- Wayne County Department of Environment held five lawncare workshops between May 2001 and June 2002. Over 185 people participated. Participant surveys indicated that over 90 percent of respondents plan to change lawn care practices as a result of information presented.
- FOTR has been assisting neighborhoods in storm drain stenciling and the placement of storm drain markers that alert residents to the end point of the storm drain. In 2003, 226 volunteers stenciled 1,380 storm drains in 11 communities.
- In 2003, there were approximately 1,100 volunteers for Rouge Rescue/River Day activities at 23 sites.
- In 2001, the restoration of the Nankin Mills Nature Center was completed. Exhibits include a comprehensive historical perspective and natural history of the Rouge River Watershed.
- FOTR began a frog and toad volunteer survey in 1998 that has been expanding ever since. In 1998, 140 people attended workshops and 57 survey blocks were covered in the Middle 1 subwatershed. In 1999, the Lower 1 subwatershed was added, 360 people were trained and over 200 blocks were surveyed. In 2000, the survey was opened up to any area in the watershed. In 2002, 451 people attended workshops - with 141 attending the workshop in Livonia; 700 people participated in the survey covering 383 survey blocks.
- FOTR-Rouge Education Project (REP), a school-based water-monitoring program, engaged more than 180 teachers and 6,300 students from more than 90 schools in 2002-2003 school year. Since its inception in 1987, it has engaged tens of thousands of students from 160 schools.
- The University of Michigan-Dearborn Environmental Interpretive Center opened May 25, 2001. A theme of the center's exhibits is to demonstrate the concept of a watershed and to



Nankin Mills

develop a sense of place about our location and role as stewards in the Rouge River Watershed. A nine-foot infrared aerial photograph allows visitors to understand the history and land-use patterns. From June 2001 to June 2002, scheduled programs were offered to 12,486 participants in 265 groups.

- In 2002, Washtenaw County's Johnson Creek Bioengineering restoration project received a Michigan Association of County Drain Commissioners Honorable Mention Award in the Public Education/Participation category.
- In 2002, SOCWA sponsored 50 outreach events accounting for more than 1,000 volunteer hours on a wide range of topics including healthy lawn care, native plants and natural landscaping, composting and school education programs.
- Riparian workshops - over 150 riparian landowners attended two riparian workshops held in the spring and fall of 2001.
- In 2000, Subwatershed Advisory Groups (SWAGs) held public meetings for hundreds of residents to explain the subwatershed management plans and to receive public input.
- With cosponsorship and support from the Oakland County Drain Commissioner and the Wayne County Department of the Environment, SOCWA initiated the rain garden "agenda" for professionals in developed communities (e.g., planners, engineers, developers etc.) Demonstration rain garden projects have been planted in Lathrup Village and Birmingham.
- Cranbrook Institute of Science is creating an interactive Rouge River display.
- In cooperation with the Oakland County Planning and Development Division, the Oakland Land Conservancy and several communities have begun initiation of the "Rouge Green Corridor/ Greenways" map and project.
- In May 2001, FOTR began a volunteer benthic macroinvertebrate monitoring program. The program has grown from 14 sites and 20 volunteers in May 2001 to 20 sites and 105 volunteers in the fall of 2003.
- In partnership, Dearborn Public Schools students, Dearborn Parks Department and the Ford Motor Company worked together to plant Michigan native wildflowers at Ford Field.
- Since the summer of 2001, FOTR has offered 27 Information Outreach Workshops to residents of the Rouge communities on River Friendly Lawn Care, Backyard Wildlife Habitat, Rain Gardens, Rain Barrels, Streambank Stabilization/ Riparian Corridor Management, and Subwatershed Bus Tours. In September 2002, FOTR targeted elected officials with a Middle 3 bus tour and municipal employees with a stream bank stabilization workshop. In 2003, over 120 stakeholders participated in FOTR bus tours.
- In 2002, 30 Girl Scouts participated in River Day activities at Detroit's Rouge Park prairie/ native plants. In 2003, nearly 150 girl scouts participated in River Day at Rouge Park pulling invasives, planting natives and picking up trash.



Educating Students



Dearborn Public Schools Plantings

Where We Want to Be:

The 1994 RAP Goals:

1. Develop a strategy to educate the public about the positive and negative impacts that their actions have on the river.
2. Educate local governments about the importance of protecting the river and their responsibility in its remediation.
3. Coordinate efforts to clean up and enhance the Watershed.

The 2004 Goals:

1. Increase watershed awareness.
2. Increase storm water awareness.
3. Increase public awareness about how individual actions impact the river.
4. Educate local officials about watershed and storm water issues.
5. Coordinate the Public Education and Participation Plans (PEP and PPP) within and between the Subwatershed Advisory Groups (SWAGs).
6. Increase school-based, Rouge-specific environmental education.
7. Identify human resources and adequate funding for implementation of public education goals.
8. Develop mechanisms for ongoing input and advice from technical experts to staff responsible for education efforts.

How to Get There:

Phase I (2004 to 2007):

- Implement a viable river education program, including the public education and public participation activities developed under the Voluntary Watershed-based General Storm Water Permit.
- Promote environmentally friendly actions that can be taken by individuals. The actions may include the promotion of the following: Rouge Repair Kit, household hazardous waste collection days, and SOCCRA's Healthy Lawn and Garden Program.
- Secure necessary human and monetary resources to accomplish the goals.
- Develop a statewide public education strategy for use by Phase II permittees.
- Promote river friendly business practices.
- Create videos, public service announcements, and websites that promote awareness and actions by residents and that promote a consistent, watershed-wide message.
- Promote recognition of stewardship activities.
- Continue and/or expand the following activities: 1) SWAG and FOTR bus tours for local elected officials 2) annual Rouge 2000 event 3) IDEP and other training programs (Rouge Friendly Lawn Care, FOTR workshops, Riparian Corridor Management) and Rouge Rescue/ River Day practices for municipal staff.
- Financially support educational efforts of university, FOTR, RRAC and/or counties to sustain outreach and education efforts targeted to local elected officials, municipal staff and local citizens.
- Form long-lasting partnerships between communities, FOTR, other educational and stewardship organizations and local businesses.
- Develop a mass media campaign with a simple, consistent, public awareness message.
- Develop programs to present to local elected officials, including school boards, city councils and planning commissions in order to educate them on critical and technical issues so that they can make more environmentally sound decisions.
- Encourage increased media participation in watershed issues.
- Conduct surveys to evaluate effectiveness of public education efforts.

Primary responsibility: Local Governments, Counties, MDEQ, MDNR, FOTR, educational institutions, local businesses.

Phase II (2008 to 2014):

- Work with Rouge schools to integrate watershed education and programs such as the Rouge Education Project into their schools' curricula.
- Provide public access to geographic information system Rouge database.
- Create interactive educational exhibits that promote stewardship.
- Modify the public survey process to specifically target elected officials and begin gauging their awareness and support for watershed/storm water issues.

Primary responsibility: Local Governments, Counties, MDEQ, MDNR, FOTR, educational institutions

Phase III (2015 to 2020):

- Demonstrate significant improvement, since 2004, in survey results of local elected officials.
- Demonstrate through surveys the following: 1) 60 percent of surveyed residents have changed the type, amounts or application of lawn and garden fertilizers, pesticides or other chemicals. 2) 95 percent of surveyed residents have indicated refraining from disposing of any waste material into storm drains or have taken some action to minimize the amount of water draining into local storm drains or waterways. 3) 85 percent of surveyed residents have indicated that they have taken waste oil, antifreeze, batteries or other household hazardous waste in for recycling or proper disposal.
- Continue implementing a strong public education program and evaluating its effectiveness.

Primary responsibility: Local Governments, Counties, MDEQ

Recreational Use and Aesthetics

Active recreation is an important component of human culture. Just as significant is the opportunity for passive recreation. Many people enjoy a "private place" within the public environment -- places where they go to sit and watch the world go by. Places where they can relax and enjoy the quiet peace of a rambling stream in the midst of their busy lives. The availability of unadulterated spaces ensures the chance for human exposure and connection to nature. Active and passive recreation are elements of an enriched urban life.

The aesthetic value, or appearance, of the Rouge River is degraded by unnatural color from turbidity or cloudiness, solid waste or garbage, oil and unnatural odors. The river is considered to be impaired for aesthetic value in all branches except some headwaters areas. Sources that contribute to degradation include nonpoint source pollution, storm sewer discharges, combined sewer overflows, separated sewer overflows, contaminated sediments, erratic stream flows, permitted municipal and industrial discharges and illegal dumping or discharges.





Bathing Beach at Phoenix Park (historic photo courtesy of Wayne County Parks and Recreation)

Where We Were:

In the early 1900s the Rouge River was an aesthetically pleasant place to visit. Many recreational activities, such as picnicking, canoeing, fishing and swimming were safe. With the onset of industrial use and urban sprawl the river degraded to the point of becoming a nonviable recreational resource. It became polluted, developed unpleasant odors, contained abundant trash, and had increasing turbidity. In a 1999 survey, 61 percent of those interviewed indicated that they are familiar with the Rouge River. The two most desirable recreational uses were walking and picnicking.

The original Rouge RAP identified the Water Quality goal, "Make the Rouge River safe for total body contact recreation," and the "Resource Development" goal of "Enhance the recreational potential of the Rouge River and its banks, through both water quality and stream improvement measures."

Where We Are:

Today, with the implementation of pollution control measures, recreational use is making a comeback. More than 75 miles of the Rouge River flows through parkland, making it one of the most publicly accessible rivers in the state. In addition, the Rouge River Watershed has 300 parks, 20,000 acres of parkland, 27 nature preserves, and over 400 lakes, impoundments, and streams. Three trout derbies are held annually in the Rouge River. A golf course with adjoining created wetlands has been built near the Rouge River in Inkster. In addition, the Newburgh Lake restoration project, completed in 1998, allowed recreational use such as fishing and boating to return to the lake. To the extent that source impairments are reduced, the aesthetics of the river will continue to improve.



Walking Tour

Recreational Use and Aesthetics Progress Since 1998:

- At Ford Park in Northville, a project has begun to restore recreational activities focusing on ecology, integration of water, education program, pedestrian river walk and native plantings.
- Canton Township has developed a plan to construct non-motorized trails through the Lower 2 Rouge River Parkway and the community.
- Plymouth Township completed a project that included the installation of a barrier-free walkway trail system providing access along the creek to an existing pond and a proposed fishing platform. Habitat plantings define and enhance wildlife use areas adjoining the creek. Interpretive stations incorporate the creek, wetlands and upland areas to demonstrate elements in storm water and river ecology. A stream bank stabilization project using natural materials was installed in 2001.
- Salem and Lyon schools developed an outdoor lab and interpretive trail system. The activities compliment the science curriculum and recreational use at the schools.
- Washtenaw County has developed a Parks and Recreation system that strongly promotes both active and passive use. The county recently approved a dedicated millage to acquire and preserve open space.

- The restored Oxbow at The Henry Ford includes pathways so that visitors can view it.
- In Birmingham, the integrity and recreational uses of Quarton Lake and the Rouge River are being restored by the removal of accumulated sediment, sediment trap, shoreline stabilization, fish habitat enhancement, aquatic plant revegetation, and fish restocking. Lake monitoring and evaluation and assessment of influent stream are a part of this project. In addition, this project has used public involvement activities to educate area residents and upstream communities on how to protect Quarton Lake and the Rouge River.
- The University of Michigan-Dearborn has designed a series of projects at the Henry Ford Estate and the Environmental Interpretative Center that will provide a river-based recreation site for visitors, educate the public about the river and improve fish and wildlife habitat. The project will be the initial development increment of the Automobile National Heritage Area which will include the planning and design of a visitor area, a dock for tour boats at The Henry Ford, a bicycle and pedestrian trail, public access sites, a fishing pier, etc.
- FOTR has sponsored the annual Rouge Rescue/River Day for 17 years. During this annual event volunteers gather at the river and engage in environmentally friendly activities. Over the last few years, activities have moved away from simply clearing out all the logjams in the river to woody debris management, removing man-made debris, nature trail construction, habitat enhancement, stream bank stabilization and similar activities.
- A special project is being conducted in cooperation with Parks and Recreation staff from Southfield, Beverly Hills and Birmingham. The project is titled the "Rouge Green Corridor Resource Characterization Project" and experts are helping to identify the ecologic and resource character of the Main Branch Rouge corridor, stretching from 8 Mile Road north to Quarton Road. The project is in line with the plan objective of enhancing appropriate public use of the Rouge and recognizes the essential first step: defining the value of the natural resource at our door.

Where We Want to Be:

1994 RAP Goals:

1. Develop recreational opportunities.
2. Develop more fishing opportunities to encourage safe recreational activities. These fishing opportunities should be focused in areas without fish advisories. In other areas, catch-and-release fishing should be encouraged.
3. Reduce the bacterial levels in problem areas in order to make the river safe for full body contact recreation. (From Use impairment: "Restrictions on Swimming and Other Water-Related Activities.")
4. Eliminate objectionable deposits, unnatural color or turbidity, and unnatural odors that interfere with river aesthetics. (From Use Impairment: "Degradation of Aesthetics.")

2004 Goals:

1. Develop and expand recreational opportunities, including fishing.
2. Improve river aesthetics.
3. Create more opportunities for access to the river.
4. Meet the delisting criteria to delist the use impairments "Restrictions on Swimming and Other Water-related Activities" and "Degradation of Aesthetics." (see Table 1)

How To Get There:

Phase I (2004 to 2007):

- Identify pilot projects for additional recreational opportunities.
- Recruit more businesses, institutions, government and citizen organizations, and recreational groups to work together on restoration projects, programs and events.

- Encourage the MDNR-Fisheries Division and local governments to work in partnership to create fish habitat, thus increasing fishing opportunities.
- Expand the number of FOTR Rouge Rescue/River Day sites and the scope of activities to include more invasive species removal, stream bank stabilizations, native plant restoration, woody debris management, river celebrations, and nature walks.
- Support wildlife viewing opportunities, such as birding, on public land.
- Continue to eliminate/control point and nonpoint sources that contribute objectionable deposits, colors, and odors.

Primary responsibility: Local Governments, Counties, MDEQ, MDNR, Environmental Organizations, FOTR

Phase II (2008 to 2014):

- Encourage county parks and recreation administrators to increase public access through the construction of trail systems with active and strong support of the Southeast Michigan Greenways Initiative.
- Increase the number of fishing derbies.

Primary responsibility: Local Governments, Counties, MDNR, Wildlife Organizations

Phase III (2015 to 2020):

- Conduct surveys to evaluate the public awareness and use of the expanding recreational opportunities.
- Determine what remedial actions remain to eliminate the use impairments "Restrictions on Swimming and Other Water-Related Activities" and "Degradation of Aesthetics."

Primary responsibility: Local Governments, Counties, MDEQ, MDNR

Chapter 5

Take Responsibility for the Rouge - Stewardship

"Ford Motor Company's successful past and future are dependent on community quality of life and a healthy environment. The coalition of community, business and government which have come together to enhance the Rouge River Watershed are among the most outstanding environmental efforts I have seen, anywhere in the world. Our Company and I, personally, are proud to be a part of this endeavor. It is creating a healthy environment, vital communities, and a prosperous economy."

Tim O'Brien, Vice President, Governmental Affairs, Ford Motor Company



Main 1-2 Public Education Committee (1999)

The *Caring for Water*, *Caring for Nature*, and *Caring for Community* action steps identified in Chapter 2, 3, and 4, require three key factors for implementation: commitment, cooperation and change. Effective restoration of the Rouge means that all of us - citizens, politicians, municipal and agency personnel - actively commit and creatively cooperate. It means forming new partnerships in order to set goals, identify restoration priorities and funding mechanisms, and monitoring for success.



Change is the third key factor for successful implementation. As invested stakeholders, we must all examine ways to decrease the negative impact that we have on the natural world and make changes accordingly. We need to broaden our view and help others understand that the Rouge River Watershed is a functioning and essential part of our environment.

Local Government Stewardship

Local government leadership is essential to successful implementation of restoration actions cited in the RAP and the subwatershed management plans. This participation is also needed to complement the stewardship efforts of individuals, environmental groups, and businesses. A major goal is for local governments to work within their regulatory and statutory obligations while actively supporting the stewardship efforts.

Where We Were:

In the 1989 RAP, concerns about water pollution were largely focused on the need for expansion of the Detroit wastewater treatment plant and the need for controlling CSOs and SSOs in Detroit and several other communities along the Rouge River. However, for many of the communities, the problems seemed remote and distant from their backyards. Concerns about storm water were largely based on the need for public safety and flood control. However, the 1989 RAP foresaw the growing concern of storm water management, illicit discharges, and failing septic systems, and recommended storm water management plans and permits for local and county governments.

The 1989 RAP identified the RAP Implementation Process goal, "Build a strong local, state and federal coalition that will ensure implementation of the Remedial Action Plan."

Where We Are:

One of the most innovative efforts is underway in the Rouge River Watershed. In an initiative that addresses sources of pollution that include storm water runoff and nonpoint source pollution in a more holistic manner, municipalities and agencies have formed seven subwatershed groups to cooperatively address storm water management (See Appendix A). Voluntarily, Rouge communities and the three counties applied for and received Certificates of Coverage (COC) for the MDEQ NPDES General Wastewater Discharge Permit for Storm Water Discharges from Separate Storm Water Drainage Systems (formerly called the "Voluntary Watershed-based General Storm Water Permit").

The permit requires an Illicit Discharge Elimination Plan (IDEP); a program to eliminate illicit connections, address failing on-site sewage disposal systems (OSDS) and leaking sanitary sewers. It also requires the communities to implement a public education plan that addresses polluted urban runoff.

The goal of the pioneering efforts under the Voluntary Watershed-based General Storm Water Permit is to demonstrate that a flexible, locally driven program will be effective in dealing with wet weather issues. Coordinated and cooperative efforts between upstream and downstream neighbors should increase the efficiency and effectiveness of storm water control. Another advantage of this approach is that communities can choose what programs will be most effective in addressing local storm water issues. The EPA has endorsed the permit and will accept it in lieu of the pending federal requirements until 2007, when it will audit the program.

Local Government Stewardship Progress Since 1998:

- Local government leadership is being demonstrated through membership in Seven Subwatershed Advisory Groups (SWAGs). The goals of the groups include improving water quality, protecting property values and enhancing recreational opportunities and aesthetic appeal of the river.
- 41 permittees have approved Storm Water Pollution Prevention Initiatives and have begun implementation.
- In October 2001, the Rouge communities and counties began meeting to form a new watershed-wide coordinating mechanism. The functions of the Rouge Assembly include 1) providing basic, essential permit required services, such as river monitoring data, public education materials and SWAG facilitation 2) coordinating the transition from federal to local funding 3) providing advocacy for the membership.
- Bus tours were conducted for public officials in the Main 1-2 and the Middle 3 subwatersheds.

Where We Want to Be:

No 1994 Goal directly addressed local governments.

2004 Goals:

1. Implement strong local, state and federal coalitions ensuring ongoing actions to restore the Rouge River.

How to Get There:

All phases:

- Continue implementation of SWPPI actions.
- Continue developing cooperative approaches, such as the Rouge Assembly, with neighboring communities and regional agencies to sustain restoration and protection efforts.
- Continue to educate local officials on watershed issues.
- Demonstrate environmentally friendly practices on municipal property.
- Implement an effective public participation process in order to integrate the stewardship goals of citizens, businesses and environmental groups into the regulatory and statutory obligations of local governments.



RRAC Meeting

Primary responsibility: Local Governments, Counties, MDEQ

Business and Institutional Stewardship

Attitudes and perceptions about the Rouge River are becoming more positive and momentum is building. Awareness is growing regarding the role businesses and institutions play in the degradation as well as the restoration of the river.

Where We Were:

For most of the 20th century, industrial activities and discharges were a major contributing factor to environmental degradation in the Rouge River and Southeast Michigan. Most of the industries along the Rouge River used river water in industrial processes, as well as their sanitary sewer systems to carry away liquid wastes. The river was severely polluted especially in the downstream reaches where oil and other chemicals frequently floated on the water's surface and even caught fire.

The 1989 RAP did not address business stewardship directly but did identify the RAP Implementation Process goal, "Educate and involve the public to build understanding and support for restoration of the Rouge River."

Where We Are:

Today, major industrial discharges directly to the river are less than 2 percent of the pollutant sources to the Rouge. Major corporations are actively supporting and promoting stewardship efforts including the Rouge Education Project, recycling and pollution prevention, and habitat protection/restoration projects. Pollution control and prevention is being integrated into their daily activities. Small and medium-sized businesses are beginning to participate in pollution prevention initiatives such as Rouge Friendly Business programs, Community Partners for Clean Streams business recognition programs, and the Great Printers Project.

Institutions such as the University of Michigan, Henry Ford Community College and Cranbrook Educational Community are partnering with Friends of the Rouge and local communities to establish Rouge River resource information and interpretive centers and programs. A consortium of University of Michigan-Dearborn, Greenfield Village, Henry Ford Estate, Wayne County, local communities, the Ford Motor Company, DTE Energy and other businesses are teaming up to explore and promote revitalization of the lower portions of the Rouge River. Through the Gateway Partnership a fish ladder, interpretive trails, and boat tours linking historic sites along the Rouge River corridor are all aspects of the vision being promoted.

Since 1999, the Rouge River RAP Advisory Council (RRAC) has focused on revising the 1994 Rouge RAP. The five committees, Watershed Management, Habitat and Wildlife, Public Education, Pollution Prevention and Finance met regularly to draft sections of the 2004 RAP.

Business and Institutional Stewardship

Progress Since 1998:

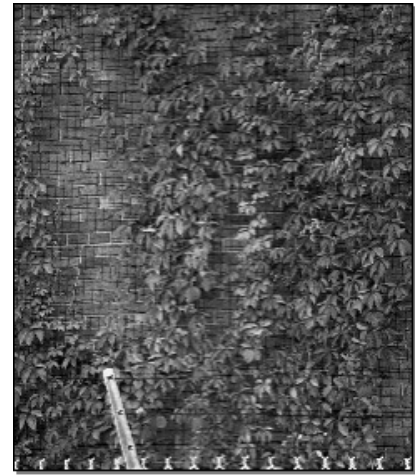
- Ford volunteers
- Each year DTE Energy provides partial funding, displays and presentations for the Rouge River Water Festival.
- In 1999, William McDonough was hired by the Ford Motor Company to redesign the Ford Rouge Center with the objective to transform the Rouge plant from the icon of the 20th century manufacturing to a model of 21st century sustainable manufacturing. Ford is



Ford Green Roof

implementing a variety of environmental sustainability initiatives at the Ford Rouge Center with goals to re-establish wildlife habitat, protect water quality and reduce flow from the site to the river during storm events. Current and planned projects include:

- ◊ A 10-acre sedum roof on the new Final Assembly building
 - ◊ A site-wide storm water management program including swales with hedgerows, constructed wetlands, pervious pavement and underground storage
 - ◊ Green screens and trellises on the sides of building planted with native vines
 - ◊ Phytoremediation, cleaning hydrocarbons from the soil with native plants
- Working in cooperation with municipal representatives SOCWA has enlisted the participation of more than 20 retailers for the slow-release sticker program.
 - The "Rouge Friendly Businesses" program continues to expand.
 - Members from the DTE Energy's Green Team participated in many watershed activities including the frog and toad surveys, the Johnson Creek Protection Group Earth Day festivals and clean-ups, and the Rouge Education Project.
 - In 2002, The University of Michigan-Dearborn Environmental Interpretive Center (EIC) created Corporate Leaders' Environmental Affiliates Network (CLEAN), an organization designed to develop strong and diverse partnerships between the EIC and local businesses. Companies support the EIC through corporate sponsorship and in return the EIC provides opportunities for corporate volunteerism and educational activities for employees' families, professional education programs, corporate recognition, research partnerships and advance recruitment.
 - DTE Energy supported the University of Michigan-Dearborn EIC through a \$50,000 contribution to the building fund, an "Energy of Nature" display, and the donation and installation of a solar energy system.
 - Washtenaw County hosts annual Environmental Excellence Awards that provide an opportunity for Rouge River Watershed businesses, institutions and multi-complexes to receive an award based on Pollution Prevention, Water Quality and Waste Management categories.
 - The RRAC and its committees drafted revisions to the 1994 Rouge RAP and completed the 2004 Rouge RAP.



Green Screens and Trellises

Where We Want to Be:

The 1994 RAP discussed financial and institutional arrangements but did not have a specific goal to address business and institutional partnerships.

2004 RAP Goal: Expand partnerships between government, business, educational institutions, other agencies and environmental groups to continue working together to restore and protect the Rouge River.

How To Get There:

All Phases:

- Sponsor Employee Volunteer days for Rouge restoration projects.
- Take a leadership role in providing community education regarding Rouge issues.
- Increase the number of businesses and institutions that are recognized as River Friendly or as a Community Partner for Clean Streams by 25 percent.

- Increase membership in University of Michigan-Dearborn's Environmental Interpretive Center's Corporate Leaders' Environmental Affiliates Network (CLEAN).
- Support conducting quarterly RRAC meetings to host a public forum for continued discussion of ongoing issues in the watershed.
- Conduct periodic surveys of local government, education officials and business owners to determine their understanding and involvement in the restoration and protection of the watershed.

Primary Responsibility: Local Governments, Counties, Local Businesses, Educational Institutions, MDEQ, USEPA

Chapter 6

Evaluating Progress - Monitoring

"If you don't measure it, you won't manage it."

Unknown



Monitoring

Monitoring water quality, biological communities and ecological conditions is essential to assessing the success of best management practices; remedial measures; trends in environmental conditions, and, identifying new and emerging problems so that eventually the Rouge River AOC can be delisted. Monitoring programs sufficient for these purposes, however, must be carefully designed and executed, require quantitative, timely data interpretation and reporting mechanisms and require consistent financial support. Previous monitoring programs were not entirely sufficient for these purposes, but current programs are moving in this direction.

Where We Were:

The Rouge River Watershed's numerous environmental problems have been studied by various consultants, volunteers, the RPO and the state, and federal governments since at least the 1930s. Studies have focused on water quality, sediment quality, biological communities, aquatic habitat features, land use and hydrology. Prominent historic monitoring reports are listed in Appendix H. An excellent summary of much of the historic monitoring data is contained in the "Rouge River Assessment" (MDNR, 1998).

The historic studies demonstrate that the Rouge River has had the same problems for decades:

- Poor water quality, including high bacteria counts, high nutrient concentrations and low dissolved oxygen concentrations - often associated with sewage inputs from CSOs and SSOs.
- Degraded biological communities, dominated by fish and macroinvertebrates tolerant of poor water quality.
- A few localized hotspots of contaminated sediments.
- Unnaturally high peak stream flows, after rain storms.
- Substantial losses of natural habitats - wetland, riparian corridor, upland forest, etc. - due to urbanization.

The 1989 RAP goals did not directly address the issue of water quality monitoring.

The previous studies, while good "snapshots" of historic conditions and immensely valuable for qualitatively assessing changing conditions over time, were often focused on short-term problem identification or regulatory compliance, rather than long-term trend assessment or resource management. More specifically, the older studies were often limited in geographic scale (sampling just a few stations), often did not resample the same locations over time or utilized different data interpretation techniques (limiting their utility for trend monitoring), and did not consistently measure the same parameters from study to study.



Sampling

Where We Are:

Since the early 1990s, the RPO's extensive monitoring program has made the Rouge one of the best-understood watersheds of its size in the world. Watershed-wide studies of water quality, sediment quality, biological communities and stream hydrology by RPO, the state, and the Friends of the Rouge have demonstrated some encouraging improvements in water quality and macroinvertebrates in some locations, but also that many of the historic problems remain. The numerous reports issued by RPO should

be consulted for details - see Appendix H, and the RPO website. Preliminary statistical analysis of the RPO water quality data set indicates that enough samples have been collected from a consistent set of stations for trend analysis, at least for conventional water quality parameters like dissolved oxygen, water temperature, suspended solids, etc. Data suitable for trend assessment of the Rouge's hydrology is also available, from USGS. Similar data for biological community health is currently lacking, except for the long-term migratory and nesting bird studies at the University of Michigan-Dearborn.

Where We Want to Be:

As the Rouge communities strive to protect and restore the natural features of the watershed, and eventually delist the Rouge River AOC, the focus of monitoring studies must shift from problem identification and regulatory compliance to trend monitoring and resource management. This will require:

- Limiting the parameters monitored to those that are directly related to the remaining problems will directly respond to the best management practices executed and will act as surrogates for other, unmeasured parameters.
- Locating stations such that they are representative of larger, unsampled portions of the river.
- Taking advantage of volunteer monitoring programs where possible, and confirming the accuracy of their data.
- Collecting an adequate number of samples from each station to characterize conditions at a specific location with known accuracy.
- Resampling the same locations regularly.
- And perhaps most importantly, ensuring timely data interpretation and communication by technical staff to decision-makers and the general public.

The three current major Rouge monitoring programs - conducted by RPO, the state, and the Friends of the Rouge - are moving in this direction. The water quality and quantity parameters, sampling locations and sampling frequencies of RPO's proposed long-term monitoring plan are designed to quantitatively assess the Rouge communities' progress in complying with their Voluntary Watershed-based General Storm Water Permit. The monitoring scheme, though focused on Voluntary Watershed-based General Storm Water Permit compliance, will provide data suitable for trend assessment for many of the remaining problems. Previous MDEQ monitoring has focused almost exclusively on compliance enforcement and use-attainment status. The agency is currently evaluating its biological and fish contaminant monitoring protocols for use in trend monitoring, however, and should be encouraged to make this a priority. FOTR is in the process of confirming the accuracy of the data generated by its volunteer macroinvertebrate sampling program, which conducts surveys far more frequently than the MDEQ (twice per year, versus once every five years). Preliminary results are promising. FOTR's frog and toad monitoring program should also prove useful for trend monitoring of wetland conditions, once data has been collected for a few more years.

These three monitoring programs combined still do not address a few important monitoring needs, particularly regular watershed-wide fish population and fish contaminant monitoring. Most importantly, all three programs still need to improve the timeliness of their data interpretation and communication procedures, especially RPO and the state (up to 12-month and 24-month reporting times, respectively). One possibility would be to expand the annual RPO monitoring summary report to include all monitoring surveys.

The 1994 RAP goals did not directly address environmental monitoring.

2004 RAP Goal: Establish scientifically rigorous, financially stable and cost-efficient monitoring programs to assess trends and inform resource managers and the public about water quality and flow, biological communities and aquatic and terrestrial habitats. The programs should consider both professional and volunteer monitoring efforts.

How to Get There:

Phase I (2004 to 2007):

- Continue implementation and evolution of the monitoring system established by RPO, USGS, Friends of the Rouge and the University of Michigan-Dearborn.
- MDEQ should make modifications to its biological and fish contaminant monitoring protocols so they are suitable for trend monitoring and can support implementation of the watershed management plans and 2004 RAP.
- Identify and establish mechanism(s) for stable, collaborative financing of the monitoring system intended to comply with the Voluntary Watershed-based General Storm Water Permit.
- Identify and implement procedures that improve the timeliness of data interpretation and reporting/communication of results to local decision-makers and the general public.

Primary responsibility: Local Governments, Counties, MDEQ

Phase II (2008 to 2014):

- Maintain watershed-monitoring program; make any modifications as required to support and assess implementation of comprehensive pollution controls, watershed management plans and habitat/river restoration projects.

Primary responsibility: Local Governments, Counties, MDEQ

Phase III (2015 to 2020)

- Continue watershed-monitoring program; make any modifications as required to support and assess implementation of comprehensive pollution controls, watershed management plans and habitat/river restoration projects.
- Utilize all available monitoring data to determine the delisting status of the Rouge River.

Primary responsibility: Local Governments, Counties, MDEQ

Chapter 7

The Challenge of Financing Rouge RAP Goals



"To facilitate the cooperative management of the Rouge River and to allow for mutual assistance in meeting the storm water permit requirements under the Michigan Department of Environmental Quality's watershed-based, general storm water discharge permit and similar requirements in other state water discharge permits."

*Mission of the Rouge River
Watershed Local Management
Assembly (Rouge Assembly)*



Rouge Assembly Officers (l-r) James D. Anulewicz, Plymouth Twp., Co-Chair; Thomas Biasell, City of Farmington Hills, Chair; Gary Mekjian, West Bloomfield Twp., Treasurer

With the passage of the Clean Water Act, first enacted in 1972 and subsequently amended, the federal government committed to removing polluted discharges from the nation's waterways. Citizen demand, enforcement and public works projects drove the Act. Industrial discharges were highly regulated and private funds were used to eliminate these discharges. Municipal discharges were controlled using both incentives and enforcement. Large grants made expensive projects palatable at the local level while the threat of fines helped keep the sometimes reluctant public officials moving forward.

The first 30 years of laws and rules requiring local government implementation of programs to improve water quality were accompanied by massive state and federal funding support. This funding support was a key to program implementation and water quality improvement. In the early years large federal grants (75 percent of costs) coupled with substantial state subsidies (an additional 10 percent grant) provided sufficient incentive for most communities to voluntarily proceed. With time, the program was reduced to a 55 percent grant and then was ultimately replaced by a loan program.

The recommendations and goals of the 2004 Rouge RAP, while necessary for improved water quality in Southeast Michigan, are coming at a time of financial crisis for most Rouge River Watershed communities. During an economic recession, dramatic reductions in revenue sharing funds from the State of Michigan, and cuts in funding for water quality projects from the state and federal governments, place all levels of government in severe economic conditions. Most of the Rouge communities face other infrastructure, public safety, and recreation costs which compete with environmental programs.

When the challenges faced by the locals, state and federal agencies are so daunting, it is more important than ever to find creative and innovative approaches to the funding of non-mandated projects recommended in the RAP. This will be essential to achieving *all* of the RAP goals, and the eventual delisting of the Rouge River as an Area of Concern (AOC).

Where We Were:

Beginning in 1992, the Rouge River Wet Weather Demonstration Project (also called the Rouge Project) was funded through grants totaling \$300,000 million from the USEPA, with additional funding from state and local sources, including an \$822,000 319 Grant from the State of Michigan for BMP demonstration projects. The Rouge Project is managed by Wayne County.

“The intent of the Rouge Project is to demonstrate storm water remediation techniques in an urban watershed using a comprehensive and cost-effective approach. An initial focus was upon the correction of SSOs and CSOs through the separation of sewers and the construction of CSO retention basins. In addition, the Project dealt with the problems of polluted stormwater runoff and other nonpoint source pollutants. Also included was an intensive monitoring and sampling program, modeling, geographic information systems and public outreach. Other urban watersheds throughout the nation can model their cleanup efforts based on the experience in the Rouge.”¹⁵

The 1989 RAP made a series of recommendations on funding initiatives required to implement the goals. In 1994, a report developed by Apogee Research, Inc. examined an array of institutional and financial arrangements for managing wastewater and stormwater. However, the Financial and Technical Advisory Group for the study could not reach consensus on a final recommendation.

Where We Are:

To date, approximately \$500,000 million has been spent on the restoration of the Rouge River. However, the federal grant dollars for the Rouge Project are dwindling. The Rouge Project and direct federal appropriations cannot be counted on as sources of future funding. At the same time funding has declined, demands on local governments to meet new requirements are increasing. Municipalities are faced with meeting new and expanded mandates independent of state and federal assistance, challenging them to seek long-term, stable sources of locally derived revenue.

To continue the restoration effort and to comply with the Phase II Watershed-based General Stormwater Permit, the Rouge permittees have formed the Rouge Assembly (see *Local Government Stewardship* section). One of the functions of the Assembly is to coordinate the transition from the Rouge Project dollars to local and other sources.

Funding for Sewage Collection and Treatment

For the most part, funding support for sewer programs has steadily declined and efforts to reverse that trend have mostly failed. For example, in 2000 Michigan's federal allotment and state contribution for sewer funding programs totaled \$68 million, down from \$255 million in 1974.

In April 2001, the Southeast Michigan Council of Governments (SEMCOG) prepared the report, *Investing in Southeast Michigan's Quality of Life: Sewer Infrastructure Needs*; a comprehensive analysis of the water quality and sewer infrastructure challenges in Southeast Michigan. The report concluded that there is a serious shortfall in fiscal resources needed to sustain Southeast Michigan's aging sewer infrastructure. It is estimated that over the next 30 years, an additional \$14-26 billion will be needed to maintain and improve the region's sewage collection and treatment systems. These estimates grow to \$29-52 billion when inflation and interest charges for capital projects are considered.

Funding for Storm Water Management

The NPDES Phase II program brings focus to many pollutant sources but stops short of requiring communities to manage their storm water in a manner that would require extensive retrofits. Many recommended projects, such as habitat restoration or streambank stabilization, are not required by law. Funding from the Clean Michigan Initiative and the Section 319 grant programs has encouraged several communities to pursue these efforts. Unfortunately this funding is insufficient for the long list of projects that are deemed necessary to fully restore the Rouge. For this reason, communities have been investigating the use of the Drain Code and/or the formation of a storm water utility as a means of generating funds. The State Revolving Fund (SRF) program can also be used to fund non-point source control projects.

"Integrating stormwater management programs into daily procedures of a community will most likely incur new costs. In many cases, communities and agencies will need to explore creative solutions to finance new staff, new programs, and new requirements in their stormwater program. Grants may be available, often with a local match involved, but these are short term solutions for one time projects. Long term solutions that have been tested include implementing a stormwater utility fee, incurred by users of the stormwater system; use impervious cover as a basis for user fees; give credits to fees if private detention/retention practices exist; create habitat stamps patterned after the duck stamp program; one-time septic system installation fee; restore Buffer Incentive Program to \$500/acre payment to landowners; purchase of environmental easements by the private sector; adopt-a-stream/fish giving programs; statewide Purchase/Transferable Development Right Bank (PDR/TDR); lawn and garden fertilizer surcharge; charge per day exposed acre of land on construction sites."¹⁶

Funding Challenges in the Rouge Watershed

Federal, state, local units of governments and citizens must all bear responsibility for providing funding for the projects listed in the RAP. Sewage collection and treatment, while costly, has a well-defined financing mechanism; loans coupled with sewer rates. This represents 35 percent of the costs listed in the RAP. The other 65 percent must rely on non-traditional financing.

Managing the Challenge

Given competing needs for public resources, it is unlikely that the gap between available funding for environmental needs and mandated projects can be eliminated — at least in the foreseeable future. (See Appendix J for *An Evaluation of Existing Funding Sources*) Because of the substantial gap between available funding and infrastructure needs, the challenge is to find ways to simultaneously increase funding and reduce costs.

Meeting the challenge will result in cost savings by avoiding future remediation costs, reducing emergency fixes, reducing lawsuit settlements and avoiding more costly court ordered solutions. It is imperative to explore all available funding options and to seek creative sources wherever possible. (See Appendix K and L)

Meeting the challenge means residents will enjoy the benefits of cleaner water, improved quality of life, and the continued economic vitality needed to support our ability to finance these investments in our future.

Finance Progress Since 1998:

- Local governments, county and state agencies and non-governmental organizations continue to commit funding and staff resources to the restoration and protection of the watershed.
- In July 2002, Wayne County awarded Round III grants totaling over \$3.8 million in federal grants and over \$3.8 million in local matching funds.
- In December 2002, Wayne County awarded Round IV grants for CSO/SSO control projects totaling over \$10 million in federal grants.
- In 2003, Local governments united to create the Rouge Assembly.
- In August of 2000, SEMCOG published the document, *Managing the Cost of Clean Water: An Assessment of Michigan's Sewer Infrastructure Needs*.
- In April of 2001, SEMCOG published another document, *Investing in Southeast Michigan's Quality of Life: Sewer Infrastructure Needs*.
- Every year, Wayne County publishes a document that reviews the previous year's accomplishments and successes under the Rouge Project.
- In November 2002, a majority of Michigan's registered voters agreed to the issue of a 'Billion Dollar Bond' (Proposal 2) which was approved for financial support of two programs: one existing program, the State Revolving Fund (SRF), provides low interest loans to communities for publicly-owned wastewater facilities, and one new program, the Strategic Water Quality Initiative Fund (SWQIF). The SWQIF is the first loan program that was created especially for Michigan communities needing to perform work on private property, such as replacement of failing septic systems and the disconnection of privately owned footing drain connections to public sanitary systems.¹⁷ For more information on the Strategic Water Quality Initiatives Fund (SWQIF) visit the Water Funds website: http://www.michigan.gov/deq/0,1607,7-135-3307_3515_4143—,00.html
- In November 2002, the Great Lakes Legacy Act, passed by Congress, authorized \$270 million for cleanup efforts in the AOCs. Over a five-year timeframe the law authorizes:
 - ◊ \$50 million annually for assessment, monitoring and remediation of contaminated sediments;

- ◊ \$3 million annually for research on sediment treatment technologies; and
- ◊ \$1 million annually for a public information program.
- The Great Lakes Commission has developed a list of funding sources called, *Selected Federal and Foundation Funding Sources Available for Environmental Restoration Efforts in Michigan's Great Lakes Areas of Concern* (See Appendix K)
- The following projects were or are in the process of being implemented with the assistance of the MDEQ-NPS staff technical support and CMI funding:
 - ◊ Section 34 Swales – City of Southfield
 - ◊ Flemings Roseland Detention Basin – City of Farmington Hills
 - ◊ Quail Ridge Drain Improvement – Northville Township
 - ◊ Old Orchard Pond Restoration – City of Dearborn Heights
 - ◊ Rouge River Improvement – Ford Field Bridge – City of Dearborn
 - ◊ Streambank and Outlet Stabilization Projects – City of Novi
 - ◊ Wayne City Hall Parking Lot Improvements – City of Wayne
 - ◊ Storm Water Treatment Wetland – City of Dearborn
 - ◊ Shared Parking Lot BMP Project – Village of Beverly Hills
- In 2003, with state and local grants, the City of Southfield worked in partnership with the Oakland Land Conservancy to acquire private property, Berberian Woods, for a nature preserve along the Rouge Corridor.

Where We Want to Be:

The 1994 RAP discussed financial and institutional arrangements but did not have a specific goal to address funding.

2004 RAP Goal: Identify and implement cooperative and innovative solutions to meet the serious funding challenges faced by the Rouge community.

How to Get There:

All Phases (2004 – 2020):

- Meet the challenge of funding infrastructure needs by following the “Action Steps” recommended in the SEMCOG report, *Investing in Southeast Michigan's Quality of Life: Sewer Infrastructure Needs*, April 2001. (See Appendix M)
- Share resources and ideas across the watershed to increase cost efficiency.
- Endorse the efforts of SEMCOG, the Water Quality Consortium and MDEQ to refine the SRF program so that communities are able to make fuller use of the funding resources.
- Expand volunteer efforts and coordinate with local environmental groups. Volunteers can be recruited for activities such as:
 - ◊ Seniors conducting public education phone surveys
 - ◊ Graduate students conducting watershed research both in the field (collecting scientific data, based on identified needs); and in the office (data input and interpretation).
 - ◊ The continued expansion of the FOTR frog and toad and macroinvertebrate surveys
 - ◊ Training volunteer groups for wildlife and habitat inventories (such as the Johnson Creek Protection Group has done)
 - ◊ Expanding River Day walks, plantings, woody debris management
 - ◊ Working with local Watershed Stewards' groups developing presentations for homeowners' associations, local businesses, government officials etc.
- Initiate a challenge fund to match corporate donations, or a tax credit program to attract corporate investment.
- Seek an expanded role for private foundations in funding projects.
- Develop an “Adopt-a-River” segment program.
- Create endowment funds for environmental protection and restoration (e.g. stream restoration, wetlands preservation, conservation easements).

- Create partnerships between local governments, land conservancies and private donations to meet match requirements for grant funding.
- Reduce expenses through better environmental practices, including pollution prevention.
- Reduce costs through the use of protection of critical land resources, rather than incurring the higher costs of restoration.

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Appendices



- A Summary of Subwatershed Management Plans
- B Model Decision Making Process
- C Amphibians and Reptiles in the Rouge river Watershed
- D Mammals in the Rouge River Watershed
- E Natural Features of the Rouge River Watershed
- F Birds Regularly Occurring in the Rouge River Watershed
- G Rouge Contacts and RRAC Members
- H Selected Rouge River Monitoring Reports
- I Comment Letters
- J An Evaluation of Existing Funding Sources
- K Selected Federal and Foundation Funding Sources Available for
Environmental Restoration Efforts in Michigan's Great Lakes Areas of
Concern
- L Example Funding Sources
- M Managing the Challenge: A Blueprint for Action

Appendix A

Introduction

Seven Subwatershed Management Plans were developed as part of a comprehensive effort to restore the uses of the Rouge River impaired by pollution and excessive river flows. The purpose of these plans is to mitigate the adverse effects of pollution caused by wet weather discharges (e.g., combined sewer overflows (CSO), sanitary sewer overflows (SSO), and stormwater) as well as the effects associated with dry weather conditions (e.g., illicit discharges to separate storm sewers). The plans also outline the steps needed to control and reduce the adverse affects of excessive river flows that impair fish and wildlife values and injure riparian property. This summary will provide an overview of the information detailed in the seven Rouge River Subwatershed Management Plans developed as a requirement of the Michigan Department of Environmental Quality (MDEQ) Voluntary General Storm Water Permit (MIG610000).

The problems and opportunities for protecting and restoring the Rouge River vary from one subwatershed to another, depending upon the type and intensity of urbanization, the age of the communities, and the design and function of storm and sanitary sewer infrastructure developed over the past 100 years. The seven subwatersheds that were identified to address Rouge River impairments are based upon hydrologic boundaries, so the political boundaries of many communities overlap two or more subwatersheds. While the subwatersheds tend to aggregate communities that have common issues, differences between communities and agencies even within a single subwatershed often require different management practices to meet water management goals.

The watershed approach to management of the Rouge River is unique in that it allows maximum flexibility for regulated communities and agencies to participate in an integrated effort to protect and restore the river. The long-term goals (i.e., greater than five years) established in each of the subwatershed plans will take many years to achieve. Actions are identified, however, to meet short-term objectives (i.e., less than five years) that will be steps toward meeting long-term goals. The approach periodically will measure success toward achieving these long-range goals and modify future actions based upon the progress made.

State of the Watershed

The Rouge River watershed encompasses a diverse geographic area that is home to 1.5 million people living in 48 communities and three counties, as shown in Figure 1. It includes portions of urban core cities, older suburban communities, and rapidly developing rural areas of southeast Michigan. Table 1 summarizes several political and hydrologic characteristics for each subwatershed.

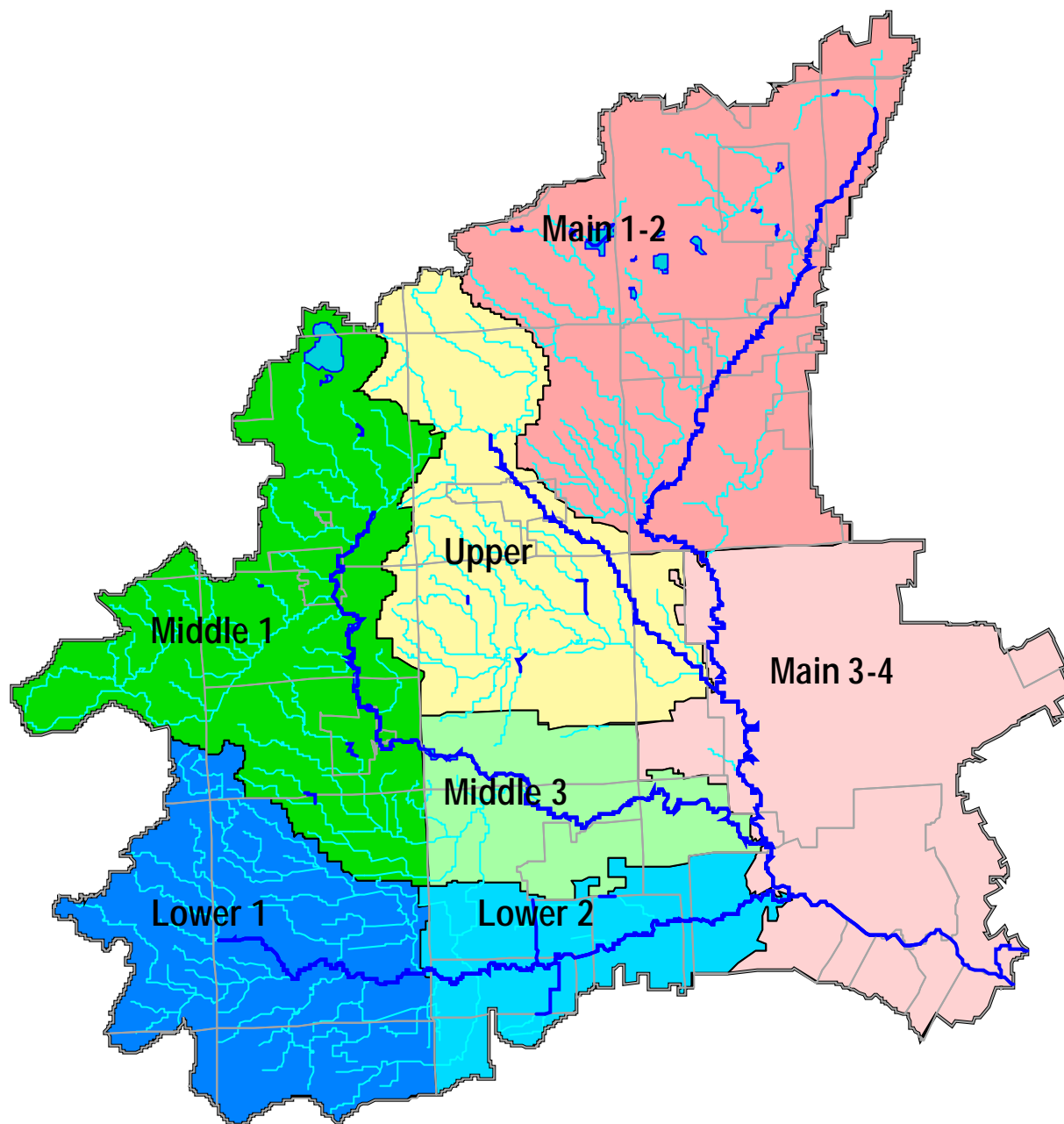
Extensive monitoring within the Rouge River watershed has been conducted, encompassing numerous measures of stream and ecosystem health. Monitoring conducted includes:

- Bacteria
- Oxygen Demand
- Nutrients
- Solids
- Metals
- Toxic contaminants in sediments and water
- Rainfall
- Water and stream levels and flows
- Algae
- Fish and wildlife habitat
- Fish and Benthic Macroinvertebrates
- Aesthetic indices

Appendix A

Urbanization has created unstable flow conditions throughout the Rouge River watershed. In fact, the primary source of flow in the Rouge River is now surface water runoff. Highly fluctuating flows are common, and in general, the frequency and magnitude of flood flows in the watershed have increased with increased urbanization and associated impermeability of the watershed.

Figure 1 - Rouge Subwatersheds



Appendix A

Table 1: Summary of Subwatershed Characteristics

Subwatershed	Number of Counties	Number of Communities	Population ¹	Drainage Area (mi ²)	Percent of the Watershed as Impervious Area
Upper	2	8	177,000	91	21%
Middle 1	3	13	94,000	81	17%
Middle 3	1	4	125,000	32	29%
Lower 1	2	6	58,000	62	N.A. ²
Lower 2	1	7	134,000	33	32%
Main 1-2	1	18	215,000	103	N.A. ³
Main 3-4	1	8	593,000	91	N.A. ⁴

¹Population based on 1990 census.

²Not Available: Value not reported in the Lower 1 Subwatershed Management Plan.

³Not Available: Value not reported in the Main 1-2 Subwatershed Management Plan. (66% of land use is identified as residential.)

⁴Not Available: Value not reported in the Main 3-4 Subwatershed Management Plan. (56% of land use is identified as residential, 30% industrial.)

Water quality is highly variable within the Rouge Watershed. In the areas that contain them, CSOs have significantly degraded water quality. In general, the measured water quality parameters (i.e., dissolved oxygen, metals, bacteria, nutrients, and suspended solids) indicate much poorer water quality downstream of the CSO discharges. Approximately 38 of the 127 miles (30%) of the larger streams and tributaries of the Rouge are currently impacted by CSOs. However, significant water quality improvements have been achieved through the control of 40% of the original CSO areas. While water quality improves in areas not impacted by CSOs, bacteria and dissolved oxygen levels still do not meet Michigan water quality standards in many areas. Illicit connections (i.e., illegal or unintentional connection of waste drains into separate stormwater systems), possible separate sanitary sewers overflows (SSOs), and failing septic systems are suspected sources of pollution in the areas upstream of the CSOs.

Habitat quality and fish sampling in the Rouge River watershed indicate that highly variable flows and poor water quality have caused adverse impacts for aquatic species in most areas. A RPO aquatic habitat quality in 1996 found that more than half of all sites monitored had fair or poor conditions. Excellent habitat conditions were observed in the Middle 1 subwatershed only. A 1995 Michigan Department of Natural Resources (MDNR) Fisheries Division survey indicated that pollution intolerant fish species were found in less than 50% of sites monitored in each subwatershed.

Existing Pollution Sources

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. Flow variability, excessive sediment and nutrient loading, bacteria, toxics and heavy metals, increase in temperature and loss of natural features were all identified as threats to river quality. Table 2 lists sources and causes of river quality threats identified for each Rouge subwatershed.

Appendix A

Table 2: Sources of Pollutants in the Rouge River

Threats to River Quality	Sources Identified by Each Subwatershed	Upper	Middle 1	Middle 3	Lower 1	Lower 2	Main 1-2	Main 3-4
Flow Variability	Urban stormwater	√	√	√	√	√	√	√
	Groundwater			√				
Sediment	Construction sites	√	√	√	√	√	√	√
	Roads/streets/highways		√	√	√	√	√	√
	Eroding stream banks and/or bed scour		√	√	√	√	√	√
	Agricultural land		√		√	√	√	√
	Livestock in streams		√	√	√	√	√	√
	Urban stormwater	√		√				
	Residential lawns	√	√	√	√	√	√	√
Nutrients	Failing septic systems		√	√	√	√	√	√
	Illegal discharges to the storm sewer		√	√	√	√	√	√
	Golf courses		√	√	√	√	√	√
	Streets		√	√	√	√	√	√
	Agricultural fertilizers and livestock waste		√		√	√	√	√
	Waterfowl and pet waste		√	√	√	√	√	√
	Combined Sewer Overflows	√		√				
	Sanitary Sewer Overflows	√		√				
	Failing Septic Systems	√	√	√	√	√	√	√
Bacteria	Illegal Discharges to the Storm Sewer	√	√	√	√	√	√	√
	Combined Sewer Overflows	√		√		√		√
	Sanitary Sewer Overflows	√		√		√	√	√
	Pet and waterfowl waste		√	√	√			
	Livestock wastes		√		√			
	Atmospheric deposition		√		√	√	√	√
Toxics/Heavy Metals	Construction materials		√		√	√	√	√
	Street/roads/highway runoff	√	√	√	√	√	√	√
	Household Hazardous Waste	√	√		√	√	√	√
	Combined Sewer Overflows			√				
	Sanitary Sewer Overflows			√				
	Deicing of roads	√		√				
	Landfill leachate			√				
	Runoff from polluted areas			√				
	Illegal Discharges to the Storm Sewer			√				
	Impervious surfaces		√		√	√	√	√
Temperature increase	Lack of riparian vegetation	√	√		√	√	√	√
Loss of natural features	New development		√		√	√	√	√
	Older, urban development/redevelopment		√		√	√	√	√

Appendix A

Subwatershed Goals and Objectives

Individual Subwatershed Advisory Groups established goals and objectives for each Rouge subwatershed. Numerous resources provided a basis for these goals and objectives. Consideration was made for the designated and desired uses for each subwatershed, the vision for the Rouge River as stated by the Rouge Remedial Action Plan (RAP), and public opinion. Subwatershed goals establish a framework to guide long-term efforts to protect the existing values of the river and restore the impaired uses. Short-term objectives identify the conditions or activities that will be completed within the next five years as interim steps in achieving the long-term goals, those that will be realized beyond five years. The short-term objectives have measurable outcomes that can be used to monitor progress. Examples of Rouge River subwatershed goals and corresponding objectives include:

- Goal:** Reduce Excessive River Flows.
- Objective:** Evaluate the effectiveness of current design requirements for onsite stormwater management in county, township, and city permit and site plan approval processes to assure effective control of the volume of stormwater runoff.

- Goal:** Remove sources of pollution that threaten public health.
- Objective:** Develop detailed plans and approved schedules for satisfactorily addressing known SSOs.

- Goal:** Increase public understanding of their role in protecting water quality.
- Objective:** Develop and/or promote existing public involvement programs (workshops, events, etc.) to improve the public's understanding of their role in protecting water quality.

- Goal:** Reduce soil erosion and sedimentation.
- Objective:** Revise ordinances to prevent, minimize and reduce soil erosion and sedimentation, especially from construction sites.

The designated and desired uses for each subwatershed, as well as the vision for the Rouge River as stated by the RAP, individual Subwatershed Advisory Groups and the public, provided a basis from which to build long-term goals and objectives for each subwatershed. Table 3 summarizes the general goal topics established for each Rouge subwatershed.

Table 3: Subwatershed Goals

Goals Identified Related To:	Upper	Middle 1	Middle 3	Lower 1	Lower 2	Main 1-2	Main 3-4
Flow	√	√		√	√	√	√
Water Quality		√	√	√	√		√
Soil Erosion/Sedimentation	√	√		√	√	√	
Public Health	√		√		√	√	√
River Aesthetics	√					√	

Rouge River National Wet Weather

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11/25/03

Demonstration Project

Appendix A

Goals Identified Related To:	Upper	Middle 1	Middle 3	Lower 1	Lower 2	Main 1-2	Main 3-4
River Ecosystem and Habitat	√	√	√	√	√	√	√
Recreation		√	√	√		√	√
Education		√	√	√	√		√
Great Lakes Quality						√	
Institutional Arrangements and/or Financing		√	√	√			
Subwatershed Monitoring		√		√			
Stormwater Management in Planning and Land Use Approval Process		√		√			
Enforcement and Accountability for Stormwater Management		√		√			
General Storm Water Permit			√				

Management Alternatives and Planned Actions

There are variety of alternative actions that can be used to achieve the goals established for protection and restoration of each Rouge Subwatershed. The communities and agencies within the Rouge Watershed identified the ongoing actions during 1999 and 2000, and those planned through 2005 to assist in meeting the long-term goals and short-term objectives. Over 250 different types of management practices and activities are planned or are currently underway throughout the Rouge Watershed. Participating communities and agencies have described a combined total of more than 1,100 activities. Table 4 summarizes alternative actions identified by the Rouge Subwatersheds. These actions are grouped by the related goal category they address.

Table 4: Management Practice Activities to Address Subwatershed Goals

FLOW	
<ul style="list-style-type: none"> • Reduce directly connected imperious surfaces • Slow stormwater runoff 	<ul style="list-style-type: none"> • Construct/maintain wet detention ponds • Construct/maintain stormwater infiltration devices
WATER QUALITY	
<ul style="list-style-type: none"> • Street sweeping • Reduce fertilizer runoff and phosphorous discharge • Conduct household hazardous materials management programs 	<ul style="list-style-type: none"> • Support environmentally friendly lawn and garden maintenance • Install/maintain oil and grease trap devices

Appendix A

SOIL EROSION/SEDIMENTATION	
<ul style="list-style-type: none"> • Control soil erosion • Perform sewer system cleaning • Perform catch basin cleaning • Construct/maintain detention and/or retention ponds • Construct/maintain media filters 	<ul style="list-style-type: none"> • Use engineered streambank stabilization measures • Prevent and remove stream obstructions • Assure soil stabilization measures used • Install/maintain sediment trapping devices
PUBLIC HEALTH	
<ul style="list-style-type: none"> • Identify and control untreated CSOs • Identify and control SSOs without causing basement flooding • Identify and eliminate illicit discharges 	<ul style="list-style-type: none"> • Identify and eliminate failing OSDS • Perform septic system/sanitary sewer maintenance • Maintain infrastructure
RIVER AESTHETICS	
<ul style="list-style-type: none"> • Continue participation in annual Rouge Rescue/River Day • Educate riparian landowners about their responsibilities 	<ul style="list-style-type: none"> • Provide "hotline" to report illegal dumping or disposal practices • Publicize correct disposal practices for household waste
RIVER ECOSYSTEM AND HABITAT	
<ul style="list-style-type: none"> • Improve or create fisheries and wildlife habitat • Identify opportunities to create habitat in conjunction with other public or private water management projects 	<ul style="list-style-type: none"> • Preserve and enhance existing wetlands • Develop and encourage the implementation of best management practices for park lands, golf course, and other publicly owned lands adjacent to the river to assure that maintenance practices adequately protect water quality
RECREATION	
<ul style="list-style-type: none"> • Reduce geese populations • Land Use Planning and Management 	<ul style="list-style-type: none"> • Continue/expand litter and debris clean up
EDUCATION	
<ul style="list-style-type: none"> • Develop and implement public participation program • Inform residents of the costs and benefits involved in restoring the river 	<ul style="list-style-type: none"> • Encourage riparian land owners to manage their waterfront as an asset to enhance property values • Encourage use of parklands adjacent to the river
GREAT LAKES QUALITY	
<ul style="list-style-type: none"> • Produce and distribute education and information materials for homeowners on proper disposal of hazardous waste, minimization of lawn and garden chemical use, and problems associated with residential car washings 	<ul style="list-style-type: none"> • Advertise "hot line" for reporting discharges of toxic pollutants • Enhance soil erosion and sediment control programs • Address discharges from CSOs and SSOs

Appendix A

FINANCING AND/OR INSTITUTIONAL ARRANGEMENTS	
<ul style="list-style-type: none"> • Explore need for new staffing • Develop local financial arrangements 	<ul style="list-style-type: none"> • Determine entity to produce and coordinate technical watershed-wide information
SUBWATERSHED MONITORING	
<ul style="list-style-type: none"> • Work with MDEQ and RPO to review existing programs • Identify specific desired uses to direct monitoring 	<ul style="list-style-type: none"> • Establish additional long-term monitoring program
STORMWATER MANAGEMENT IN PLANNING AND LAND USE APPROVAL PROCESS	
<ul style="list-style-type: none"> • Creation of wetlands, woodlands/tree replacement, natural features setback, and zoning ordinances 	<ul style="list-style-type: none"> • Develop ordinance/incentive explanations/handbook • Ongoing education for land use decision makers
ENFORCEMENT AND ACCOUNTABILITY FOR STORMWATER MANAGEMENT	
<ul style="list-style-type: none"> • Develop and adopt water resource protection ordinances that are enforceable 	<ul style="list-style-type: none"> • Continue involvement in the Michigan Voluntary General Storm Water Permit program

Progress Measurement

The Subwatershed goals established to protect and restore water uses of the Rouge River are ambitious and may take several decades to accomplish. However, significant progress can be made over the next five years and the short-term objectives identify the progress that can be reasonably expected to occur if the actions contained in the Subwatershed Plans are fully implemented by the cooperating public agencies, private organizations, businesses, and residents. At the end of 2005 there should be sufficient information available to document whether or not the short-term goals have been met and what additional actions are needed to assure continuing progress toward meeting the long-term goals.

Table 5 summarizes measures to evaluate how effective the proposed Subwatershed actions have been in achieving short-term objectives and long-term goals. Where possible the measures focus on quantifiable improvements documented by direct sampling of the river. Where studies or investigations are needed to evaluate alternatives or develop information, the measure is simply a determination of whether or not the proposed action has been completed on schedule.

Table 5: Progress Measures for Rouge Subwatershed Goals

FLOW	
<ul style="list-style-type: none"> • Rainfall monitoring • USGS flow monitoring 	<ul style="list-style-type: none"> • Macroinvertebrate monitoring
WATER QUALITY	
<ul style="list-style-type: none"> • Dry and wet weather water quality sampling 	<ul style="list-style-type: none"> • Macroinvertebrate monitoring

Appendix A

SOIL EROSION/SEDIMENTATION	
<ul style="list-style-type: none"> • Dry and wet weather total suspended solids sampling • Aesthetics monitoring 	<ul style="list-style-type: none"> • Habitat assessment, embeddedness and bottom deposition measures • Macroinvertebrate monitoring
PUBLIC HEALTH	
<ul style="list-style-type: none"> • Dry weather water quality monitoring for <i>E. coli</i> and DO 	<ul style="list-style-type: none"> • Wet weather water quality monitoring for <i>E. coli</i> and DO
RIVER AESTHETICS	
<ul style="list-style-type: none"> • Aesthetics monitoring 	<ul style="list-style-type: none"> • Dry and wet weather water quality monitoring for Total Phosphorus
RIVER ECOSYSTEM AND HABITAT	
<ul style="list-style-type: none"> • Evaluate frog and toad population trends 	<ul style="list-style-type: none"> • Macroinvertebrate monitoring • Fish monitoring
RECREATION	
<ul style="list-style-type: none"> • Recreation use and aesthetics monitoring/surveys 	<ul style="list-style-type: none"> • Dry and wet weather water quality monitoring for <i>E. coli</i>
EDUCATION	
<ul style="list-style-type: none"> • Evaluate participation in Rouge Rescue Days • Evaluate on the number of schools involved in Rouge Education Project (REP) • Evaluate the number of visitors community watershed/ stormwater websites 	<ul style="list-style-type: none"> • Evaluate participation in household hazardous waste collection days • Telephone or mail survey of watershed residents • Evaluate the types and amount of public education (PE) materials distributed and the number of households reached
GREAT LAKES QUALITY	
<ul style="list-style-type: none"> • Evaluate on the number of schools involved in Rouge Education Project (REP) • Evaluate the number of visitors community watershed/ stormwater websites 	<ul style="list-style-type: none"> • Telephone or mail survey of watershed residents • Evaluate the types and amount of PE materials distributed and the number of households reached
FINANCING AND/OR INSTITUTIONAL ARRANGEMENTS	
<ul style="list-style-type: none"> • Reporting on activities performed and evaluating success 	
SUBWATERSHED MONITORING	
<ul style="list-style-type: none"> • Reporting on activities performed and evaluating success 	
STORMWATER MANAGEMENT IN PLANNING AND LAND USE APPROVAL PROCESS	
<ul style="list-style-type: none"> • Reporting on activities performed and evaluating success 	
ENFORCEMENT AND ACCOUNTABILITY FOR STORMWATER MANAGEMENT	
<ul style="list-style-type: none"> • Reporting on activities performed and evaluating success 	

Subwatershed Plan Updates

The short-term objectives established in the Rouge Subwatershed Management Plans are to be implemented, as scheduled by each community, through 2005. These activities are part of a long-term effort to protect the Rouge River and restore the designated uses. The process for

Appendix A

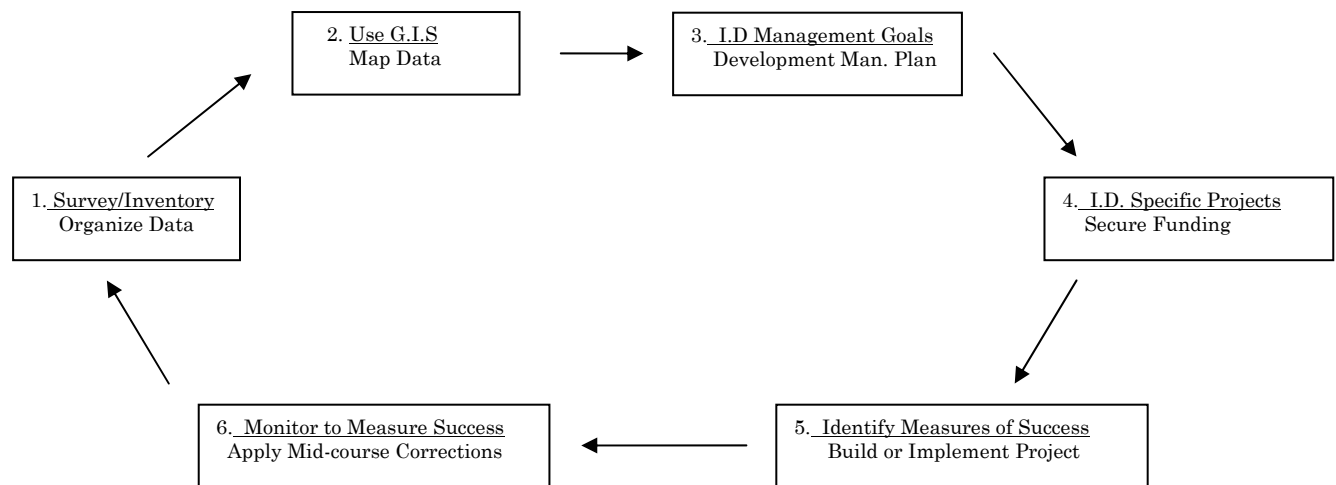
revising the plans will be based on results of the measures for progress. Revisions will begin in 2002 with a target for the first updates in 2005. The updated plans will document the success in achieving the short-term objectives, reassess long-term goals and schedule new initiatives for the next five-year period (2006-2011). Through this iterative process the communities and agencies will be able to evaluate and apply the most cost-effective approaches to protecting and restoring the river to meet the long-term goals consistent with state and federal water quality requirements.

As in the development of the plans, the public will be invited to participate in the review of progress, in the reassessment of long-term goals, and in consideration of alternative actions for the next five-year period. Public meetings and formal hearings before local governing bodies will be provided at a minimum. Workshops and/or other public involvement mechanisms may be utilized to assist in obtaining public input and support of plan revisions. Within the next five years the Rouge Subwatershed Advisory Groups intend to meet periodically to share data, assess progress and review new information on best management practices. Based upon new information, the Subwatershed Advisory Groups may recommend modifications to the Subwatershed Management Plans prior to the 2005 update.

Appendix B

Schematic Relationship of Mechanism to Provide Resources to Reduce Impairments Degrading Fish and Wildlife Populations

The following schematic illustrates the relationship between the components needed to implement and then evaluate the actions taken to effect positive changes in environmental and ecological parameters affecting fish and wildlife populations with the Rouge River Watershed.



The scheme above shows the relationships between the various program elements. Each element above the line leads to a product that is needed to carry the process forward in a logical sequence of events leading to implementation and then evaluation of any action that has been undertaken. Notice that the entire process is cyclic. That is, the final element leads back to the first element (Survey/Inventory) showing that the process can be an on-going, or can be terminated once the original management goals have been achieved. This scheme applies to different geographical scales (watershed, sub-watershed, or creekshed).

Appendix C

Amphibians and Reptiles in the Rouge River Watershed¹¹

Amphibians and reptiles in the watershed that require an aquatic or wetland environment. Endangered, threatened, and special concern (defined as rare, may become endangered or threatened in the future) species are noted. Data from: J. Craves, University of Michigan-Dearborn, T. Payne, Michigan Department of Natural Resources, Wildlife Division, K. Gourlay, Michigan Department of Natural Resources, Parks and Recreation Division.
Sittings: confirmed = C; within range = R.

Common name	Scientific name	Sittings
Salamanders		
Blue-spotted salamander	<i>Ambystoma laterale</i>	C
Small-mouthed salamander	<i>Ambystoma texanum</i> (endangered)	R
Spotted salamander	<i>Ambystoma maculatum</i>	C
Eastern tiger salamander	<i>Ambystoma tigrinum tigrinum</i>	C
Mudpuppy	<i>Necturus maculosus</i>	R
Eastern newt	<i>Notophthalmus viridescens</i>	R
Red-spotted newt	<i>Notophthalmus viridescens viridescens</i>	R
Red-backed salamander	<i>Plethodon cinereus</i>	C
Four-toed salamander	<i>Hemidactylium scutatum</i>	R
Tiger salamander	<i>Ambystoma tigrinum</i>	R
Lizards		
Five-lined skink	<i>Eumeces fasciatus</i>	R
Frogs and Toads		
Blanchard's cricket frog	<i>Acris crepitans blanchardi</i> (special concern)	R
Eastern American toad	<i>Bufo americanus</i>	C
Northern spring peeper	<i>Pseudacris crucifer</i>	C
Eastern gray tree frog	<i>Hyla versicolor</i>	C
Cope's gray tree frog	<i>Hyla chrysoscelis</i>	R
Western chorus frog	<i>Pseudacris triseriata triseriata</i>	C
Bullfrog	<i>Rana catesbeiana</i>	C
Green frog	<i>Rana clamitans melanota</i>	C
Northern leopard frog	<i>Rana pipiens</i>	C
Pickerel frog	<i>Rana palustris</i>	C
Wood frog	<i>Rana sylvatica</i>	C
Turtles		
Spiny softshell	<i>Apalone spinifera</i>	C
Snapping turtle	<i>Chelydra serpentina</i>	C
Painted turtle	<i>Chrysemys picta</i>	C
Spotted turtle	<i>Clemmys guttata</i> (special concern)	R
Wood turtle	<i>Clemmys insculpta</i> (special concern)	C
Blanding's turtle	<i>Emydoidea blandingii</i> (special concern)	C
Common map turtle	<i>Graptemys geographica</i>	C
Red-eared slider	<i>Trachemys scripta elegans</i>	C
Common musk turtle	<i>Sternotherus odoratus</i>	R
Eastern box turtle	<i>Terrapene carolina carolina</i> (special concern)	C

Appendix C

Common name	Scientific name	Sitings
Snakes		
Kirtland's water snake	<i>Clonophis kirtlandi</i> (endangered)	R
Northern water snake	<i>Nerodia sipedon</i>	C
Queen snake	<i>Regina septemvittata</i>	R
Eastern massasauga rattlesnake	<i>Sistrurus catenatus</i> (special concern)	C
Northern ribbon snake	<i>Thamnophis sauritus septentrionalis</i>	
C		
Eastern garter snake	<i>Thamnophis sirtalis</i>	C
Butler's garter snake	<i>Thamnophis butleri</i>	R
Eastern hognose snake	<i>Heterodon platyrhinos</i>	C
Black rat snake	<i>Elaphe obsoleta obsoleta</i> (special concern)	R
Brown snake	<i>Storeria dekayi</i>	C
Blue racer	<i>Coluber constrictor foxi</i>	C
Northern red-bellied snake	<i>Storeria occipitomaculata</i>	C
Eastern milk snake	<i>Lampropeltis triangulum</i>	C
Eastern fox snake	<i>Elaphe vulpina gloydi</i> (threatened)	R
Northern ringneck snake	<i>Diadophis punctatus edwardsi</i>	R
Eastern smooth green snake	<i>Liochlorophis vernalis vernalis</i>	R

Appendix D

Mammals in the Rouge River Watershed¹¹

Mammals in the Rouge River watershed that use aquatic, wetland, or riparian habitats.

Data from: O. Gelderloos, University of Michigan-Dearborn, T. Payne, Michigan Department of Natural Resources, Wildlife Division.

Sitings: confirmed = C.

Common name	Scientific name	Sitings
Red fox	<i>Vulpes vulpes</i>	C
Gray fox	<i>Urocyon cinereoargenteus</i>	C
Raccoon	<i>Procyon lotor</i>	C
Muskrat	<i>Ondatra zibethicus</i>	C
Eastern mole	<i>Scalopus aquaticus</i>	C
Fox squirrel	<i>Sciurus niger</i>	C
Eastern cottontail rabbit	<i>Sylvilagus floridanus</i>	C
Eastern chipmunk	<i>Tamias striatus</i>	C
White-footed mouse	<i>Peromyscus leucopus</i>	C
Deer mouse	<i>Peromyscus maniculatis</i>	C
Meadow vole	<i>Microtus pennsylvanicus</i>	C
Mink	<i>Mustela vison</i>	C
Opossum	<i>Didelphis virginiana</i>	C
Red bat	<i>Lasarus borealis</i>	C
Big brown bat	<i>Eptesicus fuscus</i>	C
Southern flying squirrel	<i>Glaucomys volans</i>	C
White-tailed deer	<i>Odocoileus virginianus</i>	C
Ground hog	<i>Marmota monax</i>	C

Appendix E

Natural Features of the Rouge River Watershed¹¹

Data from: Michigan Department of Natural Resources, Wildlife Division, Natural Features Inventory, November 7, 1995.

Status Codes: E=endangered, T=threatened, SC=special concern (rare, may become E or T in the future). No species are federally listed. Blanks indicate that none of the categories are applicable.

Common name	Scientific name or feature	State status
Oakland County		
<i>Novi Township</i>		
Redside dace	<i>Clinostomus elongatus</i>	T
Showy orchis	<i>Galearis spectabilis</i>	SC
Great blue heron rookery		
Green violet	<i>Hybanthus concolor</i>	SC
Twinleaf	<i>Jeffersonia dyphylla</i>	SC
Sullivant's milkweed	<i>Asclepias sullivantii</i>	T
Prairie rose	<i>Rosa setegera</i>	SC
Dry-mesic southern forest		
Seedbox	<i>Ludwigia alternivolia</i>	T
Three-awned grass	<i>Aristida longespica</i>	T
<i>Farmington Hills</i>		
Redside dace	<i>Clinostomus elongatus</i>	T
<i>West Bloomfield Township</i>		
Pugnose shiner (Walnut Lk., 1906)	<i>Notropis anogenus</i>	SC
Dry-mesic southern forest		
Vasey's pondweed	<i>Potamogeton vaseyi</i>	T
<i>Bloomfield Township</i>		
American chestnut	<i>Castanea dentate</i>	E
Least shrew	<i>Cryptotis parva</i>	T
Washtenaw County		
<i>Superior Township</i>		
Champion tree, blue ash	<i>Fraxinus quadrangulata</i>	
Wayne County		
<i>Plymouth & Northville Townships</i>		
Redside dace	<i>Clinostomus elongatus</i>	T
Champion tree, wild crab apple	<i>Malus coronaria</i>	
Mesic southern forest		
Goldenseal	<i>Hydrastis canadensis</i>	T
<i>Livonia</i>		
Shellbark or kingnut hickory	<i>Carya laciniosa</i>	SC
<i>Canton Township</i>		
Compass-plant	<i>Silphium laciniatum</i>	T

Appendix E

Common name	Scientific name or feature	State status
Wayne County (continued)		
<i>Detroit</i>		
False pimpernel	<i>Lindernia anagallidea</i>	SC
Prairie trillium	<i>Trillium recurvatum</i>	T
Northern madtom	<i>Noturus stigmosus</i>	E
<i>T02S, R09E</i>		
American chestnut	<i>Castanea dentata</i>	E
Champion tree, cottonwood	<i>Populus deltoides</i>	
<i>T02S, R10E</i>		
Cup-plant	<i>Silphium perfoliatum</i>	T
Prairie rose	<i>Rosa setigera</i>	SC
Champion tree, pin oak	<i>Quercus palustris</i>	
Compass-plant	<i>Silphium laciniatum</i>	T
<i>T02S, R11E</i>		
Northern madtom (mouth of river)	<i>Noturus stigmosus</i>	E
Showy orchis	<i>Galearis spectabilis</i>	SC
Cup-plant	<i>Silphium perfoliatum</i>	T

Appendix F

Birds Regularly Occurring in the Rouge River Watershed¹¹

Data from: J. Craves, University of Michigan-Dearborn, T. Payne, Michigan Department of Natural Resources, Wildlife Division.

B = Breeding species in the watershed.

Common name	Scientific name	Breeding Status
Common loon	<i>Gavia immer</i>	
Pied-billed grebe	<i>Podilymbus podiceps</i>	
Double-crested cormorant	<i>Phalacrocorax auritus</i>	
Great blue heron	<i>Ardea herodias</i>	B
Great egret (American egret)	<i>Ardea alba</i>	B
Green heron	<i>Butorides virescens</i>	B
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	B
Turkey vulture	<i>Cathartes aura</i>	B
Canada goose	<i>Branta canadensis</i>	B
Mute swan	<i>Cygnus olor</i>	B
Tundra swan (Whistling swan)	<i>Cygnus columbianus</i>	
Wood duck	<i>Aix sponsa</i>	B
Gadwall	<i>Anas strepera</i>	
American wigeon	<i>Anas americana</i>	
American black duck	<i>Anas rubripes</i>	B
Mallard	<i>Anas platyrhynchos</i>	B
Blue-winged teal	<i>Anas discors</i>	B
Northern shoveler	<i>Anas clypeata</i>	
Northern pintail	<i>Anas acuta</i>	
Green-winged teal	<i>Anas crecca</i>	
Canvasback	<i>Aythya valisineria</i>	
Redhead	<i>Aythya americana</i>	
Ring-necked duck	<i>Aythya collaris</i>	
Greater scaup	<i>Aythya marila</i>	
Lesser scaup	<i>Aythya affinis</i>	
Common goldeneye	<i>Bucephala clangula</i>	
Hooded merganser	<i>Lophodytes cucullatus</i>	
Common merganser	<i>Mergus merganser</i>	
Osprey	<i>Pandion haliaetus</i>	
Bald eagle	<i>Haliaeetus leucocephalus</i>	
Northern harrier	<i>Circus cyaneus</i>	
Sharp-shinned hawk	<i>Accipiter striatus</i>	
Cooper's hawk	<i>Accipiter cooperii</i>	B
Broad-winged hawk	<i>Buteo platypterus</i>	B
Red-shouldered Hawk	<i>Buteo lineatus</i>	B
Red-tailed hawk	<i>Buteo jamaicensis</i>	B
American kestrel	<i>Falco sparverius</i>	B
Peregrine falcon	<i>Falco peregrinus</i>	B
Ring-necked pheasant	<i>Phasianus colchicus</i>	B
Northern bobwhite	<i>Colinus virginianus</i>	B
Virginia rail	<i>Rallus limicola</i>	B
Sora	<i>Porzana carolina</i>	B
Common moorhen	<i>Gallinula chloropus</i>	B
American coot	<i>Fulica americana</i>	B
Sandhill crane	<i>Grus canadensis</i>	
Killdeer	<i>Charadrius vociferus</i>	B

Appendix F

Common name	Scientific name	Breeding Status
Greater yellowlegs	<i>Tringa melanoleuca</i>	
Lesser yellowlegs	<i>Tringa flavipes</i>	
Solitary sandpiper	<i>Tringa solitaria</i>	
Spotted sandpiper	<i>Actitis macularia</i>	B
Upland sandpiper	<i>Bartramia longicauda</i>	B
Common snipe	<i>Gallinago gallinago</i>	
American woodcock	<i>Sclopax minor</i>	B
Ring-billed gull	<i>Larus delawarensis</i>	
Herring gull	<i>Larus argentatus</i>	
Caspian tern	<i>Sterna caspia</i>	
Common tern	<i>Sterna hirundo</i>	
Forster's tern	<i>Sterna forsteri</i>	
Rock dove	<i>Columba livia</i>	B
Mourning dove	<i>Zenaida macroura</i>	B
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	B
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	B
Eastern screech-owl	<i>Otus asio</i>	B
Great horned owl	<i>Bubo virginianus</i>	B
Northern saw-whet owl	<i>Aegolius acadicus</i>	
Common nighthawk	<i>Chordeiles minor</i>	B
Chimney swift	<i>Chaetura pelagica</i>	B
Ruby-throated hummingbird	<i>Archilochus colubris</i>	B
Belted kingfisher	<i>Ceryle alcyon</i>	B
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	B
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	B
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	
Downy woodpecker	<i>Picoides pubescens</i>	B
Hairy woodpecker	<i>Picoides villosus</i>	B
Northern flicker	<i>Colaptes auratus</i>	B
Eastern wood-pewee	<i>Contopus virens</i>	B
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	
Acadian flycatcher	<i>Empidonax virescens</i>	B
Alder flycatcher	<i>Empidonax alnorum</i>	B
Willow flycatcher	<i>Empidonax traillii</i>	B
Least flycatcher	<i>Empidonax minimus</i>	B
Eastern phoebe	<i>Sayornis phoebe</i>	B
Great-crested flycatcher	<i>Myiarchus crinitus</i>	B
Eastern kingbird	<i>Tyrannus tyrannus</i>	B
White-eyed vireo	<i>Vireo griseus</i>	B
Yellow-throated vireo	<i>Vireo flavifrons</i>	B
Blue-headed vireo	<i>Vireo solitarius</i>	
Warbling vireo	<i>Vireo gilvus</i>	B
Philadelphia vireo	<i>Vireo philadelphicus</i>	
Red-eyed vireo	<i>Vireo olivaceus</i>	B
Blue jay	<i>Cyanocitta cristata</i>	B
American crow	<i>Corvus brachyrhynchos</i>	B
Horned Lark	<i>Eremophila alpestris</i>	B
Purple Martin	<i>Progne subis</i>	B
Tree swallow	<i>Tachycineta bicolor</i>	B
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	B
Bank swallow	<i>Riparia riparia</i>	B

Appendix F

Common name	Scientific name	Breeding Status
Cliff swallow	<i>Hirundo pyrrhonota</i>	B
Barn swallow	<i>Hirundo rustica</i>	B
Black-capped chickadee	<i>Poecile atricapillus</i>	B
Tufted titmouse	<i>Baeolophus bicolor</i>	B
Red-breasted nuthatch	<i>Sitta canadensis</i>	
White-breasted nuthatch	<i>Sitta carolinensis</i>	B
Brown creeper	<i>Certhia americana</i>	B
Carolina wren	<i>Thryothorus lucovicianus</i>	B
House wren	<i>Troglodytes aedon</i>	B
Winter wren	<i>Troglodytes troglodytes</i>	
Marsh wren	<i>Cistothorus palustris</i>	B
Golden-crowned kinglet	<i>Regulus satrapa</i>	
Ruby-crowned kinglet	<i>Regulus calendula</i>	
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	B
Eastern bluebird	<i>Sialia sialia</i>	B
Veery	<i>Catharus fuscescens</i>	B
Gray-cheeked thrush	<i>Catharus minimus</i>	
Swainson's thrush	<i>Catharus ustulatus</i>	
Hermit thrush	<i>Catharus guttatus</i>	
Wood thrush	<i>Hylocichla mustelina</i>	B
American robin	<i>Turdus migratorius</i>	B
Gray catbird	<i>Dumetella carolinensis</i>	B
Northern mockingbird	<i>Mimus polyglottos</i>	
Brown thrasher	<i>Toxostoma rufum</i>	B
European starling	<i>Sturnus vulgaris</i>	B
Cedar waxwing	<i>Bombycilla cedrorum</i>	B
Blue-winged warbler	<i>Vermivora pinus</i>	B
Golden-winged warbler	<i>Vermivora chrysoptera</i>	
Tennessee warbler	<i>Vermivora peregrina</i>	
Orange-crowned warbler	<i>Vermivora celata</i>	
Nashville warbler	<i>Vermivora ruficapilla</i>	
Northern parula	<i>Parula americana</i>	
Yellow warbler	<i>Dendroica petechia</i>	B
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>	
Magnolia warbler	<i>Dendroica magnolia</i>	
Cape May warbler	<i>Dendroica tigrina</i>	
Black-throated blue warbler	<i>Dendroica caerulescens</i>	
Yellow-rumped warbler	<i>Dendroica coronata</i>	
Black-throated green warbler	<i>Dendroica virens</i>	
Blackburnian warbler	<i>Dendroica fusca</i>	
Pine warbler	<i>Dendroica pinus</i>	
Palm warbler	<i>Dendroica palmarum</i>	
Bay-breasted warbler	<i>Dendroica castanea</i>	
Blackpoll warbler	<i>Dendroica striata</i>	
Cerulean warbler	<i>Dendroica cerulea</i>	
Black-and-white warbler	<i>Mniotilta varia</i>	
American redstart	<i>Setophaga ruticilla</i>	
Ovenbird	<i>Seiurus aurocapillus</i>	B
Northern waterthrush	<i>Seiurus noveboracensis</i>	
Louisiana waterthrush	<i>Seiurus motacilla</i>	

Appendix F

Common name	Scientific name	Breeding Status
Connecticut warbler	<i>Oporornis agilis</i>	
Mourning warbler	<i>Oporornis philadelphia</i>	
Common yellowthroat	<i>Geothlypis trichas</i>	B
Wilson's warbler	<i>Wilsonia pusilla</i>	
Canada warbler	<i>Wilsonia Canadensis</i>	
Yellow-breasted chat	<i>Icteria virens</i>	
Scarlet tanager	<i>Piranga olivacea</i>	B
Eastern (rufous-sided) towhee	<i>Pipilo erythrophthalmus</i>	B
American tree sparrow	<i>Spizella arborea</i>	
Chipping sparrow	<i>Spizella passerina</i>	B
Field sparrow	<i>Spizella pusilla</i>	B
Vesper sparrow	<i>Pooecetes gramineus</i>	B
Savannah sparrow	<i>Passerculus sandwichensis</i>	B
Fox sparrow	<i>Passerella iliaca</i>	
Song sparrow	<i>Melospiza melodia</i>	B
Lincoln's sparrow	<i>Melospiza lincolnii</i>	
Swamp sparrow	<i>Melospiza georgiana</i>	
White-throated sparrow	<i>Zonotrichia albicollis</i>	
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	
Dark-eyed junco	<i>Junco hyemalis</i>	
Northern cardinal	<i>Cardinalis cardinalis</i>	B
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	B
Indigo bunting	<i>Passerina cyanea</i>	B
Bobolink	<i>Dolichonyx oryzivorus</i>	B
Red-winged blackbird	<i>Agelaius phoeniceus</i>	B
Eastern meadowlark	<i>Sturnella magna</i>	B
Common grackle	<i>Quiscalus quiscula</i>	B
Brown-headed cowbird	<i>Molothrus ater</i>	B
Baltimore oriole	<i>Icterus galbula</i>	B
Orchard oriole	<i>Icterus spurius</i>	
House finch	<i>Carpodacus mexicanus</i>	B
American goldfinch	<i>Carduelis tristis</i>	B
House sparrow	<i>Passer domesticus</i>	B

Appendix G

ROUGE CONTACTS & RRAC MEMBERS

Friends of the Rouge

Carolyn Foster----- (734) 792-9900

Holliday Nature Preserve

Bill Craig----- (248) 476-5127

MDEQ Staff

Allison McCormick----- (734) 432-1291

Oakland County Drain Commission

Ron Fadoir----- 248) 858-5248

Southeast Michigan Land Conservancy

Jack Smiley----- (313) 582-8377

University of MI-Dearborn Environmental Interpretive Center

Orin Gelderloos----- (313) 593-5339

Washtenaw County DEIS

Rich Badics----- (734) 222-3800

Wayne County Department of Environment

Noel Mullett----- (734) 326-4486

Subwatershed Advisory Group Representatives

Robert Belair, Lower 1 Subwatershed Advisory Group----- (734) 394-5154

Ron Fadoir, Main 1 & 2 Subwatershed Advisory Group----- (248) 858-5248

Jim Zoumbaris, Middle 3/Lower 2 Subwatershed Advisory Group----- (734) 466-2606

Robert Beckley, Upper Subwatershed Advisory Group----- (734) 466-2606

James D. Anulewicz, Middle 1 Subwatershed Advisory Group----- (734) 453-8131
ext. 23

John Kozuh, Main 3-4 Subwatershed Advisory Group----- (313) 928-4111

Appendix G

Other Resources:

Rouge web site – <http://rougeriver.com>

David A. Mifsud (M.S. Candidate) Herpetologist, City of Ann Arbor (For information on “turtle crossings”)

Phone (mobile) (313) 268-6189

E-mail (1): Davidmifsud@comcast.net

E-mail (2): Miffer@umich.edu

CURRENT RRAC MEMBERSHIP

Rich Badics, Washtenaw County Department of Environment and Infrastructure Services

Brandy Bakita, Southfield Parks and Recreation Department

Dan Ballnik, Ford Motor Company

Jack Barnes, Lower 2 SWAG Representative

Robert Belair, Lower 1 SWAG Representative

Kelly Cave, Wayne County Department of Environment

Carol Clements, Wayne County Parks Department

Bill Craig, Holliday Nature Preserve, RRAC Vice-Chair

Carolyne Foster, Friends of the Rouge

Orin Gelderloos, University of Michigan-Dearborn, 2004 RRAC Chair

Linda Ginsburg, Schafer Development

Barbara Goryca, Citizen Representative

Kurt Heise, Wayne County Department of Environment, 2003 RRAC Chair

Meroe Kaericher, Citizen Representative

Noel Mullett, Wayne County Department of Environment

Steve Olds, Natural Resources Conservation Service

George Rinke, Ford Motor Company

Philip Sanzica, Oakland County Drain Commission

Raj Sinha, Wayne County Health Department

Jack Smiley, Southeast Michigan Land Conservancy

Ted Starbuck, SEMCOG

Sue Vignoe, Middle 1 SWAG Representative

Gary Zorza, Upper SWAG Representative

Jim Zoumbaris, Middle 3 SWAG Representative

Vacant, Detroit Water and Sewerage Department

Vacant, Environmental Attorney

Vacant, Oakland County Health Department

Vacant, Student

Vacant, Teacher

Vacant, Main 1-2 SWAG Representative

Vacant, Main 3-4 SWAG Representative

Ex-Officio Members:

Allison McCormick, MDEQ Representative

Joe Rathbun, MDEQ Representative

Quintin White, USEPA-Region V

Jonathon Bulkley, Federal Court Representative

Appendix H

Selected Rouge River Monitoring Reports

- RPO reports are available on the RPO website: www.rougeriver.com
- Most MDNR and MDEQ reports may be obtained from Denise Page of MDEQ; 517-241-5821, or pared@michigan.gov. Provide the title and publication number (where available) when ordering.

Title (Source)	Date	Comments
Rouge River Quality: 1973-1986 (MDNR; MI/DNR/SWQ-87/043)	1987	Fish and macroinvertebrates; 23 stations watershed wide
Rouge River Ambient Monitoring Report (MDNR)	1988	Water quality; 22 stations watershed wide; weekly or monthly sampling
Rouge River Reconnaissance Survey (RPO)	1994	Survey of outfalls, sediments, and general stream characteristics over 90 miles of river
An Assessment of the Rouge River Fish Community (MDNR)	1995	The best recent watershed-wide fish survey
Rouge River Sediment Reconnaissance Survey (RPO)	1995	Sediment contaminants at 182 stations, watershed wide
Impoundment Limnological Report: 1994-1995 (RPO)	1996	Water quality, in 4 Middle Branch impoundments; cites previous studies
Aquatic Habitat Survey (RPO)	1998	Physical habitat; 83 locations, watershed wide
Rouge River Assessment (MDNR; Fisheries Division Special Report No. 22)*	1998	Review of historic data; biology, hydrology, water quality
Biological Assessment of the Rouge River: June-July, 2000 (MDEQ; MI/DEQ/SWQ-02/038)	2002	Macroinvertebrates at 39 locations and fish at 6; mostly headwater locations

Also very useful are the “Baseline Data Summary” reports published annually since 1993 by the RPO, and the regular reports on macroinvertebrate and frog & toad distributions based on the Friends of the Rouge volunteer monitoring programs.

*Available on the MDNR website (www.michigan.gov/dnr), under Institute for Fisheries Research library

Appendix I



12/10/2003

December 29, 2003

Ms. Allison McCormick
MDEQ-WD
38980 W. Seven Mile Rd.
Livonia, MI 48152

RE: 2003 Rouge River RAP

Dear Allison:

Our engineering staff has reviewed the RAP - Revision you provided on December 10th and we wanted to compliment you on the thoroughness of the document. We have only one suggestion to make relative to the various references in the document to achieving the goal of elimination of all SSO's.

It is neither practical, nor cost effective, to eliminate all SSO's. For "preventable" SSO's this could be an objective, albeit a costly one. My point is best perhaps explained with the following example. A community could design its sanitary sewer system to transport flows from the 10 year : 1 hour design storm, store flows up to the 25 year : 24 hour design storm and even possibly treat overflows above that threshold to the 100 year storm. However, should a 150 year equivalent design storm hit that community, untreated SSO's are inevitable. Thus I would be cautious in stating the goal as elimination of all SSO's.

Please contact me at (734) 394-5160 if you have any questions regarding this information.

Sincerely,

MUNICIPAL SERVICES

Tim Faas
Director

Tim Faas, Director
734/394-5160
Building & Inspection Services
734/394-5200

DEPARTMENT OF MUNICIPAL SERVICES
1150 Canton Center S.
Canton, MI 48188-1699
www.canton-mi.org

Planning Services
734/394-5170
Public Works
734/394-5150



Appendix I

JAN - 6 2003

20050 Milburn
Livonia, MI 48152-1615

Allison McCormick, Rouge RAP Coordinator
MDEQ-SWQD
S.E. MI District Office
38980 West Seven Mile Road
Livonia, MI 48152-1006

Dear Mrs. McCormick:

Please accept the following as my comments on the 2003 Rouge RAP Revision. I am pleased that the revision is done. I know good thought and much effort was put into making this document user friendly for the general public, while providing the necessary elements of a useful remediation plan. Since the public must pay for the work necessary to accomplish most of the goals, making the plan less technical and less specific is logical for ensuring effective support and participation.

My greatest concern, however, is that until we have a true commitment to protect wetlands at all levels of government; national, state, county and local, the "loss of fish and wildlife habitat" use impairment will never move towards delisting. The Rouge River Watershed is not moving towards "no net loss". Wetlands are the only portion of the natural landscape with any degree of regulated protection, yet; wetlands are being over-emphasized as stormwater BMPs to promote development, which accelerates our loss of quality habitat (national and state policy), wetlands are being mitigated outside the watershed (state policy), wetland mitigation is far too controversial (state policy), wetland mitigation banking in Wayne County has been a costly failure (county policy), and many communities have not improved their local land use decisions enough to protect their wetland inventory (local policy).

It will take more than money, people, hard work and time to preserve, restore and protect the vital natural elements of the Rouge River Watershed. It will take a knowledgeable public who demands their public representatives address the goals of our habitat related use impairments. It takes public will and government will to achieve success in any endeavor, and our watershed needs much of both for the work that must be done. I believe the 2003 Rouge River RAP Revision provides sufficient information to motivate the general public and our representatives. Thank you for a plan that can work.

Sincerely,

William Craig
William Craig
1/5/04

Appendix I



JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



STEVEN E. CHESTER
DIRECTOR

January 7, 2004

Mr. Kurt Heise, RRAC Chair
WCDOE
415 Clifford Street
Detroit, MI 48226

JAN 13 2004

Dear Mr. Heise:

SUBJECT: 2004 Rouge River Remedial Action Plan Revision

On behalf of the Department of Environmental Quality (DEQ), I commend the efforts of the Rouge River Remedial Action Plan Advisory Council (RRAC) in the development of the *2004 Rouge Remedial Action Plan (RAP) Revision*. The document serves as an important guide in the implementation of actions that will achieve significant progress towards achieving the goal of delisting the Rouge River as a Great Lakes Area of Concern.

We support those goals and recommendations that comply with current environmental laws and regulations. The following are specific comments on the document:

1. In response to the Sanitary Sewer Overflow (SSO) and Combined Sewer Overflow goals of "Eliminate or provide adequate treatment and control for all wet weather overflows from separate sanitary sewers and combined sewers," the DEQ would add that this should be in compliance with existing state and federal requirements.
2. On page 48, under "How to Get There – Phase I," the fourth bullet states that the SSO policy should be clarified. In October 2003, DEQ Director Steven E. Chester provided an SSO policy clarification statement to address questions on the 2002 SSO Policy Statement.

It will require continued hard work on the part of all Rouge stakeholders, including the local communities, county, state, and federal agencies to realize the vision of:

"A Rouge River Watershed that is aesthetically pleasing, clean and safe, that supports a healthy, diverse fish and wildlife community, and that provides an enriching variety of recreational experiences."

Again, I wish to commend the RRAC for completing the 2004 RAP Revision. We look forward to being a partner in the continued restoration of the Rouge River. Should you

Appendix I

Mr. Kurt Heise
Page 2
January 7, 2004

require further information of a technical nature, please contact Ms. Allison McCormick, Southeast Michigan District Office, Water Division, at 734-432-1291, or you may contact me.

Sincerely,

A handwritten signature in cursive script, appearing to read "Richard A. Powers".

Richard A. Powers, Chief
Water Division
517-335-4176

cc: Ms. Allison McCormick, DEQ

Appendix I



JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
LANSING

GLORIA J. JEFF
DIRECTOR

January 7, 2004

JAN 13 2004

Ms. Allison McCormick
Michigan Department of Environmental Quality
Water Division
38980 West Seven Mile Road
Livonia, Michigan 48152

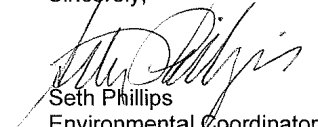
Dear Ms. McCormick:

This letter is to provide the comments of the Michigan Department of Transportation (MDOT) on the Draft 2003 Rouge River Remedial Action Plan (RAP) Revision which was distributed for review at the December 10, 2003 meeting of the Rouge River Assembly.

MDOT is supportive of the draft RAP as presented and will continue to work cooperatively with storm water control efforts in the Rouge River watershed. As you know, MDOT is about to receive a Phase II National Pollutant Discharge Elimination System (NPDES) storm water permit from the Department of Environmental Quality (DEQ) that will govern MDOT storm water management activities on a statewide basis. This new permit will replace all existing MDOT storm water permits. MDOT will conduct its storm water management activities as required under that permit. While we will continue to work cooperatively with communities in the Rouge River watershed on storm water management activities, project specific needs will be addressed within the scope and limits of MDOT's authority, funding, permit requirements and other considerations that must be addressed in designing and implementing transportation projects.

Thank you for the opportunity to review this document.

Sincerely,


Seth Phillips
Environmental Coordinator
517-373-1908

cc: Zachare Ball, ECT, Rouge Program Office
Kathleen Hermann, TTMPs
Gary Croskey, MDOT
Mike O'Malley, MDOT
Molly Lamrouex, MDOT
Sharon Ferman, MDOT

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www.michigan.gov • (517) 373-2090

Appendix I

Ms. Allison McCormick
MDEQ-WD
38980 W. Seven Mile Rd.
Livonia, MI 48152

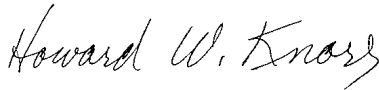
Dear Ms. McCormick:

In reviewing the Rouge Remedial Action Plan, I was struck by how many of the 41 goals listed in the Executive Summary are dependent upon successfully dealing with the problems created by impervious surfaces. While the revision recognizes this frequently throughout its length as an important factor in achieving the various goals, indeed, again in the Executive Summary, for example stating: "Flow has emerged as perhaps the most critical, technically and politically, difficult challenge for restoration and protection.", I feel imperviousness is crucial to the maintenance of the improvements already made in the River's quality as well as any future gains to be made. It is the factor which can profoundly determine the Rouge's future direction environmentally, and should be explored, studied and emphasized in a major straight-forward approach.

I became aware of problems and failures of under-emphasizing the problems of imperviousness at the 2003 Rouge Report Day. The event, held at Greenfield Village, celebrated the reconnection of the oxbow remnant there to the current channel of the Rouge. At the same time the work was being done on the oxbow previously pervious pavements in the Village were being paved with impervious concrete. Aside from wondering about the wisdom of installing very hard surfaces for walkways the are primarily used by pedestrians on long walking tours of the Village, it occurred to me that the extent of the pavement would probably cover the oxbow twice.

The Revision cites 1995 land use cover data saying that "23.1 percent of the Rouge Watershed has been transformed into impervious surface." This is a study that definitely needs updating. Urban sprawl has certainly increased that percentage as has the growing popularity of what are referred to as "bigfoots" or mini-mansions. Birmingham, for example, recently enacted an ordinance setting the upper limit for the amount of lot surface a residence could cover at 30%. Of that the remaining 40% may be paved. .

There has to be graphic education on the impact of impervious surfaces on the environment. The very definite limits of the usual solutions such as detention ponds must be pointed out. The value, economically as well as environmentally, of innovative solutions such as rain gardens, green roofs and pervious pavements as exist at the Ford Rouge Plant (and my driveway for that) must be promulgated if we are to make much more progress or even to keep that which has been made.



Citizen

Appendix J

An Evaluation of Existing Funding Sources *Provided by Southeast Michigan Council of Governments*

Federal Funding An evaluation of potential federal funding sources showed that available support continues to decline while basic pollution requirements in the Clean Water Act remain intact. This results in an increasing compliance burden on state and local governments.

1. Federal funding for water pollution control programs is rapidly declining.
2. Federal non-point source pollution control funds (Section 319 grants, Watershed Initiative Grants) are limited. Competition for the funding is intense.
2. Existing federal funding programs will not be sufficient for the remedial action measures needed to clean up the Rouge River.
3. Reduced federal funding means state and local governments must assume more pollution control costs.

State Funding Evaluation of state funding sources shows that despite federal cutbacks, increases in state funding are not forthcoming.

1. Money available from state funding for water pollution control is very limited. The major source of state funding support for water pollution control projects will not be in the form of grants. Legislation is being drafted to institute a State Revolving Fund (SRF). Based on current proposals for establishing an SRF program, funding will be inadequate to meet all of the projected statewide needs for wastewater treatment facilities. And financial constraints on the communities limit their ability to repay the loans. As a result, only projects that avoid enforcement actions are initiated. This does little to rehabilitate infrastructure.

In 2002, Michigan voters approved a \$1 billion bond to supplement the SRF program, providing up to an additional \$200 million per year available to municipalities in the form of low-interest loans.

2. Funding from existing state programs to support implementation of remedial action measures is minimal. Any new programs for revenue beyond that provided in the State Revolving Fund are unlikely without local communities initiating action.

Appendix J

Unconventional Funding So-called "unconventional" sources such as special districts should be viewed as mechanisms to raise revenue, not as additional sources of revenue.

1. Neither the Headlee tax limits nor the charter tax limits apply to special assessments. (Special assessments are not a tax).
2. Special assessments cannot be community-wide (this is prohibited by the Drain Code).
3. Special assessments cannot be based upon property values but must be based upon benefit.
4. Voluntary special assessments may be assessed by individual communities for a portion of the community's property owners.
5. Statutes, such as the Drain Code, which precede the Headlee Amendment and which have not been amended are not subject to the amendment.
6. The Drain Code can be used by drainage districts to levy taxes. Such taxes are not special assessments, but rather unlimited obligations of the community
 - A drainage district may be created by having at least two corporations (or communities) petition the State Department of Agriculture to form the district. Other corporations (or communities) may be added non-voluntarily to this group.
 - The federal courts have ruled that the Headlee Amendment does not supersede the Drain Code - so if a drainage district was created and a tax levied, the Headlee Amendment should not be a constraint.
 - A drainage district may receive taxing authority in two ways:
 - A. The drainage board, by majority vote, may petition the State Department of Agriculture for this authority, or
 - B. The Water Resources Commission could petition the Department of Agriculture for this authority.
 - Chapter 22 of the Drain Code can also be explored as a way to fund storm water activities in a designated watershed area.
7. A "471" agreement could be reached between local governments and the County Drain Commissioner in order to address storm water management mandates and SWPPI requirements.

Appendix K

Selected Federal and Foundation Funding Sources Available for Environmental Restoration Efforts in Michigan's Great Lakes Areas of Concern

*Prepared by the
Statewide Public Advisory Council for Michigan's Areas of Concern Program
May 2001*

NOTE: Some of the figures below represent Michigan or Great Lakes regional funding allocations, while others are nationwide appropriations.

Army Corps of Engineers

FY 2001 Funding

· Great Lakes Remedial Action Plans and Sediment Remediation	\$600,000
· Planning Assistance to States	\$6,700,000
· Great Lakes Sediment Transport Models	\$500,000
· Restoration of Environmental Quality	\$21,000,000
· Aquatic Ecosystem Restoration	\$19,000,000
· Beneficial Use of Dredged Material	\$4,000,000
· Environmental Dredging	\$1,500,000

Environmental Protection Agency

FY 2001 Funding

· Coastal Environmental Management	\$2,000,000
· Great Lakes National Program Office	\$3,150,000
· Water Pollution Control–State and Interstate Program Support	\$30,250,000
· Nonpoint Source Water Pollution Control	\$42,500,000
· State Wetlands Protection Grants	\$1,500,000
· Water Quality Management Planning	\$2,800,000
· National Pollutant Discharge Elimination System	\$2,700,000
· Five-Star Restoration Program	\$500,000 (FY '00)
· Wetlands Program Development Grants	\$15,000,000

Department of Agriculture

FY 2001 Funding

· Conservation Reserve Program	\$142,000,000
· Environmental Quality Incentives Program	\$199,942,800
· Watershed Protection and Flood Prevention Program	\$99,443,000
· Wetlands Reserve Program	\$143,000,000

Department of Commerce, National Oceanic and Atmospheric Administration

FY 2001 Funding

	\$7,000,000
· Great Lakes Restoration Grants	\$92,700,000
· Coastal Zone Management Program	\$500,000
· Coastal Protection & Restoration Program	

U.S. Fish and Wildlife Service

FY 2001 Funding

· Coastal Wetlands Planning, Protection and Restoration Act Program	\$11,300,000 (FY '00)
	\$15,000,000
· National Coastal Wetlands Conservation Grant Program	\$72,600,000
· North American Wetlands Conservation Act Grants	\$24,000,000
· Partners for Fish and Wildlife Program	

Appendix K

Foundation Funding Sources

FY 2001 Funding

· Michigan Great Lakes Protection Fund	\$2,000,000
· Great Lakes Protection Fund	\$2,300,000 (FY '00)
· Great Lakes Fisheries Trust	\$3,500,000
· Great Lakes Habitat Network	\$62,252 (FY '00)
· Joyce Foundation	\$12,500,000 (FY '00)
· The George Gund Foundation	\$20,850,000 (FY '00)
· C.S. Mott Foundation	\$19,000,000
· Rockefeller Family Fund	\$710,000

Other resources:

Appendix L

Example Funding Sources

Catalog of Federal Domestic Assistance (CDFA) - ENTIRE Federal government assistance link

1. **CDFA Home** <http://www.cfda.gov/default.htm>
2. **CDFA -grants sorted by deadline**
http://www.cfda.gov/public/browse_by_deadline.asp
3. **CDFA - sort by a category** <http://www.cfda.gov/public/faprs.htm>

EPA Grant Writing Tutorial

<http://www.epa.gov/seahome/grants/src/grant.htm>

EPA STAR RESEARCH GRANTS Database (many grants-check often for openings) <http://es.epa.gov/ncer/rfa/>

National Fish and Wildlife Foundation Grants (many grants - check often for openings) http://www.nfwf.org/programs/grant_apply.htm

Michigan Community Service Commission (MCSC)

<http://www.michigan.gov/mcsc/0,1607,7-137-6114-12046--,00.html>

Environmental Support Center (Washington DC) Many programs for grass roots orgs- check often for openings

<http://www.envsc.org/>

2003 Catalog of Federal Funding Sources for Watershed Protection

<http://cfpub.epa.gov/fedfund/>

An Internet Guide to Financing Stormwater Management

<http://stormwaterfinance.urbancenter.iupui.edu/>

Appendix M

Managing the Challenge: A Blueprint for Action

(modified from *Investing in Southeast Michigan's Quality of Life: Sewer Infrastructure Needs, Executive Summary, April 2001*)

The following action steps should be considered by governmental decision-makers.

Action Step One: Reduce Costs

1. Establish collaborative infrastructure planning.
 - Wastewater service providers should work together in identifying opportunities for providing the necessary service at a reduced cost.
 - State regulators should help identify the most cost-effective means of achieving water quality standards. (This includes implementation of the SSO control program)
 - Wherever possible, extended schedules for implementing remediation projects should be sought to reduce costs and make implementation more achievable.
 - A requirement that newly proposed regulations and laws affecting sewer infrastructure be subject to special review before adoption should be implemented.
 - Communities should review their master plans and zoning ordinances to identify ways to reduce sewer infrastructure needs. This should include assessing planning and design before development occurs, assuring that the full cost of development is borne by the developer and utilizing existing infrastructure wherever possible.
2. Place emphasis on watershed management.
 - Fiscal resources for environmental projects should be allocated and prioritized based on how they will improve water quality and not as a result of a regulatory checklist.
 - The most cost-effective projects should take precedence.
3. Implement pollution prevention.
 - Preventing pollution at the source remains the most cost effective means of control.
 - The region's citizens should actively participate in solving the problem.
 - The public sector should vigorously advocate public education efforts in full recognition that the responsibility to achieve water quality standards remains with the local units of government.
4. Continue to support innovative projects that demonstrate ways of reducing costs while protecting water resources.

Appendix M

Action Step Two: Increase Funding

1. Increase federal funding for sewer infrastructure projects.
 - Sewer infrastructure merits funding levels proportional to that for transportation infrastructure; at the very least, funding should be similar to that which existed in the 1970s and early 1980s.
2. Use the sewer-related needs identified in this report as a basis for determining an appropriate increase in capitalizing the State Revolving Fund (SRF).
 - A commitment to allocate \$135 million annually to the SRF program would result in about \$400 million annually in loans to support sewer needs.
3. Local communities will need to identify additional funding mechanisms.
 - Creation of a storm water utility or Chapter 20 drainage district could provide funding for storm water projects.
 - Review sewer rates to determine the adequacy of revenue to properly operate and maintain local wastewater treatment systems.
5. Implement widespread public education efforts to help rate-payers understand the need for additional financial resources and prepare them for expected increases in sewer rates.
 - Support for increased investment in sewer infrastructure hinges, in large part, on citizen awareness of both costs and benefits to the community.

Action Step Three: Brief Elected Officials and Other Decision-Makers on Report Findings

The actions described in steps one and two cannot be implemented unless and until key parties understand and support them. Groups needing the information in this report include:

- The Southeast Michigan Consortium for Water Quality;
- The Rouge Assembly;
- Environmental committees in the state legislature;
- Southeast Michigan representatives in the state legislature;
- Michigan's congressional delegation;
- The governor's office
- City/township/village elected officials
- The media
- Representatives of the private sector
- Citizens