Flr

REMEDIAL ACTION PLAN FOR THE RIVER ROUGE BASIN

VOLUME 1: EXECUTIVE SUMMARY

REVISED SEPTEMBER 1990

SEMCOG . . . *Planning For The Future Today*

Southeast Michigan Council of Governments

DNR

Printed at *SEMCOG* on recycled paper

REMEDIAL ACTION PLAN
for the
ROUGE RIVER BASIN

Volume 1: Executive Summary

Revised September 1990

submitted to the

Michigan Water Resources Commission

by

Michigan Department of Natural Resources
and
Rouge River Executive Steering Committee
and
Rouge River Basin Committee

prepared by

Southeast Michigan Council of Governments
660 Plaza Drive, Suite 1900
Detroit, Michigan 48226

and

Michigan Department of Natural Resources
Surface Water Quality Division
Lansing, Michigan 48909

Preparation of this document was financed through a grant from the United States Environmental Protection Agency through the Michigan Department of Natural Resources and through SEMCOG local membership dues.

ROUGE RIVER REMEDIAL ACTION PLAN

RESOLUTION

Whereas, the Michigan Water Resources Commission on October 1, 1985, called for the development of a plan to restore the Rouge River to the extent practicable by the year 2005; and

Whereas, local, state and federal concerns have worked together to establish goals and objectives for the 20-year plan, which has resulted in defining the necessary programs to restore the Rouge River; and

Whereas, the Rouge River Remedial Action Plan is based on the goals set by the Water Resources Commission and the 48 basin communities and addresses the problems that result from combined sewer overflows, storm-water runoff, contaminated sediment, log jams and other concerns; and

Whereas, the Remedial Action Plan presents a challenging but practicable course of action; and

Whereas, the draft of the Remedial Action Plan has been reviewed by the 48 communities and modified based on the reviews;

Now, therefore be it resolved that the Rouge River Basin Committee and the Executive Steering Committee endorse the Remedial Action Plan as a guide to the implementation of corrective measures to improve the Rouge River through the year 2005; and

Be it further resolved that the Rouge River Basin Committee and the Executive Steering Committee believe that it is appropriate given the severity and long-standing nature of the problems in the Rouge River for all state, federal and local concerns to pursue financial assistance necessary for the implementation of the recommendations of the Remedial Action Plan; and

Be it further resolved that the Rouge River Basin Committee and Executive Steering Committee call on the Michigan Water Resources Commission, the Department of Natural Resources, the U.S. Environmental Protection Agency and local governments in the Rouge Basin to work cooperatively to ensure implementation of the recommendations of the Rouge River Remedial Action Plan.

This resolution adopted this 12th day of January, by the Rouge River Executive Steering Committee and the Rouge Basin Committee.

Thomas J. Anderson, Chairman
Rouge River Executive Steering Committee

Lyle C. VanHouten, Chairman
Rouge River Basin Committee

NATURAL RESOURCES COMMISSION
THOMAS J. ANDERSON
MARLENE J. FLUHARTY
GORDON E. GUYER
KERRY KAMMER
O. STEWART MYERS
DAVID D. OLSON
RAYMOND POUPORE

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
P.O. BOX 30028
LANSING, MI 48909

DAVID F. HALES, Director

May 18, 1989

Dr. Fred Brown, Chairman
Michigan Water Resources Commission
488 W. Ashby, Route 5
Midland, Michigan 48640

Dear Dr. Brown:

In July 1985, the Michigan Water Resources Commission passed a resolution requesting that the Department of Natural Resources, Surface Water Quality Division staff prepare a remedial action plan to restore the Rouge River. Culminating a three-year effort, I am pleased to present to you this Rouge River Remedial Action Plan. This plan represents a major endeavor on the part of the Department, the Southeast Michigan Council of Governments (SEMCOG) and many local municipalities. The document points the direction for the necessary cleanup activities to return to the Rouge River the tremendous recreational potential it has. The State, local and federal partnership that was developed through this process was vital to the completion of the RAP and must continue for the remedial actions to be successfully implemented.

This document is not only of importance to the State and to the Rouge River communities but is of international significance. The Rouge River Remedial Action Plan reflects the State of Michigan's commitment to the Great Lakes Water Quality Agreement between the United States and Canada by presenting a plan that will not only clean up the Rouge River, but will also result in significant improvement to the Detroit River and eventually Lake Erie.

Many key activities have already been initiated. Local commitments and federal grants have been made for the construction of three major sewage disposal projects: the North Huron Valley/Rouge Valley Project, the Evergreen-Farmington Project, and the Detroit Pump Station 2A. These projects represent a total local and federal commitment of over $313 million to the Rouge cleanup effort. National Pollutant Discharge Elimination System permits addressing the combined sewer overflow problems are under development and will be placed on public notice in the near future. Another key activity underway is the identification and correction of nonpoint source problems in the basin.

To be successful, the Remedial Action Plan must be dynamic. We will be continually updating the Remedial Action Plan and taking the necessary steps to ensure that implementation of the recommendations are proceeding according to the identified schedules. It is critical that there is the continued involvement of the established committees, including the Rouge River Executive Steering Committee and the Rouge River Basin Committees. We will keep the Commission informed through regular progress reports of the programs undertaken and progress made in the Rouge River cleanup efforts.

On behalf of the Surface Water Quality Division, I would like to thank the Commission for its strong interest in the restoration of the Rouge River. We look forward to working with you in the years ahead as we jointly pursue this important goal.

Sincerely,

Paul D. Zugger, Chief
Surface Water Quality Division
517-373-1949

cc: David F. Hales, MDNR

Rouge River Remedial Action Plan

Forward

In 1985, the Department of Natural Resources and the Water Resources Commission developed and adopted, respectively, the Rouge River Basin Strategy calling for a comprehensive Rouge River cleanup effort. A key aspect of this Strategy called for the development of a Rouge River Remedial Action Plan consistent with commitments under the international Water Quality Agreement for the Great Lakes.

Under a Department grant to the Southeast Michigan Council of Governments (SEMCOG), and with major emphasis on public participation involving Rouge Basin communities, this document, the "Rouge River Remedial Action Plan," has been completed.

In June 1985 the Department of Natural Resources (DNR), Surface Water Quality Division proposed to the Michigan Water Resources Commission, the draft Rouge River Basin Strategy calling for the development of a comprehensive Rouge River basin planning effort. This effort proposed to include the following activities:

-- Identification of stream quality problems
-- Identification of pollution sources
-- Review all corrective alternatives
-- Development of recommended alternatives
-- Establishment of an effective partnership with local, state and federal agencies

As a result, in July 1985, the Commission issued a resolution supporting the Rouge River Basin Strategy and requested that an Action Plan and process for public participation be developed. In October of that year, the Department presented to the Commission an Action Plan and a Local Participation Process. The following actions were initiated:

-- grant funding was provided to SEMCOG to assist in the development of the Rouge River Remedial Action Plan;

-- a full-time Rouge River coordinator was appointed;

-- staff were assigned to develop and review problem identification information, control alternatives, financing and other activities;

-- a three level public participation process was implemented to assist in the development of the Remedial Action Plan, including:

A. Rouge River Executive Advisory Committee (key local, federal and state officials)
B. Rouge River Basin Committee (representatives of all local communities and interest groups)
C. Technical Committees (local and state experts on critical scientific, engineering and economic issues)

In January 1987, the Initial Rouge River Remedial Action Plan, detailing work accomplished to date, was presented to the WRC. This Initial Remedial Action Plan also identified specific activities that needed to be completed to ensure development of an implementable Remedial Action Plan for the Rouge.

In July 1988, the Executive Summary of the Rouge River Remedial Action Plan was presented to the WRC. The Executive Summary contained basin information regarding the problems in the Rouge basin and actual recommendations for continuation of the clean-up effort. The WRC endorsed the release of the document for public review.

Corrective Programs Initiated

A key principal of the Rouge Strategy is to proceed with feasible, high priority corrective programs as soon as they are identified. Early in the strategy preparation it was determined that major sewer improvement programs were needed in the basin. To expedite the initiation of these important projects, the Department and local agencies focused their resources on ensuring that the necessary local and federal funds would be committed to these programs.

Many local communities have already initiated programs or projects to correct identified problems. Local projects include optimization of the existing collection facilities, sewer separation, elimination of improper connections to storm drains and other activities.

Sanitary Sewer Improvement Projects

The North Huron Valley/Rouge Valley and Evergreen-Farmington Sewage Disposal System interceptor relief projects are integral components of the Rouge River Remedial Action Plan for Wayne and Oakland Counties, respectively. Together with Detroit Pump Station 2A and the First Hamilton relief interceptor, these projects eliminate sanitary sewer overflows and reduce combined sewer overflows to the Rouge River on a regional basis. This local/state/federal effort resulted in the commitment of substantial local and federal funds for these projects. The federal Construction Grants awarded through the DNR are shown below:

a.	Wayne County (North Huron Valley/Rouge Valley)	29,100,000
b.	Oakland County (Evergreen-Farmington)	21,600,000
c.	Detroit (Pump Station 2A and First Hamilton Connection)	$92,400,000
	Total Grant Awards	$143,100,000

The estimated total financial commitment of the projects is:

Federal Grants	$142,100,000
Local Commitment	171,200,000
Total Commitment	$313,300,000

Construction of these projects is a vital first step in the Rouge cleanup effort and represents a major initiative in the state/local/federal cleanup commitment.

Combined Sewer Overflow Control

The Rouge River RAP identifies combined sewer overflows as a major cause of pollution in the Rouge Basin. The RAP calls for the implementation of a three-phase combined sewer overflow (CSO) control program to be implemented through the National Pollutant Discharge Elimination System (NPDES) permits. These discharge permits are required under the federal Clean Water Act and are developed by the DNR and issued by the WRC. The goal set forth in the RAP is to eliminate raw sewage discharges and protection of public health by the year 2005. Phase I includes the optimization of the existing collection system and the development of a long term plan for controlling CSO discharges. Phase II is the actual construction of the necessary CSO control facilities to assure raw sewage discharges are eliminated and public health is protected. Phase III calls for the evaluation of the Phase I and Phase II programs and the implementation of any necessary additional correction programs to meet Michigan's Water Quality Standards and restore the beneficial uses of the river.

To assure timely implementation of the RAP, the Michigan Water Resources Commission adopted a schedule calling for the development and issuance of NPDES permits containing CSO requirements consistent with the recommendations included in the Rouge River Remedial Action Plan. The schedule called for the permits being issued in the spring of 1989.

Industrial and Municipal Discharges

In 1988 on-going implementation efforts were increased in monitoring the industrial and municipal discharges in the Rouge basin. All discharges were surveyed by the DNR by November, 1988. It is significant to note that thirty-one of the thirty-three discharges in the basin have been verified to be in continuous compliance with their NPDES permit. The Department is working with the remaining two facilities to assure the necessary steps are taken to return to a continuous compliance status.

Monitoring

A major component of the Rouge River Remedial Action Plan effort involved surveys of the river to document the extent of the pollution problem. The Department completed an extensive biological and fisheries survey of the River in 1987. This study found that the Rouge ranged from fair to poor quality. The DNR, along with the Michigan Department of Public Health, collected and analyzed fish throughout the basin. One result of this work was fish consumption advisories being placed on the lower branch, middle branch and lower portion of the main branch. The Wayne County Health Department (WCHD), under contract to the DNR is sampling 22 sites throughout the basin on a weekly basis. The City of Detroit, Wayne County, and the Detroit Edison Company have in the past or are presently assisting in the stream sampling program. The DNR and WCHD are also in the process of sampling storm drains in the basin that have been identified as having significant water pollution problems and implementing corrective programs where improper connections are found. These examples illustrate the cooperative working relationship being initiated to implement the needed programs in the Rouge.

Financing

Clearly, the correction of combined sewer overflows throughout Michigan, and nationwide, is going to be a very expensive undertaking. This is certainly true in the Rouge Basin. The Remedial Action Plan estimates that approximately $900 million will be needed for addressing sewer system improvements and other problems in the basin.

Large expenditures have already been made to upgrade sewage treatment plants throughout Michigan, and the United States in general. The multi-billion dollar federal construction grants program represents the second largest public works program in the history of the nation. The 1987 amendments to the federal Clean Water Act, however, call for the phase out of the construction grants programs. In its place, the new act established the State Revolving Loan Fund (SRF). Michigan qualifies for $365 million in federal capitalization grants to establish the SRF. The required twenty percent state match was included in the recently approved Quality of Life Bond Bill, and raises the total amount of the fund to approximately $440 million. It is estimated that the fund will provide low interest loan assistance of approximately $1 Billion. The SRF will provide low interest loans for eligible sewage treatment works and nonpoint source control projects. There are restrictions on the first round of the SRF.

It is clear that SRF assistance will only address a portion of the total need identified for the Rouge River Remedial Action Plan. A major portion of the financial burden will have to be carried at the local level. In establishing construction schedules for CSO controls, the DNR will take into consideration the economic constraints facing each community, but will be requiring maximum feasible progress in correcting these overflows.

Through completion of the RAP, it has been demonstrated that the technology is available to clean up the Rouge and that State, local and Federal officials, and the public, have the desire to initiate such an effort. The major remaining hurdle is the commitment of all involved, including state, local and federal interests, to assure that the necessary programs to cleanup the Rouge River are implemented. This can only be accomplished through a continued cooperative working relationship similar to that which has been developed through the remedial action planning process. It is the task of all interests to ensure that this cooperative relationship and commitment to the Rouge cleanup effort continues.

Acknowledgements

The Michigan Department of Natural Resources, Surface Water Quality Division would like to thank the individuals that participated in this effort over the last several years including numerous meetings of the Rouge River Executive Steering Committee, the Rouge River Basin Committee and the many technical Advisory Committees. The Department appreciates the leadership shown by Mr. Thomas Anderson, Executive Steering Committee Chairman and Mr. Lyle VanHouten, Basin Committee Chairman. It is through the efforts of the members of these committees that this document reflects the state/local/federal, interests in this important effort.

The Department would like to especially thank the Southeast Michigan Council of Governments for providing the leadership, local direction and staff expertise necessary to accomplish the unprecedented endeavor the completion of this document represents. The Department would like to acknowledge the efforts of Mr. Jim Rogers for his day-to-day involvement in the preparation of this document.

The Department would also like to express its appreciation to the communities in the Rouge basin for their cooperative efforts to complete this document. It is our trust that the implementation of the recommendations included in the Plan carry forward in the same cooperative spirit.

TABLE OF CONTENTS
(for Chapter I only)

VOLUME 1

Chapter I: Executive Summary

	Page
Title Page	i
Resolution	iii
Transmittal Letter	v
Forward	vii
Acknowledgements	xi
Table of Contents	xiii
List of Tables	xv
List of Figures	xvii
Summary	1
Part 1 - Introduction	3
Purpose of the RAP	5
RAP Contents	5
Findings and Recommendations	6
Part 2 - Goals of the Remedial Action Plan	11
Part 3 - Recommended Remedial Actions	17
General Recommendations	24
Subbasin Specific Recommendations	47
Part 4 - RAP Development	81
RAP Studies and Planning Elements	83
RAP Oversight and Advisory Committees	86
Part 5 - The Rouge River Basin: Characteristics and Problems	91
Basin Characteristics	93
Problem Definition	93
Pollution Sources	100
Pollutant Loadings	106
Part 6 - Data and Monitoring Needs	109
Data Evaluation	111
Monitoring Needs	113
Part 7 - Institutions and Financing	117
Background and Methodology	120
Findings	122
Alternate Scenarios for a Financing Strategy	132
Recommended Financing Strategy	138
Part 8 - List of Full RAP Contents and Appendices	139

LIST OF TABLES

VOLUME 1

Chapter I

Table I-1 Summary of Recommended Rouge RAP Projects..... 21

Table I-2 Rouge RAP Planning Activities and Studies Summary.... 84

Table I-3 Probably Causes of Impairments in Rouge River Subbasins..... 97

Table I-4 Summary of Pollutant Sources, Types of Specific Pollutants Discharged, by Subbasin.....102

Table I-5 Annual Estimated Pollutant Loadings Summary for each Subbasin of the Rouge River and the Entire Basin.....107

Table I-6 Summary of Rouge River Monitoring Needs.....114

Table I-7 Estimated Total Annualized Funding to Implement the RAP.....123

Table I-8 Increases in Local Revenue Sources to Match Needed Level 1 Costs.....125

LIST OF FIGURES

VOLUME 1

Chapter I

Figure I-1 Location of Rouge River Basin..... 7

Figure I-2 Communities in the Rouge River Basin..... 8

Figure I-3 Fecal Bacteria Levels in the Rouge River Basin..... 10

Figure I-4 Summary Timeline of Rouge RAP Implementation..... 23

Figure I-5 Recommended Sanitary Sewer Projects in the Rouge River Basin..... 25

Figure I-6 Key Features of Rouge CSO Recommendations..... 29

Figure I-7 Potential Locations of CSO Treatment Basins..... 30

Figure I-8 Subbasins of the Rouge River Basin..... 48

Figure I-9 Selected Pollution Sources in the Main-1 Subbasin..... 50

Figure I-10 Selected Pollution Sources in the Main-2 Subbasin..... 53

Figure I-11 Selected Pollution Sources in the Main-3 Subbasin..... 56

Figure I-12 Selected Pollution Sources in the Main-4 Subbasin..... 59

Figure I-13 Selected Pollution Sources in the Upper-1 Subbasin..... 62

Figure I-14 Selected Pollution Sources in the Upper-2 Subbasin..... 65

Figure I-15 Selected Pollution Sources in the Middle -1 Subbasin..... 67

Figure I-16 Selected Pollution Sources in the Middle-2 Subbasin..... 70

Figure I-17 Selected Pollution Sources in the Middle-3 Subbasin..... 73

Figure I-18 Selected Pollution Sources in the Lower-1 Subbasin..... 76

Figure I-19 Selected Pollution Sources in the Lower-2 Subbasin..... 78

Figure I-20 Organization of Rouge River Local Participation Process..... 87

Figure I-21 The Rouge River Basin..... 94

Figure I-22 Summary of Impaired Uses for the Rouge River..... 96

Figure I-23 Discharges to the Rouge River Basin.....101

Figure I-24 Rouge River Data Review and Evaluation Results.....112

Figure I-25 Proportion of Costs by Project Category.....127

SUMMARY

Why must we act now to clean up the Rouge River?

The Rouge River Remedial Action Plan (RAP) presents a 20-year program that is needed to begin to solve the river's worst pollution problems and to protect public health. Federal and state law mandates that progress be made toward the ultimate goal of a "fishable and swimmable" river. The Rouge RAP acknowledges that the first priority must be to protect public health while making reasonable progress toward the goal of a restored Rouge River. This priority means that by the year 2005 we must eliminate untreated discharges of raw sewage, and also address the discharge of toxic pollutants. The goal of achieving state Water Quality Standards remains as a long term goal.

There really is no choice except to act now. But how can the 48 Rouge Basin communities protect public health while making reasonable progress without suffering unacceptable financial hardships? The Remedial Action Plan answers this question by recommending a program that is achievable and makes the necessary progress toward meeting federal and state requirements.

The RAP is to be submitted for final endorsement to the Michigan Water Resources Commission (WRC). The WRC issues state permits to wastewater dischargers. In requesting preparation of the plan in 1985, the WRC wanted to know that its permitting actions would be consistent with a coordinated effort to address pollution problems in the Rouge River. The permits that the WRC will be issuing or reissuing for discharges of combined sewage and of stormwater will determine the basic requirements for Rouge Basin communities over the 20-year RAP implementation period. The RAP presents a recommended course of action that the Rouge River RAP oversight committees, the Basin Committee and the Executive Steering Committee, believe should be followed by the Water Resources Commission, the Michigan Department of Natural Resources, the Rouge communities, and other charged with implementing the plan.

What actions are recommended in the plan?

The Remedial Action Plan recommends that two serious problems be tackled first - elimination of raw sewage discharges and control of toxic discharges to the river. The plan identifies interceptor projects and local sewer improvement projects that must be constructed to eliminate overflows from separate sanitary sewers. The plan also identifies the actions necessary to control the 168 combined sewer overflows (CSOs) that discharge an estimated 7.8 billion gallons of combined sanitary sewage and stormwater annually. The plan recommends that all CSO discharges are to receive treatment that accomplishes at least settling, skimming, and disinfection.

The CSO controls are to be carried out through a two-phased program. Phase I will last five years and will require optimizing performance of the existing combined sewer system and community-level CSO control planning. The second phase will involve building the necessary CSO control facilities that are required to meet the objective of protecting public health.

Sewer cross connections and improper discharges to storm drains are to be dealt with through a new program spearheaded by county health departments. Toxic pollutants that now are being discharged from CSOs are to be controlled at their sources. Special studies will be carried out by the Michigan Department of Natural Resources to locate additional problem areas in the Rouge Basin.

How much will the RAP cost to implement?

The RAP provides estimates of costs for each recommended project. Costs are also presented by community. Capital costs of the RAP over the 20-year implementation period are estimated to be approximately $900 million. The most significant costs will be incurred through implementing the recommended CSO control program, estimated at approximately $500 million. Separate sanitary sewer improvements and the Rouge River Basin share of improvements within the Detroit wastewater collection and treatment system are estimated to be $370 million. The other costs, such as for eliminating improper connections to storm drains, will be incurred in attaining the objectives of the plan.

Who will pay for the Rouge clean-up?

With this magnitude of costs, timely implementation depends on continuing to provide state, local, and federal sources of funding. The RAP recommends CONTINUAL FINANCIAL assistance from state and federal sources. However, local communities will need to bear most of the costs.

The financial analysis carried out during preparation of the RAP has resulted in recommendations that will assist communities in handling these very large costs. First, the goal of public health protection rather than Water Quality Standards was set for the first 20 years. This resulted in the selection of a lower cost alternative for CSO control: settling, skimming, and disinfection. Second, in establishing permit requirements the Department of Natural Resources will consider locally prepared CSO control plans and timetables. The implementation schedules in these plans will be based on community-specific estimates of affordability. Third, the plan recommends the establishment of a basinwide drainage district, which will allow coordination, priority setting, and a flexible means of raising revenue for the 48 basin communities.

PART I - INTRODUCTION

PART I - INTRODUCTION

Purpose of the Remedial Action Plan (RAP)

The Rouge River Remedial Action Plan (RAP) defines an ambitious 20-year program of actions needed to protect public health and make substantial progress toward full clean up of the Rouge. RAP recommendations will not be easy to achieve. The difficult task assigned to the 48 communities in the basin by the Michigan Water Resources Commission (WRC) is: take a small urban river polluted throughout its four branches by hundreds of individual sewage and stormwater discharges and restore it to a condition that meets the state's Water Quality Standards. The WRC's statement of goals for the RAP included the phrase "to the extent practicable." The Rouge River Basin Committee and Executive Steering Committee, which have overseen development of the RAP, believe that this plan represents an achievable program that is "practicable" and that will provide substantial improvements to conditions in the Rouge River.

The RAP recommendations incorporate new projects and incorporate existing sewer capacity improvement projects that have been in the planning and design stages for a number of years. It must be recognized that the RAP's implementation will require substantial additional funding from local, state, and federal sources. The RAP's financing strategy was developed to identify methods of providing this funding.

RAP Contents

This Executive Summary is Chapter I of the full Remedial Action Plan document, which has 10 chapters and approximately 1,300 pages plus 17 appendices. SEMCOG and the Michigan Department of Natural Resources (MDNR) worked with eight technical advisory committees and the two oversight committees to define the problems and necessary remedial actions contained in the Remedial Action Plan. The RAP's contents include the following major elements:

- Problem Definition - the condition of the Rouge River system
- Pollution Sources - the types and places of origin of pollutants
- Pollutant Loadings - amounts of pollutants that enter each stream segment
- Remedial Strategies - plans of action that address each pollution source
- Appendices - background reports on subjects such as water quality monitoring

A list of the chapters and appendices contained in the nine volumes of the full RAP is provided at the end of this Executive Summary.

Findings and Recommendations

The Executive Summary provides an overview of problems and remedial actions that are defined in detail in the full RAP. All RAP recommendations are included within Part 3 of the Executive Summary. The location of the Rouge River Basin is shown in Figure I-1. The basin drains all or part of 48 communities as shown in Figure I-2.

For planning purposes the basin was divided into 11 subbasins. A problem assessment found that all 11 subbasins are affected by pollution problems. Problems are severe enough that every subbasin fails the State of Michigan standards for stream use in at least three of the five categories. Examples of the extent of the Rouge's problems include:

- Sewage discharges from combined sewer overflows (CSOs), over-capacity separate sanitary sewers, and sewage improperly discharged to storm drains result in severe bacterial contamination of 10 of 11 subbasins. Figure I-3 shows results of recent sampling of fecal bacteria levels.

- Improper connections to storm drains.

- Storm runoff is rapid due to the paved surfaces and rooftops in the basin, which causes stream bed scouring and bank erosion. This runoff carries large quantities of pollutants.

- River sediments continue to be of concern because of toxic contaminants such as metals and PCBs.

- Near zero stream flow in upper portions of the watershed during dry weather makes it difficult to maintain oxygen levels sufficient for fish and stream organisms to survive.

The Remedial Action Plan calls for a phased approach to solving the Rouge's problems. The plan identifies specific projects needed between now and the year 2005. The approach followed in the recommendations follows the guidance set forth in the Water Resources Commission Strategy: address the entire Rouge River Basin, implement improvement projects as soon as they are identified, and determine implementation costs and schedules. In addition, the RAP recommends a financing strategy as an essential part of the overall plan.

The phases of RAP implementation, as contained in the recommendations, generally can be described as follows:

Phase I, present to 1993,

- Construct separate sanitary improvement projects at a capital cost of approximately $370,000,000.

- Monitor and optimize the existing combined sewer system.

- Conduct detailed local planning for CSO controls.

- Implement programs to remove improper connections to storm drains.

FIGURE I-1

LOCATION OF ROUGE RIVER BASIN

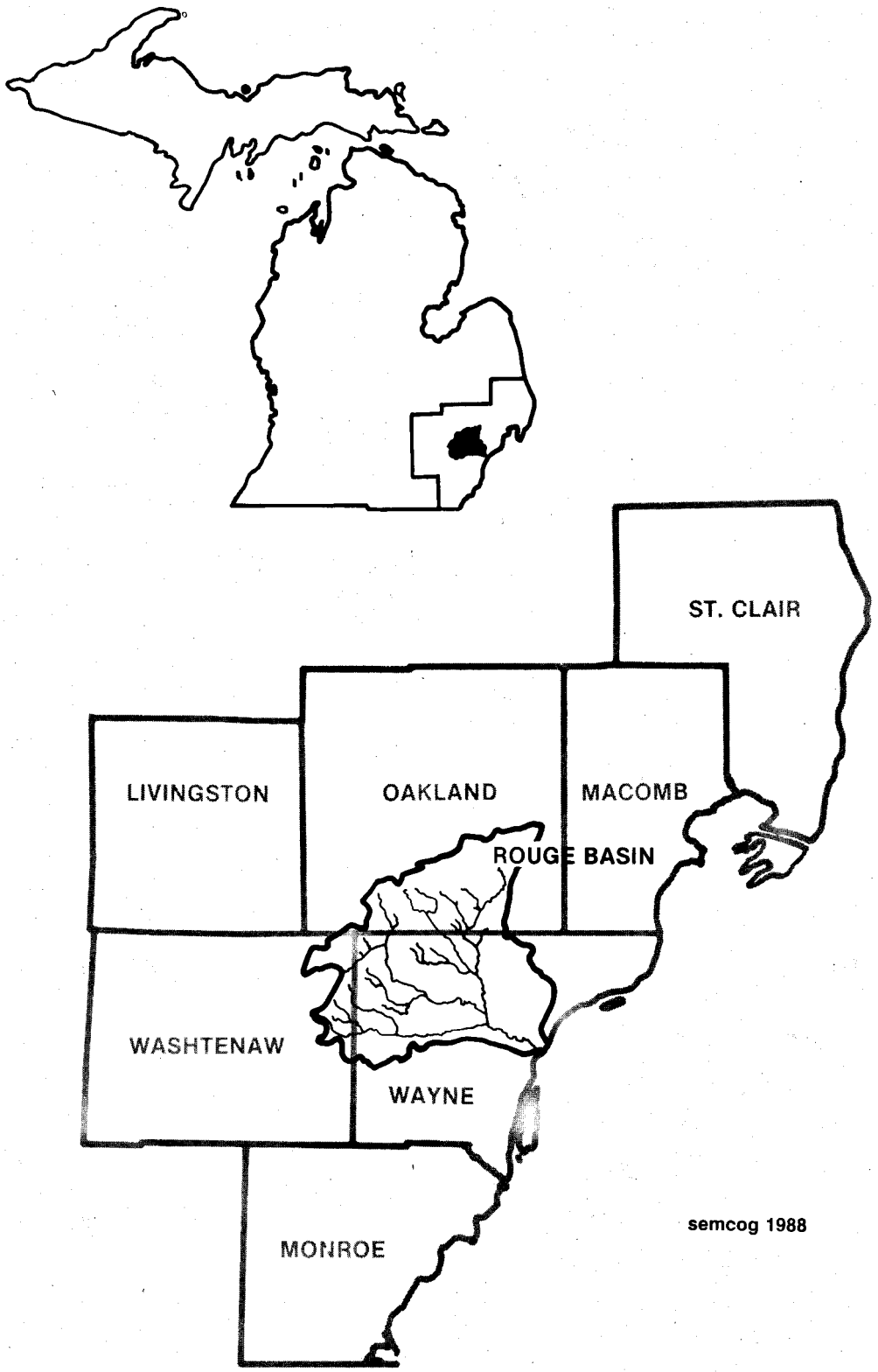
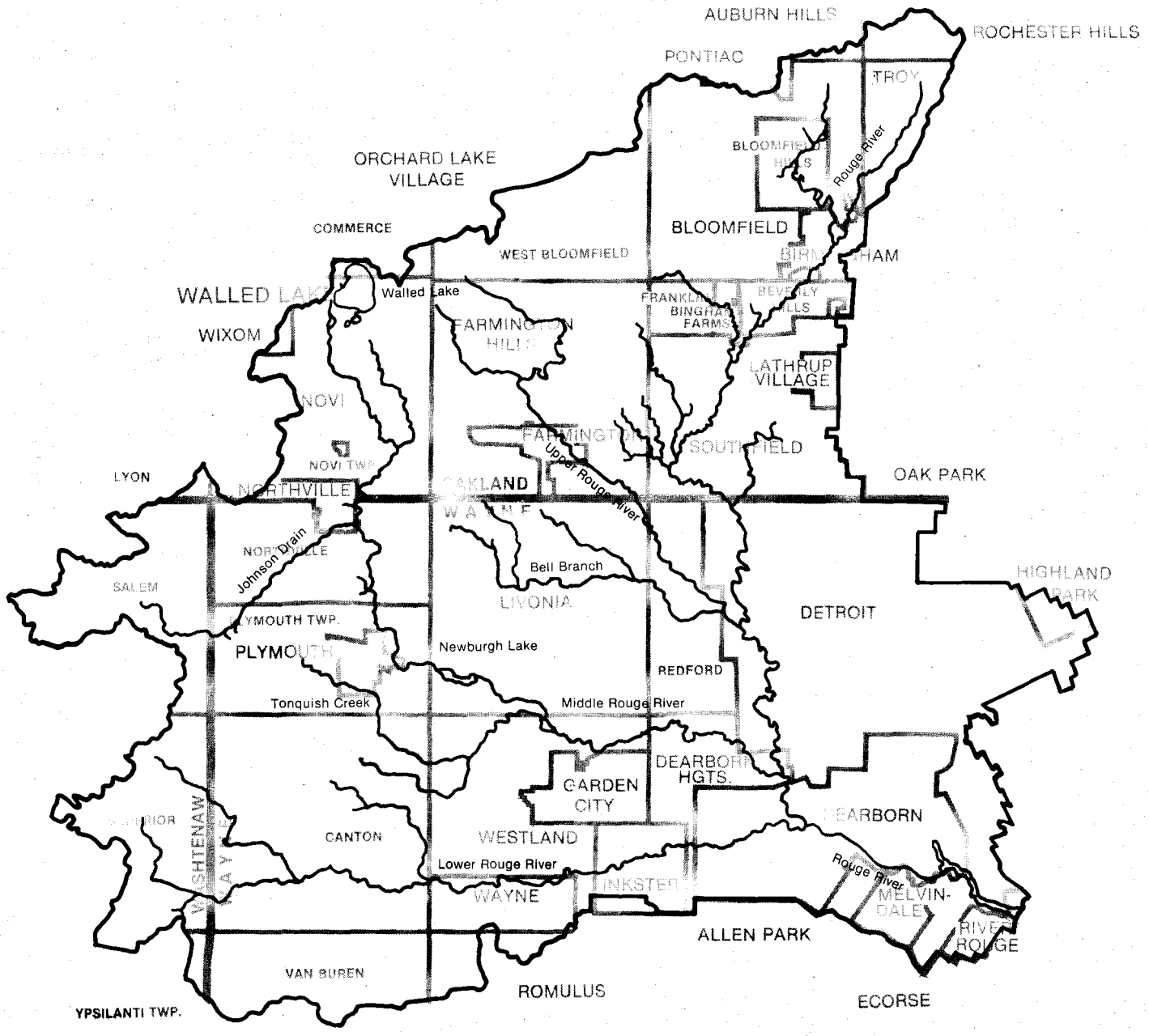


FIGURE I-2

COMMUNITIES IN THE ROUGE RIVER BASIN



semcog 1988

- Implement new or updated stormwater management plans.

- Study and implement resource improvements, such as log jam removal and habitat enhancement.

- Control industrial pollutants at the source through NPDES permits for direct dischargers and through source controls for dischargers to the sewer system.

- Continue regular monitoring and conduct special intensive studies in identified problem areas.

- Implement financing methods at the local, state, and federal levels to pay for improvements.

- Issue discharge permits that specify requirements for CSOs and stormwater discharges.

Phase II, 1994 - 2005,

- Implement CSO improvements that will eliminate untreated raw sewage discharges. Meet the minimum objective of point-by-point control with settling, skimming, and disinfection for all overflows, at a capital cost of approximately $500,000,000.

- Complete implementation of improper connections program and other programs that address problems identified in special studies.

- Implement further stormwater controls as needed based on monitoring and the stormwater management plans.

Phase III, after Phase II completion,

- Evaluate results of CSO controls and initiate planning and implementation of further improvements necessary to meet Water Quality Standards.

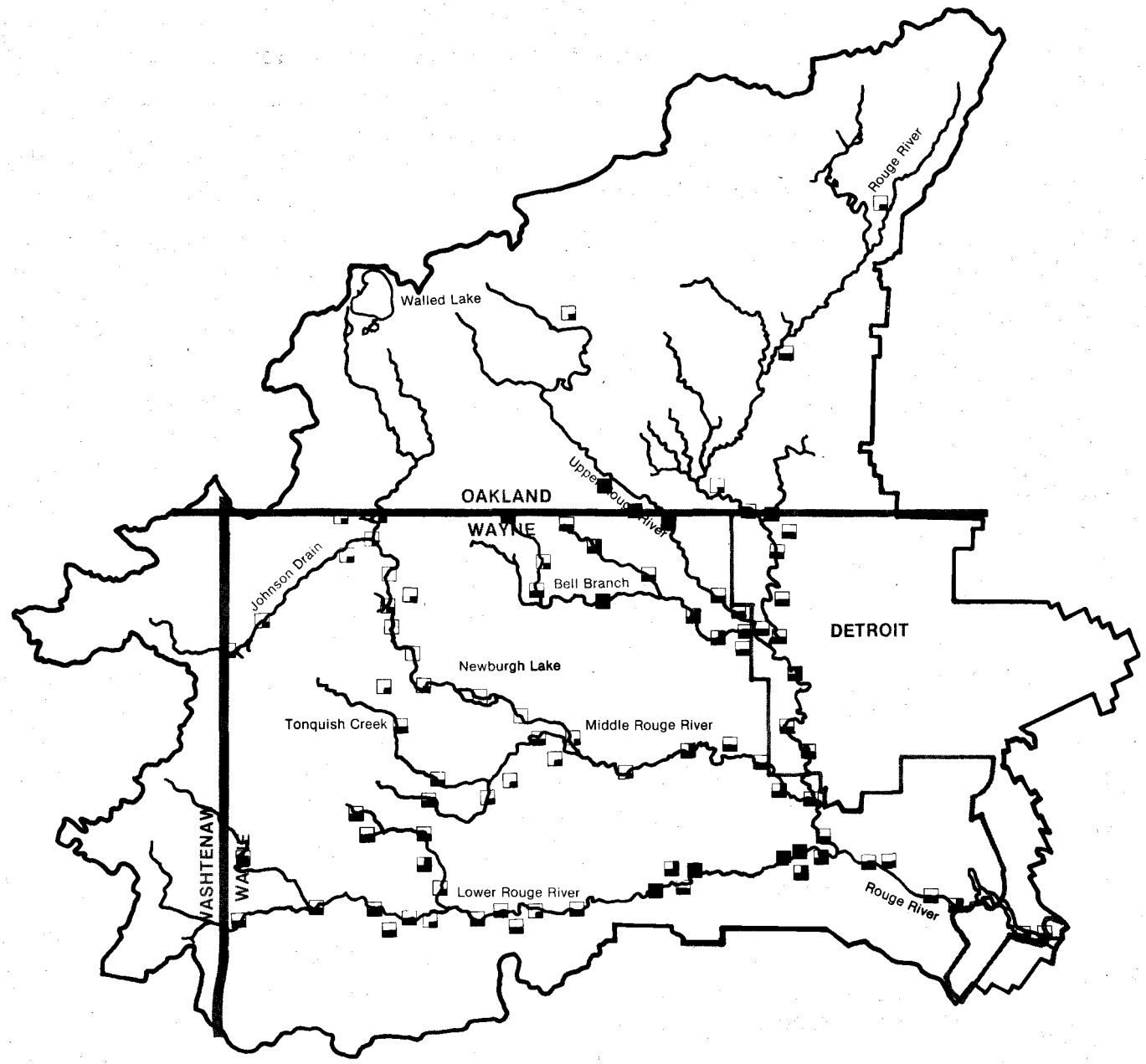
- Evaluate further needs for stormwater discharge controls and implement where needed to meet Water Quality Standards.

- Evaluate effect of reductions in pollutant loadings on sediment contamination and determine appropriate remedial actions, if necessary.

The RAP recommendations are presented as both general recommendations, applying across the basin, and as subbasin recommendations, which identify area-specific actions.

FIGURE I-3

FECAL BACTERIA LEVELS IN THE ROUGE RIVER BASIN



Geometric Mean of Fecal Coliform Concentrations
(five samples collected within 30 days)

		Number of sites
Over 10,000	per 100 ml	9
5,001—10,000	per 100 ml	10
1,001—5,000	per 100 ml	44
201—1,000	per 100 ml	22
200 or less*	per 100 ml	5

semcog 1988

*200 is state water quality standard

SOURCE: 1987 Wayne County Health Department and MDNR.

PART 2 - GOALS OF THE REMEDIAL ACTION PLAN

PART 2 - GOALS OF THE REMEDIAL ACTION PLAN

The Rouge River Basin Strategy that was adopted by the Water Resources Commission (WRC) on October 1, 1985, contained improvement goals for the Rouge River Basin. Pollution control goals in the Strategy were fairly explicit and were directed at the most significant sources of pollution to the Rouge. The WRC Strategy set an overall goal of restoration of the Rouge River by the year 2005. The Strategy also dealt with the process of achieving this restoration. Accomplishment of Strategy goals was to be completed by implementing cost-efficient projects as soon as possible without waiting for the completion of a "grand plan" that would take years of further study to prepare.

The preparation of the Rouge River Remedial Action Plan has been guided by the direction set by the WRC. Based on this guidance, the original WRC goal statements have been rewritten and revised by the Basin Committee and the Executive Steering Committee with input by subcommittees and technical advisory committees.

RAP planning determined that full restoration of the Rouge cannot be achieved within 20 years. While achievement of restoration of designated uses by meeting Water Quality Standards remains as a long term goal, the primary short term goal must be to protect public health. Following the primary goals listed below are 27 additional goals. These goals identify specific actions and further define the intent of the primary goals.

PRIMARY GOALS OF THE RAP

1. Protect public health by the elimination of discharges of untreated sewage and the control of discharges of toxic substances to the Rouge River.

2. As a long term goal, meet designated uses through the eventual achievement of Water Quality Standards to the greatest extent practicable.

<u>Pollution Control</u>

3. Eliminate all wet weather overflows from separate sanitary systems.

4. Eliminate all combined sewer overflows to the extent practicable.

5. Control direct discharges of pollutants through effective NPDES permits.

6. Implement needed industrial pretreatment programs throughout the basin.

7. Reduce the discharge of pollutants from stormwater runoff and other nonpoint sources.

8. Reduce the impact of increased, high flow stormwater discharges that

cause scouring, erosion, and sedimentation in the stream channel.

9. Determine and reduce the impact of in-place pollutants (primarily sediments) on fish and other biota in the Rouge River.

10. Implement cost-efficient controls by optimizing use of the existing sewage collection and treatment system, using in-system storage, and improving operations and maintenance.

Water Quality

11. Reclaim the Rouge River to meet designated uses through the eventual achievement of Water Quality Standards, to the greatest extent practicable.

12. Protect the public health from threats due to pollution of the Rouge River.

13. Make the Rouge River safe for total body contact recreation, to the greatest extent practicable.

14. Protect the water quality in feeder streams as well as the four major branches of the river.

15. Enhance the Detroit River and the Great Lakes as a consequence of cleanup of the Rouge River itself.

16. Eliminate sources of sediment contamination in the Rouge Basin.

17. Determine and eliminate causes of elevated PCB levels in fish in the Lower Main Rouge, the Middle Rouge, and the Lower Rouge.

Resource Development

18. Enhance the recreational potential of the Rouge River and its banks, through both water quality and stream improvement measures.

19. Develop fisheries where appropriate in the Rouge River system.

20. Eliminate nuisances such as odors, debris, and log jams that limit the use of the Rouge River and its banks.

21. Improve the natural hydraulics of the river system.

22. 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.

23. Initiate or improve control of stormwater in the Rouge Basin.

RAP Implementation Process

24. Educate and involve the public to build understanding and support for restoration of the Rouge River.

25. Implement incremental solutions to problems as soon as they are identified, as long as the proposed actions are consistent with the goals of the plan.

26. Use permits or other enforceable documents to ensure compliance with problem solutions by responsible parties where sources and problems are identified.

27. Build upon existing facilities planning work done for communities within the Rouge River Basin.

28. Ensure that institutional arrangements and funding sources are adequate for achieving the goals of the plan.

29. Build a strong local, state, and federal coalition that will ensure implementation of the Remedial Action Plan.

PART 3 - RECOMMENDED REMEDIAL ACTIONS

PART 3 - RECOMMENDED REMEDIAL ACTIONS

The purpose of the Rouge River Remedial Action Plan (RAP) is to identify the projects and activities necessary to meet the Water Resources Commission's goals for restoring the river. Recommendations that follow address the pollution sources and other problems that have been identified as contributing to the impairment of the designated uses of the Rouge:

- Separate sanitary sewer overflows
- Combined sewer overflows
- Improper connections to storm drains, storm water runoff, and other nonpoint sources.
- Municipal and industrial dischargers
- Sediment contamination
- Log jams and debris

In addition, recommendations are made that deal with data gathering, public education, and the institutions and financing that are essential to successful implementation of the RAP.

Several basic concepts have shaped development of the RAP recommendations, including guidance in the WRC's strategy:

- Implement projects as soon as they are identified as being consistent with the goals of the RAP.
- Proceed in stages on sewer projects: build new combined sewer overflow facilities after completing improvements to separate sanitary sewers and optimizing existing system performance.
- Proceed in stages with other pollution sources. For example, with stormwater runoff deal first with the known problems of improper connections to storm drains.
- Continue data collection and planning needed to better identify pollution sources and document cleanup progress.
- Develop a financing strategy at the same time as project costs are being identified.
- Involve local governments and citizens in plan development in order to have an implementable plan.

Estimated costs are provided for each recommendation to the extent that estimates could be made. Costs shown are capital cost or direct program costs. Financing and annual operation and maintenance costs are taken into account in the RAP financing strategy. The timing of project design, reviews, and construction are indicated. The recommendations also contain the names and responsibilities of agencies and units of government charged with carrying them out. Table I-1 presents a summary of the projects recommended in the Remedial Action Plan. Figure I-4 summarizes the timing of RAP implementation.

TABLE I-1

SUMMARY OF RECOMMENDED ROUGE RIVER RAP PROJECTS

Project	Estimated Capital or Program Costs
A. Separate Sanitary Sewers	
1. Implementation of Detroit Flow Management Plan, including Pump Station 2A*	$190,000,000
2. Evergreen-Farmington improvements	44,500,000
3. First-Hamilton Relief Outlet	33,000,000
4. North Huron Valley-Rouge Valley Interceptor	39,100,000
5. Western Townships Utility Authority Interceptor	38,400,000
6. Local sewer projects	24,700,000**
B. Combined Sewer Overflows (CSO)	
1. Implementation of Detroit Flow Management Plan, including Pump Station 2A*	cost shown above
2. Monitoring, system optimization, in-system storage	no estimate
3. Local CSO studies, detailed planning and design	no estimate
4. CSO control projects	$500,000,000
C. Stormwater Runoff and Other Nonpoint Sources	
1. Improper connections projects	$ 12,600,000
2. Local stormwater management programs	no estimate
3. Materials storage piles and Act 307 site controls	no estimate
D. Municipal and Industrial Dischargers	no estimate
E. Sediments	
1. Sediment Re-evaluatiion	no estimate

* The Detroit improvements are listed under both categories because they benefit both separate sanitary and combined parts of the sewer system served by Detroit. Cost indicated does not include all projects included in the Flow Management Plan.

** Local sewer projects costs estimates are only available for the North Huron Valley-Rouge Valley and Western Township Utility Authority communities.

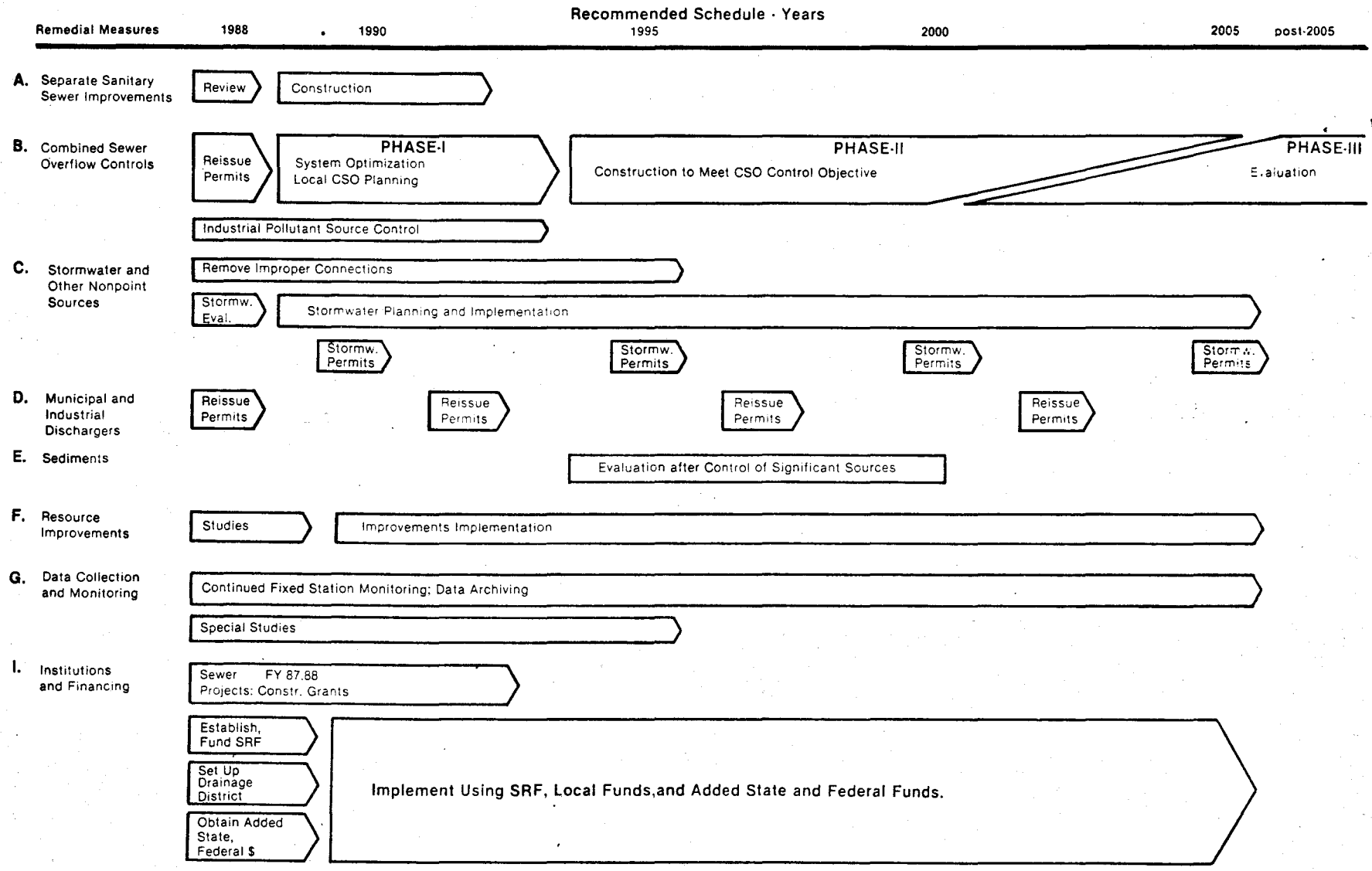
TABLE I-1
(continued)

Project	Estimated Capital or Program Costs
F. Resource Improvements	
1. Log and debris jam master plan	$ 150,000
2. Log and debris jam implementation	no estimate
3. Habitat enhancement projects	no estimate
4. Fisheries management plan	no estimate
5. Middle Rouge impoundments recreation study	$ 78,000
G. Data Collection and Monitoring	
1. Maintenance of Rouge River Archive	no estimate
2. Fixed station monitoring	$ 500,000
3. Intensive event response surveys in 11 subbasins	no estimate
4. Intensive survey of Middle and Lower Rouge for PCBs	70,000
5. Intensive survey of Evans Creek	no estimate
6. Monitoring of CSOs and industrial and municipal dischargers	$ 140,000
H. Public Education	
1. On-going RAP communications	no estimate
2. High school water quality projects	$ 30,000
I. Institutions and Financing	
1. Basin and Executive Steering Committees	no estimate
2. Implementation of financing strategy	no estimate
Total of Estimated Capital and Program Costs	$900,000,000

Note: Cost estimates in this table were developed during preparation of the original Remedial Action Plan (1986-1989). These estimates were developed and used for planning purposes in the RAP. Better estimates for individual projects may be available as they proceed towards implementation.

FIGURE I-4

SUMMARY TIMELINE OF ROUGE RAP IMPLEMENTATION



Source SEMCOG, 1988

GENERAL RECOMMENDATIONS

A. Sewer System Improvements - Separate Sanitary Sewers

The RAP identifies problems of inadequate sewer capacity in many areas of the Rouge Basin. Sanitary sewer bypasses occur at pumping stations, manholes, and other locations due to infiltration and inflow and lack of adequate wet weather capacity in local sewers and in interceptor sewers. Sewage discharges to the river system contribute to impairment of designated uses. In particular, human contact with the river is impaired due to bacterial contamination.

The following recommendations concern needed improvements to sewage transport and treatment capacity that affect the Rouge River Basin. The result of these actions will be to eliminate bypasses of separate sanitary sewage and to provide a basis for subsequent reductions in overflows of combined sewage to the Rouge River. Figure I-5 shows the locations of the recommended projects.

A number of the recommended sewer improvement projects are currently in the project review stage. Timely completion of construction grant requirements can ensure that state and federal grant funding will be provided to offset a portion of the local costs of needed sewer improvements.

Recommendation A-1.

The Detroit Water and Sewerage Department should continue to pursue design, MDNR approval, and construction of Pump Station 2A and implementation of its Flow Management Plan. MDNR should provide timely review of Pump Station 2A and the Flow Management Plan consistent with the high priority MDNR has placed on the Rouge Basin.

Cost: $190 million Timing: Review 1988; Construction of Pump Station 2A 1988 - 1992

Agencies: Design and Construction - Detroit Water and Sewerage Department; Review - MDNR, U.S. EPA.

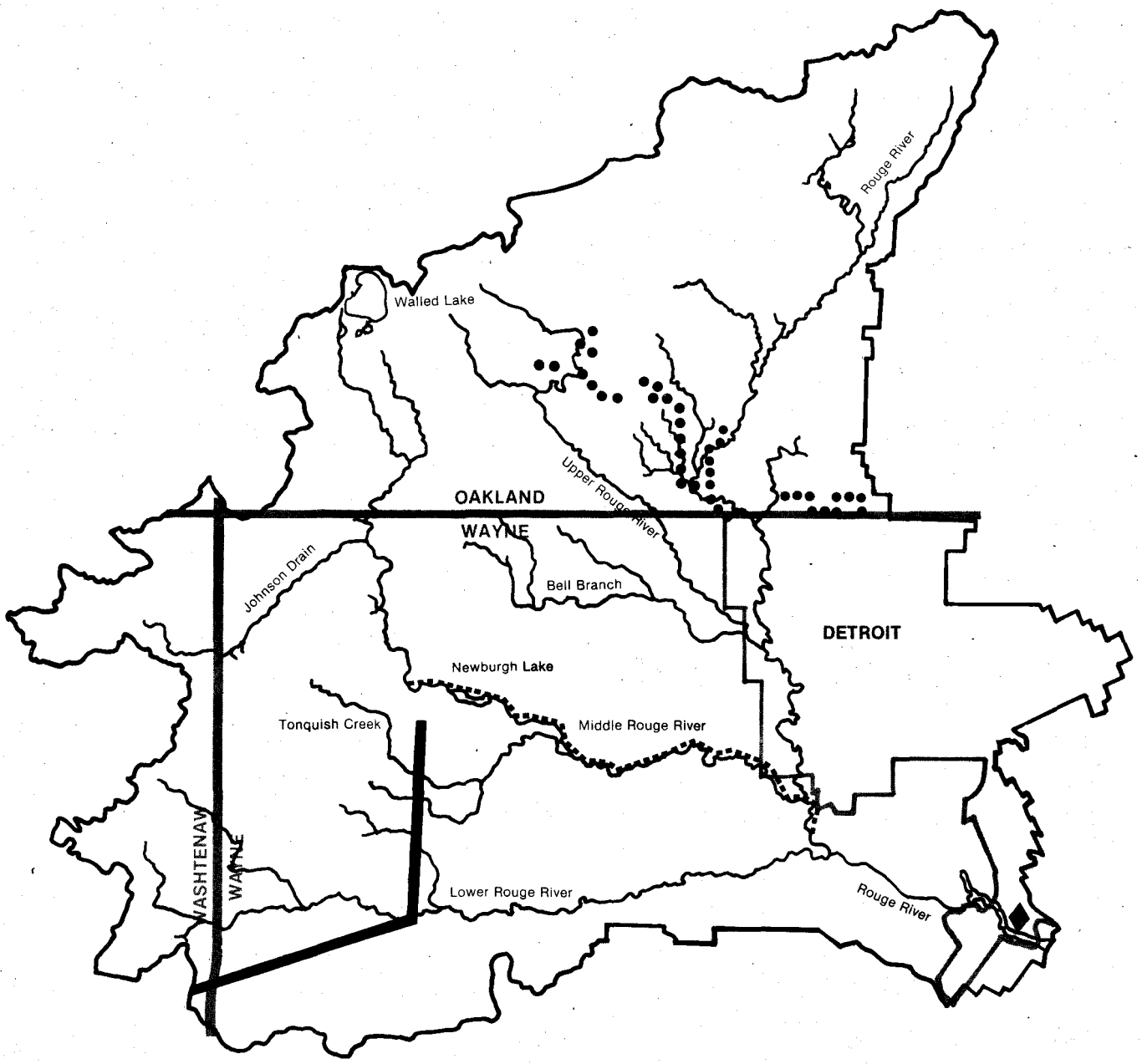
Recommendation A-2.

The Oakland County Drain Commission should continue to pursue design, MDNR approval, and construction of the Evergreen-Farmington Improvements. MDNR should provide timely review of the Evergreen-Farmington Improvements project consistent with the high priority MDNR has placed on the Rouge Basin.

Cost: $44.5 million Timing: Review 1988; Construction 1989 - 1993

FIGURE I-5

RECOMMENDED SANITARY SEWER PROJECTS IN THE ROUGE RIVER BASIN



semcog 1988

- ♦ Pump Station 2A
- ●●● Evergreen-Farmington Improvements
- ▬▬ North Huron Valley - Rouge valley Improvements
- ▬ Western Townships Utility Authority Improvements

Agencies: Design and Construction - Oakland County Drain Commission; Review - MDNR, U.S. EPA.

Recommendation A-3.

The Rouge Basin communities in the Evergreen-Farmington service area should implement the local sewer improvements that are included in the Evergreen-Farmington project.

Cost: Being developed Timing: Review 1988; Construction 1989 - 1993

Agencies: Oversight - MDNR; Implementation - Communities in the Evergreen-Farmington service area: Auburn Hills, Beverly Hills, Bingham Farms, Birmingham, Bloomfield Hills, Bloomfield Twp., Farmington, Farmington Hills, Franklin Village, Lathrup Village, Orchard Lake Village, Southfield, Troy, West Bloomfield Twp., and the Oakland County Drain Commission.

Recommendation A-4.

The Detroit Water and Sewerage Department, in conjunction with the Oakland County Department of Public Works and Drain Commission and the Wayne County Department of Public Works, should continue to pursue design, MDNR approval, and construction of the First-Hamilton Relief Outlet Sewer which connects the Evergreen Interceptor to the First-Hamilton Relief Outlet Sewer project consistent with the high priority MDNR has placed on the Rouge Basin.

Cost: $33 million Timing: Review 1988; Construction 1989 - 1993

Agencies: Design and Construction - Detroit Water and Sewerage Department; Review - MDNR, U.S. EPA.

Recommendation A-5

The Wayne County Department of Public Works should continue to pursue design, MDNR approval, and construction of the North Huron Valley-Rouge Valley Interceptor. MDNR should provide timely review of the North Huron Valley-Rouge Valley project consistent with the high priority MDNR has placed on the Rouge Basin.

Cost: $39.1 million Timing: Review 1988; Construction 1989 - 1992

Agencies: Design and Construction - Wayne County Department of Public Works; Review - MDNR, U.S. EPA.

Recommendation A-6.

The Rouge Basin communities in the North Huron Valley and Rouge Valley service areas should implement the local sewer improvements that are included in the North Huron Valley-Rouge Valley project.

Cost: $21.4 million Timing: Review 1988; Construction 1988 - 1993

Agencies: Oversight - MDNR; Implementation - Communities in the North Huron Valley and Rouge Valley Service areas: Dearborn Heights, Garden City, Inkster, Livonia, Northville, Novi, Plymouth, Redford Twp., Romulus, Van Buren Twp., Wayne, Westland.

Recommendation A-7

The Western Townships Utilities Authority should continue to pursue design, MDNR approval, and construction of the Western Townships Utilities Authority project in western Wayne County, including the construction of an outfall from the Ypsilanti Community Utilities Authority Plant to the Lower Rouge River. MDNR should provide timely review of the Western Townships Utilities Authority project consistent with the high priority MDNR has placed on the Rouge Basin.

Cost: $78 million Timing: 1990 - 1995

Agencies: Design and Construction - Western Townships Utilities Authority; Review - MDNR.

Recommendation A-8

Canton Township, Northville Township, and Plymouth Township should implement local sewer improvements that are included in the Western Townships Utility Authority project.
Costs: Being developed Timing: Being determined

Agencies: Oversight - MDNR; Implementation - Canton Twp., Northville Twp., and Plymouth Twp.

Recommendation A-9

The Cities of Walled Lake and Novi and the Oakland County Drain Commission should continue to pursue sewer and/or treatment capacity to ensure continued compliance during community expansion. MDNR should provide timely review of this project consistent with the high priority MDNR has placed on the Rouge River Basin.

Cost: No estimate Timing: Ongoing

Agencies: Construction - Walled Lake and Novi; Review - MDNR

Recommendation A-10

The sewered communities in the Rouge Basin should develop and implement Operation and Maintenance programs for their local sewer systems.

Cost: No estimate Timing: 1988

Agencies: Sewered communities in the Rouge Basin.

Recommendation A-11

MDNR should monitor the planning and implementation of sanitary sewer projects and local sewer improvements. If serious deviation from the implementation schedules in permits/orders issued by the WRC to the local communities occurs, MDNR should take appropriate enforcement actions.

Cost: No estimate Timing: 1988 - 2005
Agencies: Enforcement - MDNR, WRC.

B. Combined Sewer Overflow (CSO) Controls

This section presents recommendations for a phased, 20-year program to deal with the problem of combined sewer overflows (CSOs). Figure I-6 shows a summary of the recommended approach.

Combined sewage is bypassed to the Rouge River at 168 locations that affect 10 of the 11 subbasins of the Rouge. Combined sewage is a major contributor to the impairment of uses in six of the subbasins. Bacterial contamination from CSOs is a threat to public health. The industrial component of sewage that is potentially discharged through CSOs is believed to contain metals and toxic organic compounds.

The following recommendations are based on review of existing CSO facilities' plans and the development of a regional CSO control program by the CSO Technical Advisory Committee. For the determination of basin-wide comparable cost information, the CSO report assumed the construction of detention/treatment basins in the combined sewer areas as the control technology. Figure I-7 shows, in general, the potential locations of a series of detention/treatment basins that were studied. Actual control programs/technologies will be determined through detailed local planning for CSO control. Sewer separation may be the most cost-effective alternative in some areas and would meet the RAP's CSO objective.

RAP planning has determined that the reduction of contamination from CSO's sufficient to meet Water Quality Standards is not achievable within the 20 year timeframe originally established by the Water Resources Commission. However, substantial progress can be made toward that goal through a phased planning and implementation program that addresses both basinwide (regional) and local CSO projects.

The first two phases of the program are to be completed by the year 2005 and are based on the primary goal of protecting public health. Phase I includes optimizing performance of the existing combined system and planning for the next phase. Phase II is construction of CSO control projects to meet an objective based on public health protection. To achieve Water Quality Standards, a third phase of evaluation, planning, and construction will be necessary after completion of Phase II.

FIGURE I-6

KEY FEATURES OF ROUGE CSO RECOMMENDATIONS

Goals:

1. Protect public health by eliminating untreated raw sewage discharges
2. Make reasonable progress toward meeting Water Quality Standards

What? **CSO Control 20-Year Objective**

Control or elimination of all points of CSO discharge. Sewer separation or treatment is acceptable. Treatment consists of: settling, skimming, and effective disinfection.

Where? All 168 CSO discharges (in 10 of 11 subbasins)

How? Required through NPDES permits for each CSO

When?

Permit Reissuance	Phase I	Phase II	Phase III
1989	1989-1993	1994-2005	After Phase II
	Improve operation and maintenance	Construction to achieve objectives	Evaluation and further controls, as needed
	Inventory and monitor system		
	Prepare Phase II plans		

Who? Permits for municipal owners of CSOs, costs shared by communities based on tributary flow

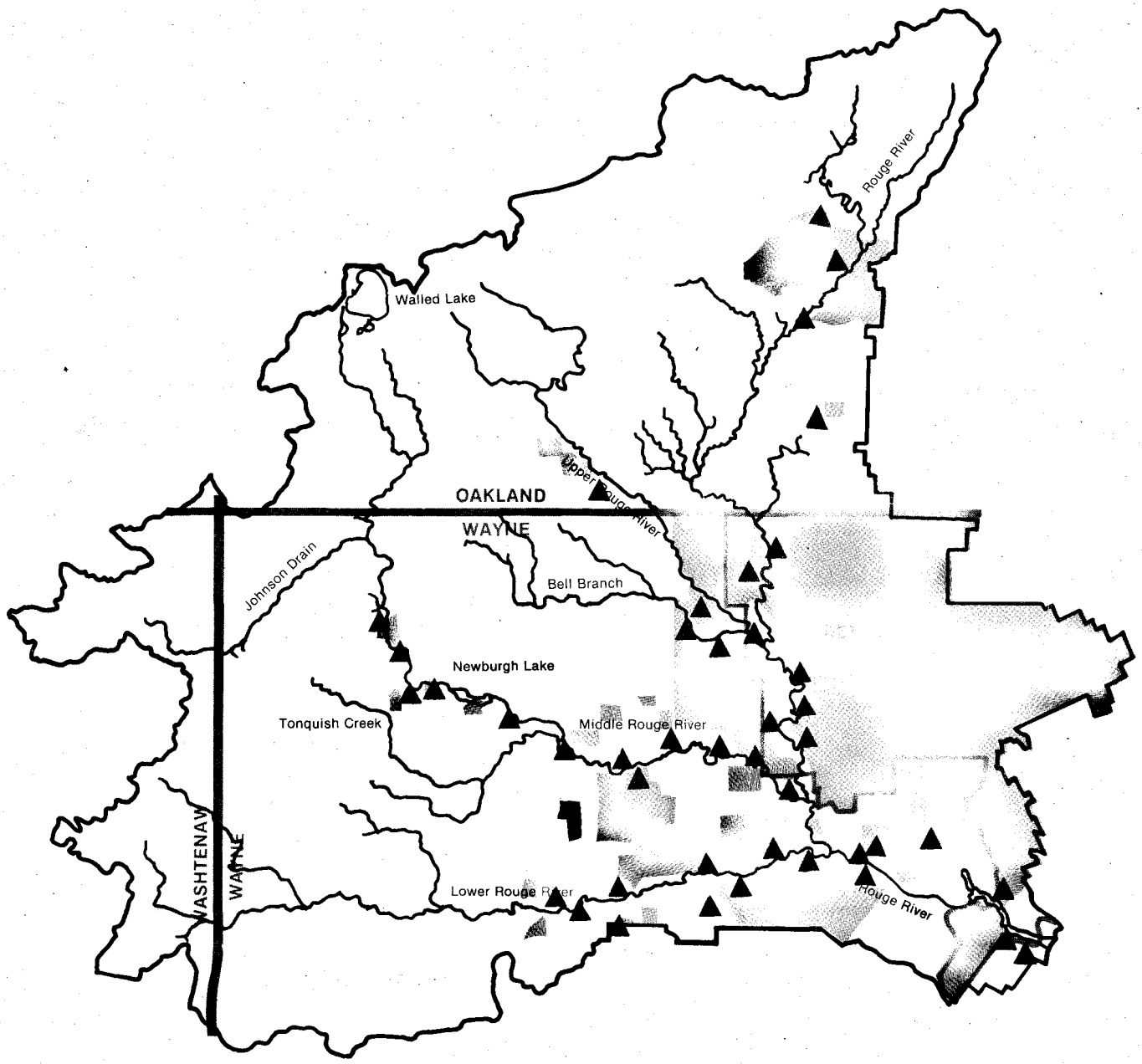
Cost? Approximately $500 million capital cost

Financing? Combination of local, state, federal

Source: SEMCOG, 1988

FIGURE I-7

POTENTIAL LOCATIONS OF CSO TREATMENT BASINS



▲ Potential Locations of CSO Treatment Basin
Areas Served by Combined Sewers

semcog 1988

Recommendation B-1.

The Water Resources Commission should maintain the long range goal for the Rouge of the restoration of designated uses through the achievement of Water Quality Standards. To assure progress toward this goal, the Water Resources Commission should establish for the Rouge Basin the 20-year goal of protection of public health through the elimination of the discharge of untreated sewage from combined sewer overflows. This goal should be reflected in state permits and orders issued by MDNR. As a minimum to achieve the 20-year goal, the WRC should require the control of each point of CSO discharge through the construction of detention basins or other appropriate control technology that will accomplish settling, skimming, and disinfection of combined sewage before it is discharged to the river. Sewer separation is an acceptable alternative for CSO control.

Recommendation B-2.

The Water Resources Commission should issue or reissue permits to CSO owners and contributing municipalities requiring the following:

a) The elimination of discharges of untreated sewage from CSOs through a two phased program,
b) A Phase I program designed to optimize performance of the existing combined sewer system, and
c) The preparation of local plans for facilities sufficient to ensure the elimination of discharges of untreated raw sewage.

Permits issued prior to RAP adoption should be reissued or modified to reflect RAP recommendations. When local plans are completed, permits should be reissued to specify implementation schedules.

Cost: No estimate Timing: Initial permits 1988, Later reissuance as appropriate

Agencies: MDNR and WRC.

Recommendation B-3.

In Phase I, municipalities should implement projects that precede the planning and implementation of regional CSO controls. These projects include:

a) Monitoring of existing system performance,
b) Effective Operation and Maintenance programs,
c) Physical improvements to optimize performance of the existing collection system,
d) Use of available in-system storage capacity, and
e) Construction of sewer separation projects in localized areas not affected by the regional control program.

Cost: Estimates included in costs of B-6 Timing: 1988 - 1993

Agencies: Rouge Basin municipalities with sewage flows tributary to combined sewers (see list for B-6).

Recommendation B-4.

(Same as Recommendation A-1. Repeated in CSO control section because the benefits apply to both separate and combined portions of the sewer system tributary to Detroit.)

In Phase I, the Detroit Water and Sewerage Department should continue to pursue design, MDNR approval, and construction of Pump Station 2A and implementation of its Flow Management Plan. MDNR should provide timely review of Pump Station 2A and the Flow Management Plan consistent with the high priority MDNR has placed on the Rouge Basin.

Cost: $190 million Timing: Review 1988; Construction of Pump Station 2A 1988 - 1992

Agencies: Design and Construction - Detroit Water and Sewerage Department; Review - MDNR, U.S. EPA.

Recommendation B-5.

During Phase I, additional planning by individual communities should be initiated to provide detailed local planning and design to meet the Phase II CSO control objective and to ensure selection of appropriate cost-effective facilities prior to design and construction.

Cost: No estimate Timing: 1989 - 1993

Agencies: Review - MDNR; Rouge basin municipalities with sewage flows tributary to combined sewers (see list for B-6).

Recommendation B-6.

Based on the primary 20-year goal of eliminating the discharge of raw sewage and protecting public health, Phase II should include a minimum level of CSO control across the entire basin. The minimum CSO control program should include:

a) Control over each point of CSO discharge,
b) Detention and treatment of CSOs, or sewer separation in local districts where cost-effective, and
c) Settling, skimming, and contact time to allow for effective disinfection of all remaining CSOs with discharge to the stream of the treated effluent.

Cost: Estimated to be approximately $500 million - individual community costs will vary with allocation method selected and construction design. Timing: Construction 1994 - 2005

Agencies: Review MDNR; Rouge basin municipalities with sewage flows tributary to combined sewers: Oakland County - Beverly Hills, Birmingham, Bloomfield Hills, Bloomfield Twp., Farmington, Novi, Southfield; Wayne County - Allen Park, Canton Twp., Dearborn, Dearborn Heights, Detroit, Garden City, Inkster, Livonia, Melvindale, Northville, Northville Twp., Plymouth Twp., Redford Twp., River Rouge, Romulus, Van Buren Twp., Wayne, Westland.

Recommendation B-7.

In Phase II, the regional CSO control program should be implemented in segments throughout the basin after completion of Phase I projects and system performance evaluations. First consideration for construction should be given to those projects that will result in achievement of water quality improvement over the greatest area. The staging of CSO projects will also reflect the timing of local planning and the complexity of the district being studied, and should be consistent with the financing strategy.

Recommendation B-8.

Phase III CSO controls, based on the long term goal of achieving Water Quality Standards, should be designed and implemented after Phases I and II and the completion of an evaluation of system performance.

Cost: No estimate Timing: Evaluation - Upon completion of Phase II projects; design and implementation follows evaluation.

Agencies: Rouge Basin Municipalities.

Recommendation B-9.

Toxic pollutants from industrial sources that are discharged through CSOs should be controlled at the source of the waste by the local community having jurisdiction over the discharge. Where discharge limitations on toxic pollutants are determined to be necessary, this will be addressed through the NPDES permit for the CSO discharge.

Cost: No estimate Timing: 1989 - 1993

Agencies: Jurisdictions responsible for CSO (see list for B-6); significant industrial users.

Recommendation B-10.

The approved authorities, with oversight from MDNR, should ensure the full implementation of the Industrial Pretreatment Program for all the communities in the Rouge Basin to control industrial pollutants discharged through combined sewer overflows.

Cost: No estimate Timing: 1989 - 1993

Agencies: MDNR and approved authorities.

Recommendation B-11.

Improper discharges of toxic pollutants to the combined sewer system from materials storage areas, floor drains, and other sources should be eliminated.

Cost: No estimate Timing: 1989 - 1995

Agencies: Wayne, Oakland Health Departments in cooperation with Rouge municipalities.

C. Stormwater Runoff and other Nonpoint Sources

Discharges of stormwater runoff and other nonpoint sources of pollution of the Rouge River are identified as major contributors to use impairment in 8 of the 11 subbasins in the watershed. Discharges of stormwater cause direct damage to streambanks and the stream channel in addition to carrying all types of pollutants. The following recommendations will result in reductions in the known types of nonpoint source pollution at the same time that controls nonpoint sources and CSOs are being improved.

Recommendation C-1.

Programs to eliminate improper connections to storm drains should be implemented in all Rouge subbasins where nonpoint sources are identified as major causes of use impairment.

Cost: $12.6 million Timing: 1988 - 1995

Agencies: Health Departments and Drain Commissioner's Offices in Oakland and Wayne Counties; with cooperation of local municipalities.

Recommendation C-2.

Local stormwater management should be evaluated in all Rouge Basin communities that are served by separate storm drains. The evaluation should focus on whether local stormwater management programs are adequate to protect water quality and to limit streambank and channel damage from stormwater discharges. The evaluation should include whether programs are adequate to prevent future problems and whether stormwater management needs are adequately funded.

Cost: $33,000 Timing: 1988

Agencies: MDNR and SEMCOG; with cooperation from Rouge municipalities.

Recommendation C-3.

Local communities should plan and implement stormwater controls including stormwater retention facilities necessary to protect water quality and limit damage from stormwater discharges.

Cost: No estimate Timing: 1989 - 2005

Agencies: Rouge municipalities served by separate storm drains.

Recommendation C-4.

Stormwater discharge permits should be issued for all Rouge Basin municipalities that include subbasins with major nonpoint source-caused use impairments. Permit requirements should be consistent with the federal Clean Water Act and federal requirements. This should be carried out in two phases. The permits should require in phase I: a) inventory, b) monitoring, c) a schedule of implementation of improper connections programs, and d) the inclusion of water quality protection measures in local stormwater management programs. A future phase II would include further control of stormwater discharges based on monitoring and evaluations of results of phase I and controls on CSOs. All stormwater permits should be reissued on a five year schedule.

Cost: No estimate Timing: Permits in 1990, 1995, 2000, 2005

Agencies: MDNR.

Recommendation C-5.

Soil erosion control should be improved by a) on-going evaluation of the performance of county and local Act 347 enforcing agencies to ensure acceptable status for all local programs, b) providing state funds needed for full MDNR implementation of Act 347, and c) amending Act 347 or its rules to require certification of staff. These measures should be implemented through the state nonpoint strategy.

Cost: No estimates Timing: 1989 - 1991

Agencies: MDNR and local 347 enforcing agencies.

Recommendation C-6.

Controls should be implemented on significant chemical storage piles identified by MDNR through on-site inspections. Sites of environmental contamination (Act 307 sites) should be addressed through the 307 program.

Cost: No estimate Timing: 1988 - 2005

Agencies: MDNR and responsible parties.

Recommendation C-7.

Household hazardous waste such as paint thinner, pesticides, used oil, and other toxic substances potentially may be a significant source of loadings of toxic materials to the Rouge River. Public education programs need to be developed and implemented to inform people of proper disposal of household hazardous waste and the problems associated with disposal in sanitary sewers and storm drains. To assist in controlling this source of toxic pollutants, a periodic collection of household hazardous waste should be considered.

Cost: No estimate Timing: 1989 - 2005

Agencies: Basin communities, MDNR, interested local organizations.

D. Municipal and Industrial Dischargers

The 34 municipal and industrial dischargers in the Rouge River Basin have NPDES permits with limits that generally have been met. Most of the discharge permits were reissued in 1987. Detailed requirements for specific dischargers are contained with the subbasin-specific recommendations in the next major section and in Chapter V of the RAP.

Recommendation D-1.

All expired NPDES permits should be reissued with consideration given to specific recommendations for individual facilities included in Chapter V of the RAP. All NPDES permits should be reissued on a five year schedule.

Cost: No estimate Timing: 1987-88, 1992-93, 1997-98, 2002-3

Agency: MDNR.

E. Sediment Evaluations

Sediments in the Rouge River have been found to be of major or minor concern in 10 of 11 Rouge River subbasins. Portions of the Rouge River have been identified as a sited environmental contamination (Act 307 Site) because of polluted sediments. Additionally, other Act 307 sites have been identified in the basin.

Recommendation E-1.

The clean up of sites of environmental contamination in the Rouge Basin, such as Act 307 sites, including river sediments, should be pursued. Funding to carry out the clean ups should be sought from Act 307, responsible parties, and other sources.

Cost: No estimate Timing: 1989 - 2005

Agencies: MDNR, County Health Department; Responsible parties

F. Resource Improvements

The Rouge River flows through an urbanized watershed and suffers from a highly variable flow regime, blockage by debris and logs, and poor habitat for fish. Low flows are a source of impaired uses in all but the lower reaches of the Main Rouge. Debris and log jams affect the potential for recreational use and the general aesthetics of all parts of the Rogue River system. The stream channel and streambanks are scoured by high flows. The following recommendations address concerns with the physical state of the river system.

Recommendation F-1.

A basinwide log and debris jam master plan for public ownership areas should be prepared. The plan should include a primer on river restoration techniques designed for use by public agencies and individual citizens. The master plan should be implemented in conjunction with improvements in water quality and adjacent parkland.

Cost: $150,000 Timing: Plan 1988 - 1990

Agencies: Rouge municipalities with public ownership areas.

Recommendation F-2.

Methods should be studied to mitigate the high variable flow regimes of the Rouge River. Projects should be implemented that would include:

1) Flow augmentation to mitigate flow conditions, such as the WTUA proposed discharge of treated effluent to the Lower Rouge; and
2) The creation of wetlands to mitigate stormwater discharges.

Flow augmentation should not be used as a means of avoiding adequate treatment of wastewater.

Cost: No estimate Timing: 1989 -2005

Agency: MDNR and Rouge municipalities.

Recommendation F-3.

Stream habitat should be improved to enhance the development of aquatic communities where and when the stream quality permits. Habitat improvements should include stabilizing channels and banks using stone, rocks, logs, vegetation and other natural material when possible. Riparian wetlands and floodplains should be protected and their water retention capacity enhanced, if possible.

Cost: No estimate Timing: 1988 - 2005

Agencies: Streambank owners and municipalities.

Recommendation F-4.

Review criteria for stream enclosure requests should emphasize the need to consider basinwide impacts of enclosures and not simply localized case-by-case impacts. Natural, open drainage systems should be used whenever possible and stream enclosures should be discouraged.

Cost: No estimate Timing: 1988 - 2005

Agencies: MDNR and Rouge municipalities.

Recommendation F-5.

A fisheries management plan for the Rouge River should be prepared.

Cost: No estimates Timing: 1989

Agency: MDNR.

Recommendation F-6.

A study should be undertaken to determine the needs of the recreation programs in relation to the Rouge River. Emphasis should be given to the potential for expanding the recreational use of the Middle Rouge impoundments.

Cost: $78,000 Timing: 1988 - 1989

Agency: Wayne County Parks and Recreation Department.

G. Data Collection and Monitoring

The data base needed to understand Rouge River pollution problems and sources has been substantially augmented during the RAP preparation. An archive of reports and data has been established at Wayne State University. Results are now available from monitoring and analysis programs in the areas of ambient water quality, biota and fish populations, fish tissue, sediments, and storm drain contents. Further data collection and analysis is required to track trends, pinpoint pollution sources, evaluate toxic impacts, plan remedial projects, and evaluate progress toward meeting water quality goals. Certain monitoring needs for CSOs and stormwater discharges have been indicated in previous recommendations. Those not previously identified are listed below.

Recommendation G-1.

Maintain and keep current the Rouge River Archive at the Wayne State University Science and Engineering Library.

Cost: No estimate Timing: 1988 - 2005

Agency: Wayne State University.

Recommendation G-2.

Continue the fixed station monitoring including flow monitoring, at 22 stations.

Cost: $30,000 annually Timing: 1988 - 2005

Agencies: MDNR; Collection - Wayne County Health Department; In-Kind analysis - Detroit Water and Sewerage Department and Detroit Edison Company.

Recommendation G-3.

Complete a wet weather water quality survey in each of the four major branches.

Cost: No estimate Timing: 1988 - 1999

Agencies: MDNR.

Recommendation G-4

Conduct nonpoint source problem identification surveys in storm drains suspected to contain contaminants due to improper connections.

Cost: $150,000 annually Timing: 1988 - 1994

Agencies: Wayne and Oakland County Health Departments.

Recommendation G-5.

Conduct an intensive survey of Evans Creek to identify the sources of the problems and determine the corrective actions necessary.

Cost: No estimate Timing: 1988

Agency: MDNR.

Recommendation G-6.

Conduct an intensive survey of the Middle and Lower Rouge to determine the source of PCBs that are responsible for the issuance of a fish consumption advisory. The survey should include further determination of the extent of contamination in the Lower and Middle branches.

Cost: $70,000 Timing: 1988

Agency: MDNR.

Recommendation G-7.

Conduct point source monitoring of representative combined sewer overflows and industrial and municipal dischargers, as necessary, to characterize all discharges. Give emphasis to monitoring CSOs that have significant industrial sources tributary to the discharge.

Cost: $140,000 Timing: 1988 - 1995

Agency: MDNR.

Recommendation G-8.

The Rouge River Remedial Action Plan focuses on stream quality problems in the Rouge River. Efforts should be made to work with the Detroit River remedial planning effort to ensure a coordinated approach in determining what impact the Rouge River has on the Detroit River and Lake Erie. If an impact is documented through the Detroit River planning effort, surveys should be undertaken to determine the nature, extent and sources of the problems impacting the Detroit River.

Cost: To be determined. Timing: 1990

Agencies: MDNR, SEMCOG, Ontario Ministry of Environment.

H. Public Education

Public support and pressure are responsible for the improvement goals contained in the Remedial Action Plan. Public education results in better informed citizenry and public officials who are more likely to support the projects needed to clean up the Rouge River. The Rouge River Basin Committee meetings serve to inform and involve representatives of Rouge River Basin municipalities. Public education has also been accomplished through activities sponsored by the Rouge River Watershed Council, the Friends of the Rouge, and SEMCOG. Media coverage that has accompanied these activities has been important to informing the public.

Recommendation H-1

General public education must be actively supported throughout the implementation of the RAP. Activities and programs of the Friends of the Rouge, the Rouge River Watershed Council, and SEMCOG should be supported and enhanced.

Cost: No estimate Timing: 1988 - 2005

Agencies: Friend of the Rouge, Rouge River Watershed Council, SEMCOG.

Recommendation H-2.

The Rouge River Interactive Water Quality Project (Friends of the Rouge and University of Michigan) should be supported and expanded to include 32 high schools in the basin.

Cost: $30,000 Timing: 1988

Agencies: Friends of the Rouge, University of Michigan, MDNR.

Recommendation H-3.

Because of the magnitude and complexity of problems and proposed remedial actions, successful implementation of the RAP will depend on a good level of understanding by local elected officials and administrators. Communications about the recommendations and responsibilities contained in the RAP should

be a high priority following its completion. SEMCOG and MDNR should communicate directly with Rouge River Basin municipalities concerning their RAP implementation responsibilities. This information and feedback program should be continued to provide the basis for plan updates.

Cost: No estimate Timing: 1988 - 2005

Agencies: MDNR, SEMCOG, Basin Committee membership

Recommendation H-4.

Public education should include direct information to homeowners about household practices that can limit the input of toxic household chemicals and other pollutants to the Rouge.

Cost: No estimate Timing: 1988 - 2005

Agencies: Rouge Basin municipalities and county health departments.

I. Institutions and Financing

The technology necessary to carry out RAP recommendations for restoration of the Rouge River has been available for many years. Clean-up of the river has been postponed because of extremely high costs, limited state and federal assistance for CSO remedies, inadequate institutional arrangements, and the necessity for undertaking other pollution control projects that have competed for limited resources. To ensure that the technical recommendations in this plan will be implemented, it was necessary to develop a financial and institutional strategy.

The financing strategy has been structured so that the RAP can be implemented by using a combination of the existing institutional framework and special drainage districts. The strategy is designed to provide some flexibility in project scheduling based on affordability and to maintain local governmental control in decisions regarding methods of financing.

The financing recommendations are based on an evaluation of existing and potential economic and institutional factors. The following conclusions resulted from this analysis.

First, the extent of the river's pollution problems requires that communities incur very large costs for implementing remedial actions. Paying for these costs without additional state and federal funding would be beyond the financial capability of many communities. Yet, some mitigation of the discharges of raw sewage and other pollutants to the river is mandatory. To aid communities in meeting their obligations, a flexible permitting process that considers financial capability is needed. This is crucial to the implementation of a reasonable plan and is a major element of the strategy.

Second, the strategy is based on an attempt to maximize funds from existing programs; most notably the construction grants program and the State Revolving Fund. What is more, the strategy confronts the affordability issue by incorporating a financial capability review in the project review and approval phase. The permit schedules will reflect the results of this review. This financial capability review accounts for state and federal funding support, or the lack thereof, during implementation.

Third, the strategy recommends forming a drainage district to finance projects that would handle previously unaddressed sources of pollution. Further, the proposed mechanism is flexible under existing enabling legislation and could be used for implementing other parts of the RAP if desired by individual communities or groups of communities.

Finally, the strategy maintains local control over decisions about how to pay for clean up costs. Communities can determine how they wish to pay on a project by project basis, including deciding whether or not to place such decisions on a ballot for a vote of the people.

Recommendation I-1.

Pursue Multiple Sources of Funding. Because of the extent of pollution in the Rouge River, the various sources of that pollution, the number of communities in the basin, and the magnitude of costs associated with implementing the RAP, financing will have to be accomplished by communities pursuing a variety of funding sources. Clean-up measures recommended in the RAP must be financed using a combination of federal, state, local, and unconventional revenue sources.

Communities in the Rouge River Basin, the Michigan Department of Natural Resources, and SEMCOG must join in pursuing funding support for implementation of the Remedial Action Plan through all available means, including: 1) the State Revolving Fund program, including the required state match, 2) state bonds, such as the $800,000,000 Quality of Life bond fund, 3) through the use of a special drainage district, and 4) special appropriations from the federal government for projects to implement the Remedial Action Plan.

Cost: No estimate Timing: 1988-2005

Agencies: Basin Communities, EPA, MDNR, SEMCOG, Drain Commissioner's Offices.

Recommendation I-2.

Fund Separate Sanitary Projects under the Construction Grants or SRF Loan Programs. Several separate sanitary sewer improvement projects have been identified in the Remedial Action Plan as critical to improving the water quality of the Rouge River. The projects are in various states of development and approval. Federal grant or SRF Loan support will help ease the local financial burden of these projects and other measures in the RAP. The projects that must receive grant or loan assistance are as follows:

1) Projects already funded under the construction grants program.
   - The Detroit Pump Station 2A
   - The North Huron Valley - Rouge Valley Interceptor, Phase I
   - The Evergreen - Farmington improvements, Phase I
   - The First Hamilton Relief Outlet

2) Future phases of the project in 1) that must receive funding from the construction grants program.
   - North Huron Valley - Rouge Valley, Phase II
   - Evergreen Farmington - Phase II

3) Additional projects that may receive funding from the State Revolving Fund.
   - Western Townships Utilities Authority Project

The MDNR must provide sufficient technical assistance and project review resources to ensure that maximum federal funding for these projects is not jeopardized.

Cost: Committed construction grant share is $133,000,000 (See Rec. A-1 through A-8 for full cost) Timing: 1988 - 1995

Agencies: Basin Communities, EPA, MDNR.

Recommendation I-3.

Expand the State Revolving Loan Fund. Development of legislation is still in progress that would establish a State Revolving Loan Fund (SRF) program in Michigan. This would replace the federally funded grant program. Because the SRF program may be the major source of funding support for water pollution control projects over the next several years in Michigan, and because various assessments of infrastructure needs for water pollution control indicate the proposed program would be inadequate, the program must be expanded by increasing the minimum required 20 percent match from the state.

Priority for receiving loans under the SRF program must not be based on the existence of court orders. Priority must be based on the magnitude of existing pollution problems and the extent to which such problems would be addressed with a project or group of projects. Further, CSO projects that meet the RAP CSO control objective should be eligible for SRF funding. All communities that incur costs for control measures recommended in the RAP should be eligible for reimbursement refinancing through SRF.

Cost: No estimate Timing: 1988

Agencies: MDNR, SEMCOG, Basin communities, State Legislature.

Recommendation I-4.

Pursue Loans in the SRF Program. Timely preparation and submittal of request for funds will affect the ability of a community or a group of communities to receive a low interest loan in the SRF program.

As appropriate, individual communities and combinations of communities should pursue low interest loans in the SRF program to help defray costs associated with implementation of the Remedial Action Plan. This should be accomplished through the cooperation of project participants, consistent with implementation of the Remedial Action Plan.

Cost: No estimate Timing: 1988 - 2005

Agencies: Basin municipalities.

Recommendation I-5.

Consider Establishing Special Drainage Districts. Certain pollution control measures (e.g., nonpoint source controls, log jam removal, removal of improper connections and sewer cross connections of storm drains, and others) generally have not been implemented due, in part, to lack of intergovernmental authority and funding.

The Infrastructure Financing Committee recommended that special basin drainage districts be formed using the Drain Code. The districts would be used to raise revenue to pay for such projects as: log jam removal, identification and correction of improper sewer connections, and nonpoint source control measures. Communities within the Rouge River Basin would participate in these special basin drainage districts as appropriate. The district would be structured so that payment for other remedial action projects could be accomplished at a community's prerogative.

Cost: No estimate Timing: 1988-1990

Agencies: County Drain Commissioners, DPW, Health Department, MDNR, WRC, Michigan Department of Agriculture, RAP Implementation Financing Committee.

Recommendation I-6.

Examine Cost Allocation Methods. In addressing the issue of distributing costs for the mitigation of combined sewer overflows (CSOs) during the planning process, the Infrastructure Financing Committee recommended that causality should be the basis of cost allocation. The method of allocating the cost of CSO controls should be reexamined by an Implementation Financing Committee.

Costs: No estimates Timing: 1989

Agencies: RAP Implementation Financing Committee, Basin Committee, Executive Steering Committee.

Recommendation I-7.

Secure State and Federal Funding Support. If implementation of the Remedial Action Plan is to include controls for combined sewer overflows, some level of state and/or federal support must be secured to assure timely basinwide implementation. The need for this support is evidenced by the fiscal impact on communities as documented in the financing strategy analysis. The need for federal participation is especially great because of the federal

responsibility for the International Joint Commission's effort to protect an international resource - the Great Lakes.

Responsibility for implementing the Rouge River RAP must be viewed as a partnership between federal, state, and local government. Local, state and federal interest should support implementation of CSO controls by pursuing additional means of providing funding support for achieving the objectives of the RAP.

Cost: No estimate Timing: 1988 - 2005

Agencies: EPA, MDNR

Recommendation I-8.

Incorporate Flexibility to the Permit Process: CSO Reduction. When evaluating and developing costs for the control of combined sewer overflows, the CSO Advisory Committee and its engineering consultant assumed basinwide implementation of one of three levels of control. Under such an assumption, the costs of CSO control are relatively high.

That is, the difference in cost between doing nothing and even a minimum level of CSO control is very high.

Considering the constraints imposed by this assumption, there are approaches that could be used in the process of implementing the Remedial Action Plan that could be used to help lower the actual cost of implementing CSO projects. When reissuing permits for CSO discharges, the Michigan Department of Natural Resources must provide for flexibility by using an objective or goal for CSO control, rather than by setting specific limits on allowable pollutant discharges. Projects should be allowed to proceed based on incremental progress and negotiated schedules that ultimately lead to achievement of those goals.

Recommendation I-9.

Incorporate Flexibility to the Permit Process: Affordability. Because the fiscal impact on communities of implementing the Remedial Action Plan varies significantly, it is important that affordability be considered in the project planning and implementation process.

The Michigan Department of Natural Resources must consider the fiscal impact of costs associated with compliance with permits issued as part of the CSO control program. The fiscal impact of projects should be evaluated using "A Guidebook for Evaluating the Affordability of Wastewater Treatment System Improvements" prepared by SEMCOG for the Michigan Department of Natural Resources. This evaluation should be the basis of the negotiated schedules described in Recommendation I-8.

Recommendation I-10.

Evaluate Institutional Framework. After the recommended institutional and financing mechanisms have been implemented, the Rouge RAP oversight committees must evaluate their effectiveness. The evaluation must include: a) the degree to which communities have been able to separately and jointly respond to permit requirements, b) the usefulness of the recommended drainage district, and c) the adequacy of the state and federal response to Rouge funding needs.

Cost: No estimate Timing: 1990

Agencies: Rouge River Basin Committee and Executive Steering Committee.

Recommendation I-11.

Continued Role of Rouge Committees. It is recognized that circumstances will change over time and that additional financial and institutional modifications may be needed to continue the successful implementation of the RAP. There is a need for continuing oversight and periodic evaluation by a basinwide planning entity.

The Executive Steering Committee should meet at least semi-annually and the Basin Committee should meet at least annually to review progress and approve updates to the Remedial Action Plan. Desired changes should be made through plan amendment or direct communication with the Water Resources Commission.

Cost: No estimate Timing: 1988 - 2005

Agencies: Rouge River Basin Committee and Executive Steering Committee.

SUBBASIN SPECIFIC RECOMMENDATIONS

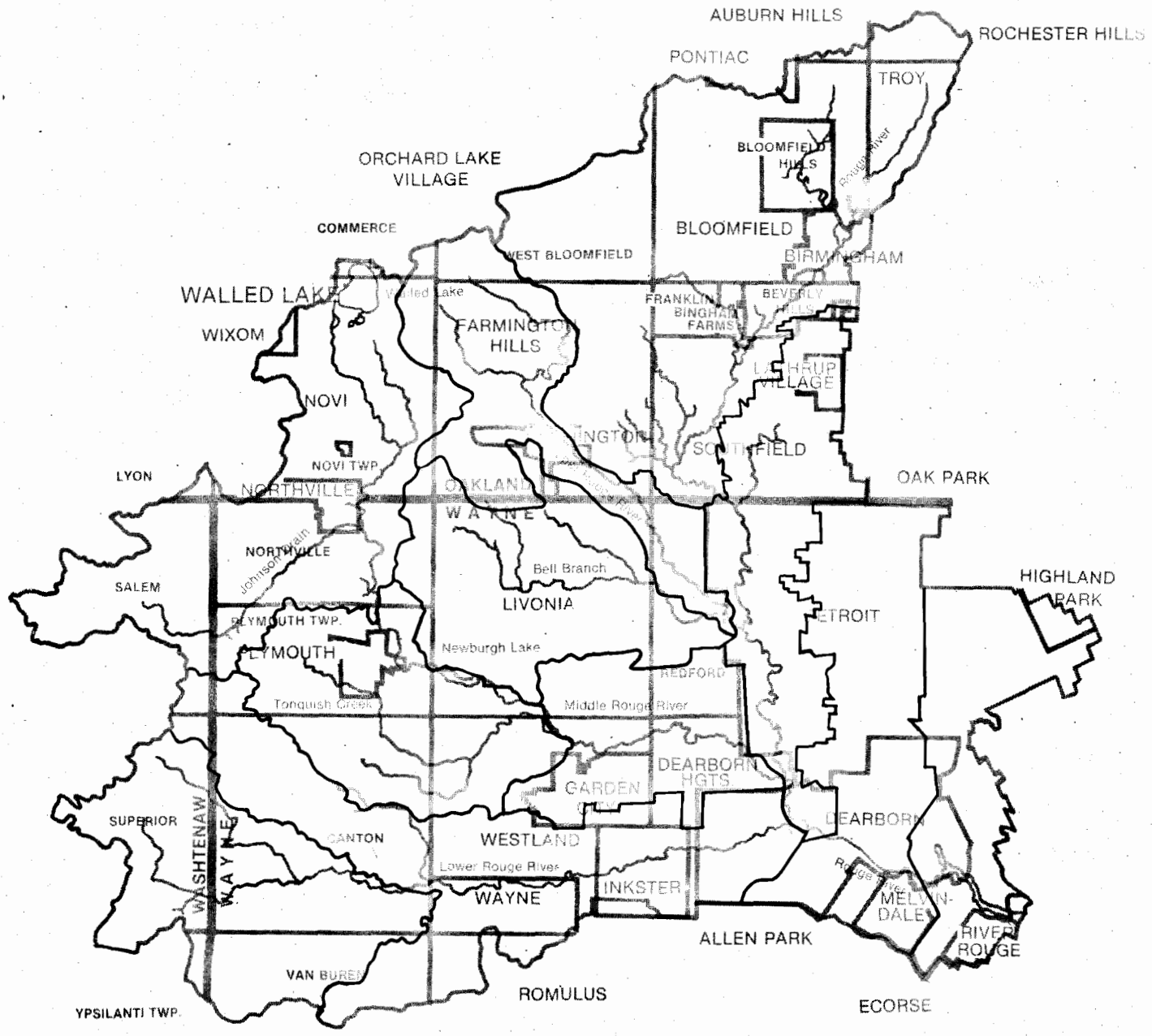
Each of the 11 subbasins of the Rouge River (see Figure I-8) is affected by several pollution sources. This section summarizes the causes of impaired designated uses in each of the Rouge subbasins and presents a set of area-specific recommendations for each. The subbasin recommendations are based on the general recommendations, presented above.

Figures I-9 through I-19 are maps of each subbasin. These display the following information:

- Locations of industrial and municipal dischargers
- Locations of combined sewer overflow (CSO) discharge points
- Sites of environmental contamination (Act 307 sites) affecting surface waters
- General locations of recommended projects

FIGURE I-8

SUBBASINS OF THE ROUGE RIVER BASIN



semcog 1988

Main-1 Subbasin Recommendations

This subbasin, shown in Figure I-9, contains the headwaters of the Main Rouge River. Combined sewer overflows and stormwater runoff are the major pollution concerns in the subbasin, probably resulting in low dissolved oxygen (D.O.) levels, high fecal coliform bacteria counts, as well as impairing the general aesthetic conditions. In 1987 sampling, fecal coliform counts were above the state standard of 200 organisms per 100 ml in 94 percent of the samples. Low flows potentially contribute to use impairments, ranging from 0 to 2.8 cubic feet per second (cfs). Sediment contamination is considered to be a minor concern in the Main-1.

Sewer Discharge Controls

1. The Oakland County Drain Commission should continue to pursue design, MDNR approval, and construction of the Evergreen-Farmington Improvements.

2. The Rouge Basin communities in the Evergreen-Farmington service area should implement the local sewer improvements that are included in the Evergreen-Farmington project.

3. Combined sewer overflow (CSO) controls necessary to meet the identified CSO control objective of the Rouge RAP should be implemented in Beverly Hills, Birmingham, Bloomfield Hills, Bloomfield Township and Southfield.

4. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer systems.

Stormwater Runoff and Other Nonpoint Source Control

5. Design, approve, and construct improvements necessary to eliminate Village of Franklin's on-site septic system failures.

6. Implement municipal stormwater management plans and programs in all separate sewer areas.

7. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection program in all separate sewer areas.

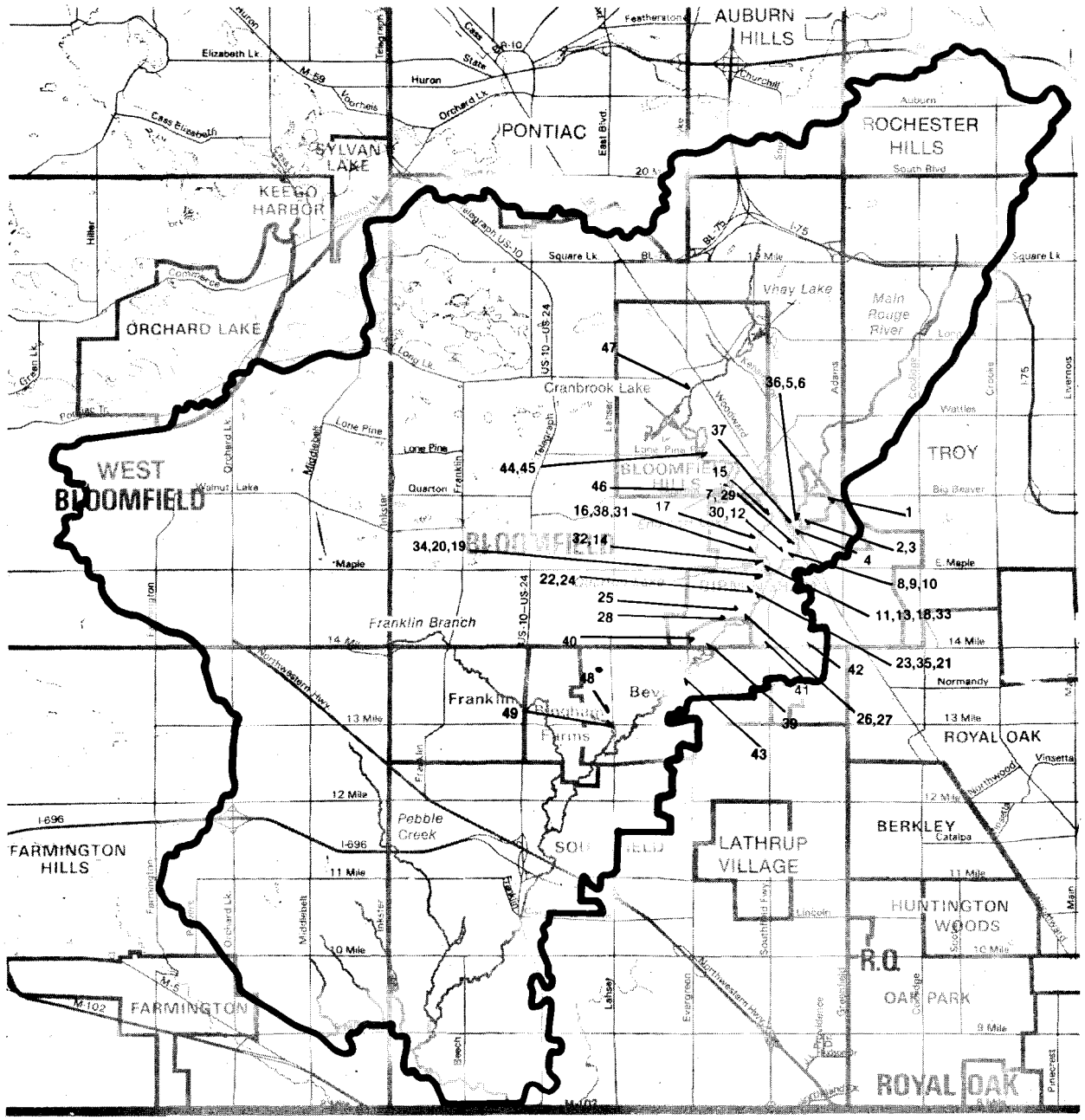
8. Continue or initiate monitoring of known sites of environmental contamination (307 sites) to further assess the impact on surface water, and implement corrective measures where necessary.

Resource Improvements

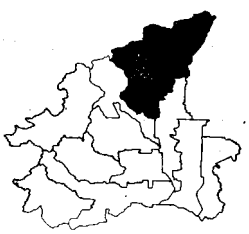
9. Log and debris jam removal programs should be developed and implemented in public ownership areas.

FIGURE I-9

SELECTED POLLUTION SOURCES IN THE MAIN-1 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge
Act 307 Site



MAIN-1 Subbasin of the Rouge River Basin

N 0 1 2 3 Miles

semcog 1988

10. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible.

Stream Monitoring

11. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

Main-2 Subbasin Recommendations

This subbasin, shown in Figure I-10, is influenced by several pollution sources including contributing flows from Main-1, Upper-1, and Middle-3 subbasins. Because of occasional low levels of D.O. in the Upper-1 and metals in the Upper-1 and Middle-3, upstream influence is classified as a potential major contributor to use impairment. Low flow conditions range from 2.8 cfs to 11 cfs in the Main-2 subbasin.

The designated use category of warm water fishery is impaired by low D.O. and toxics potentially resulting from CSOs, stormwater runoff, and industrial inputs to the Main-2. Due to high levels of fecal coliform bacteria in these sources, water contact recreation is also impaired. Certain CSOs are expected to contribute wastes from industrial sources that discharge to the sewer system.

Sewer Discharge Controls

1. The Detroit Water and Sewerage Department, in conjunction with the Oakland County Department of Public Works and the Wayne County Department of Public Works, should continue to pursue design, MDNR approval, and construction of the First-Hamilton Relief Outlet Sewer.

2. The Detroit Water and Sewerage Department should continue to pursue design, MDNR approval, and construction of Pump Station 2A and implementation of its Flow Management Plan.

3. Combined sewer overflow (CSO) controls necessary to meet the identified CSO control objective of the Rouge RAP should be implemented in Detroit, Redford Township, and Oakland County.

4. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer systems.

5. The subbasin communities should ensure implementation of the necessary controls to preferentially treat waste at the source from significant industrial users with waste potentially being discharged through CSOs in Oakland County, Redford Township, and Detroit.

Stormwater Runoff and Other Nonpoint Source Control

6. Implement municipal stormwater management plans and programs in all separate sewer areas.

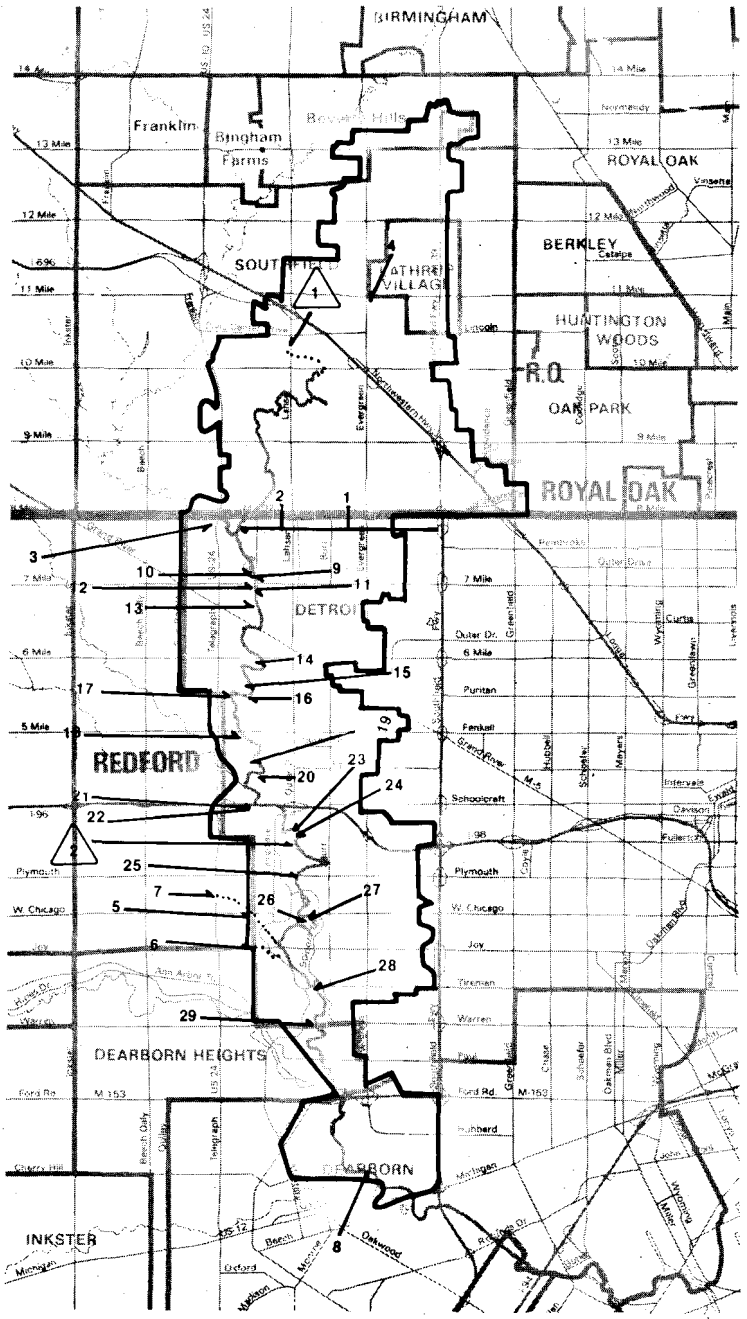
7. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection program in all separate sewer areas.

Municipal and Industrial Discharge Control

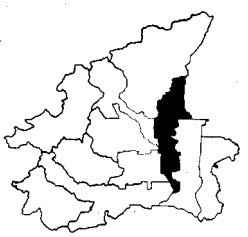
8. All industrial dischargers should meet the requirements of their respective NPDES permits.

FIGURE I-10

SELECTED POLLUTION SOURCES IN THE MAIN-2 SUBBASIN



Combined Sewer Overflow*
Municipal or Industrial Discharge*
Act 307 Site*



MAIN-2 Subbasin of the Rouge River Basin

N 0 1 2 3 Miles

semcog 1988

Resource Improvement

9. Log and debris jam removal programs should be developed and implemented in public ownership areas.

10. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible.

Stream Monitoring

11. An investigation of Evans Creek should be undertaken to determine the extent and cause of the stream quality problems identified in the 1986 DNR stream quality survey.

12. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

Main-3 Subbasin Recommendations

This subbasin, shown in Figure I-11, is potentially influenced by contributing flows from the Main-2 and Lower-2 subbasins, where monitoring indicates fecal coliform in excess of water quality standards, low D.O., and toxic metals. As a result of these upstream influences and sources within the Main-3, water quality monitoring in Main-3 indicates high fecal coliform and toxic metals in excess of water quality standards. Low flows are about 12 cfs. Contaminated sediments are identified as a major concern. Stormwater runoff is identified as a minor concern due to limited areas being drained by separate storm conveyances (primarily Melvindale and Allen Park). The vast majority of Main-3 is served by combined sewers.

Frequent or severe impairment of the warm water fishery is probably due to CSOs, industrial direct discharges, runoff and upstream influences. CSOs and direct discharges are major concerns. This subbasin contains the basin's largest CSO, the Hubbell-Southfield. The major direct discharge influence, Rouge Steel outfall 001, is at the extreme downstream end of the subbasin and probably has a greater influence on Main-4.

Sewer Discharge Controls

1. Detroit Water and Sewerage Department should continue to pursue design, MDNR approval, and construction of Pump Station 2A and implementation of its Flow Management Plan.

2. Combined sewer overflow (CSO) controls necessary to meet the identified CSO control objective of the Rouge should be implemented in Detroit, Dearborn, Melvindale, and Wayne County.

3. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer systems.

4. The subbasin communities should implement the necessary controls to preferentially treat waste at the source from significant industrial users with waste potentially being discharged from CSOs in Dearborn and Detroit.

5. All necessary sanitary sewer improvements should be constructed to eliminate separate sewer overflows.

Stormwater Runoff and Other Nonpoint Source Control

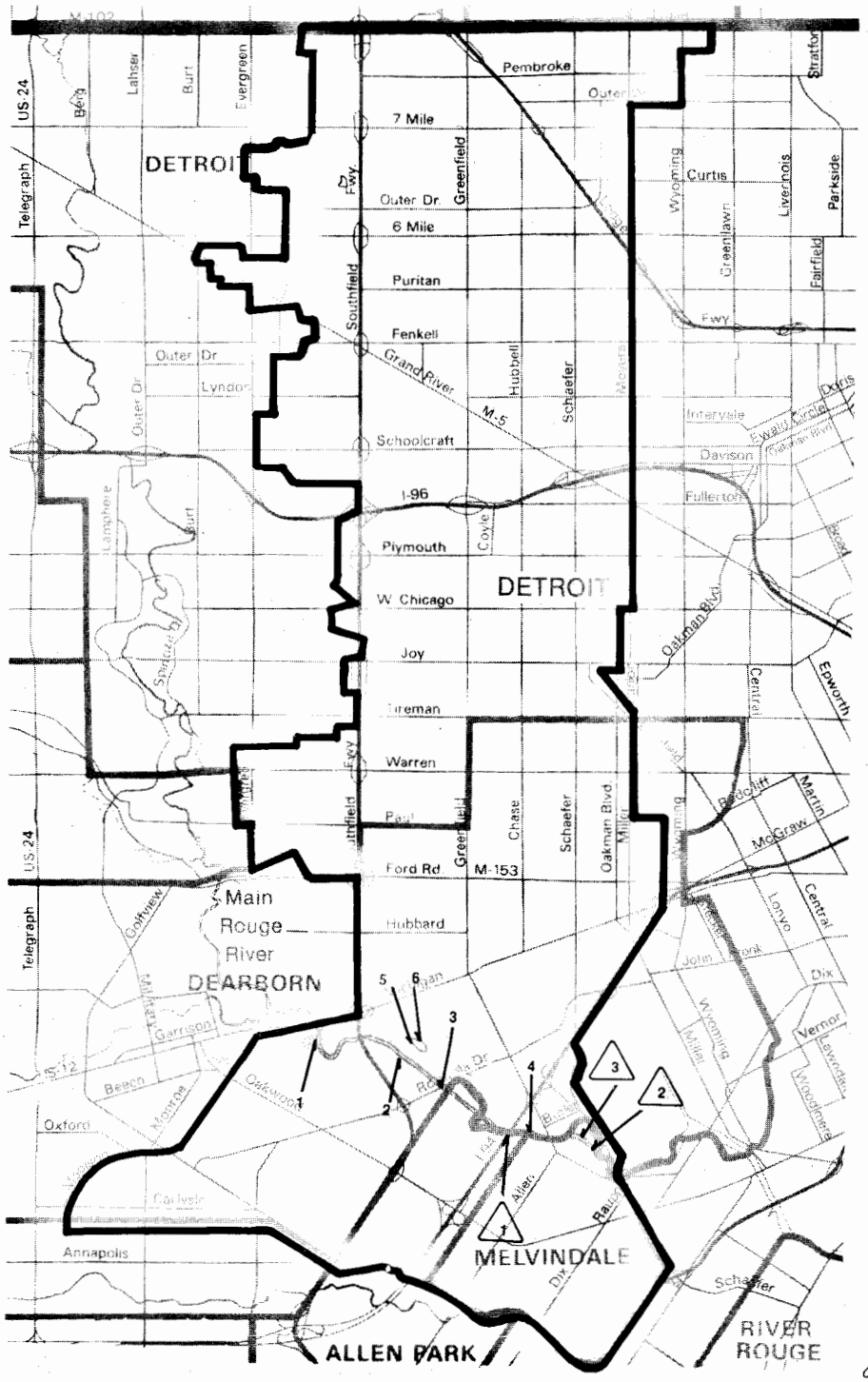
6. Implement municipal stormwater management plans and programs in all separate sewer areas.

7. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection program in all separate sewer areas.

8. Continue or initiate monitoring of known sites of environmental contamination (307 sites) to further assess the impact on surface

FIGURE I-11

SELECTED POLLUTION SOURCES IN THE MAIN-3 SUBBASIN



1 → Combined Sewer Overflow
△ Municipal or Industrial Discharge
(1) Act 307 Site

MAIN-3 Subbasin of the Rouge River Basin

N 0 1 2 3 Miles

semcog 1988

water, and implement corrective measures where necessary.

Municipal and Industrial Discharge Control

9. All industrial dischargers should meet the requirements of their respective NPDES permits.

Stream Monitoring

10. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

Main-4 Subbasin Recommendations

The subbasin, shown in Figure I-12, is potentially influenced by contributing flows from the Main-3 subbasin. Due to large pollutant inputs from the Main-3, this influence identified is a major concern for oxygen demanding materials (BOD) suspended solids, toxics, fecal coliform, and nutrients. Low flow conditions range from 11 to 13 cfs. The sediments in Main-4 are identified as a major concern. The thirteen direct discharges and CSOs in Main-4 identified as a major concern. The majority of the subbasin is served by combined sewers. CSOs and upstream sources probably contribute to water contact impairments due to elevated fecal coliform, and fisheries impairments due to low D.O. and toxics. Runoff from industrial storage areas and storage piles is judged to be of at least minor concern.

Sewer Discharge Controls

1. Combined sewer overflow (CSO) controls necessary to meet the identified CSO control objective of the Rouge RAP should be implemented in Detroit, Dearborn, River Rouge, and Wayne County.

2. The Detroit Water and Sewerage Department should continue to pursue design, MDNR approval, and construction of Pump Station 2A and implementation of its Flow Management Plan.

3. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer systems.

4. The subbasin communities should implement the necessary controls to preferentially treat water at the source from significant industrial users in with waste potentially being discharged from CSOs in Detroit, Dearborn, and River Rouge.

Stormwater Runoff and Other Nonpoint Source Control

5. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection program in all separate sewer areas.

6. Best management practices should be identified and implemented to control pollutant runoff from material storage piles.

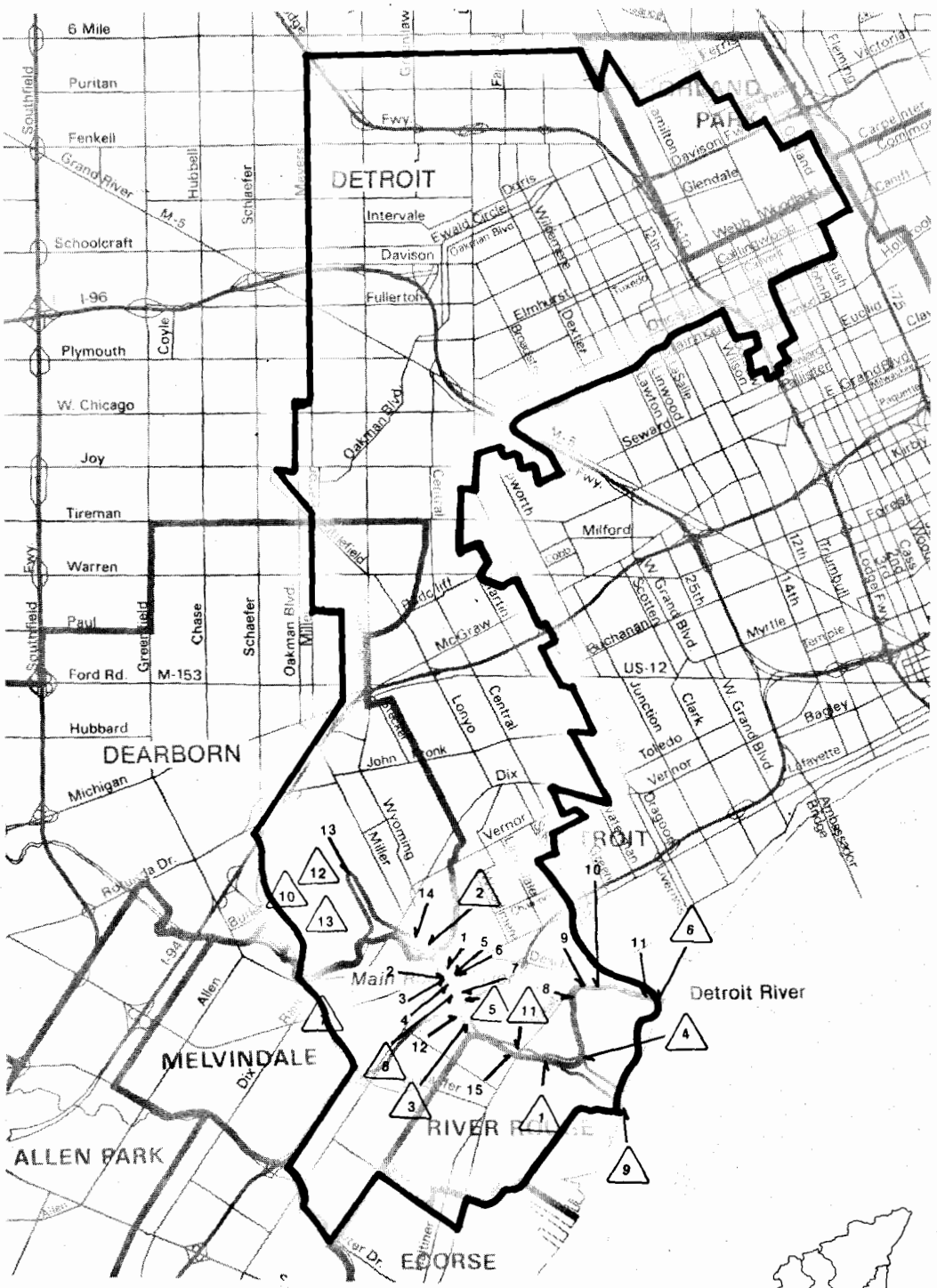
7. Continue or initiate monitoring of known sites of environmental contamination (307 sites) to further assess the impact on surface water, and implement corrective measures where necessary.

Municipal and Industrial Discharge Control

8. All municipal and industrial dischargers should meet the requirements of their respective NPDES permits.

FIGURE I-12

SELECTED POLLUTION SOURCES IN THE MAIN-4 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge

MAIN-4 Subbasin of the Rouge River Basin

N 0 1 2 3 Miles

semcog 1988

Stream Monitoring

9. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

Upper-1 Subbasin Recommendations

This subbasin, shown in Figure I-13, contains the headwaters of the Upper Branch of the Rouge River. The Upper-2 subbasin influences only the extreme downstream end of the Upper-1 subbasin prior to its confluence with the Main Rouge River. Low flows range from 0 to 2.1 cfs, and may contribute to impairments. Sediments are a minor concern. Frequent or severe warm water fisheries impairments, due to low D.O. and toxics, are probably caused by stormwater runoff and CSOs. One or more of the CSOs may contain waste from one significant industrial user. Both stormwater runoff and CSOs probably result in the frequent or severe impairments of water contact caused by high levels of fecal coliform. Due to relative loading estimates CSOs are identified as a minor concern and nonpoint stormwater runoff as a major concern in the Upper-1.

Sewer Discharge Controls

1. The Oakland County Drain Commission should continue to pursue design, MDNR approval, and construction of the Evergreen-Farmington Improvements.

2. The Rouge Basin communities in the Evergreen-Farmington service area should implement the local sewer improvements that are included in the Evergreen-Farmington project.

3. Combined sewer overflow (CSO) controls necessary to meet the identified CSO control objective of the Rouge RAP should be implemented in Farmington and Redford Township.

4. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer systems.

5. The subbasin communities should implement the necessary controls to preferentially treat waste at the source from significant industrial users with waste potentially being discharged from CSOs in Farmington.

Stormwater Runoff and Other Nonpoint Source Control

6. Implement municipal stormwater management plans and programs in all separate sewer areas.

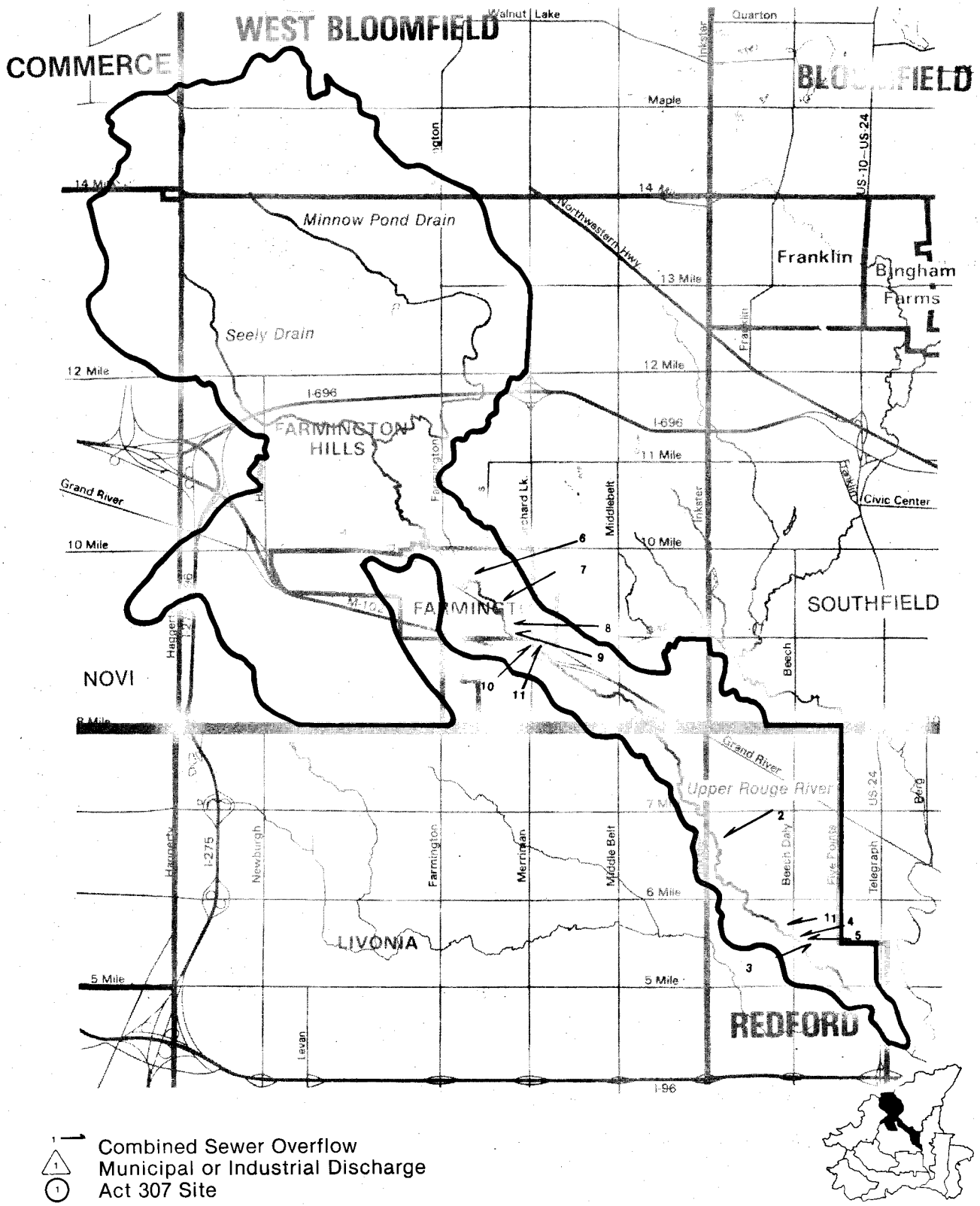
7. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection programing all separate sewer areas.

Municipal and Industrial Discharge Control

8. The municipal discharger should meet the requirements of its NPDES permit.

FIGURE I-13

SELECTED POLLUTION SOURCES IN THE UPPER-1 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge
Act 307 Site

UPPER-1 Subbasin of the Rouge River Basin

N 0 1 2 3 Miles

semcog 1988

Resource Improvements

9. Log and debris jam removal programs should be developed and implemented in public ownership areas.

10. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible.

Stream Monitoring

11. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

Upper-2 Subbasin Recommendations

This subbasin, shown in Figure I-14, contains the Bell Branch. Low flows range from 0 to 1.1 cfs, and may contribute to impairments. Impairment of the warm water fisheries (low D.O. and toxics) is probably due to nonpoint storm runoff, with some contribution from CSOs. These sources also cause the impairment of water contact recreation due to high levels of fecal coliform bacteria. Based on relative loading estimates, CSOs are a minor concern and nonpoint storm runoff is a major concern.

Sewer Discharge Controls

1. Combined sewer overflow (CSO) controls necessary to meet the identified CSO control objective of the Rouge RAP should be implemented in Redford Township.

2. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer system.

Stormwater Runoff and Other Nonpoint Source Control

3. implement municipal stormwater management plans and programs in all separate sewer areas.

4. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connections program in all separate sewer areas, with Purlingbrook Drain as a high priority.

Municipal and Industrial Discharge Control

5. The industrial discharger should meet the requirements of its NPDES permits.

Resource Improvements

6. Log and debris jam removal programs should be developed and implemented in public ownership areas.

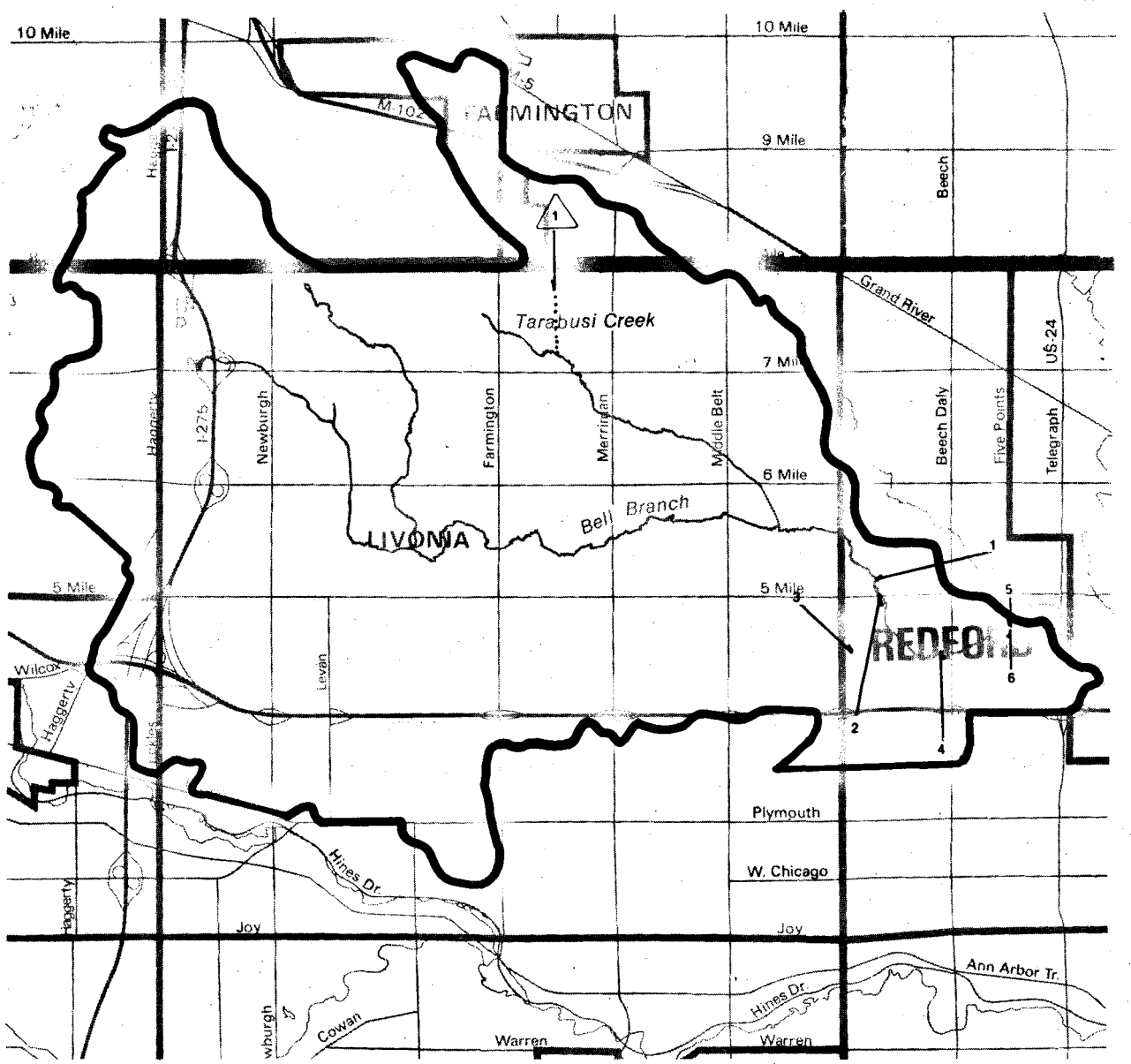
7. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible.

Stream Monitoring

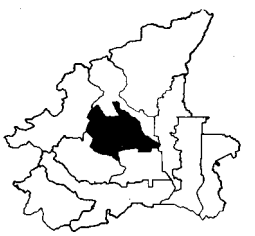
8. Stream quality should be reassessed once significant pollutant inputs are controlled.

FIGURE I-14

SELECTED POLLUTION SOURCES IN THE UPPER-2 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge
Act 307 Site



UPPER-2 Subbasin of the Rouge River Basin

N 0 1 2 3 Miles

semcog 1988

Middle-1 Subbasin Recommendations

This subbasin, shown in Figure I-15, contains the headwaters of the Middle Rouge River and includes Johnson Drain. Low flows range from 0 to 3 cfs and may contribute to impairments. Occasional or slight impairment of warm water fisheries (low D.D.) is probably due to stormwater runoff. CSO inputs only affect the downstream portion of the subbasin at Phoenix Lake. Due to loading estimates and location of CSO inputs, nonpoint storm runoff is considered a major concern and CSOs are considered a minor concern. Sediments are considered a minor concern in the Middle-1. One 307 site may potentially affect surface water.

Sewer Discharge Controls

1. Combined sewer overflow (CSO) controls necessary to meet the CSO control objective of the Rouge RAP should be implemented in Plymouth Township.

2. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer systems.

3. The Western Townships Utility Authority should continue to pursue design, MDNR approval, and construction of a project to provide adequate sewerage capacity in western Wayne County.

Stormwater Runoff and Other Nonpoint Source Control

4. Implement municipal stormwater management plans and programs in all separate sewer areas.

5. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection program in all separate sewer areas.

6. Continue or initiate monitoring of known sites of environmental contamination (307 sites) to further assess the impact on surface water and implement corrective measures, where necessary.

7. Monitor Salem-Plymouth Landfill, Green Valley Acres, Northville public works, and Northville and Salem Township on-site systems to assess impact on surface waters and implement corrective measures where necessary.

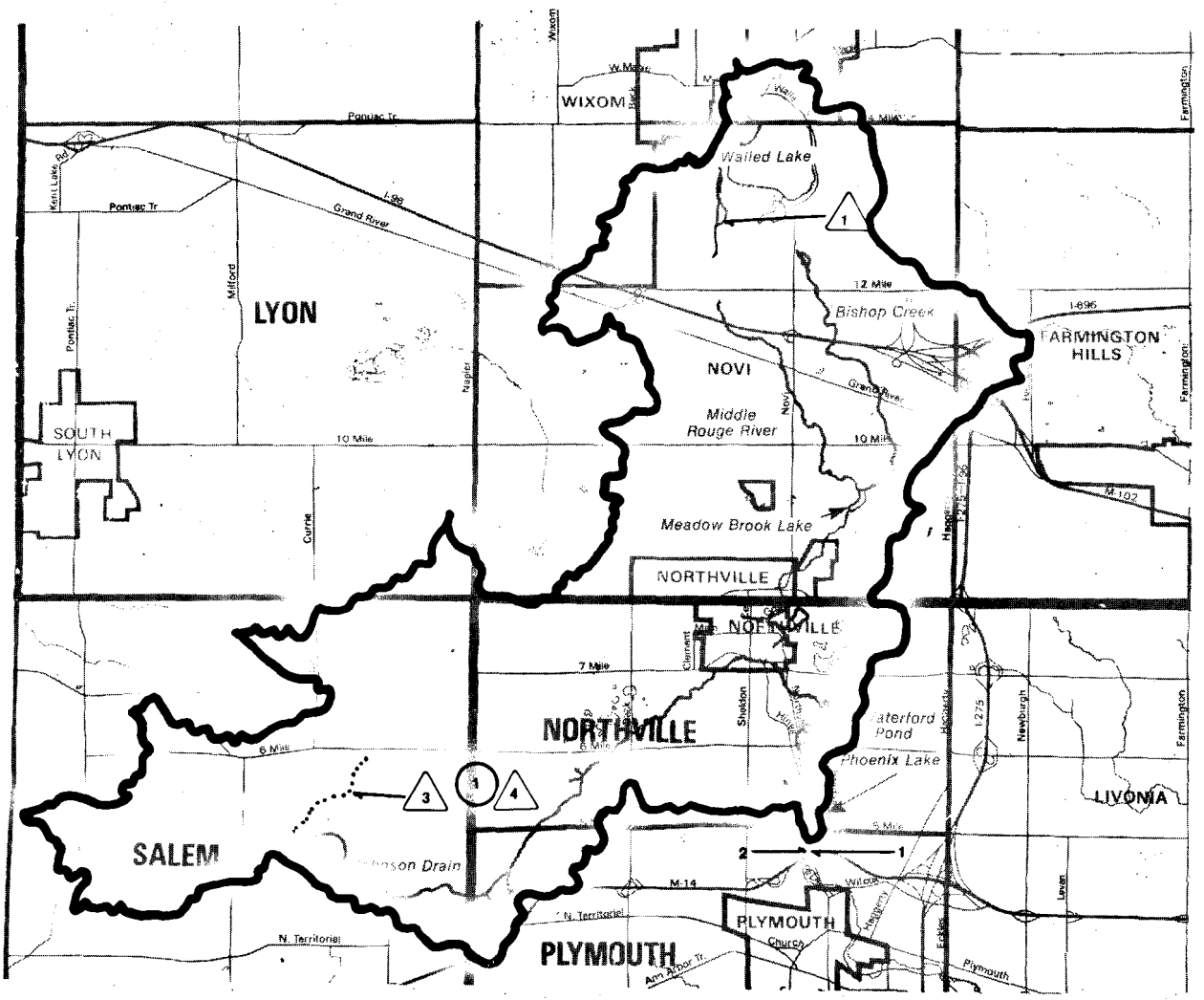
Municipal and Industrial Discharge Control

8. All municipal and industrial dischargers should meet the requirements of their respective NPDES permits.

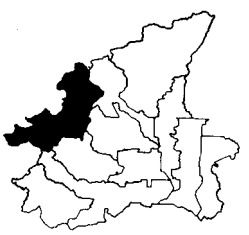
9. Alternatives to the disposal of Walled Lake WWTP sludge in the Detroit interceptor should be developed and implemented.

FIGURE I-15

SELECTED POLLUTION SOURCES IN THE MIDDLE-1 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge
Act 307 Site



MIDDLE-1 Subbasin of the Rouge River Basin

N 0 1 2 3 Miles

semcog 1988

Resource Improvements

10. Log and debris jam removal programs should be developed and implemented in public ownership areas.

11. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible.

Stream Monitoring

12. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

13. The extent of contamination and source of PCBs that resulted in the establishment of a fish consumption advisory for the Middle Rouge should be determined.

Middle-2 Subbasin Recommendations

This subbasin, shown in Figure I-16, is probably influenced by flow from Middle-1, which contributes high fecal coliform levels to Middle-2. For this reason, upstream influences are a major concern. Tonquish Creek is part of this subbasin and joins the Middle Rouge near the downstream end of the Middle-2 subbasin. Low flow of 3 cfs to 4.5 cfs may contribute to impairments and is considered a major concern. Sediment contamination is a minor concern. Impairments of water contact (high fecal coliform) and fisheries (low D.O., toxics) are probably caused by a combination of nonpoint storm runoff, CSOs, and upstream sources. Based on estimated loadings, nonpoint storm runoff is a major concern and CSOs are a minor concern. Two of the CSOs are expected to contain waste from significant industrial users during discharge.

Sewer Discharge Controls

1. The Wayne County Department of Public Works should continue to pursue design, MDNR approval, and construction of the North Huron Valley-Rouge Valley projects.

2. The Rouge Basin communities in the North Huron Valley and Rouge Valley service areas should implement the local sewer improvements included in the North Huron Valley-Rouge Valley project.

3. The Western Townships Utility Authority should continue to pursue design, MDNR approval, and construction of a project to provide adequate sewerage capacity in western Wayne County.

4. Canton Township, Northville Township, and Plymouth Township should implement local sewer improvements included in the Western Townships Utility Authority project.

5. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer systems.

6. Combined sewer overflow (CSO) controls necessary to meet the identified CSO control objective of the Rouge RAP should be implemented in Plymouth Township and Livonia.

7. The subbasin communities should implement the necessary controls to preferentially treat waste at the source from significant industrial users in with waste potentially being discharged from CSOs in Plymouth Township and Livonia.

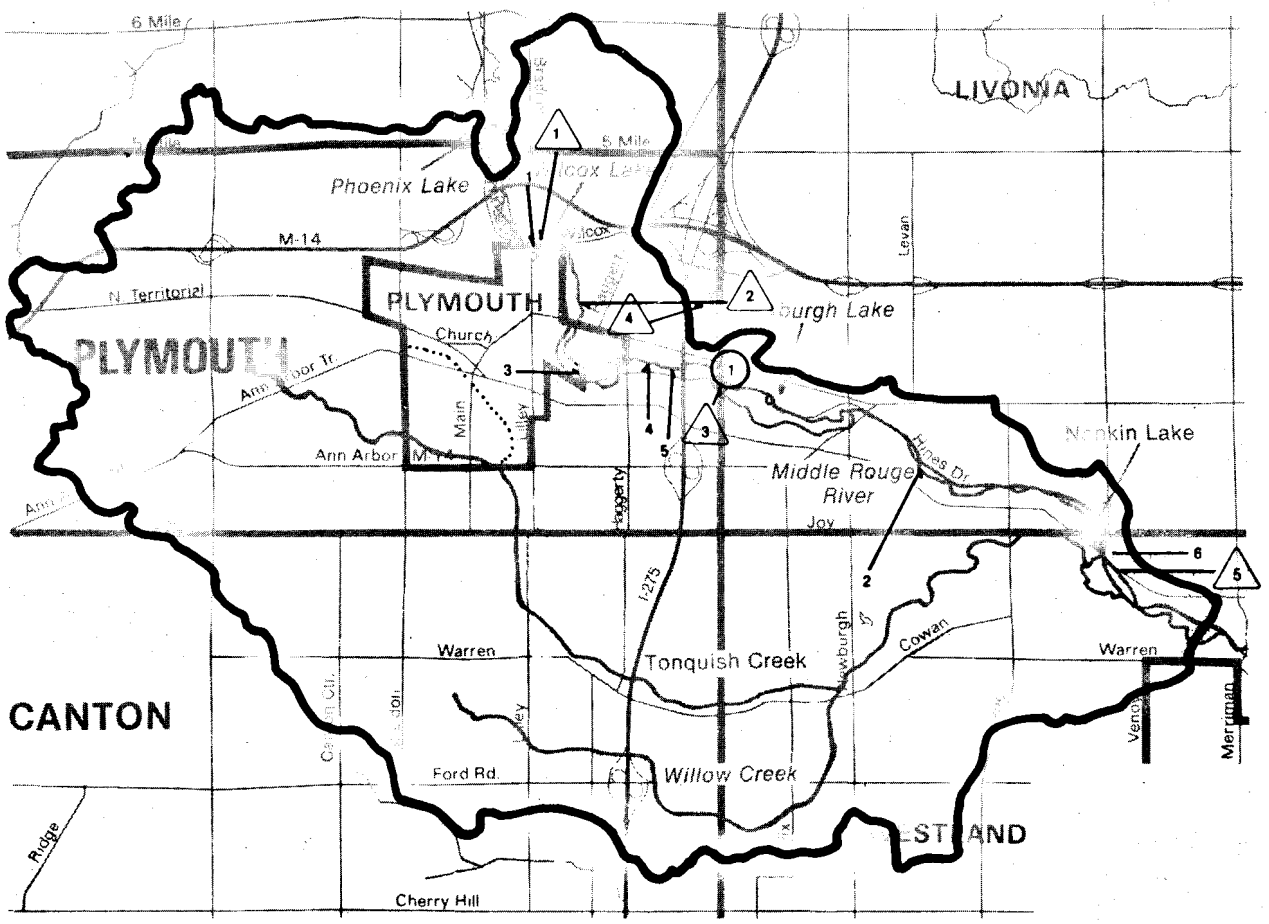
Stormwater Runoff and Other Nonpoint Source Control

8. Implement municipal stormwater management plans and programs in all separate sewer areas.

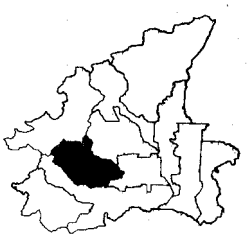
9. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection

FIGURE I-16

SELECTED POLLUTION SOURCES IN THE MIDDLE-2 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge
Act 307 Site



MIDDLE-2 Subbasin of the Rouge River Basin

N 0 1 2 Miles

semcog 1988

program in all separate sewer areas.

10. Continue or initiate monitoring of known sites of environmental contamination (307 sites) to further assess the impact on surface water, and implement corrective measures where necessary.

Municipal and Industrial Discharge Control

11. All industrial dischargers should meet the requirements of their respective NPDES permits.

12. MDNR should determine if a NPDES permit is necessary for Highland Superstores, previously permitted under Ameritech Services.

13. The MDNR should take necessary actions to ensure that BMC Manufacturing (Mid Continent Enterprises) meets its NPDES permit requirements.

Resource Improvements

14. Log and debris jam removal programs should be developed and implemented in public ownership areas.

15. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible.

Stream Monitoring

16. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

17. The extent of contamination and source of PCBs that resulted in the establishment of a fish consumption advisory for the Middle Rouge should be determined.

Middle-3 Subbasin Recommendations

This subbasin, shown in Figure I-17, is potentially influenced by contributing flow from Middle-2, which contributes toxic metals and high fecal coliform counts to Middle-3. Upstream influences are considered to be major. Low flows are approximately 5 cfs, and may contribute to impairments. CSOs, nonpoint stormwater runoff, and upstream sources probably contribute to severe water contact impairments (high fecal coliform(. Impairment of the fishery is probably due to these sources as well as one direct discharge. Based on loadings estimates, nonpoint storm runoff and CSOs are major concerns. Sediment contamination is a minor concern.

Sewer Discharge Controls

1. The Wayne County Department of Public Works should continue to pursue design, MDNR approval, and construction of the North Huron Valley-Rouge Valley project.

2. The Rouge Basin communities in the North Huron Valley and Rouge Valley service areas should implement the local sewer improvements that are included int he North Huron Valley-Rouge Valley project.

3. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer system.

4. Combined sewer overflow (CSO) controls necessary to meet the CSO control objective of the Rouge RAP should be implemented in Westland, Livonia, Garden City, and Dearborn Heights.

5. The subbasin communities should implement the necessary controls to preferentially treat waste at the source from significant industrial users with waste potentially being discharged from CSOs that serve or are located in Livonia, Garden City, and Dearborn Heights.

Stormwater Runoff and Other Nonpoint Source Control

6. Implement municipal stormwater management in all separate sewer areas.

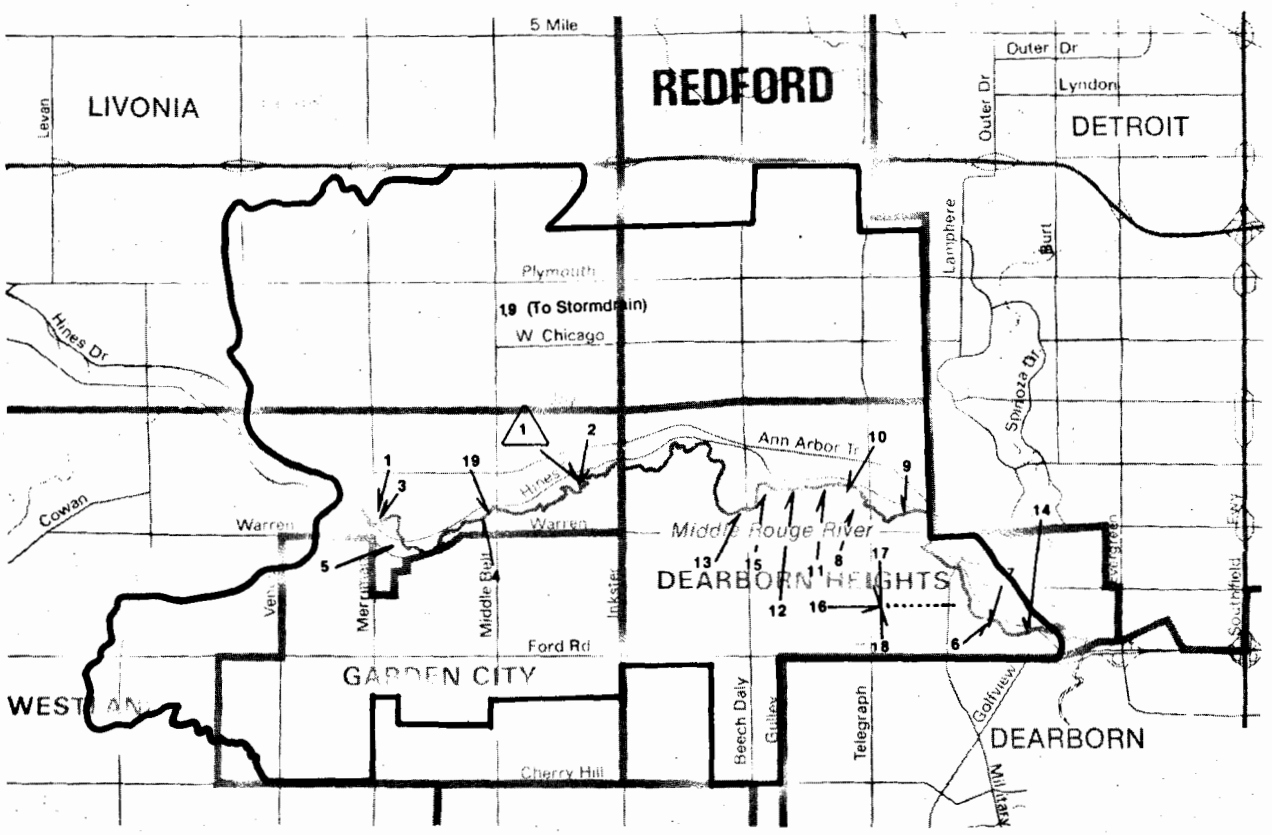
7. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection program in all separate sewer areas, with Red Run Drain being high priority.

Municipal and Industrial Discharge Control

8. All industrial discharges should meet the requirements of their respective NPDES permits.

FIGURE I-17

SELECTED POLLUTION SOURCES IN THE MIDDLE-3 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge
Act 307 Site

MIDDLE-3 Subbasin of the Rouge River Basin

N 0 1 2 3 Miles

semcog 1988

Resource Improvements

9. Log and debris jam removal programs should be developed and implemented in public ownership areas.

10. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible.

Stream Monitoring

11. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

12. The extent of contamination and source of PCBs that resulted in the establishment of a fish consumption advisory from the Middle Rouge should be determined.

Lower-1 Subbasin Recommendations

This subbasin, shown in Figure I-18, contains the headwaters of the Lower Rouge River. Low flows are around 0 cfs, causing flow to be a major concern. Only occasional or slight impairments of the warm water fishery are identified in Lower-1 (low D.O., toxics). These are probably due to low flow, and contributed to by nonpoint storm runoff. Severe or frequent impairments in water contact (high fecal coliform) are probably caused by nonpoint storm runoff. Based on the loading estimates and other concerns, such as flow, nonpoint storm runoff is considered to be a minor concern. CSOs and direct discharges are not present in the subbasin. Sediment contamination is a minor concern in the Lower-1.

Sewer Discharge Controls

1. The Western Townships Utility Authority should continue to pursue design, MDNR approval, and construction of a project to provide adequate sewerage capacity in Western Wayne County.

Stormwater Runoff and Other Nonpoint Source Control

2. Implement municipal stormwater management plans and programs in all separate sewer areas.

3. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection program in all separate sewer areas.

4. Continue or initiate monitoring of known sites of environmental contamination (307 sites) to further assess the impact on surface water, and implement corrective measures where necessary.

Resource Improvements

5. Log and debris jam removal programs should be developed and implemented in public ownership areas.

6. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible, including the WTUA discharge to the Lower Rouge.

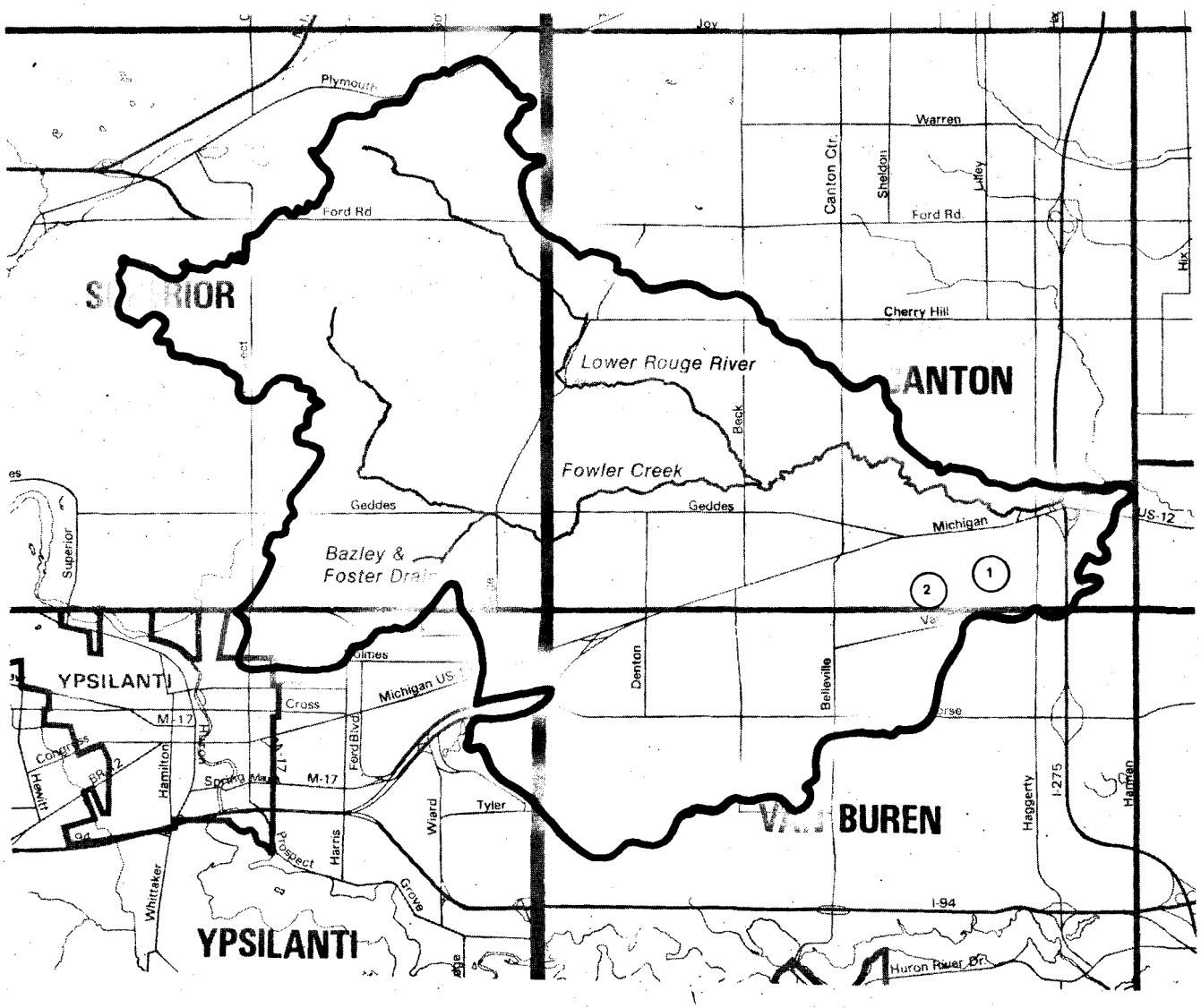
Stream Monitoring

7. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

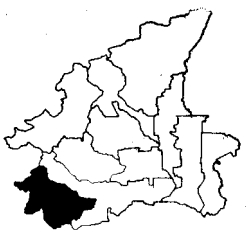
8. The extent of contamination and source of PCBs that resulted in the establishment of a fish consumption advisory for the Lower Rouge should be determined.

FIGURE I-18

SELECTED POLLUTION SOURCES IN THE LOWER-1 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge
Act 307 Site



LOWER-1 Subbasin of the Rouge River Basin

N

semcog 1988

Lower-2 Subbasin Recommendations

This subbasin, shown in Figure I-19, contains Fellows Creek and is influenced by contributing flow from Lower-1. Upstream contributions appear to influence low D.O. and high fecal coliform counts in the Lower-2 and are considered a major concern. Low flows range from about 0 cfs to 11 cfs, and may contribute to impairments. Frequent or severe impairment of the warm water fishery (low D.O. toxics) and water contact (high fecal coliform) are probably caused by CSOs, nonpoint storm runoff, and upstream sources. The CSOs and nonpoint storm runoff are major concerns. Direct discharges are a minor concern because some toxics are discharged. Sediment contamination is a major concern.

Sewer Discharge Controls

1. The Wayne County Department of Public Works should continue to pursue design, MDNR approval, and construction of the North Huron Valley-Rouge Valley project.

2. The Rouge Basin communities in the North Huron Valley and Rouge Valley service areas should implement the local sewer improvements that are included in the North Huron Valley-Rouge Valley project.

3. The Western Township Utility Authority should continue to pursue design, MDNR approval, and construction of a project to provide adequate sewerage capacity in Western Wayne County.

4. The sewered communities in the subbasin should develop and implement Operation and Maintenance programs for their local sewer systems.

5. Combined sewer overflow (CSO) controls necessary to meet the identified CSO control objective of the Rouge RAP should be implemented in Wayne, Inkster, and Dearborn.

6. The subbasin communities should implement the necessary controls to preferentially treat waste at the source from significant industrial users with waste potentially being discharged from CSOs in Inkster and Wayne.

Stormwater Runoff and Other Nonpoint Source Control

7. Implement municipal stormwater management plans and programs in all separate sewer areas.

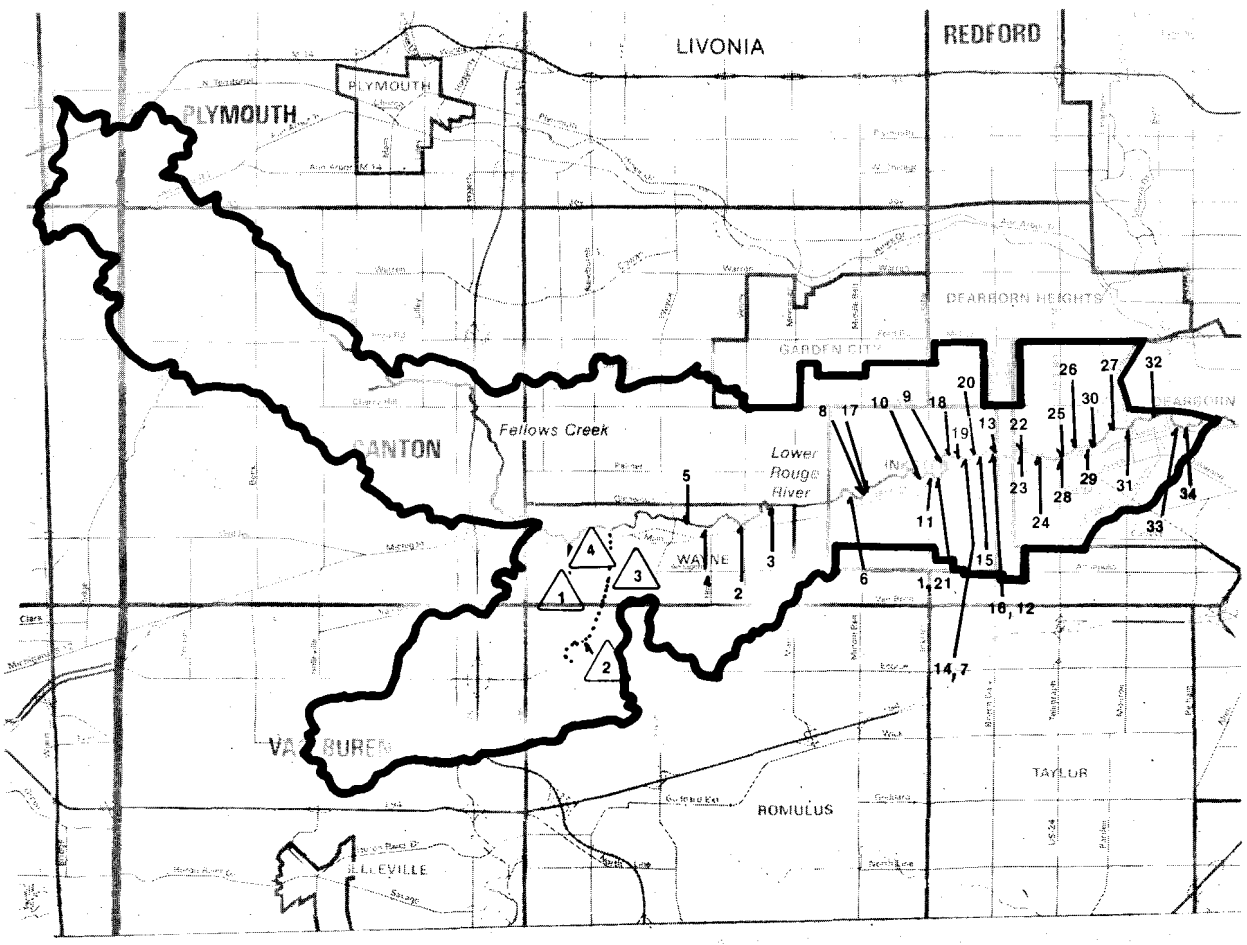
8. Stormwater permits should be issued for the subbasin communities that would include implementation of an improper storm sewer connection program in all separate sewer areas.

Municipal and Industrial Discharge Control

9. All industrial dischargers should meet the requirements of their

FIGURE I-19

SELECTED POLLUTION SOURCES IN THE LOWER-2 SUBBASIN



Combined Sewer Overflow
Municipal or Industrial Discharge
Act 307 Site

LOWER-2 Subbasin of the Rouge River Basin

N

semcog 1988

representative NPDES permits.

10. MDNR should determine if a NPDES permit is necessary for Radtow, Inc., previously permitted under Hennels, Inc.

Resource Improvements

11. Log and debris jam removal programs should be developed and implemented in public ownership areas.

12. Methods to mitigate low flow conditions and degraded channel conditions should be considered and implemented, where feasible, including the WTUA discharge to the Lower Rouge.

Stream Monitoring

13. Stream quality and sediments should be reassessed after significant pollutant inputs are controlled.

14. The extent of contamination and source of PCBs that resulted in the establishment of a fish consumption advisory for the Lower Rouge should be determined.

PART 4 - RAP DEVELOPMENT

PART 4 - RAP DEVELOPMENT

RAP Studies and Planning Elements

Beginning with the directive of the Water Resources Commission in October 1985 that a Rouge River Remedial Action Plan should be developed, the Michigan Department of Natural Resources with assistance from SEMCOG and other local agencies, have carried out a number of studies and planning activities. A local participation process was also established, as specified by the WRC strategy, to provide technical expertise and to oversee plan development.

Table I-2 summarizes the studies and key planning activities that have gone into defining Rouge River problems and identifying remedial actions. SEMCOG was under contract with MDNR to develop the plan, oversee several subcontractors, and conduct the local participation process. MDNR's effort involved coordination and oversight of RAP development, conducting monitoring surveys and studies, preparation of study reports, and plan review on Rouge River facilities.

The planning studies listed were all carried out as a part of Remedial Action Plan development. Each of the studies listed was approved by the Executive Steering Committee. In Table I-2, under the category of planning studies, the subcontractor firms that performed all or part of the task are shown in the agency column.

Monitoring and analyses activities were performed directly by MDNR or under the department's oversight, except for the Wayne County Bacteriological Survey. This study was conducted solely by WCHD in response to concerns about bacterial contamination of the river. Both the City of Detroit and Detroit Edison also provided volunteer water sample analysis services without a cost to the state.

TABLE I-2

ROUGE RAP PLANNING ACTIVITIES AND
STUDIES SUMMARY

ACTIVITY	AGENCY	DATE
Plan Development		
RAP Development	SEMCOG	Nov. '85-May '88
RAP Coordination/Oversight/ District Staff Participation	MDNR	Nov. '85-May '88
Planning Studies		
Outfall Survey	SEMCOG	Apr.-Nov. '86
Data Evaluation	Wayne State University	Mar.-Aug. '87
Data Archive Assessment	Wayne State University	Mar.-Sept. '87
Subbasin Problem Assessment	Wayne State University/ Limno-Tech, Inc.	June-Oct. '87
Lower-2 Watershed Project	SEMCOG/Wayne County Health Department	Jan.-Sept. '87
CSO Strategy Project	CSO Committee/ Wade-Trim/Assoc.	Mar.-Dec. '87
Infrastructure Financing Project	SEMCOG/Plante & Moran/Metropolitan Affairs Corporation	Jan. '87-Apr. '88
Monitoring and Analysis		
Biological Survey	MDNR	July '87-Apr. '87
Fixed Station Monitoring -Sample Collection	Wayne County Health Department	July '86-Oct. '86 Apr. '87-May '88

TABLE I-2
(continued)

ACTIVITY	AGENCY	DATE
Monitoring and Analysis (continued)		
Fixed Station Monitoring - Analysis of Weekly Samples	Detroit Water and Sewerage Department	July '86-Oct. '86 Apr. '87-May '88
Toxic Organics Analysis	Detroit Edison Corp.	Sept. '87
Fish Tissue Analysis	Michigan Department of Public Health	July '87
Sediment Survey	MDNR	July-Aug. '87
Wayne County Bacteriological Survey	Wayne County Health Department	Aug. '87

NOTE: During the period of RAP development several sewerage transport and treatment projects were in the process of completing further engineering study and MDNR review. Because these projects were not initiated specifically as a part of the RAP development, they are not listed here.

Source: SEMCOG, 1988

RAP Oversight and Advisory Committees

The Water Resources Commission Strategy specified that the RAP should be developed with the advice and approval of a set of committees representing the 48 units of government in the Rouge River Basin. Appendix I.2 of the RAP contains complete committee membership listings.

The strategy established two oversight committees, shown in Figure I-20. The Basin Committee was designed to be broadly representative and to include participants from each of the 48 units of government in the basin plus appropriate agencies and interest groups, as follows:

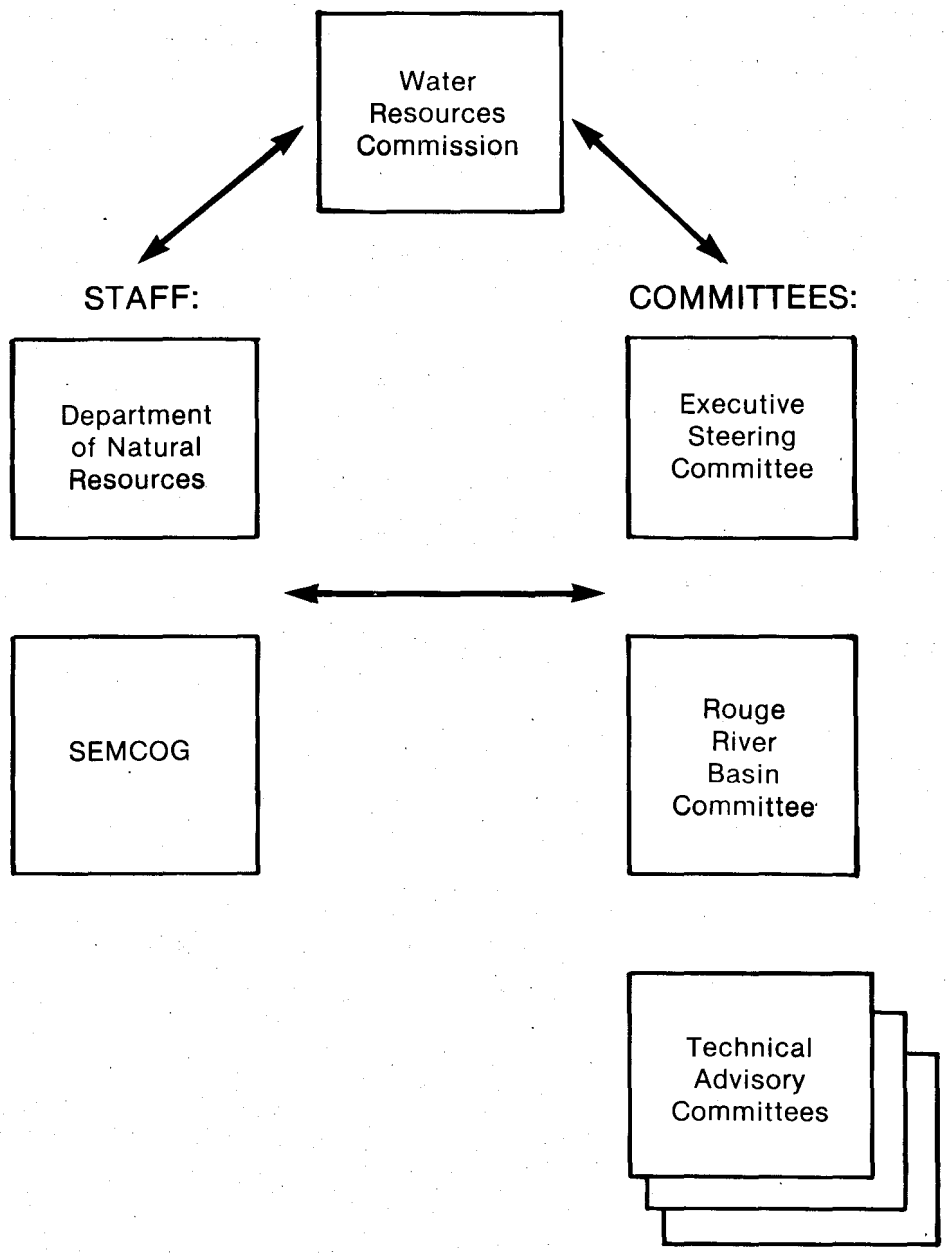
Basin Committee

- Representative of each of 48 units of government
- State representatives - agencies, legislature, and Governor's office
- Federal and international water resources agencies
- Local water resources, health, and public agencies
- Public and private interest groups
- Industry groups

The Executive Steering Committee is composed of key decision-makers, but also represents the communities in the basin through its 16 members. Local government members of the Executive Steering Committee were chosen by the Oakland County and Wayne County Executives and Boards of Commissioners. The 16 members of the Executive Steering Committee represent the following agencies and units of government:

FIGURE I-20

ORGANIZATION OF ROUGE RIVER LOCAL PARTICIPATION PROCESS



semcog 1988

Executive Steering Committee

Water Resources Commission	Wayne County Public Works
Governor's Office	Oakland County Public Works
House of Representatives	Rouge River Watershed Council
State Senate	Wayne County, appointed by County Executive
Department of Natural Resources	Wayne County, appointed by Board of Commissioners
U.S. Environmental Protection Agency	Oakland County, appointed by County Executive
SEMCOG	Oakland County, appointed by Board of Commissioners
Detroit Water and Sewerage Department	

Technical advisory committees were formed, as needed, to advise staff and the two oversight committees in RAP development. Several committees met only once to make recommendations on a particular subject, such as the Stream Enclosures and Soil Erosion Committee. Others, like the CSO Advisory Committee, met monthly to provide expertise and thorough review of elements of the RAP. Following is a listing of technical committees and their periods of activity:

Technical Advisory Committees	Dates of Activity
Infrastructure Financing Committee	Jan. '87 - Apr. '88
CSO Technical Advisory Committee	Mar. - Sept. '87
Basin Committee Subcommittees on Area-Specific Recommendations	Jan. '88
Education Committee	Oct. '86 - Dec. '86
Water Quality and Facilities Committee	Mar. - Oct. '86
Log Jam Advisory Committee	Mar. - Oct. '86
Lower-2 Project Advisory Group	Jun. - Sept. '87
Stream Enclosures and Soil Erosion Control Subcommittee	Jul. '87

PART 5 - THE ROUGE RIVER BASIN CHARACTERISTICS AND PROBLEMS

PART 5 - THE ROUGE RIVER BASIN CHARACTERISTICS AND PROBLEMS

Basin Characteristics

The Rouge River Basin is a fan-shaped basin consisting of four river branches that drain a land area approximately 438 square miles in Wayne, Oakland, and Washtenaw Counties (Figure I-21). In addition to the four major river branches, the basin's extensive surface water system includes numerous tributary streams and more than 400 lakes and ponds.

Included in the basin are all or part of 48 municipalities, with a total basin population of more than 1.5 million people. Overall, more than 50 percent of the land use in the basin is residential, commercial, or industrial, primarily in the intensely urbanized eastern portion. The northern and western portions of the watershed are mainly suburban and rural in nature and contain most of the 25 percent of undeveloped lands still found in the basin.

The Rouge River's central location is heavily populated southeast Michigan and the 50 plus miles of publicly owned riparian parklands make the potential for public use and contact with the river system greater than that of any other river system in the State of Michigan. This also means that the basin's surface waters are especially susceptible to severe degradation as a result of urbanization and related human activities.

Problem Definition

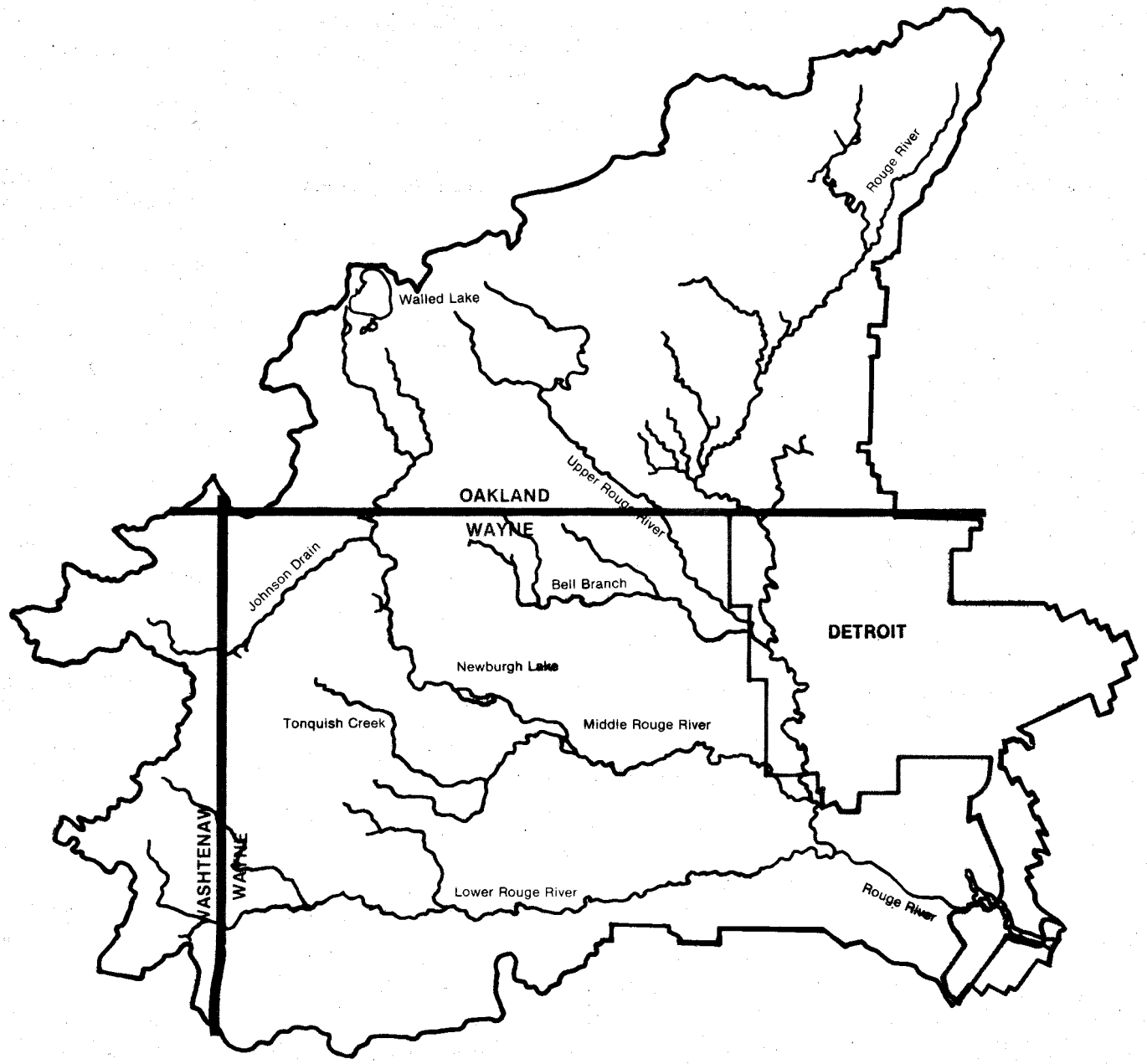
The development of remedial actions to address specific water quality problems has required an extensive data collection and evaluation effort. This work was needed to define the problems caused by pollution, to identify the pollution sources, and to determine the pollutant loadings entering the surface waters.

A standard for measuring the extent of the water quality problems in the Rouge Basin is necessary to define the existing pollution problems. For purposes of the remedial action plan the severity of pollution is expressed in terms of the degree to which beneficial uses of the water are impaired due to poor quality. This concept of "use impairments" is incorporated into the state Water Quality Standards. The state standards use physical and chemical parameters that indicate the suitability of the water for each designated use. The designated uses for the Rouge River, as established by the Water Resources Commission include:

- Water Contact Recreation
- Warmwater Fishery
- Industrial and Agricultural Water Supply
- Navigation (Commercial and Recreational)
- General Aesthetic

FIGURE I-21

THE ROUGE RIVER BASIN



semcog 1988

Associated with each designated use are a number of water quality, physical, and biological characteristics of the stream. These factors are indicators of the ability to make use of the river system as designated. For example, if fecal coliform bacteria concentrations exceed the state standard, as is the case in all subbasins nearly 100 percent of the time, then the river cannot be used for activities such as swimming and wading, and it is considered impaired for this designated use.

Figure I-22 summarizes the extent of impairment to each of the designated uses of the Rouge River, by subbasin. Data collected since 1980 were the primary sources used in this assessment, with pre-1980 data used for support and verification.

As Figure I-22 demonstrates, each of the 11 subbasins suffers a level of degradation sufficient to impair some, if not all, of the designated uses for that stream segment. Frequent or severe impairment of each designated use is common throughout the basin and is not limited to the downstream reaches.

The primary exceptions to this are fisheries and navigation. Fisheries are only slightly impaired in the Main-1 and Main-2 subbasins. Recreational navigation (primarily canoeing) suffer no or slight impairment in the Upper-1 and Middle-2 subbasins. Commercial and general navigation is not impaired in the Main-4 subbasin, due to the dredging and maintenance of the shipping channel.

The extent and severity of use impairments in the Rouge shows that the sources of pollution responsible are common throughout the basin. Therefore, many of the remedial actions needed to address the problems will require basinwide implementation.

SEMCOG and the Michigan Department of Natural Resources (MDNR) staff have identified the probable causes of impaired designated uses in the 11 subbasins of the Rouge River. The probable causes were determined using identified subbasin impairments and estimated pollutant loadings. Table I-3 is a summary of this information. The sources of impairment are grouped into major categories and listed across the top of the table. The probable cause of impairment in each subbasin are rated as "major," "minor," or "no," depending on the relative importance of the source as a cause of the impairment. References to the types of pollutants discharged by the source and believed to contribute to the impairment are in parentheses.

Pollutants affecting the Rouge River originate from a number of diverse sources throughout the basin. This is the result of the large size of the basin and the variety of human activities and uses within its boundaries. Just as the degree of impairment of designated uses varies between subbasins, so do the causes of impairments. For example, in the Middle-1 subbasin nonpoint source pollution/stormwater runoff is a major cause of impairment relative to other sources, with combined sewer overflows (CSOs) being a relatively minor cause. However, in the Main-3 subbasin nonpoint source pollution is a relatively minor cause of impairment, while combined sewer overflows are a major cause.

FIGURE I-22

Summary of Impaired Uses for the Rouge River

SUBBASIN		DESIGNATED USES				
		Water Contact	Warm Water Fishery	Ind/Agr Supply	Canoeing Navigation	General Aesthetic
Main 1	**Southeast Oakland Co.**	●	⊙	●	●	●
Main 2	**Southfield/Detroit**	●	⊙	●	●	●
Main 3	**Detroit/Dearborn**	●	●	●	●	●
Main 4	**Detroit/River Mouth**	●	●	⊙	○	●
Upper 1	**Farmington Hills/Farmington**	●	●	●	⊙	●
Upper 2	**Livonia/Bell Branch**	●	●	●	⊕	⊕
Middle 1	**Novi/Northville**	●	●	●	○	●
Middle 2	**Plymouth/Westland**	●	●	●	●	●
Middle 3	**Garden City/Dearborn Heights**	●	●	●	●	●
Lower 1	**Superior Twp/Canton Twp**	●	●	●	●	●
Lower 2	**Wayne/Inkster**	●	●	●	●	●

○ No Impairment ⊕ Insufficient Data ⊙ Occasional or Slight Impairment ● Frequent or Severe Impairment

Source: SEMCOG, 1988; adapted from Limno-Tech, Inc., 1987.

TABLE I-3

Probable Causes of Impairments in Rouge River Subbasins

Subbasins	Sources of Impairment					
	Mun. & Ind. Direct Dischargers	Combined Sewer Overflows (CSO)	Nonpoint (Storm Runoff)	Sediments	Upstream Subbasin(s) Influence	Stream Flow
M-1	No	Major (1,4,5)	Major (1,3,4,5)	Minor (3)	No	Major
M-2	Minor (3)	Major (1,2,3,4,5)	Major (1,2,3,4,5)	Minor (3)	Major (1,2,3,4)	Major
M-3	Major (1,3)	Major (1,2,3,4,5)	Minor (1,2,3,4,5)	Major (3)	Major (1,2,3,4)	No
M-4	Major (1,2,3)	Major (1,2,3,4,5)	Minor (3)	Major (3)	Major (1,2,3,4)	No
U-1	No	Minor (1,2,3,4,5)	Major (1,2,3,4,5)	Minor (3)	No	Major
U-2	No	Minor (1,2,4,5)	Major (1,2,3,4,5)	No	No	Major

1 = Conventional Pollutants
2 = Nutrients
3 = Toxic Pollutants
4 = Bacterial Contamination
5 = General Aesthetic

Source: SEMCOG, 1988.

TABLE I-3
(continued)

Probable Causes of Impairments in Rouge River Subbasins

Subbasins	Sources of Impairment					
	Mun. & Ind. Direct Dischargers	Combined Sewer Overflows (CSO)	Nonpoint (Storm Runoff)	Sediments	Upstream Subbasin(s) Influence	Stream Flow
Md-1	Minor (3)	Minor (4)	Major (1,2,3,4,5)	Minor (3)	No	Major
Md-2	No	Minor (3,4)	Major (1,2,3,4,5)	Minor (3)	Major (4)	Major
Md-3	Minor (3)	Major (1,2,3,4,5)	Major (1,2,3,4,5)	Minor (3)	Major (3,4)	Minor
L-1	No	No	Minor (1,2,3,4,5)	Minor (3)	No	Major
L-2	Minor (3)	Major (1,2,3,4,5)	Major (1,2,3,4,5)	Major (3)	Major (1,3,4)	Major

TABLE I-3
(continued)

NOTES: CRITERIA FOR CATEGORIZATION ON TABLE I-3

	MAJOR	MINOR	NO
DIRECT DISCHARGERS CSOs NONPOINT (same criteria for each source)	A significant source of pollutants, which could cause impairments that are identified in RAP Chapter IV. Degree of significance is based on SEMCOG loading estimates and/or judgement	A contributing source of pollutants of concern, based on SEMCOG loading estimates.	Insignificant
SEDIMENT (only toxic pollutants considered)	50% or more of the MDNR '86 & '87 sites in the subbasin were heavily polluted for at least one parameter according to U.S. EPA guidelines and the biota in the subbasin indicated use impairment.	Less than 50% of the MDNR '86 & '87 sites in the subbasin were heavily polluted for at least one parameter, but at least one site was moderately polluted for at least one parameter and the biota in the subbasin indicated use impairment.	All '86 & '87 MDNR sites in the subbasin were non-polluted for all sampled parameters all sampled parameters.
UPSTREAM	Primarily based on violations of Water Quality Standards at monitoring stations in upstream subbasins (MDNR '86). If no monitoring station represented the upstream subbasin, judgement was based on upstream violations discussed in RAP Chapter IV, or other information	"Minor" was not a category used for upstream influence.	No violations of Water Quality Standards in upstream subbasin.
FLOW	Low flow conditions (95% exceedance flow) less than 5 cfs anywhere in subbasin.	Low flow conditions (95% exceedance flow) between 5 and 10 cfs somewhere in subbasin.	Low flow conditions (95% exceedance flow) more than 10 cfs at all points in basin.

Pollution Sources

The location of pollutant discharges to the Rouge River Basin is shown in Figure I-23. Detailed pollutant source information is contained in Chapter V of the Remedial Action Plan. A summarization of this information is presented in Table I-4, identifying the sources of pollution and the specific pollutants or types of pollutants discharged or potentially discharged to each subbasin.

The primary pollution sources in the Rouge Basin are grouped into the following categories:

- Municipal and Industrial Direct Dischargers
- Combined Sewer Overflows (CSO)
- Separate Sewer Overflows (SSO)
- Nonpoint/Storm Runoff
- Act 307 Sites (Sites of Environmental Contamination)
- Others

Municipal and Industrial Direct Dischargers. This category includes the four publicly owned treatment works (POTWs) and 30 private dischargers that have National Pollutant Discharge Elimination System (NPDES) permits issued by the state of Michigan. [Note: the South Commerce Township wastewater treatment plant (WWTP) is currently under construction and as yet has no discharge and the Detroit WWTP normally discharges to the Detroit River, using the Rouge River outfall only as an emergency discharge.]

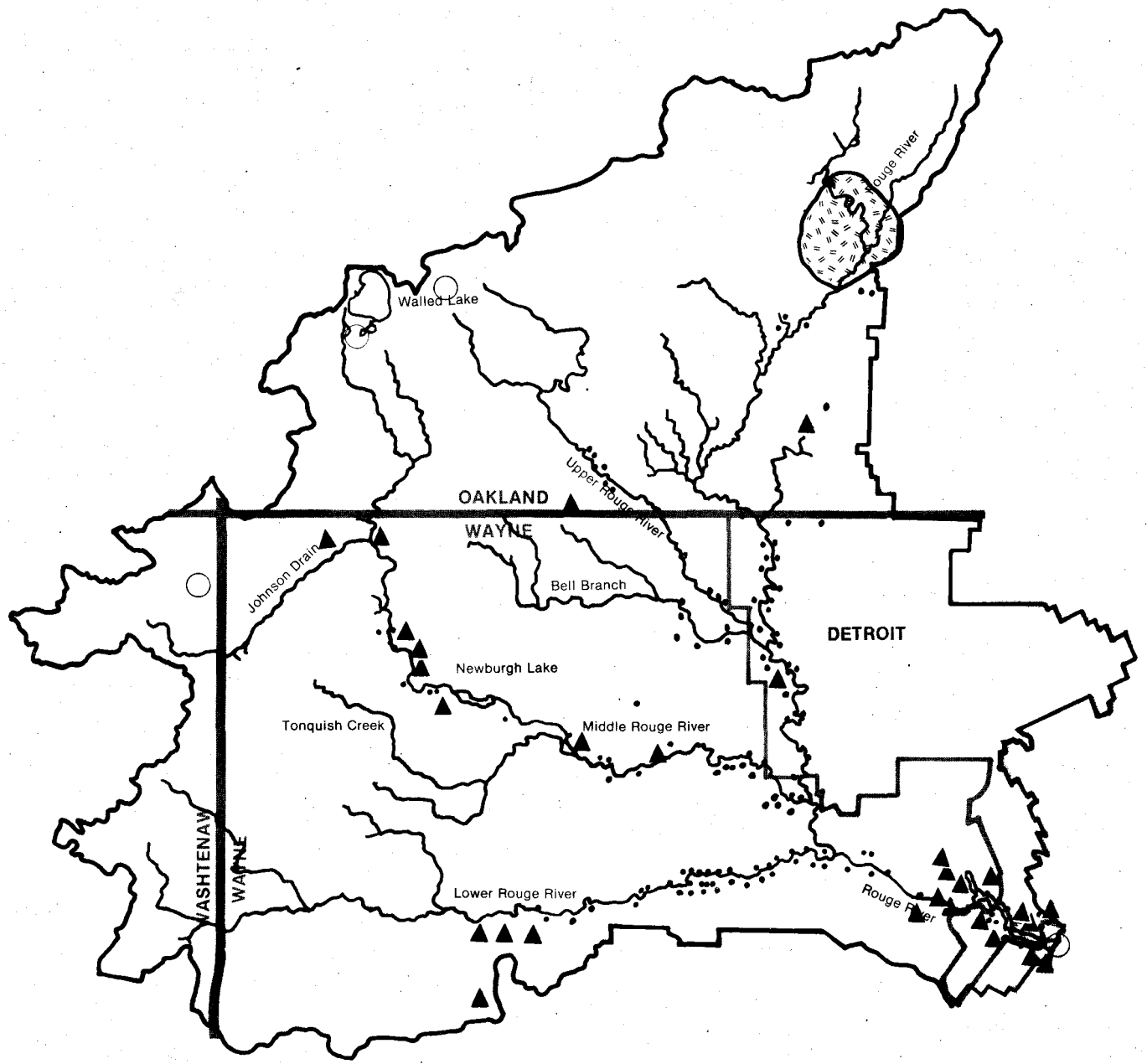
As demonstrated in Table I-4, municipal and industrial direct dischargers contribute a broad range of pollutants to the Rouge system. These include: conventional pollutants such as total suspended solids and biochemical oxygen demanding materials (as indicated by BOD); non-conventional pollutants such as iron, aluminum, and total phenols; toxic pollutants (priority pollutants) such as metals (zinc, nickel, lead, cadmium, chromium, etc.) and PCBs; and polynuclear aromatic hydrocarbons (PAH).

It should be noted that municipal and industrial direct dischargers are, for the most part, meeting the effluent limitations set forth in their NPDES permits.

Combined Sewer Overflows. There are some 168 combined sewer overflow (CSO) discharges in the Rouge Basin. The combined sewers carry a mixture of domestic sewage, industrial wastewater, and stormwater runoff to the Detroit wastewater treatment plant. During times of heavy flow, usually associated with storm events, the volume of combined sewage exceeds the capacity of the sewers. When this happens a portion of the flow is diverted to an overflow point and untreated combined sewage is discharged directly to the surface water. Of the 168 combined sewer overflows, approximately 37 potentially discharge waste from significant industrial users.

FIGURE I-23

DISCHARGES TO THE ROUGE RIVER BASIN



semcog 1988

- Combined Sewer Overflow
- Industrial Discharge
- Municipal Discharge
- Birmingham-Bloomfield Hills Area has 43 CSOs. See Figure I-9 For Detail

TABLE I-4
SUMMARY OF POLLUTANT SOURCES, TYPES OR SPECIFIC POLLUTANTS DISCHARGED OR POTENTIALLY DISCHARGED, BY SUBBASIN

Subbasin	(#) Municipal & Industrial Direct Dischargers	Combined Sewer Overflow (CSO)	Separate Sewer Overflow (SSO)	Nonpoint (Storm Runoff)	307 Sites Affecting Waters	Other
Main-1	None identified	Domestic Sewage; Runoff	Domestic Sewer	Runoff	None Identified	Franklin's On-site system (Domestic Sewage)
Main-2	(2) TSS, BOD_5, Oil & Grease, TP, Fe, Zn, Cu, Cr(T), NO_2+NO_3, Dissolved Solids	Domestic Sewage; Runoff Potentially: Phenols, Ag, Cu, Ni, Cr, Zn, Cd, Pb, Hg, CN, Fe, Toxic Organics from SIUs		Runoff		
Main-3	(3) TSS, BOD_5 COD, TOC, Dissolved Solids, NO_2 + NO_3, NH_3-N, Reactive Silicon, Pb, Zn, Al, Ba, Cd, Cu, Fe, Mn, Ni, Phenols, PAHs-Naphthalene, Phenanthrene, Acenaphthylene, Acenaphthene, Benzo (a) Anthracene, Pyrene, Fluoranthene, Florene**	Domestic Sewage; Runoff; Potentially: Phenols, Ag, Cu, Ni, Cr, Zn, Cd, Pb, Hg, CN, Fe, As, Toxic Organics from SIUs		Runoff		
Main-4	(13) TSS, BOD_5, COD, TOC, Dissolved Solids, No_2+No_3, NH_3-N, Reactive Silicon, T-P, TRC, Fe, Al, Ba, Mn, Li, Ti, Mo, Sb, Co, Sodium Bisulfate, Phenols, CN(F), CN(T), Zn, Cr, Ni, Pb, As, Se, Hg, Cd, Cu, Be, TI, Bis(2ethyl Hexyl) Phthalate**	Domestic Sewage; Runoff; Potentially: Phenols, Ag, Cu, Ni, Cr, Zn, Cd, Pb, Hg, Fe, As and Toxic Organics from SIUs	Domestic Sewage	Runoff	Contaminated Sediments in Subbasin Qualify as 307 Site	Runoff, Specifically from Industrial Materal Storage

TABLE I-4 (continued)
SUMMARY OF POLLUTANT SOURCES, TYPES OR SPECIFIC POLLUTANTS DISCHARGED OR POTENTIALLY DISCHARGED, BY SUBBASIN

Subbasin	(#) Municipal & Industrial Direct Dischargers	Combined Sewer Overflow (CSO)	Separate Sewer Overflow (SSO)	Nonpoint (Storm Runoff)	307 Sites Affecting Waters	Other
Upper-1	None Currently Discharging	Domestic Sewage; Runoff; Potentially: Ag, Cu, Ni, Cr, Zn, Cd, Pb, Hg, CN from SIUs	Domestic Sewage	Runoff	None Identified	
Upper-2	(1) Insignificcant levels of TSS, BOD_5, COD, dissolved solids	Domestic Sewage; Runoff	Domestic Sewage	Runoff	None Identified	
Middle-1	(4) TSS, BOD, COD, Oil & Grease, NH_3-N, NO_2+NO_3, T-P Dissolved Solids, CN(A), CN(T), Zn, Cr, Ni, Pb, Ag, As, Se, Hg, Trichloroethene	Domestic Sewage: Runoff		Runoff	(1) NH_3-N, COD, possibly some heavy manufacturing waste	
Middle-2	(6) TSS, COD, Oil & Grease, T-P, Dissolved Solids	Domestic Sewage; Runoff; Potentially: Phenols, Ag, Cu, Ni, Cr, Zn, Cd, Pb, Hg, CN, Toxic Organics, Fe, from SIUs	Domestic Sewage	Runoff	Unknown, but of municipal and industrial origin	
Middle-3	(1) TSS, BOD_5, COD, TOC, Oil & Grease, NH_3-N, T-P, Fe, Dissolved Solids, Phenols, Chloroform, Di-N-Butylphthalate, Bis(2-ethyl hexyl) Phthalate	Domestic Sewage; Runoff; Potentially: Phenols, Ag, Cu, Ni, Cr, Zn, Cd, Pb, Hg, CN, Toxic Organics, Fe from SIUs	Domestic Sewage	Runoff	None Identified	

TABLE I-4 (continued)
SUMMARY OF POLLUTANT SOURCES, TYPES OR SPECIFIC POLLUTANTS DISCHARGED OR POTENTIALLY DISCHARGED, BY SUBBASIN

Subbasin	(#) Municipal & Industrial Direct Dischargers	Combined Sewer Overflow (CSO)	Separate Sewer Overflow (SSO)	Nonpoint (Storm Runoff	307 Sites Affecting Waters	Other
Lower-1				Runoff	(2) Chlorides, Phenols, Cd, Cr, Cu, Ni, Pb, Zn, PCB, Pentachlorophenol, Possibly Heavy Metals	
Lower-2	(4) TSS, BOD_5, COD, TOC, NH_3-N, T-P, Fe, Dissolved Solids, Zn, Phenols, Oil & Grease	Domestic Sewage; Runoff; Potentially: Phenols, Ag, Cu, Ni, Cr, Zn, Cd, Pb, Hg, CN, Fe, and Toxic Organics, from SIUs	Domestic Sewage	Runoff	None Identified	

NOTES:

Typical domestic sewage contains oxygen demanding substances indicated by BOD_5, COD, TOC and TKN, NO_2 + NO_3, T-P, S-P, TSS, dissolved solids.

Runoff typically contains oxygen demanding substances indicated by BOD_5, COD, TOC, and TKN, NO_2 + NO_3, T-P, S-P, TSS, dissolved solids, probably Zn, Pb, Cu and possibly parameters listed in Chapter V, Table V-13.

* Phenols, metals, CN, and/or toxic organics from significant industrial users (SIUs) are potentially discharged to the sewers, therefore may be present in discharge from combined sewer overflows.

** Many parameters detected at very low concentrations. Detection based on only one sample - see Chapter VI.

Source: SEMCOG, 1988

Separate Sewer Overflows. Separate sewer overflows (SSO) occur in several areas of the Rouge Basin. Generally SSOs are the result of growth and development overburdening the capacity of the sanitary sewers. When sewage volumes exceed sewer capacity the raw sewage is discharged directly to surface waters in order to prevent backups and spillage into basements or at manholes.

Stormwater Runoff and Other Nonpoint Source Pollution. Nonpoint source pollution, primarily stormwater runoff, contributes pollutants to the Rouge River in those areas serviced by separate sanitary sewer and storm sewer systems. The percentage of impervious surfaces such as streets, parking lots, roof tops, and commercial and industrial sites increases as land is developed. The result is an increase in runoff rates and volumes and, therefore, in the amount of stormwater discharged to surface waters. As the stormwater travels over these surfaces its picks up various pollutants. These pollutants are often bonded to the soil particles and other solid materials carried in the runoff and released to the water once they enter the river. The pollutants carried by stormwater runoff depend upon the surface over which it travels. Nutrients (phosphorous and nitrogen) and biochemical oxygen demanding materials (BOD) are associated with stormwater runoff from streets, lawns, and bare soil. Stormwater runoff having traveled over streets, parking lots, or industrial sites might contain metals and toxic organic pollutants.

Another potentially major source of pollutants in stormwater discharges results from improper connections to storm drains and sanitary-storm sewer cross connections. In these cases, discharges that should be made to the sanitary sewers are entering the storm sewers and, therefore, the surface waters because pipes have been connected to the wrong sewer.

Appendix C-1 of the RAP contains the Nonpoint Source Management Plan for the Lower-2 Watershed of the Rouge River Basin. This study, undertaken by SEMCOG and the Wayne County Department of Health, indicates that improper connections to storm sewers exist in the Lower Rouge and are potentially a significant source of pollutants in many storm drains. Once located and identified, the improper connection needs simply to be eliminated in order to prevent the pollutants from entering the surface water.

Act 307 Sites. There are 27 Act 307 sites (sites of environmental contamination) that have been identified by the Michigan Department of Natural Resources in the Rouge Basin. Five of these sites are known to be a source of pollutants affecting surface waters in the basin. A detailed discussion of each of these sites is included in Chapter V of the Remedial Action Plan.

Pollutant Loadings

Pollutant loadings (quantities estimated by mass/year) have been estimated, by source, for each subbasin of the Rouge River Basin. This information is summarized in Table I-5. Loading estimates for over 50 parameters are presented in Chapter VI, Table VI-15. A discussion of the methodology used to develop these loading estimates is also included in Chapter VI. The precision and accuracy of loadings estimates and associated limitations are dependent upon the information sources used. Due to the availability of data, the most precise and accurate information is probably measurements of municipal and industrial dischargers. Less precise and accurate are CSO and nonpoint loadings because of the limited data available.

Keeping in mind the limitations on precision and accuracy of estimates, Table I-5 can be used as a planning tool to compare annual loadings of particular pollutants for the different sources within a subbasin. Comparisons can only be qualitative. For example, the Lower-2 subbasin receives total suspended solids (TSS) loadings from all three of the sources listed. However, the estimated annual loadings of TSS entering the Lower-2 is estimated to vary greatly between sources. Municipal and industrial direct discharges contribute an estimated 40,100 pounds per year of TSS to this subbasin, more than in any other subbasin except Main-3 and Main-4. Yet this is estimated to be a very small portion of the total annual TSS loadings to the Lower-2 from the three sources. Combined sewer overflows (CSOs) are estimated to be responsible for a larger portion, with nonpoint sources (NP) estimated to contribute the vast majority of the annual TSS loadings to the Lower-2.

The table can also be used to compare annual loadings between subbasins for particular pollutants from specific sources. For example, the basinwide total annual loading of BOD_5 from CSOs is estimated at 5,480,000 pounds. More than half of this total, 3,200,000 pounds, is estimated to be discharged from CSOs to the Main-3 and Main-4 subbasins.

The following are some general observations based upon the data presented in Table I-5:

- Main-4 subbasin receives an estimated 87 percent of the municipal and industrial direct discharge flow to the basin.
- Approximately 99 percent of the total suspended solids (TSS) from municipal and industrial direct dischargers is estimated to be discharged to Main-3 and Main-4 subbasins.
- Approximately 7,800 million gallons of combined sewage are estimated to be discharged annually to the Rouge Basin.
- Approximately 75 percent of the combined sewer overflow (CSO) volume discharged to the basin is estimated to be in the Main-2, Main-3, and Main-4 subbasins.
- Nonpoint sources are a significant and often the major contributor of flow and pollutant loadings throughout the separate sewer areas of the basin.

TABLE I-5

ANNUAL ESTIMATED POLLUTANT LOADINGS SUMMARY FOR EACH SUBBASIN
OF THE ROUGE RIVER AND THE ENTIRE BASIN (lb/yr) - (Executive Summary)

SUB BASIN	SOURCE[1]	FLOW (MILLION GALLON PER YEAR)	TOTAL SUSPENDED SOLIDS	OIL & GREASE	BOD_5 (BIOCHEMICAL OXYGEN DEMAND)	TOTAL NITRO-GEN	TOTAL PHOS - PHORUS	METALS[2]	TOXIC ORGANIC COMPOUNDS[3,4]
MAIN 1	M&I	0	0	0	0	0	0	-	-
	CSO	600	1,100,000	46,000	300,000	100,000	22,000	*	-
	NP	13,000	39,000,000	N.E.[5]	1,500,000	200,000	72,000	*	***
MAIN 2	M&I	110	4,140	1,950	13,200	N.E.	60	*	-
	CSO	1,100	2,000,000	140,000	850,000	88,000	68,000	*	**
	NP	3,300	11,000,000	N.E.	420,000	53,000	20,000	*	***
MAIN 3	M&I	22,900	1,710,000	690,000	382,000	N.E.	0	*	**
	CSO	3,100	4,200,000	430,000	2,000,000	190,000	81,000	*	**
	NP	1,000	3,800,000	N.E.	150,000	19,000	7,000	*	***
MAIN 4	M&I	166,000	5,340,000	2,300,000	1,500,000	N.E.	98,700	*	**
	CSO	1,800	2,200,000	13,000,000	1,200,000	42,000	26,000	*	**
	NP	500	1,300,000	N.E.	55,000	5,800	2,300	*	***
UPPER 1	M&I	0	0	0	0	0	0	-	-
	CSO	30	59,000	2,300	25,000	2,800	1,100	*	-
	NP	4,500	10,000,000	N.E.	390,000	59,000	19,000	*	***
UPPER 2	M&I	10	N.E.	0	N.E.	0	0	-	-
	CSO	100	410,000	7,500	120,000	15,000	5,000	*	-
	NP	5,900	20,000,000	N.E.	770,000	100,000	37,000	*	***

Notes:

1. Sources include: "M&I" = municipal and industrial point sources that discharge to the river; "CSO" = combined sewer overflows; and "NP" = nonpoint sources (primarily stormwater runoff for our purposes).

2. An asterisk (*) indicates that certain metals may be present in: 1) municipal and industrial discharges to the subbasin; 2) CSO discharges to the subbasin from significant industrial users only and/or stormwater runoff. Detail is provided in the complete loadings table in Chapter VI, elsewhere in Chapter VI, and Appendix G.8.

3. A double asterisk (**) indicates that certain toxic organic compounds may be present in: 1) municipal and industrial discharges to the subbasin; 2) CSO discharges to the subbasin from significant industrial users only. Detail is provided in the complete loadings table in Chapter VI, elsewhere in Chapter VI, and Appendix G.8.

4. A triple asterisk (***) indicates that toxic organic compounds are potentially discharged from stormwater runoff and/or specific nonpoint sources. See Chapters V & VI for details on available information.

5. "N.E." = no estimate of loading, however, parameter is probably present based on screening tools used.

6. Totals do not necessarily equal summation of subbasin totals due to roundoff error. See Chapter VI.

TABLE I-5 (continued)

SUB BASIN	SOURCE[1]	FLOW (MILLION GALLON PER YEAR)	TOTAL SUSPENDED SOLIDS	OIL & GREASE	BOD_5 (BIOCHEMICAL OXYGEN DEMAND)	TOTAL NITRO-GEN	TOTAL PHOS-PHORUS	METALS[2]	TOXIC ORGANIC COMPOUNDS[3]
MIDDLE 1	M&I	650	7,400	40	14,400	N.E.	1,400	*	**
	CSO	1	3,600	70	1,000	150	30	*	-
	NP	9,200	16,000,000	N.E.	730,000	180,000	38,000	*	***
MIDDLE 2	M&I	180	12,900	4,570	N.E.	N.E.	10	-	-
	CSO	1	5,300	100	1,500	220	50	*	**
	NP	6,000	16,000,000	N.E.	650,000	100,000	32,000	*	***
MIDDLE 3	M&I	70	3,580	1,100	1,930	N.E.	10	*	**
	CSO	400	1,800,000	32,000	510,000	72,000	16,000	*	**
	NP	2,600	9,400,000	N.E.	360,000	42,000	17,000	*	***
LOWER 1	M&I	0	0	0	0	0	0	-	-
	CSO	0	0	0	0	0	0	-	-
	NP	5,900	9,600,000	N.E.	520,000	160,000	28,000	*	***
LOWER 2	M&I	470	40,100	9,000	8,530	N.E.	430	*	**
	CSO	600	1,300,000	48,000	560,000	52,000	21,000	*	**
	NP	7,200	19,000,000	N.E.	840,000	180,000	43,000	*	***
TOTAL BASIN[6]	M&I	190,000	7,120,000	3,000,000	1,900,000	N.E.	101,000	*	**
	CSO	7,800	13,000,000	14,000,000	5,500,000	570,000	240,000	*	**
	NP	59,000	150,000,000	N.E.	6,400,000	1,100,000	320,000	*	***

Limitations of Estimates:

The estimates reported above most likely vary widely in their precision and accuracy. Due to these unquantifiable limitations, only qualitative comparisons can be made from the table.

Source: SEMCOG, 1988.

PART 6 - DATA AND MONITORING NEEDS

PART 6 - DATA AND MONITORING NEEDS

Data Evaluation

A critical first step in formulating an effective Remedial Action Plan (RAP) for the Rouge River was to compile and evaluate all data which may be used to assess environmental conditions within the system. In working toward this goal, a comprehensive review of approximately 200 documents having potential relevance to the Rouge River was undertaken. Each source document was screened for data descriptive of water quality, sediments, biology, and pollution sources. Emphasis was directed toward characterizing the overall strengths and weaknesses of the available data based upon several criteria, including the number and types of parameters measured, the number of observations for each parameter, the spatial distribution of observations within the 11 major subbasins, and the temporal distribution of data (i.e., the degree to which data reflects current conditions).

The data compiled from intensive review of available documents was evaluated from the standpoint of its potential value or relevance for the examination of designated use impairments within each subbasin of the Rouge River. In all cases data relevance or "goodness" was based on subjective analysis of descriptions given in source documents from which the data was obtained. Particular emphasis was given to identification and compilation of data generated by highly-qualified agencies and organizations known for their experience and expertise in data acquisition and/or management systems, including monitoring programs, sampling techniques, and analytical laboratory methods. It is therefore assumed that the priority data identified from this study has been subjected to standard, state-of-the-art quality assurance/quality control protocols through the originating agencies or organizations.

The status of essential data for characterizing water quality in each of the 11 major subbasins is summarized in Figure I-24. Four major categories have been defined to represent the general suitability of data for water quality assessments in a given subbasin. A description of each category is given below:

Category 1: Insufficient data for meaningful water quality evaluation or comparison with conditions in other subbasins; data base outdated and/or limited observations.

Category 2: Weak overall data base; insufficient for detailed water quality assessment or rigorous analysis of use impairments; sufficient for general comparison with conditions in other subbasins and limited evaluation of use impairment.

Category 3: Relatively strong data base; at least some recent data at one or more stations for key parameters; sufficient for limited evaluation of use impairments and general comparison with conditions in other subbasins.

FIGURE I-24

ROUGE RIVER DATA REVIEW AND EVALUATION RESULTS

Subbasin	GENERAL CLASSIFICATIONS OF ROUGE RIVER DATA									
	Water Quality		Sediments		Discharges			Biota		
	Conventional*	Toxics*	Conventional**	Toxics	Point	Nonpoint	CSOs	Fish/Wildlife***	Benthic***	Algae/ Macrophytes
Main-1	■	◨	◨	◨	■	□	□	◨	■	◨
Main-2	■	◨	◨	◨	■	□	◨	◨	■	□
Main-3	■	◨	◨	◨	■	□	□	◨	■	□
Main-4	■	■	◨	■	■	□	■	◨	■	□
Upper-1	■	◨	◨	◨	NA	□	◫	◨	■	◨
Upper-2	■	■	◨	◨	■	□	◫	◨	■	◨
Middle-1	■	◨	◨	◨	■	□	□	◨	■	◨
Middle-2	■	◨	◨	◨	■	□	□	◨	■	◨
Middle-3	■	◨	◨	◨	■	□	◫	◨	■	◨
Lower-1	■	◨	◨	◨	NA	□	NA	◨	■	◨
Lower-2	◨	◨	◨	◨	■	◨	□	◨	■	◨

□ Insufficient data(Category 1)

◫ Weak overall data(Category 2)

◨ Relatively strong data(Category 3)

■ Strong data(Category 4)

NA Not Applicable

Source: SEMCOG, 1988; updated, based on Wayne State University, 1987b.

* Updated from Wayne State University, 1987b, based on recently collected fixed station monitoring data.

** Updated from Wayne State University, 1987b, based on MDNR 1987 Sediment Quality Report.

*** Updated from Wayne State University, 1987b, based on MDNR 1988 biological survey.

Category 4: Strong data base; extensive recent data at several locations for key parameters; sufficient for detailed evaluation of use impairments and comparison with conditions in other subbasins.

Inspection of the results of the evaluation presented in Figure I-24 reveals the relative strengths and weaknesses of available data, as well as general types of information for each subbasin where the data base exhibits gaps.

Water quality data are strong to relatively strong for most subbasins. As expected, information on conventional pollutants is more extensive than that for toxicants.

In terms of important findings, available data on sediment contamination levels in all subbasins are relatively strong (Category 3) for all subbasins except Main-4. In this latter case the sediment data base is strong, particularly for toxic contaminant levels.

Information on pollutant contributions attributable to combined sewer overflows is either insufficient or weak in terms of its application in water quality of designated use assessments. Only the Main-4 subbasin has a relatively strong data base for quantifying pollutant contributions from combined sewer overflows. A strong data base exists for pollutant contributions from point sources. However, in most subbasins insufficient data exists for nonpoint source contributions.

Finally, descriptive biological data which characterize environmental conditions within the major subbasins are generally limited to that collected by the MDNR during its 1973 biological investigation of the Rouge River and the results of the 1986 biological survey. The resulting information base has been characterized as strong because of the recent update of data. The sampling program which generated the data was extremely comprehensive in terms of spatial distribution within the Rouge system.

A detailed description of the overall data review and assessment undertaken for the Rouge River RAP process is presented in Appendices G.2 and G.3. Potential users of either the raw data or the cumulative data evaluation results should be aware that some sources of new data had not yet been released at the time this review/evaluation was conducted. Recent data resulting from sampling of bacteria levels, sediment, biota, as well as dry and wet weather water quality surveys, may have become available since the writing of this report.

Monitoring Needs

Table I-6 presents a summary of the Rouge River monitoring needs that have been identified during RAP development. The recommended studies will follow up on problems found by 1986 and 1987 monitoring activities. The fixed station monitoring program is recommended to continue until 2005 to provide a baseline on ambient water quality conditions throughout the Rouge system. Event response surveys will provide a better understanding of stream conditions during storm or snowmelt events.

TABLE I-6

SUMMARY OF ROUGE RIVER MONITORING NEEDS

AGENCY	MONITORING ACTIVITY	AREA COVERED	TIMING
MDNR,WCHD, DWSD	Fixed Station Monitoring • Sample Collection • Analysis	Basinwide, 22 Stations	1988-2005
MDNR,WCHD	Event Response Surveys • Sample Collection • Analysis	All Subbasins	1988-1990
MDNR	Intensive Surveys	Evans Creek; Middle Branch; Lower Branch	1988-1989
LM,I,MDNR	Point Source Monitoring	CSO Outfalls; Direct Dischargers	1988-1991
DWSD	Industrial Source Monitoring	Significant Industrial Users	1988-
DWSD	Sewer Network Monitoring	DWSD Collection System	1988-

NOTES: MDNR = Michigan Department of Natural Resources
WCHD = Wayne County Health Department
DWSD = Detroit Water and Sewerage Department
LM = Local Municipality
I = Industry

Source: SEMCOG, 1988.

The intensive surveys and monitoring of specific pollutant sources are directed at more specific problem identification. Where problems are found, specific corrective measures can be developed.

The Rouge River Remedial Action Plan focuses on stream quality problems in the Rouge River. Efforts should be made to work cooperatively with the Detroit River remedial planning effort to ensure a coordinated approach to determining the impact the Rouge River has on the Detroit River and Lake Erie. If an impact is documented through the Detroit River planning effort, surveys should be undertaken to determine the nature, extent, and sources of the problems impacting the Detroit River and/or Lake Erie.

PART 7 - INSTITUTIONS AND FINANCING

PART 7 - INSTITUTIONS AND FINANCING

Introduction

The following section describes the institutional and financial analysis that was undertaken during development of the Remedial Action Plan (RAP). This analysis was conducted for the purpose of providing cost estimates that could be used during the RAP process to determine the potential financial impact of recommended projects on basin communities. It must be emphasized that the cost estimates, allocation methods, and financing strategies contained in this report are for planning purposes only and are not being recommended for implementation as presented here. The individual community costs may vary depending upon allocation method, construction design, and institutional arrangements. Further consideration needs to be given to these issues before specific recommendations can be developed.

Certain assumptions which may no longer be valid were used in developing the cost information contained in this report. While the costs shown in the tables may not be precise they represent the magnitude of cost changes associated with different levels of CSO abatement. These assumptions included:

- All costs of RAP implementation would be borne at the local level.

  (No longer valid - federal construction grant funds for North Huron Valley-Rouge Valley, Evergreen Farmington, and Pump Station 2A have been made available, State Revolving Fund loans may be available for CSO projects.)

- All costs would be incurred in year 1 and financed over 20 years at 8% interest, having the effect of doubling costs to local communities.

  (No longer valid - federal grants have been made available, state low interest loans may be available, and other funding sources may be available that could reduce financing costs, and projects might be phased in over a number of years - all possibly reducing the initial capital outlay requirements on some communities.)

- Cost allocations between communities for CSO projects are based upon contribution of flow.

  (May not be valid - specific allocation scheme yet to be determined, this method used only as means of estimating <u>possible</u> impact on individual communities.)

- Level of CSO control would range from 20-30% (Level I) to 90-95% (Level III) volume reduction with treatment of all other discharges.

  (No longer valid - through the RAP process it was determined that volume reduction was not practicable. Recommended CSO control is based upon capture and treatment, then release to steam, of all CSO discharges and limited re-introduction of flows to the level of control recommended by the RAP is less than that identified as Level I.)

Background and Methodology

The initial phases of RAP development indicated that there would be very large costs required to implement the Remedial Action Plan. To address this issue, the Rouge River Basin Committee and Executive Steering Committee directed that a financing strategy be incorporated to the plan. Accordingly, the city of Detroit, Wayne County, Oakland County, MDNR, the Metropolitan Affairs Corporation, and SEMCOG each contributed funding towards development of a financing strategy.

This part of the Executive Summary describes the methodology used in strategy development, summarizes the community cost and funding data, presents findings, and discusses the four financing scenarios that were considered. The financing strategy recommendations are presented in Part 3 of this Executive Summary. Chapter X-Section I of the full Remedial Action Plan is the complete financing strategy. Appendix I.3 contains the consultant's report.

SEMCOG staff took the lead project role and the firm of Plante & Moran was retained to assist in strategy development. An Infrastructure Financing Committee was organized to oversee the project and provide additional expertise to project staff.

A major part of this effort consisted of identifying and evaluating various sources of funding to implement remedial actions. The Infrastructure Committee met monthly to consider the results of this work and to formulate a recommended course of action. The project consisted of five major steps:

1. A review of state and federal funding sources,

2. A review of local funding sources,

3. A review of unconventional funding sources including:

   - special districts,
   - the private sector, and
   - foundations,

4. Interviews with local elected officials and leaders, and

5. Development of the recommended financing strategy.

Concurrent with this effort, SEMCOG and the consulting firm Wade-Trim/Associates developed estimates of project costs. These cost estimates were developed for the following categories of remedial actions:

- Improvements to separate sanitary sewer systems,
- Control of combined sewer overflows,
- Nonpoint source control measures,
- Streamflow enhancement (e.g., log jam removal),
- Continued planning, and
- Monitoring,

As the study on financing was proceeding, a determination as to an appropriate level of CSO control had not been made. Therefore, cost estimates for each of the three CSO control strategies considered were used in the analytical stage of the financing study.

These estimates were considered 'capital' costs which would need financing. After Plante & Moran estimated the costs of financing, these amounts were added to the capital expenses. Operations and maintenance costs were estimated for separate sanitary sewer projects and for the CSO control alternatives. Adding these costs to the annual cost of the financed capital costs gave the complete planning estimates of funding that would be required during RAP implementation.

Once these costs were estimated, an appropriate methodology for distributing them to the various communities in the basin had to be developed. The Infrastructure Financing Committee debated this issue extensively, considering several options such as area within the basin, population, households, etc. The committee determined that costs should be allocated on the principle of causality, i.e., contributors to a problem should pay the cost of remediation. This causality philosophy was implemented as follows:

- For CSOs, costs were allocated based on a community's proportional contribution of flow to control facilities.

- For improvements to separate sanitary sewer systems, allocation was based on estimates of a community's proportional share of project cost. (Note that while community proportions may differ when project designs are final, these differences are within reason given the scope of this study. They are not expected to alter the conclusions and recommendations.) For purposes of this analysis, it was assumed that the full cost of these projects would be paid from local sources.

- Other costs (nonpoint, streamflow enhancement, etc.) were allocated based on a community's proportion of population in the basin.

It should be noted that all the cost data used in developing the financing strategy e.g., capital costs, planning costs, financing costs, etc., are estimates. They should not be regarded as a community's actual share for implementing the plan. These estimates and the distribution of costs were used as tools in the planning process of developing a financing strategy. The picture provided by viewing the magnitude and distribution of these costs was a crucial ingredient in the analytical phase of financing strategy development.

These annual cost estimates and their distribution are displayed in Table I-7. There are three cost estimates for each community reflecting the three different levels of control that were being evaluated in the CSO studies. Thus, the three estimates differ only by the incremental costs associated with the different levels of CSO control.

As one step in the planning and analysis process, the question "What if the entire cost of implementing remedial measures were paid from local sources?" was addressed. The answer to this question for the scenario including the least costly CSO control alternative is shown in Table I-8. For each community, the table depicts the percentage increase in water and sewer rates that would be needed to generate sufficient reserve to pay the annual local share of costs. Similarly, the table shows the millage increase needed to raise this revenue if property taxes were the chosen funding mechanism. For example, an estimated annual amount of $10,000 could be generated by a 1.3 percent increase in water and sewer rates or a 0.05 increase in millage.

Sixty-five to 75 percent of these costs are associated with projects related to control of combined sewer overflow (Figure I-25). Assuming implementation of a strategy to reduce combined sewer overflow volumes by approximately 20 - 30 percent (Level I) at each overflow point, annual community costs per capita range from $0.07 to $417. Based on total population of communities in the basin, average annual cost per capita would be $35.

Note that these costs are planning estimates developed for the RAP. Actual costs may differ, depending on local planning. For example, Table I-8 indicates that Farmington's cost to meet the RAP's CSO objective by partially separating its sewers rather than building treatment basins would be $5.98 million, rather than $46.25 million.

Findings

The following findings summarized the information collected in the examination of state and federal funding sources, local funding sources, unconventional funding sources, and interviews with key municipal officials.

Cost of Implementation. The evaluation of RAP costs showed that the most expensive remedial measures are for control of combined sewer overflows. Even when stretched over 20 years, the total costs for implementing the RAP are extraordinary.

1. Based on the recommendations of the RAP, estimated 20-year capital costs for implementing the Rouge River Remedial Action Plan are estimated at approximately $900,000,000. The cost of financing results in an approximate doubling of these capital cost estimates.

2. Total annual costs, including financing, of the alternatives evaluated range from $92,000,000 to $131,000,000. Technical recommendations relating to certain remedial measures for the Rouge (e.g., stormwater management and potential additional improvements at the Detroit Wastewater Treatment Plant) are not possible at this time. Therefore, costs for these projects are not included in these figures.

TABLE I-7

ESTIMATED TOTAL ANNUALIZED FUNDING TO IMPLEMENT THE RAP[1]

COMMUNITY	Level of CSO Control[2] LEVEL 1	LEVEL 2	LEVEL 3
OAKLAND COUNTY			
Auburn Hills	$ 10,000	$ 10,000	$ 10,000
Beverly Hills	1,161,000	1,261,000	1,516,000
Bingham Farms	32,000	32,000	32,000
Birmingham	2,737,000	3,053,000	3,707,000
Bloomfield Hills	318,000	338,000	388,000
Bloomfield Twp.	3,696,000	3,944,000	4,573,000
Commerce Twp. *	0	0	0
Farmington	4,879,000	5,249,000	6,353,000
Farmington Hills	2,091,000	2,091,000	2,091,000
Franklin	272,000	272,000	272,000
Lathrup Village	150,000	150,000	150,000
Lyon Twp. *	0	0	0
Novi	637,000	775,000	1,015,000
Novi Twp.	1,000	1,000	1,000
Oak Park	1,000	1,000	1,000
Orchard Lake Vil. *	0	0	0
Pontiac	1,000	1,000	1,000
Rochester Hills	12,000	12,000	12,000
Southfield	2,122,000	2,122,000	2,122,000
Southfield Twp. ***	0	0	0
Troy	326,000	326,000	326,000
Walled Lake	156,000	156,000	156,000
W. Bloomfield Twp.	829,000	829,000	829,000
Wixom	5,000	5,000	5,000
TOTAL OAKLAND COUNTY	$19,437,000	$20,629,000	$23,559,000

NOTES:

1. Costs include separate sanitary sewer improvement projects, improper connections to storm drains program, planning for log jam removal, monitoring, CSO control including operation and maintenance, and financing charges.
2. Level 1 - Would result in an approximate 20-30% reduction in CSO volume.
   Level 2 - Would result in an approximate 65-75% reduction in CSO volume.
   Level 3 - Would result in an approximate 90-95% reduction in CSO volume.
3. All estimates and allocations of costs represented in this table are for planning purposes only and do not necessarily reflect the individual community costs associated with RAP implementation. The actual costs to community will depend upon many factors, including engineering and construction design and cost allocation method selected.

* 20 year funding requirements less than $5,000, result of rounding is 0.
*** Community is comprised of other communities on list.

TABLE I-7 (continued)

COMMUNITY	Level of CSO Control[2] LEVEL 1	LEVEL 2	LEVEL 3
WAYNE COUNTY			
Allen Park	$ 22,000	$ 32,000	$ 49,000
Canton Twp.	3,102,000	3,302,000	3,649,000
Dearborn	5,325,000	9,280,000	13,736,000
Dearborn Heights	4,153,000	5,257,000	6,384,000
Detroit	40,394,000	42,360,000	49,030,000
Ecorse	1,000	1,000	1,000
Garden City	1,866,000	2,907,000	3,891,000
Highland Park	107,000	107,000	107,000
Inkster	2,335,000	3,411,000	4,389,000
Livonia	3,666,000	4,276,000	5,182,000
Melvindale	111,000	150,000	220,000
Northville	174,000	199,000	241,000
Northville Twp.	719,000	790,000	912,000
Plymouth	284,000	336,000	424,000
Plymouth Twp.	2,146,000	2,360,000	2,664,000
Redford Twp.	3,841,000	6,158,000	8,155,000
River Rouge	391,000	801,000	1,084,000
Romulus	191,000	305,000	503,000
Van Buren Twp.	302,000	393,000	552,000
Wayne	906,000	1,180,000	1,482,000
Westland	2,856,000	3,605,000	4,584,000
TOTAL WAYNE COUNTY	$72,893,000	$87,211,000	$107,240,000
WASHTENAW COUNTY			
Salem Twp.	$ 4,000	$ 4,000	$4,000
Superior Twp.	16,000	16,000	16,000
Ypsilanti	10,000	10,000	10,000
TOTAL WASHTENAW COUNTY	$30,000	$30,000	$30,000

Source: SEMCOG, 1988

TABLE I-8

INCREASES IN LOCAL REVENUE SOURCES
NEEDED TO MATCH LEVEL 1 COSTS[1]

COMMUNITY	ANNUAL LEVEL 1 COSTS	PROPERTY TAXES (MILS)	WATER & SEWER USAGE (PERCENT)
OAKLAND COUNTY			
Auburn Hills	$ 10,000	0.05	1.3
Beverly Hills	1,161,000	5.61	150.6
Bingham Farms	32,000	0.37	126.6
Birmingham	2,737,000	5.19	188.6
Bloomfield Hills	318,000	1.20	172.3
Bloomfield Twp.	3,696,000	3.16	114.1
Commerce Twp. *	0	0.00	0.0
Farmington	4,879,000	27.88 **	1059.6
Farmington Hills	2,091,000	1.67	58.8
Franklin	272,000	3.53	0.0
Lathrup Village	150,000	2.06	49.5
Lyon Twp. *	0	0.00	0.0
Novi	637,000	1.23	27.4
Novi Twp.	1,000	0.19	4.5
Oak Park	1,000	0.00	0.1
Orchard Lake Vil. *	0	0.00	0.0
Pontiac	1,000	0.00	0.0
Rochester Hills	12,000	0.01	0.0
Southfield	2,122,000	1.30 **	36.4
Southfield Twp. ***	0	0.00	0.0
Troy	326,000	0.18	7.4
Walled Lake	156,000	2.48	60.8
W. Bloomfield Twp.	829,000	0.84 **	21.6
Wixom	5,000	0.03	0.7
TOTAL OAKLAND COUNTY	$19,437,000		

1. Assumes all revenue must come from local sources.

2. Level 1 - Would result in an approximate 20-30% reduction in combined sewer overflow volume.

* 20 year funding requirements less than $5,000, result of rounding is 0.

** These communities are not able to increase operating mills by this amount due to imposed operating mill limitations (50 mills).

*** Community is comprised of others on list.

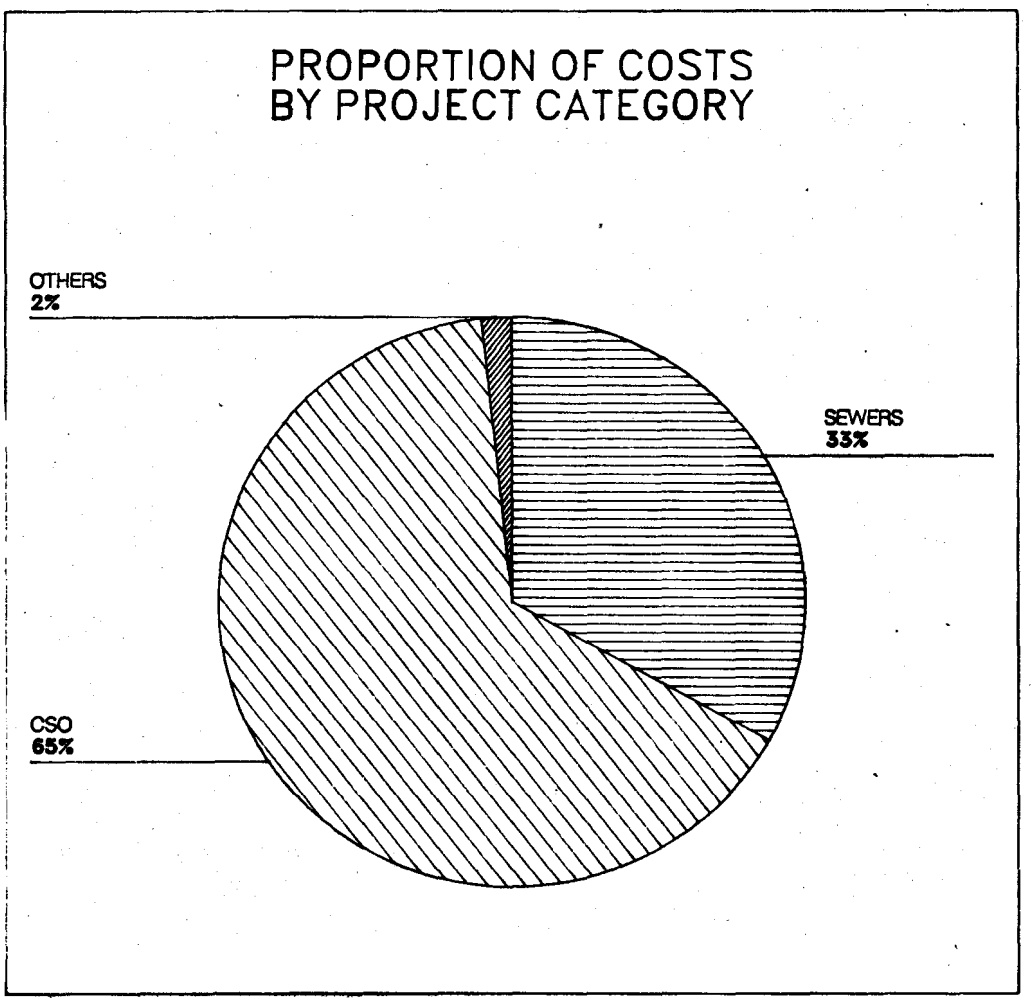
TABLE I-8 (continued)

INCREASES IN LOCAL REVENUE SOURCES
NEEDED TO MATCH LEVEL 1 COSTS[1]

COMMUNITY	ANNUAL LEVEL 1 COSTS	PROPERTY TAXES (MILS)	WATER & SEWER USAGE (PERCENT)
WAYNE COUNTY			
Allen Park	$ 22,000	0.06	1.2
Canton Twp.	3,102,000	5.78 **	83.5
Dearborn	5,325,000	2.89 **	104.7
Dearborn Heights	4,153,000	6.90 **	95.6
Detroit	40,394,000	7.71 **	74.8
Ecorse	1,000	0.00 **	0.4
Garden City	1,866,000	7.18	108.9
Highland Park	107,000	0.62 **	4.6
Inkster	2,335,000	13.90 **	79.4
Livonia	3,666,000	2.20 **	78.0
Melvindale	111,000	1.02	11.6
Northville	174,000	3.56	62.5
Northville Twp.	719,000	3.44	81.6
Plymouth	284,000	1.96	23.2
Plymouth Twp.	2,146,000	5.45 **	167.0
Redford Twp.	3,841,000	6.28 **	87.8
River Rouge	391,000	1.84	12.3
Romulus	191,000	0.59 **	13.8
Van Buren Twp.	302,000	1.39 **	14.2
Wayne	906,000	3.79 **	69.1
Westland	2,856,000	4.33 **	51.3
TOTAL WAYNE COUNTY	$72,893,000		
WASHTENAW COUNTY			
Salem Twp.	$ 4,000	0.06	0.0
Superior Twp.	16,000	0.14	2.1
Ypsilanti	10,000	0.02	0.2
TOTAL WASHTENAW COUNTY	$30,000		

Source: SEMCOG, 1988

FIGURE I-25



Notes:

1. "Others" includes monitoring activities, special studies, further planning, programs to remove improper connections to storm drains, public education, etc.

2. CSO costs are for Level I control, which would reduce the volumes of CSO discharged by 20-30 percent.

Source: SEMCOG, 1988

3. Approximately 35 percent of the RAP costs are related to implementation of sanitary sewage transport and treatment projects. Certain of these projects are likely to receive federal support under the construction grants program before it expires. This would reduce the costs of those projects by about 50 percent.

4. Project costs are certain to be different when actual project designs are complete. Annual costs could be more acceptable if consideration is given to affordability and scheduling of implementation.

Federal Funding. The evaluation of potential federal funding sources showed that available support from various programs continues to decline while the basic pollution control requirements in the Clean Water Act remain intact. This is resulting in an increasing burden on state and local governments to pay the cost of compliance.

1. Dollar resources available from the federal government for water pollution control programs are declining. This decline is consistent across virtually all programs investigated and is most evident in the decision by Congress to eliminate the construction grants program after 1990. Federal funding support for combined sewer overflow control has been statutorily eliminated.

2. Based on an assessment of existing programs, federal funding levels will not be sufficient to match needs for implementing remedial action measures to clean up the Rouge River. Average annual expenditures under the grants program since 1972 have been $160,000,000. Of this, approximately 33 percent has been used in southeast Michigan, only a portion of which has been used in the Rouge Basin. This compares to critical and essential needs for wastewater treatment that are estimated to cost over 3 billion dollars statewide.

   Some exceptions are for projects that may receive funding via the construction grants program before it expires. These projects would provide some incremental progress in achieving the goals for the Remedial Action Plan. They include the Evergreen-Farmington improvements, the First-Hamilton Relief Outlet, the North Huron Valley-Rouge Valley Interceptor, and Pump Station 2A in the city of Detroit. If approved, federal funding support for these projects totals almost $133,000,000.

3. New federal funding programs to support large scale water pollution control efforts throughout the United States are unlikely, especially in light of the federal budget deficit and the national debt. However, if implementation of a program is to meet the eventual goal of water quality standards, additional federal funds for this high priority area will be needed.

4. As a consequence of reduced federal funding, state and local governments are having to assume more of the costs for pollution control.

State Funding. The evaluation of state funding sources showed that despite these federal cutbacks, increases in state funding are not forthcoming.

1. Currently, 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. At this time legislation is being drafted to institute a State Revolving Fund (SRF). Based on current proposals for establishing an SRF program in Michigan, funding will be inadequate to meet all of the projected statewide needs for wastewater treatment facilities.

   The present SRF legislation consists of a 10 year program with revenue generation of about 1 billion dollars. It is estimated that the annual benefit of this program for the RAP could be about $3,000,000. Competition for these resources would be extensive as there are many other water pollution control projects for which funding is being sought.

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 for such programs.

3. As of writing this report, new revenue-generating programs including an environmental bond proposal are under consideration. Funds from this program are a potential source of revenue to pay some of the costs associated with implementing the RAP.

Local Funding. The evaluation of local funding sources showed that the communities could not pay for implementing the entire RAP with their own resources. The distribution of costs for implementing the RAP varies extensively across the basin.

1. The adequacy of the four local revenue sources examined (property taxes, water and sewer hook-up fees, special assessments, and rate increases) varies extensively between communities. For example, the Level 1 alternative financed with property taxes would require less than a one mil increase for 24 of the communities in the basin, but over a four mil increase for 12 other communities in the basin.

2. No single local revenue source would be appropriate for use in all communities to finance implementation of the Remedial Action Plan.

3. Twenty-seven communities in the basin could finance a RAP that includes a Level 1 strategy with less than a 50 percent increase in water and sewer rates.

4. Implementation of other remedial action plans (e.g., Detroit River, St. Clair River, Clinton River) will affect the ability of communities to generate revenue for the Rouge.

5. A substantial level of state and/or federal funding support is needed if the RAP is to be successfully implemented. This is especially critical for remedial actions that include controls for combined sewer overflows.

Unconventional Funding. Plante & Moran's evaluation of unconventional funding found that private sector and foundation sources would not contribute significantly to needed revenue. Unconventional sources such as special districts should be viewed as a mechanism to raise revenue, not an additional source of revenue.

1. Neither the Headlee tax limits nor 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 ad valorum (i.e., based upon property values) - but, must be based upon benefit.

4. Voluntary special assessments may be assessed by each individual community for a portion of the community's property owners. Based upon Plante & Moran's analysis, it is very unlikely that all basin communities will voluntarily meet their funding requirements.

5. Statutes which precede the Headlee amendment and which have not been amended are not subject to the Headlee amendment. Such is the case for the Drain Code.

6. A drainage district may be created by having at least two corporations (or communities) petition the State Department of Agriculture to form a district. Other corporations (or communities) may be added non-voluntarily to this group.

7. The Drain Code provides a mechanism for drainage districts to levy a mandatory tax. This tax is not a special assessment, but rather an unlimited obligation of the community. Communities are free to raise these funds in any manner they wish.

8. The federal courts (Judge Feikens) 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 would not be a constraint.

9. A drainage district may receive taxing authority in one of two ways:

   A. The drainage board, by a 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.

10. Court ordered taxes could raise the needed funding on a nonvoluntary basis. It is unclear, however, whether the courts have the authority to exceed Headlee or charter tax limits.

11. The Legislature may levy a mandatory tax by creating a taxing authority. This authority would not, however, be able to levy taxes which exceed charter or Headlee tax limits. The legislature could provide the authority for individual cities, villages, and charter townships (but not townships or counties) to levy taxes in excess of the charter tax limits by creating a special millage provision earmarked for this purpose.

12. Potential funding through non-governmental sources (foundations and the private sector) is estimated to be negligible relative to total RAP funding requirements, and such sources could not reasonably be expected to meaningfully contribute to RAP funding requirements.

Findings from Interviews with Community Leaders. Staff and consultants interviewed leaders from several communities. Based on these interviews local government officials will be concerned with not just the relatively high cost of RAP implementation, but also with the competition for resources with other programs.

1. Continued public information and education efforts are critical to securing necessary financial commitments for implementing the RAP. Rouge problems must be explained to at least two target groups:

    a) local elected officials and administrators, and
    b) the community at large.

2. Based on interviews with community leaders, local officials must be shown that recommended remedial actions are necessary, reasonable, and that cost allocations are equitable.

3. There are a number of mandated programs on the agenda of local governments competing with Rouge restoration for financial resources. Some examples include solid waste disposal, road improvements and maintenance, and other water pollution control projects. In many cases, these are perceived as higher priority.

4. State and federal funding support for implementing the RAP would increase the likelihood of support from communities in the basin.

General Finding. Based on requirements in the federal Clean Water Act and the Michigan Water Quality Standards, it is mandatory that progress be made in reducing the impacts of sewage discharges to the Rouge River. The alternatives to choose from do not include deciding whether or not to proceed. Rather, they consist of determining what is to be done, how it will be financed, and over what time period.

Alternate Scenarios for a Financing Strategy

To help assess alternative financing strategies and to provide guidance in selecting recommendations, the Infrastructure Financing Committee considered a set of alternative scenarios. Each scenario is outlined in the following format.

A. Mechanisms What mechanisms are needed to implement a scenario?

B. Perceptions What are the perceptions of the issues for those who identify with a scenario?

C. Pros/Cons What are the pros and cons of pursuing a strategy under a scenario?

Scenario I. Use the Existing Institutional Framework

Using this approach, remedial actions would be implemented within the 'traditional' institutional framework. Projects would be planned, designed, and constructed using traditional mechanisms such as contracts between county DPWs and several communities.

A. Mechanisms. The following mechanisms would be used in implementing a program based on this scenario.

1. Maximize funding from existing programs. Revenue from existing programs should be secured for projects in the Remedial Action Plan. Most significant is the need to obtain federal construction grants for those separate sanitary projects ready to proceed before federal funding expires.

2. Require projects using the permit program. MDNR would reissue permits for CSOs in two phases. In the first phase, permits would be reissued and address such issues as establishing an operations and maintenance manager, inventory tributary systems, monitoring of overflow events, etc.

   Once CSO control goals are established by an adopted RAP, they would serve as the foundation for site-specific planning for Phase II construction of control facilities. The planning requirements would be incorporated in reissued permits.

3. Incorporate flexibility to the permitting process. The permit process would provide for flexibility in two ways. First, alternative designs, control strategies, etc. that are consistent with the adopted CSO control goals would be deemed acceptable.

   Second, final project scheduling would vary based in part on an affordability analysis. The document "A Guidebook for Evaluating the Affordability of Wastewater Treatment System Improvements" would be used as a mechanism for assessing the fiscal constraints of alternatives considered.

B. Perception. This scenario would be favorable to those who have the following perceptions of the financing issues:

- Implementation of the Remedial Action Plan will be required.
- Local governments cannot bear the entire share of remedial action costs.
- Any deviation from the existing institutional framework would be politically unacceptable.
- Levels of state and federal funding support are uncertain, and
- Flexibility in design and timing of projects is needed based on financial capability.

C. Pros and Cons. Some of the pros and cons of pursuing a financing strategy based on this scenario are:

Pros	Cons
1. Would provide for incremental progress in addressing a complex, expensive problem.	1. May be perceived as inadequate because the river has deteriorated within the existing institutional framework.
2. Would be more fiscally prudent and politically acceptable because of flexibility in permitting, project scheduling, etc.	2. May result in gaps during implementation phase so that watershed management approach is complete.
3. Provides for more cost efficient, creative local solutions.	3. Non-traditional sources (e.g., nonpoint,) won't be addressed as easily.
4. More politically acceptable because new institutional arrangements are not needed.	4. Process is very time consuming.
5. Decisions on how to pay would be local and could be based on popular votes.	

Scenario II: Use the Existing Institutional Framework; Establish a Special Drainage District for Traditionally Uncontrolled Sources of Pollution.

This scenario is similar to number I except that a special drainage district would be formed and used to fund and manage control of pollution from nontraditional sources such as nonpoint, illegal connections; and to fund improvements such as stream flow enhancement and log jam removal. The district would be structured so that other types of projects could be funded if desired by a community or group of communities.

A. Mechanisms. The following mechanisms would be used in implementing a program based on this scenario.

1-3. These would be the same mechanisms as described in Scenario I.

4. Establish a special drainage district. Using existing enabling legislation under the Drain Code, establish a special drainage district to collect revenues to pay for nontraditional pollutant sources such as nonpoint sources, illegal connections, and other improvements such as log jam removal.

B. Perceptions. This scenario would be favorable to those that have the following perceptions of the financing issues:

- Implementation of the Remedial Action Plan will be required.
- Local governments cannot bear the entire share of remedial action costs.
- Extensive deviation from the existing institutional framework would be politically unacceptable.
- Levels of state and federal funding support are uncertain.
- Flexibility in design and timing of projects is needed to achieve financial capability.
- Paying for cleanup of unconventional sources will not be accomplished within the existing institutional framework.

C. Pros and Cons. Some of the pros and cons of pursuing a financing strategy based on this scenario are listed.

Pros	Cons
1. Would provide for incremental progress in addressing a complex, expensive problem.	1. May be perceived as inadequate because river has deteriorated within the existing institutional framework.
2. Would be more fiscally prudent and politically acceptable because of flexibility in permitting, project scheduling, etc.	2. May result in gaps during implementation phase so that watershed management approach is incomplete.
3. Provides for more cost efficient, creative local solutions.	Won't meet water quality standards (this is true of all scenarios).
4. Works with existing enabling legislation for establishing special district.	4. Will be politically unacceptable because of resistance to establishing a special district.

Pros	Cons
5. Provides a mechanism to pay for nontraditional pollution sources and improvements.	
6. Special district provides continuing visibility for Rouge cleanup effort.	
7. Special district could be designed and used as funding mechanism for other RAP projects based on local prerogatives.	
8. Decisions on how to pay would be local and could be based on popular votes.	

Scenario III: Establish a Special Drainage District to Cover Full Plan Implementation; Spread Costs for Hardest Hit Communities.

This would be an extension of Scenario II in that all remedial measures would be addressed under a special district. Also, the causality basis for allocating costs would be compromised in order to more evenly distribute the funding burden.

A. Mechanisms. The following mechanisms would be used in pursuing a program based on this scenario.

1. Maximize funding from existing programs. Revenue from existing programs should be secured for projects in the Remedial Action Plan. Most significant is the need to obtain federal construction grants before funding expires for those separate sanitary projects ready to proceed.

2. Form a drainage district. A drainage district would be formed in one of several ways. Plante & Moran recommends such a district be formed by having the Water Resources Commission petition the Department of Agriculture.

3. Provide the drainage district with taxing authority. (Although Plante & Moran used the term "taxing authority", the drainage board would actually have the power to assess an obligation.) A drainage district would be provided with taxing authority to raise revenues to implement various aspects of the Remedial Action Plan. Plante & Moran proposes establishing a minimum millage for all communities in the basin. In addition, a maximum millage would be developed so that there would be a limitation on each community's cost. Any shortage of revenue that arises because of this maximum would be recovered by spreading those costs back among other communities.

4. Use the drainage district to fully implement all parts of the RAP.

B. Perception. This scenario would be favorable to those who have the following perceptions of the financing issues.

- The existing institutional framework will be inadequate to implement the RAP.
- Voluntary local action to implement remedial measures will not occur on any significant basis.
- There is a need to spread costs to lessen the economic burden on some communities.

C. Pros and Cons. Some of the pros and cons of pursuing a financing strategy based on this scenario are listed.

Pros	Cons
1. Cuts across institutional barriers (i.e., once established this mechanism would be utilized in fully implementing the Remedial Action Plan.)	1. Too specific a proposal given the limitations of the cost information data base.
2. Would not be perceived as a piecemeal approach.	2. Will be politically unacceptable because of inevitable confrontation in establishing a totally new institutional framework.
3. Would raise revenues sufficient to begin implementing key components of the Remedial Action Plan.	3. Is based on a property tax and will therefore receive heavy opposition.
	4. Capping costs for some communities and spreading that to others would be perceived as unfair.

Scenario IV. Base Implementation and Financing on a Popular Vote Using the Metropolitan District (Act 312, P.A. 1929)

In the course of discussions by the Infrastructure Financing Committee, it was suggested that a popular vote be structured so that the people can directly decide if they will pay, how much, and what source of funding would be used to implement the RAP. This could be accomplished using the Metropolitan District Act.

A. Mechanisms. The following mechanisms would be used in pursuing a program based on this scenario.

1. Incorporate metropolitan district. Implementing a program based on this scenario would require the incorporation of several cities, villages, and townships into a metropolitan district.

2. Popular vote. Each community's participation would be subject to a popular vote.

B. Perception. This scenario would be favorable to those who have the following perceptions of the financing issues.

- No financing strategy is acceptable unless it is based on a popular vote of the people.

C. Pros and Cons. Some of the pros and cons of pursuing a financing strategy based on this scenario are listed.

Pros	Cons
1. Lets the people decide.	1. Widespread support in the Basin for approval of a new "tax" and "government agency" is unlikely.
2. May be more politically acceptable.	2. The MDNR and the Water Resources Commission already have authority and responsibility to require implementation of certain remedial actions. Therefore, it would be poor public policy to ask the people to vote on implementation of a RAP designed, in part, to address pollution problems that are under the regulatory authority of the MDNR and WRC.
3. If accepted, would result in a supported institutional framework to raise revenues for the implementation of remedial actions.	3. Ironically, basing the financing strategy on the vote of the people could result in less local control over the final elements of the Remedial Action Plan. Emphasis on "the vote" could detract from efforts to make the plan more locally acceptable.
4. Is provided for in existing legislation.	

Recommended Financing Strategy

Based on an evaluation of the merits of the scenarios considered, the financing strategy recommended is Scenario II: Use the Existing Institutional Framework; Establish a Special Drainage District for Traditionally Uncontrolled Sources of Pollution.

The recommendations to implement this strategy are contained in Part 3. The financing strategy recommendations provide the advantages of the existing institutional framework and the innovation of a flexible new mechanism, a special drainage district. The strategy is designed to provide flexibility in project scheduling based on affordability and to maintain local governmental control in decisions regarding how to pay. This scenario is recommended for several reasons.

First, the implementation mechanisms are reasonable given the extent of the river's pollution problems and the magnitude of costs for implementing remedial actions. Paying for these costs without assistance or flexible scheduling is beyond the financial capability of many communities, yet, some mitigation of the discharges of raw sewage to the river is mandatory.

Second, the other alternatives are not as favorable. The existing institutional framework has not addressed certain types of pollution problems and should be supplemented with a mechanism flexible enough to accommodate any pollution control project. Using a special district to spread costs based on ability to pay and to cover all types of projects would likely be politically unacceptable. Basing a program totally on a popular vote would be poor public policy. Such a proposal creates the impression that the choice is whether or not to clean up the Rouge River. In fact, the public policy decision to pursue remedial action and protect public health has been made and is reflected in federal law, state law, and water quality standards. The real choices involve determining how to clean up, how fast, and how to pay.

Third, the proposed strategy is based on maximizing funds from existing programs while expanding funding sources and taking into account community financial capability. To deal with the affordability issue, the strategy recommends incorporating a community financial capability review into the project implementation phase.

Fourth, the strategy includes an institutional mechanism to pay for clean up of sources of pollution that would otherwise not be addressed. Further, the proposed mechanism could be used for implementing other parts of the RAP if desired by individual communities or groups of communities.

Finally, the strategy maintains local control over decisions about how to pay for clean up costs. Communities can determine how they wish to pay on a project-by-project basis, including deciding whether or not to place such decisions on a ballot for a vote of the people.

PART 8 - LIST OF FULL RAP CONTENTS AND APPENDICES

PART 8 - LIST OF FULL RAP CONTENTS AND APPENDICES

The full Rouge River Remedial Action Plan is published in several volumes, separate from this Executive Summary. Following is a listing of the RAP chapters and appendices:

Chapter I. Executive Summary

Chapter II. Introduction

Chapter III. Environmental Setting

Chapter IV. Problem Definition

Chapter V. Pollution Sources

Chapter VI. Pollutant Loadings

Chapter VII. Historial Record of Remedial Actions

Chapter VIII. Definition of Specific Goals, Objectives, and Milestones for Restoration

Chapter IX. Programs and Participants

Chapter X. Remedial Action Steps

- A. Sewer System Improvements-Separate Sanitary Sewers
- B. Combined Sewer Overflow Strategy
- C. Stormwater Runoff and Other Nonpoint Sources
- D. Municipal and Industrial Dischargers
- E. Sediments Strategy
- F. Resource Improvement Strategy
- G. Data Needs and Monitoring Strategy
- H. Public Education
- I. Institutions and Financing
- J. Toxics Strategy

Chapter XI. Bibliography

Chapter XII. Appendices

A. DWSD Flow Management Report
B. CSO Technical Appendix
C.1. Lower-2 Nonpoint Report
C.2. Storm Drains Listing
D. Reserved for Future Use
E. MDNR Sediment Evaluation
G.1. WSU Data Archive - Task 1 Report
G.2. WSU Data Assessment - Task 2 Report
G.3. WSU Data Appendices
G.4. LTI Subbasin Assessments Appendices
G.5. MDNR Estimated Rouge River Discharge and Exceedance Flows
G.6. MDNR Rouge River Quality Report for 1973 to 1986
G.7. WCHD Bacteriological Survey
G.8. Loadings Calculations Appendix
G.9. MDNR Monitoring Strategy for the Rouge River
G.10. MDNR Rouge River Fixed Station Monitoring Program, 1987
H. Rouge River Slide Show Script
I.1. WRC Oct. 1, 1985 Rouge Strategy
I.2. Rouge RAP Committee Lists
I.3. Financing Appendices

The sources of reports included in the appendices, other than SEMCOG are as follows:

WSU - Wayne State University

MDNR - Michigan Department of Natural Resources

LTI - Limno-Tech, Inc.

DWSD - Detroit Water and Sewerage Department

WCHD - Wayne County Health Department

CLYDE CLEVELAND
Chairperson
Councilman,
City of Detroit

GERALD M. McCAFFREY
First Vice Chairperson
Vice President,
Macomb Intermediate
Board of Education

MARTHA L. HOYER
Vice Chairperson
Council Member,
City of Novi

E.A. JACKSON MORRIS
Vice Chairperson
Supervisor,
Pittsfield Township

DENNIS M. RITTER
Vice Chairperson
Supervisor,
Waterford Township

RICHARD A RUDNICKI
Vice Chairperson
Drain Commissioner,
Livingston County

MILTON L. MACK JR.
Immediate Past
Chairperson
Commissioner,
Wayne County

JOHN M. AMBERGER
Executive Director

SEMCOG, the Southeast Michigan Council of Governments, is a voluntary association of governmental units in Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw and Wayne Counties. SEMCOG fosters intergovernmental cooperation by providing the public forum in which local elected officials may coordinate planning and decision making on issues which cross local jurisdictional boundaries.

SEMCOG's principal activity is planning, including adoption of region-wide plans and policies in the areas of transportation, community and economic development, water and air quality, solid waste disposal, sewage treatment, storm drainage and other environmental concerns as well as public safety and land use.

SEMCOG also maintains the region's most extensive data base for planning and for economic development work. It is a depository for all U.S. Census data as well as the great volume of data generated in various planning activities for more than 25 years.

All SEMCOG policy decisions are made by local elected officials. This insures that regional policies reflect the interests of member communities.

SEMCOG helps member communities conserve resources and save tax dollars by providing technical assistance, statistical data and policy direction. All cities, villages, townships, counties, intermediate school districts and community colleges in the seven-county region are eligible to join SEMCOG.

Three principal sources of revenue support SEMCOG programs: federal grants and contracts, state grants and membership fees.

SEMCOG has two policy-making bodies: the General Assembly and an Executive Committee. The General Assembly adopts the Council's annual budget and membership fee schedules; reviews and gives final approval to all regional plans; adopts and/or amends bylaws; and is, in essence, the membership's voice on regional issues and needs. Each member community is represented on the General Assembly. The Executive Committee is SEMCOG's chief "working committee" functioning on behalf of the General Assembly between its meetings. It serves as the financial control body for all budgeted items and other financial programs approved by the General Assembly. It proposes, discusses and reviews regional studies and plans and forwards its recommendations to the General Assembly for final action.

Printed at *SEMCOG* on recycled paper