

Chapter 8: Evaluation / Overview of Financing Mechanisms

8.1 Introduction

8.1.1 Background

The Stage II RAP outlines a comprehensive set of actions designed to address water quality problems in the Rochester Embayment watershed. In recognition of the limited resources available for water quality programming, both new and existing funding options must be explored. The objective of Chapter 8 is to outline these funding options so that a strategy for funding RAP implementation can be developed for Chapter 11 "Management of RAP Implementation". The following criteria may be useful in assessing the appropriateness of various financing mechanisms for funding RAP implementation.

- *Equity* - Is the funding burden fairly distributed? Ideally, environmental programs are designed so that the funding burden is distributed according to the contribution to environmental degradation ("polluter pays"), or according to the level of benefit derived from an enhanced environment ("beneficiary pays").
- *Impacts* - Does this funding mechanism create incentives for desirable behavior?
- *Political Acceptability* - Will the stakeholders support this type of funding mechanism or does it place an undue burden on taxpayers or stakeholders?
- *Revenue Potential* - Will this mechanism produce adequate and long-term (if necessary) revenue?
- *Flexibility* - Can the revenue generated by this mechanism be used for a wide range of purposes or is it restricted to a single use?
- *Administrative Requirements* - What are the administrative costs associated with a particular funding mechanism?

8.1.2 Special District Task Group

In 1995, the Special District Task Group of the Monroe County Water Quality Coordinating Committee (WQCC) analyzed the issue of creating special districts as a means of funding remedial actions required to address non-point source pollution associated with stormwater runoff. The primary tools used in this analysis were an Evaluation/Overview of Funding Mechanisms (prepared by Kevin Wheeler, an intern in the Water Quality Section of the Monroe County Health Department) and Protecting the Lake Ontario Drainage Basin in New York State: A Proposal to Develop a Finger Lakes - Lake Ontario Watershed Protection Alliance (prepared by the Water Resources Board of the Finger Lakes Association, Inc. - an update is found in Appendix C). The Evaluation/Overview document presents the following range of options.

1. Establish a county-wide stormwater district
2. Establish a county-wide lake protection district
3. Establish multiple stormwater districts based upon watersheds
4. Establish an inter-county lake protection district
5. Establish a county stormwater management authority
6. Expand the role of Monroe County Pure Waters Districts¹ to include stormwater management
7. Continue to establish intergovernmental agreements (IGAs)

The Water Resources Board document describes a proposal similar to option #4.

The Task Group concluded that the most effective strategy to implement stormwater management in Monroe County consists of two parallel components. The first component of this strategy is a two-step process. The first step is the continued establishment of water quality IGAs between Monroe County and the municipalities within the County. The IGAs contain a consistent set of basic principles, including the need to explore the potential of establishing special districts on a watershed basis as funding mechanisms for stormwater remedial actions. The process of establishing and implementing IGAs will help to educate public officials and citizens on the benefits of stormwater management and involve them in remedial action. As the IGAs evolve, the municipalities and their citizens may decide to take the second step which would consist of establishing special districts based upon watersheds.

The second component of the Task Group's recommended strategy is the advancement of the proposed Finger Lakes - Lake Ontario Watershed Protection Alliance. The alliance would represent the institutionalization of the Finger Lakes Aquatic Vegetation Control Program and ultimately consist of the 25 New York State counties in the Lake Ontario watershed. The Alliance would be funded by both the New York State Environmental Protection Fund and as a line item in the budget of the New York State Department of Environmental Conservation. The primary role of the Alliance would be to develop and implement coordinated watershed protection strategies at the county level throughout New York State's Lake Ontario basin. The implementation of the RAPs would be a major part of this effort.

Upon recommendation from the full membership of the WQCC, the Monroe County Water Quality Management Agency adopted the two component stormwater management strategy, as described above, at its March 24, 1995 meeting.

¹ "The Monroe County Department of Environmental Services (DES) is divided into divisions including Pure Waters, Solid Waste Management, and the Environmental Management Council. The 5 Pure Waters Districts are funding mechanisms that are used to fund the Pure Waters Division."

8.2 Establishing New Financing Options

8.2.1 Special districts

8.2.1.1 Definition

A special district is an independent unit of local government organized to perform a single function (such as stormwater management or lake protection/rehabilitation) or a limited number of related functions. Special districts usually have the power to incur debt and levy taxes or special assessments. New York state laws grant counties and municipalities the authority to establish special districts for selected purposes, and dictates how special assessments must be calculated under certain circumstances. If the improvement or service to be provided in a proposed district is to be financed by the issuance of bonds (or other evidences of indebtedness), approval from the state Comptroller is required.

8.2.1.2 Options

Options relating to the creation of a special district:

- The county legislatures or boards of supervisors could establish one or more special districts in accordance with section 5-A of County Law (precedent - current Pure Waters Districts).
- The New York State Legislature could create a special district in accordance with state enabling legislation (precedent - Saratoga Lake Protection District).
- The Monroe County Legislature could direct the existing Pure Waters Districts to assume stormwater management responsibilities. This option could be the easiest to implement from a political and administrative perspective. However, the Pure Waters Districts do not correspond exactly with the basins in Monroe County and there are parts of Monroe County that are not included in a Pure Waters district.
- The New York State Legislature could direct the Monroe County Water Authority² to assume stormwater management responsibilities.
- The New York State Legislature could create a new authority to assume stormwater management responsibilities.

Options relating to the tax/fee structure of a special district:

- The tax or fee charged to property owners could be based on the quantity of impervious surfaces located on the parcel. Such a fee adheres to the polluter pays axiom, because property owners would be assessed fees based upon the amount of runoff which flows from their property.
- The tax or fee charged to property owners could be based on a property classification system. The amount of the tax/fee would be related to the average pollutant runoff load associated

² The Monroe County Water Authority is a public benefit corporation established by the New York State Legislature under the Public Authorities Law. The Authority was created to finance, construct, operate, and maintain a water supply for the residents of the County of Monroe. The Authority is governed by a Board of Directors that are appointed by the Monroe County Legislature and operates under guidelines established in its charter.

with the particular land use. Such a system adheres to the polluter pays principle.

- The tax or fee could be added to the existing water bill.

Options relating to the geographic/political scope of the special district:

- A county-wide special district could be established. An advantage of a county-wide district would be that priority watersheds could be identified and resources allocated accordingly. However, the redistribution of resources from one watershed to another could create resentment. There also could be political opposition to a county-wide district as authority would be shifting from the municipalities to the county.
- Special districts based on watersheds could be established. The advantages associated with this strategy are that it utilizes the watershed approach and that it might be more equitable than a county-based system because revenue generated within a particular watershed would be used in that watershed. A potential problem associated with this option is that major watersheds cross county lines. Therefore, approval from multiple counties would be required.
- An inter-county Lake Ontario protection special district could be established. There are approximately twenty counties which drain into Lake Ontario. The advantage of this option is that it is very comprehensive. However, in all likelihood, such a district would have to serve in an advisory capacity because it is very unlikely that so many counties would agree to grant taxing authority to a district.

8.2.1.3 Advantages of special districts as a funding mechanism

- A special district creates a direct link between the revenue stream and the service provided.
- A special district provides a stable revenue source and liberates stormwater management from dependence upon the financial situation/limitations of the municipality.

8.2.1.4 Disadvantages of special districts as a funding mechanism

- The creation of any new level of government, especially one with taxing authority, may not be well received by the taxpayers. Traditionally, special districts have been established after a crisis.
- Several stormwater special districts already exist at the municipal level. The municipalities may not be willing to cede local control.

8.2.1.5 Local example

- The Town of Greece (Lake Ontario West Basin) has a town-wide drainage district which levies a fee based on land use. A survey was done in that town to determine the average amount of impervious surfaces for residential properties and a flat yearly rate was set at \$14. Commercial properties are assessed a flat rate of \$70 a year and vacant lands are charged \$0.30 a year per acre.

8.2.2 General tax revenues

8.2.2.1 Definition

An enforced proportional contribution from persons and property levied by the state by virtue of its sovereignty for the support of government and for all public needs. Each level of government possesses a unique set of taxes which it may impose. For instance, in New York State, cities are granted the authority to collect property taxes, sales taxes, and income taxes, whereas counties may collect property taxes and sales taxes but not income taxes.

8.2.2.2 Options

- Revenue from sales or commodities taxes on items which contribute to environmental degradation (such as motor oil, pesticides, and fertilizers) could be used to fund restoration projects.
- A tax surcharge (an added levy, on an existing tax, that is earmarked for a specific project) on a sewer bill could be used to finance stormwater retention basins.
- Existing tax revenue could be used for water quality programs.

8.2.2.3 Advantages

- If the tax base is relatively large, even a modest tax can produce significant and relatively stable levels of revenue.
- Tax revenue can be used for a wide range of purposes.
- The administrative structure for managing taxes already exists.

8.2.2.4 Disadvantages

- Generally, taxes do not precisely target polluters or beneficiaries. However, in a situation where the polluters or beneficiaries cannot be identified a tax may be appropriate.
- Public opposition to any increase in taxes.
- Water quality programs will have to compete with other programs for funding.

8.2.2.5 Local example

- Monroe County's support for water quality staff is funded through general tax revenues.
- The Town of Pittsford funds stormwater management programs through general tax revenues.
- In some municipalities garbage collection is funded through general tax revenues.

8.2.3 Bonds

8.2.3.1 Definition

A bond is a written promise to repay a debt at a specific date or maturity with periodic payments of interest (customarily every six months). In New York State, municipalities, school districts, district corporations, and authorities have all been granted the authority to issue bonds within guidelines and restrictions established by the state. Debt size, length, and structure of repayment are all regulated by the state.

8.2.3.2 Options

- General obligation bonds which are repaid using general revenues.
- Revenue bonds which are repaid using revenue from a specific project.

8.2.3.3 Advantages

- Bonds can generate relatively large amounts of revenue very quickly.
- The issuance of bonds is a relatively common government practice therefore the administrative structure is already in place.
- If the bonds are structured so as to allow their payment to coincide with the life of the proposed projects, then those individuals who benefit from the projects would be responsible for paying for the benefits which they are receiving.

8.2.3.4 Disadvantages

- The interest associated with bonds increases the cost of a project.
- Revenue raised through the use of bonds is generally restricted to a single project or program.
- There may be political and citizen opposition to increasing the public debt.
- Water quality projects would have to compete with other programs for funds.
- The use of bonds might not result in an equitable distribution of the funding burden depending upon what source(s) of revenue are used to make payments on the bonds.

8.2.3.5 Local example

- In Monroe County, the Planning Board develops a prioritized list of capital projects. This list of recommendations is provided to the County Executive who submits his/her proposed Capital Improvement Program to the County Legislature for approval.

8.2.4 Fees

8.2.4.1 Definition

Fees are payments made for particular services rendered or rights granted. The size of the fee must correlate to the service provided. Many levels of government, including state and local, possess the authority to impose fees.

8.2.4.2 Options

- Establish a user fee which seeks to target the beneficiaries of a program.
- Establish an impact fee which seeks to target polluters.
- SPDES or wetlands permit fees could be modified or increased in order to fund water quality programs or restoration. Such an action may require legislative approval.

8.2.4.3 Advantages

- Fees tend to be more equitable because they seek to precisely target the polluter or beneficiary.
- No state imposed limit (as with taxes).
- The size of the fee is designed to adequately cover program costs.

- There may be an administrative structure already in place which can manage a new fee.

8.2.4.4 Disadvantages

- The imposition of new fees will be unpopular with the regulated community.
- There may be significant collection costs associated with the imposition of new fees.

8.2.4.5 Examples

- Water and sewer bills have a user fee component based upon the amount of water used.
- The Irondequoit Watershed Collaborative (IWC) is researching the idea of using impact fees to fund stormwater management activities. The IWC is a coalition of municipalities within the Irondequoit Watershed whose goal is to initiate cooperative efforts to manage stormwater quantity and quality.

8.2.5 Not-for-profit organization

8.2.5.1 Definition

A not-for-profit organization is an organization that is maintained for purposes other than making a profit. In New York State, the establishment of a not-for-profit organization involves filing with the New York State Secretary of State, the New York State Department of Taxation and Finance, and the United States Internal Revenue Service.

8.2.5.2 Options

- Monroe County could establish a not-for-profit organization.
- An existing not-for-profit organization could adopt water quality programming or education as its mission.

8.2.5.3 Advantages

- Contributions to a not-for-profit organization are tax deductible.
- A not-for-profit organization may be in a better position to solicit donations from corporations and the general public.
- The administrative structure may already be in place.
- The use of a voluntary contribution mechanism is likely to be popular with the public because it does not place any additional burdens on taxpayers.
- There may be a high degree of flexibility associated with the use of donated funds.

8.2.5.4 Disadvantages

- A not-for-profit does not place the funding burden on polluters or the beneficiaries.
- The quantity of revenue that may be obtained through a not-for-profit organization may be limited or unpredictable.
- An extended period of time may be required for the not-for-profit organization to establish a solid reputation in the community. A solid reputation is essential in order to obtain substantial donations from corporations, foundations, and individuals.
- Not-for-profit organizations do not possess any regulatory authority.

8.2.5.5 Examples

- Not-for-profit organizations have been established in many areas of concern across the Great Lakes basin. For example, in Hamilton Harbour, Ontario, the public advisory committee (PAC) has been incorporated as a not-for-profit organization known as the Bay Area Restoration Council (BARC). BARC was formed to monitor the implementation of the RAP and conduct implementation programs with an emphasis on educational projects. BARC is funded through citizen, corporate, and public interest group memberships.
- The Toronto Waterfront Regeneration Trust is another excellent example of a not-for-profit in the Great Lakes Basin. The Trust was established in 1992 with the objective of revitalizing the Toronto waterfront. Although the Trust receives some funds from the provincial government, it has been quite successful in marketing its cause to corporations. In order to facilitate its marketing efforts, the Trust encourages corporate participation on its committee and developed a logo which it makes available to its corporate sponsors.
- The Friends of the Buffalo River is a third example of a not-for-profit organization that has been established in a Great Lakes Basin area of concern. The objective of this volunteer organization is to preserve and protect the Buffalo River. The Friends of the Buffalo River has initiated a number of activities including litter clean-ups, greenway planning, and educational programs in schools. The organization is supported through memberships. The Greenway Planning project is being funded by grants from the New York State Council on the Arts and the Great Lakes Research Consortium.

8.2.6 Partnerships

8.2.6.1 Definition

A partnership is a voluntary, consensus-based coalition of diverse organizations and agencies convened in order to implement a specific project. The management of the partnership may be assigned to a coordinating committee comprised of representatives from each of the partners. The purpose, philosophy, bylaws, organizational structure etc. of the partnership may be outlined in a charter or memorandum of understanding (MOU).

8.2.6.2. Options

- The New York State Department of Environmental Conservation (NYSDEC) could facilitate the creation of partnerships to implement selected remedial measures”.
- The Monroe County Water Quality Coordinating Committee (WQCC) could facilitate the creation of partnerships to implement selected remedial measures.
- A not-for-profit organization could facilitate the creation of partnerships to implement selected remedial measures.
- The Genesee/Finger Lakes Regional Planning Council (G/FLRPC) or the Water Resources Board (WRB) could facilitate the creation of partnerships to implement selected remedial measures in the rural counties.

8.2.6.3 Advantages

- The voluntary nature of a partnership may facilitate the participation of a broad cross-section of stakeholders in remedial programs.
- The participation of a broad cross-section of stakeholders in the process may facilitate the contribution of financial and in-kind resources to remedial programs.
- May place the funding burden on polluters or beneficiaries (if they participate in the partnership).
- The partnership concept is very popular with funding agencies.

8.2.6.4 Disadvantages

- Some stakeholders may be unwilling to participate in a partnership unless there is a “carrot or stick”.
- Achieving consensus can be very time consuming.
- A possible disadvantage of partnerships is that the partners can change and organizations can expand or collapse.

8.2.6.5 Examples

- The Indiana Grand Kankakee Marsh Restoration Project (Grand Calumet River/Indiana Harbor Canal Area of Concern) is an example of an innovative partnership that has been quite successful in leveraging funding. The 14 project partners include federal agencies, conservation organizations, and local businesses. The partnership’s mission is to protect, restore, and enhance 26,500 acres of wetlands and associated uplands in the Kankakee River Basin. Thus far, the partners have committed approximately \$2.3 million in land, cash, and in-kind services. The North American Wetlands Conservation Council awarded the partnership a grant of \$1.5 million in matching funds.
- The Ashtabula River Partnership (Ashtabula River Area of Concern) is another example of the benefits associated with a partnership approach. The Partnership was established in 1994 in order to address sediment contamination as identified in the Ashtabula River RAP. The Partnership is comprised of the diverse community interested in sediment remediation including private corporations, government agencies, politicians, and shipping and recreational boating interests. The possibility that the lower Ashtabula River and Harbour could be listed as a Superfund site and the threat to shipping and recreational boating were major factors in encouraging stakeholder participation in the Partnership. The partners believe that a cooperative project to address a shared sediment remediation problem could provide a more comprehensive and efficient solution.

As initial steps in the process, the Partnership established a charter that outlines the by-laws, a mission, goals, and a workplan. In addition, a full-time coordinator position was established. A respected and well-known retired dean from a local university was hired for this position. Activities that have or will be undertaken by the partnership include defining the contaminated sediments to be addressed, developing a detailed plan for remediation,

identifying resources needed for remediation, and generating a timeline for remediation activities. Thus far, the Partnership has received funding from the partners themselves, the Ohio Environmental Protection Agency, the United States Army Corps of Engineers, and Congressional add-ons.

- The Wildlife Habitat Council's Waterways for Wildlife program is an example of another type of partnership. The objective of this program is to protect and enhance habitat for wildlife by means of developing and implementing corporate-led, community-based regional wildlife habitat management plans. For example, the Tri-State Waterways Partnership (West Virginia, Ohio, and Kentucky) was established to work cooperatively with local corporations, state and federal natural resource agencies, conservation organizations, and private landowners to (1) increase the quality, quantity, and diversity of wildlife habitat and (2) provide a mechanism for developing and achieving a collective vision for the future of the region's waterways. As of August 1996, the Partnership is funded by three local corporations. Thus far, habitat enhancement activities have been initiated at three corporate sites.
- Although the situation in the Rochester Embayment Area of Concern (AOC) differs from that in the Grand Calumet River/Indiana Harbor Canal and the Ashtabula River (Superfund related issues are not driving the process in the Rochester Embayment AOC), some of the success factors may be applicable. For example, the success of both partnerships in obtaining funding was the result of the large number of stakeholders that were involved in the process. In addition, in the case of the Ashtabula River Partnership, the participation of a well-respected local leader in the role of coordinator and the participation of politicians were key in obtaining financial commitments.

8.2.7 Dedication of revenues

8.2.7.1 Definition

The term "dedication of revenues" refers to the establishment of accounts or funds in order to set aside revenue for a specific purpose. For example, the New York state Legislature establishes "special revenue funds" which ensure that monies collected through a particular revenue stream are used only for the purposes designated in the fund. Revenue can also be dedicated through "earmarked revenue accounts" within New York's general revenue fund. However, because earmarked revenue accounts are administratively established, there is no guarantee that their revenue will be used only for the stated purpose.

8.2.7.2 Options NA

8.2.7.3 Advantages

- The dedication of revenues may help environmental programs compete with other government programs for funding.
- The administrative costs associated with the dedication of revenue are minimal.

- The dedication of revenue may appeal to the public because it often involves using revenue resulting from environmental degradation for environmental remediation.

8.2.7.4 Disadvantages

- The creation of special revenue funds may be unpopular with some legislators as they may not want to lose control over the allocation of revenue.

8.2.7.5 Examples

- The New York Great Lakes Protection Fund was created by the Legislature in 1990 as a depository for revenue from environmental litigation, corporate donations, and government transfers. The revenue in this fund is restricted to designated purposes.
- New York State has established an Environmental Protection and Oil Compensation Fund and a Hazardous Waste Remediation Fund.

8.2.8 Fines

8.2.8.1 Definition

A fine is a sum imposed as punishment for a criminal or civil offense. The funds that are collected through the imposition of fines can be dedicated to special funds for wetlands protection, etc.

8.2.8.2 Options NA

8.2.8.3 Advantages

- Fines target the polluter.

8.2.8.4 Disadvantages

- The revenue stream associated with fines fluctuates significantly.
- If enforcement efforts are weak, fines may rarely be imposed therefore little revenue will be generated.
- Fines are subject to litigation.

8.2.8.5 Examples

- The New Hampshire Wetlands Board is authorized to impose an administrative fine of up to \$2,000 per offense on any person violating provisions of the state's wetlands statutes or rules. Proceeds of the fines and penalties are placed in a nonlapsing fund in the state's treasury and may be spent by the Wetland's Board for restoration, research, and enforcement relative to wetlands.

8.2.9 Lotteries

8.2.9.1 Definition

A drawing of lots in which prizes are distributed to the winners among persons buying a chance.

8.2.9.2 Options NA

8.2.9.3 Advantages

- State lotteries are more acceptable to voters and state legislatures than less "voluntary" revenue sources.

8.2.9.4 Disadvantages

- As a funding mechanism, lotteries do not target polluters or beneficiaries. Instead, lottery revenues are considered by some to be a regressive source of income, that is lower-income groups bear a greater financial burden than higher-income groups.
- Some constituencies may be opposed to the concept of government promoting gambling.
- Water quality programs would have to compete with education, economic development, etc. programs for funding.
- The funding level may be variable

8.2.9.5 Examples NA

8.3 Accessing Funds from Existing Sources

8.3.1 Federal grant and loan programs

Table 8-1. Federal Grant and Loan Programs

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
Water Resource Development Act (WRDA)					
WRDA Section 401: Great Lakes Remedial Action Plans	United States Army Corps of Engineers (USACOE)	To provide technical, planning and engineering assistance in the development and implementation of RAPs.	States, local governments	\$500,000 (FY 1996) 50% Federal, 50% Non-Federal match	
WRDA Section 312: Environmental Dredging	USACOE	To provide for the removal of contaminated sediments outside the boundaries of Federal navigation channels as part of the operation and maintenance on a navigation project.	States, local governments	No specific appropriation (FY 1996), 50% Federal, 50% Non-Federal match, disposal costs are non-Federal	
WRDA Section 22: Planning Assistance to the States	USACOE	Support States in their comprehensive planning for the development, utilization, and conservation of water and related land resources.	States, local governments	\$2,000,000 (FY 1996) 50% Federal, 50% State match	
WRDA Section 1135: Project Modifications for Improvement of Environment	USACOE	Modify existing USACOE projects project structures and/or their operation to restore environmental quality, consistent with project's authorized purpose.	States, local governments, non-profits	\$10,800,000 (FY 1996) 75% Federal, 25% Non-Federal match	
WRDA Section 204: Beneficial Use of Dredged Material	USACOE	Protect, restore and create aquatic habitat, including wetlands, in connection with dredging at authorized Federal navigation projects.	States, local governments	\$500,000 (FY 1996) 75% Federal, 25% Non-Federal match, O/M costs are non-Federal	

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
Clean Water Act (CWA)					
CWA Section 104(b)(3) - Water Quality Grants	United States Environmental Protection Agency (USEPA)	Support implementation of the NPDES program through unique investigations, special one-time studies, and demonstrations. Activities might include the development and implementation of best management practices for stormwater or the development of a stormwater permit program.	States, municipalities, not-for-profits, and individuals.	For federal fiscal year 1996, the NYSDEC was awarded \$155,000 for Great Lakes program activities	The Monroe County Health Department has received Section 104 funds to support both the Rochester Embayment Watershed Mercury Pollution Prevention project and the Distribution and Presentation of Wetlands Information to Public Officials and the General Public project.
CWA Section 118 - Great Lakes Contaminated Sediment Remediation	Great Lakes National Program Office of the USEPA	To assist in bringing about remediation of contaminated sediments at priority geographic areas in the Great Lakes.	States, interstate agencies, other public or private agencies, and individuals.	A minimum of a 5% nonfederal match is required. For federal fiscal year 1996, no funds were appropriated.	
CWA Section 118 - Great Lakes Habitat Protection / Restoration	Great Lakes National Program Office of the USEPA	To assist in protecting/restoring Great Lakes habitats, including near-shore and other high-priority areas identified in 1994 by the Nature Conservancy.	States, interstate agencies, other public or nonprofit agencies, and individuals.	A minimum of 5% in nonfederal matching funds is required. For federal fiscal year 1996, no funds were appropriated.	
CWA Section 118 - Great Lakes Monitoring	Great Lakes National Program Office of the USEPA	To provide trend analysis and baseline data on toxic and nutrient concentrations through open lake and atmospheric monitoring, to support and target remedial efforts and measure environmental progress.	States, interstate agencies, other public or nonprofit private agencies, and individuals.	A minimum of 5% in nonfederal matching funds is required. For federal fiscal year 1996, \$314,000 was awarded to the NYSDEC for lake monitoring.	NYSDEC monitoring funds were applied to the Drainage Basin Sediment Study for Eastern Lake Ontario.

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
CWA Section 118 - Great Lakes Pollution Prevention	Great Lakes National Program Office of the USEPA	To support activities and projects that help reduce and/or eliminate the use, generation, or release of persistent, toxic substances, especially those that bioaccumulate.	States, interstate agencies, other public or nonprofit private agencies, and individuals.	A minimum of 5% in nonfederal matching funds is required. For federal fiscal years 1995 and 1996, no funds were appropriated.	
CWA Section 118 - Implementation of Great Lakes Remedial Action Plans and Lakewide Management Plans	Great Lakes National Program Office of the USEPA	To provide assistance to states and others in implementing remedial action plans for the 31 U.S./binational areas of concern in the Great Lakes, developing lakewide management plans, and reducing critical pollutants pursuant to those plans for each of the Great Lakes.	States, interstate agencies, other public or nonprofit private agencies, and individuals.	A minimum of 5% in nonfederal matching funds is required.	
CWA Section 319	USEPA	To provide federal funds for the implementation of approved nonpoint source management programs. Maintenance of effort and 40% match required. Administration costs are limited to 10% of the amount of the grant.	State designated lead nonpoint source agencies.	In New York State fiscal year 1995-1996, \$990,000 has been provided in federal grants to address nonpoint source pollution.	The NYSDEC has used Section 319 funds to implement nonpoint source pollution control programs, as well as information and education programs designed to control stormwater runoff from new development. Locally, Section 319 funds have been used for the Irondequoit Bay Wetlands project, the Detention Basin Conversion project, the Pesticide Amnesty Day project and Pittsford's Allen's Creek Stormwater Management Facility.

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
CWA Section 603(d)	USEPA	<p>The New York State Revolving Fund (SRF) for water pollution control projects provides interest-free short term, and low interest rate long term loans to municipalities to finance planning, design, and construction of water pollution control facilities. In the past, only publicly owned treatment plant projects were funded. However, a range of non-point source projects are now eligible for SRF funding including landfill closure or capping and deicing materials storage facilities.</p>	<p>The New York State Environmental Facilities Corporation awards loans to municipalities.</p>	<p>As of 8-30-1996, the Environmental Facilities Corporation (EFC) has made 350 SRF loans totaling \$3.32 billion. Through the use of existing resources, EFC can provide long term loans of approximately \$858 million for municipal pollution control projects during federal fiscal year 1997.</p>	<p>Collector sewers and a pump station in the Town of Pittsford were funded through the SRF. The Village of Honeoye Falls and the Towns of Penfield and Irondequoit have also received loans to fund storm and wastewater system improvements.</p>
CWA 604 (b)	USEPA	<p>Implement water quality management planning, including determining the nature, extent, and causes of water quality problems.</p>	States	<p>60% of the funds awarded to New York State are used to fund personnel at NYSDEC and 40% is passed through to local water quality planning agencies. In fiscal year 1996, these pass through funds amounted to \$579,000.</p>	<p>The erosion control projects in Linear and Powder Mills Parks, as well as the dry basin conversion program were funded through Section 604(b) funds.</p> <p>For New York State fiscal year 1995-1996, pass through funds were used to support Regional Planning Boards to establish baseline water quality programs and implementation projects.</p>
Near Coastal Waters Program of the CWA	USEPA	<p>Improve environmental condition of near coastal waters. Activities might include identification of problems and/or strategy implementation.</p>	States, municipalities, not-for-profits, and individuals	5% nonfederal match required.	

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
Regional Initiatives of the CWA	USEPA Region 2	Allow regions to develop individual initiatives within the framework of the annual budget process. All phases of a watershed protection project can be supported.	No limitations	For federal fiscal year 1996, \$424,000 was used for the contaminated sediment program.	In 1996, the contaminated sediments program at NYSDEC was funded. Past projects include pollution prevention, clean sweep, and contaminants trackdown.
Wetlands Protection Program of the CWA	USEPA	Fund wetlands protection activities including planning, monitoring, enforcement, or education.	States, municipalities	Recipient must provide at least 25% matching funding.	
Farm Bill					
Environ-mental Quality Incentives Program (EQIP)	United States Department of Agriculture (USDA)	EQIP combines the functions of a number of existing programs including the Agricultural Conservation Program. Encourage voluntary compliance with federal requirements to solve point and nonpoint sources of pollution through the provision of cost share and technical assistance.	Agricultural producers who bear a part of the cost of an approved conservation practice.	EQIP is funded at \$130 million in fiscal year 1996 and \$200 million annually thereafter.	A farm in the Town of Parma (Lake Ontario West Basin) received \$14,000 in cost share assistance to exclude clean water from entering the barnyard.
Wetlands Reserve Program	USDA	The goal of the Wetlands Reserve Program is to restore wetland function and values to eligible lands. Eligible land is defined as land that is (1) farmed or has been farmed in the past and is (2) characterized by soils that are predominately hydric. Restoration costs may be shared or paid in full by the Natural Resources Conservation Service in exchange for an easment or restoration agreement.	Landowners	The 1996 Farm Bill allows for restoration cost-share agreements, where up to 75% of the restoration will be paid by the USDA. The new Farm Bill calls 1/3 permanent easements, 1/3 in 30 year easments, and 1/3 in cost share restoration agreements only.	

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
Resource Conservation and Development Program	USDA	Assist state and local governments, as well as not-for-profit organizations plan and implement programs for Resource Conservation and Development (RC&D) through the provision of project grants and advisory services.	States, municipalities, and not-for-profit organizations		The Ontario Lake Plains RC&D Council has been active since 1991 and received not-for-profit status in 1994. The Council includes representatives from Monroe, Niagara, Orleans, Genesee, and Wayne counties. The Council has three members from each county representing the soil & water conservation district, county government, and a citizen member. Although the Council is active, it has not received authorization from the Secretary of Agriculture and therefore is funded through a \$300 annual contribution from each county.
Coastal Wetlands Planning, Protection, and Restoration Act					
	The United States Department of the Interior (USF&WS)	The long-term restoration, enhancement, management, or purchase of coastal wetland ecosystems.	States		
Land and Water Conservation Fund					
	The United States Department of the Interior (National Park Service)	To create and maintain a nationwide legacy of high-quality recreation areas and facilities. Monies are used for federal, state, and local acquisition, development, and improvement of outdoor recreation areas.	States, municipalities		

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
Coastal Zone Management Act					
National Coastal Management Program	National Oceanic and Atmospheric Administration	Assist the states in effectively managing the nation's coastal zone by balancing the competing demands of resource protection, provision for public access, and economic development. Grants are provided to the states in order to facilitate the development, administration, and implementation of coastal programs, including nonpoint source pollution control.	States	New York's award is used to fund personnel in the New York State Department of State.	Local Waterfront Revitalization Plans have been developed for a number of municipalities in the Rochester Embayment watershed including Irondequoit, Penfield, and Rochester.
North American Wetlands Conservation Act					
		Grants may be used to acquire wetlands that further the North American Waterfowl Management Plan and international treaties on migratory birds.			

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990					
	United States Fish and Wildlife Service (Lower Great Lakes Fish and Wildlife Resources Office - Aquatic Nuisance Species Task Force)	Prevent the introduction and spread of aquatic nuisance species; monitor distribution of nuisance species and impacts to native species	states with approved management plans	Vary according to Congressional appropriations	In 1995, New York State was granted \$60,000 to initiate its management plan
Great Lakes Fish and Wildlife Restoration Act of 1990					
	United States Fish and Wildlife Service (Lower Great Lakes Fish and Wildlife Resources Office)	Rehabilitate and protect Lake Erie and Lake Ontario ecosystems	Partnerships with 50/50 matching funds - no limits on potential partners	Generally \$25,000 per project	Lake Ontario assessment (Cape Vincent); Atlantic salmon rehabilitation and evaluation

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
Fish and Wildlife Foundation					
	United States Fish and Wildlife Service	Ecological restoration activities and/or ecological education		Generally under \$180,000 per year; 50% funding match required (can be in-kind services)	Wilson, New York (Lake Ontario West Basin) lake trout reef assessment

8.3.2 State grant and loan programs

Table 8-2. State Grant and Loan Programs

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
New York State Environmental Protection Fund (EPF)					
	NYSDEC	The EPF was established by New York State as a permanently dedicated fund to meet many of the state's pressing environmental needs. More than a dozen programs are authorized for funding by the EPF. These include non-point source water pollution abatement and control projects, open space conservation, and local coastal rehabilitation projects. NYSDEC and the New York State Department of Agriculture and Markets have proceeded to implement grant funded projects based on receiving requests for proposals.	Municipalities	Created in 1993, the EPF received 31.5 million in 1994-1995. In New York State fiscal year 1994-1995 \$1 million was made available to fund environmental projects. In fiscal year 1995-1996, \$1.2 million was made available. In 1996-1997 \$4 million was appropriated.	<p>Town of Irondequoit (Lake Ontario Central Basin) - \$100,000 for development of a public park on a 25 acre parcel along Irondequoit Bay. The site was formerly used by the Town as a landfill and this project will provide much needed public access to the Town's waterfront.</p> <p>Town of Penfield (Lake Ontario Central Basin) - \$20,000 for the design of stormwater run-off and drainage improvements within the LaSalle Landing area along Irondequoit Bay.</p> <p>Town of Greece (Lake Ontario West Basin) - \$29,500 (to be shared with 2 other municipalities) for preparation of a regional dredging management plan.</p>

Program	Admin. Office	General Program Objective	Eligible Parties	Funding Level	Local Example
Great Lakes Protection Fund					
	Great Lakes Protection Fund, Chicago, Ill.	The Great Lakes States created the Fund in 1989 as the nation's first multi-state environmental endowment. The Fund's mission is to identify, demonstrate, and promote regional action to enhance the health of the Great Lakes ecosystem. The Fund supports projects in three areas: pollution prevention, natural resources, and health effects.	Not-for-profit agencies, individuals, and proprietary entities	Seven of the Great Lakes States have contributed \$76.8 million to create the permanent endowment.	The State University of New York - Oswego was awarded \$203,000 to continue a study assessing the neurobehavioral impacts on infants and young children whose mothers consumed Lake Ontario fish.

8.3.3 Foundations/Private Sources

Private foundations are another possible source of funds that may be pursued in order to implement the Rochester Embayment RAP. The Rochester Public Library possesses a number of directories that provide basic information (mission, nature of assistance, eligibility, funding availability, application process, information contact, etc.) on private foundations in the United States. The following are a few of the foundation directories that are available.

- The Foundation Center (published annually). The Foundation Directory. Lists over 6,500 of the largest foundations in the United States with a brief description including address, officers, size of grants, and application procedures. Arranged geographically, with alphabetical, types of support, and field of interest indices.
- The Foundation Center (1993, 3rd edition). New York State Foundations. Comprehensive directory of over 4,600 independent, company-sponsored, and community foundations active in New York State. Indexed by subject, type of support, and geography.
- The Foundation Center (1993, 3rd edition). National Directory of Corporate Giving. Guide to corporate giving programs and foundations of more than 1,700 corporations.
- The Foundation Center (revised regularly). Corporate Foundations Profiles. Analyzes the funding patterns of over 200 of the largest company-sponsored foundations. Also provides brief financial data on over 700 additional, smaller company-sponsored foundations.
- The Foundation Center (1994, 5th edition). Foundation Fundamentals. Designed to help novice and more experienced grantmakers understand the world of foundations and learn techniques for identifying funding sources.
- Rochester Grantmakers Forum (1995). Guide to Grantmakers in the Rochester Area: 1995-1997. Directory of foundations in the Rochester area. Indexed by field of interest and type of support. Also includes a guide to creating a grant proposal and common application and reporting forms.

Additional information pertaining to foundations may be found in the New York Guide to Financing RAP Implementation. In preparing this document, the Apogee Research Corporation conducted a search of two directories and identified a number of foundations that support environmental causes in New York State.

Author: Todd Stevenson

Chapter 9: Surveillance and Monitoring Program

Chapter 9: Surveillance and Monitoring Program Introduction

Each Remedial Action Plan shall include:

"A description of surveillance and monitoring processes to track the effectiveness of remedial measures and the eventual confirmation of the restoration of uses."

(Great Lakes Water Quality Agreement, as amended in 1987)

This Stage II chapter proposes one or more monitoring methods for each use impairment identified in the Rochester Embayment Area of Concern.

Each monitoring method was designed by or with the assistance of professional persons in the appropriate field. Each monitoring method received three levels of review by:

- Review team composed of persons knowledgeable in the appropriate field.
- Monroe County Water Quality Coordinating Committee.
- Monroe County Water Quality Management Advisory Committee.

Because of the limited amount of resources that is available for monitoring and studies, a Studies and Monitoring Task Group evaluated both the studies and monitoring methods and ranked them in importance to the RAP process. See Chapter 4 for a description of proposed studies, and Chapter 11 for a description of the studies and monitoring ranking process and the ranked list.

9.1. Monitoring for toxics

9.1.1. Background:

To set priorities and plan remediation efforts effectively, residents of the Rochester Area of Concern (AOC) need to know:

- What are current conditions with regard to use impairments suspected or identified as being caused by toxic chemicals?
- How do conditions change over time in response to remediation efforts?

This section presents a sampling strategy and methodologies designed to provide this information for three use impairments in the Rochester Embayment AOC: (1) restrictions on fish and wildlife consumption, (2) degradation of fish and wildlife populations, and (3) degradation of benthos.

Impairment status (three impairments addressed):

Restrictions on fish and wildlife consumption:

Impairment status: Impaired in the Lake Ontario portion of the Rochester Embayment and the lower Genesee River. The New York State Department of Health annually issues a fish and wildlife consumption advisory for fish caught in Lake Ontario (including the lower Genesee River up to the Lower Falls) due to mirex, PCBs and dioxin. There is also a general fish consumption advisory for fish taken from any of the State's freshwaters. (NYSDOH, 1994)

Delisting guideline: Contaminant levels in fish and wildlife populations do not exceed current standards, objectives or guidelines, and no public health advisories are in effect for human consumption of fish or wildlife.

Stage I goal: Virtual elimination of toxic substances causing fish consumption advisories

Ongoing monitoring? The New York State Department of Environmental Conservation directs sampling programs for chemical contaminants in fish and shellfish (see Stage II Chapter 6 section on "Fish flesh monitoring and annual advisory").

Degradation of fish and wildlife populations:

Impairment status: Impaired in the Lake Ontario portion of the Rochester Embayment and the lower Genesee River. The impairment has been observed for mink (see Stage I RAP, page 4-12).

Delisting guideline: Environmental conditions support healthy, self-sustaining communities of desired fish and wildlife at predetermined levels of abundance that would be expected from the amount and quality of suitable physical, chemical and biological habitat present. The incidence rates of deformities or reproductive problems in sentinel wildlife species do not exceed background levels in inland control populations.

Stage I goal: Water and shore habitats within the Rochester Embayment support thriving fish and wildlife populations.

Ongoing monitoring? Water column macroinvertebrate community assessments and toxicity tests are conducted as part of the NYSDEC Rotating Intensive Basin Studies (RIBS). The

macroinvertebrate community assessment evaluates the water quality of a stream by analyzing the species richness and diversity of macroinvertebrates found there. Toxicity testing is a bioassay with *Ceriodaphnia dubia* to determine acute and chronic toxicity in the water column. Heavy metals, organochlorine pesticides and PCBs in macroinvertebrate tissue are assessed for two consecutive years within each six years. (NYSDEC, 1992) There are six sampling locations within the Genesee River watershed:

- Genesee River, Genesee docks, Rochester
- Genesee River, Cuylerville
- Genesee River, Scio
- Oatka Creek, Garbutt
- Honeoye Creek, Mendon
- Canaseraga Creek, Mt. Morris

The NYSDEC Stream Biomonitoring Unit has been using benthic macroinvertebrate communities to monitor and assess water quality in the State since 1972. Results are reported in 20 Year Trends in Water Quality of Rivers and Streams in New York State Based on Macroinvertebrate Data, 1972-1992.

Degradation of benthos:

Impairment status: Impaired in the lower Genesee River; unknown in the Lake Ontario portion of the Rochester Embayment. (See the Stage II Chapter 4 section on "Does the Lake Ontario portion of the Rochester Embayment suffer from degradation of benthos?").

Delisting guideline: The benthic macroinvertebrate community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. In the absence of community structure data, this use will be considered restored when toxicity of sediment-associated contaminants is not significantly higher than controls.

Stage I goal: The benthic macroinvertebrate community in the lower Genesee River is not degraded by pollution.

Ongoing monitoring? NYSDEC studied the lower Genesee River in 1992 and 1993. Analysis of sediments and sediment porewater and sediment toxicity tests were part of the study. (See Stage II Chapter 3 section on "Lower Genesee River Study".) NYSDEC monitored sites in the lower Genesee River in 1989 and 1990. In 1995 and 1996 sampling was conducted at five sites in the Genesee Basin plus Johnson Creek (Orleans County) and Irondequoit Creek.

Additional information:

In addition to the aquatic monitoring described above, ambient air quality monitoring for toxics also takes place in Monroe County:

- Eastman Kodak Company monitors at six sites within Kodak Park for dichloromethane (methylene chloride) and 1,2-dichloropropane. The sites are: School 41, Rand Street, Koda Vista, Merrill Street, Ridgeway Avenue and Hanford Landing Road. There is a seventh monitoring site in Irondequoit.
- NYSDEC maintains a monitoring site for lead at 1693 East Avenue, Rochester, and a site for toxics at Merrill Street, where Kodak has a separate monitoring site. NYSDEC closed

a monitoring site for toxics at Jefferson Middle School, Rochester, in summer 1996. NYSDEC monitors for the following chemicals:

Benzene	Methylene chloride
Carbon tetrachloride	Tetrachloroethylene
Chlorobenzene	Toluene
Chloroform	1,1,1-Trichloroethane
m-Dichlorobenzene	1,1,2-Trichloroethane
o-Dichlorobenzene	Trichloroethylene
p-Dichlorobenzene	m,p-Xylene
1,2-Dichloroethane	o-Xylene
Ethylbenzene	

9.1.2. Proposed monitoring method a: Levels of bioaccumulative chemicals of concern (BCCs) in resident biota

9.1.2.1. Description

Currently there are fish consumption/human health advisories for sportfish found in the Rochester Embayment and its tributaries. Fishes on the New York State Department of Health advisory list are mostly salmonids that accumulate their body burdens of persistent toxic chemicals as they move and feed throughout Lake Ontario, including the Rochester Embayment; they generally do not reside in the Rochester Embayment AOC except at the end of their lives as they spawn in tributaries. Thus, the current fish consumption use impairment in the AOC is much more related to lakewide than local conditions.

Bioaccumulative chemicals of concern (BCCs) are found at higher concentrations at higher levels of food webs. To effectively monitor changes in BCC levels as a result of remedial actions in the AOC requires sampling of resident species high in food webs. After much discussion among local technical experts, it appears that snapping turtles (*Chelydra serpentina*) are the best choice to monitor changes in BCCs over time. This species is a top predator in local aquatic communities that is known to accumulate high levels of BCCs when they are present, and that remains resident in local bays, creeks and rivers and does not enter Lake Ontario. Therefore, the snapping turtle is a sentinel species to monitor contaminant loading from the Genesee River watershed to Lake Ontario.

Chemicals that might provide the best indication of pollution remediation in Rochester Embayment watersheds are PCBs and other organochlorine compounds and mercury. PCBs are ubiquitous nonpoint source pollutants in the AOC and any remediation programs should lower overall levels in the local watersheds and in largemouth bass. Mercury has a high bioaccumulation factor (140,000) and is on the Great Lakes Initiative list for virtual elimination (see Stage II Chapter 6 section on "Great Lakes Toxic Reduction Effort"). There is also a local mercury pollution prevention project (see Chapter 6 section on "Mercury pollution prevention project").

To the extent possible, sampling in the Rochester AOC should coincide with existing monitoring programs, and the turtles should be given to monitoring agencies for analysis with their own samples. Currently, no agency monitors BCC levels in snapping turtles in the Rochester Embayment. The only "repetitive" monitoring program in the Embayment is for Age 2+ brown trout every two years (L. Skinner, NYSDEC Bureau of Environmental Protection, Albany, NY personal communication). PCBs and mercury are among the chemicals analyzed. The Monroe County Water Quality Management Advisory Committee should attempt to gain New York State Department of Environmental Conservation (NYSDEC) consent to periodically accept AOC snapping turtle samples for analysis along with regularly scheduled brown trout samples.

Snapping turtles would be collected by baited trap nets or baited hooks attached to stakes driven into the River bottom, and would be prepared in accordance with NYSDEC protocols and stored frozen until they can be transferred for analysis. Analyses should be performed by a government or contract laboratory that has participated in NYSDEC's tissue proficiency analysis program.

The collected turtles would be examined for tumors or abnormalities that can be quickly spotted by a gross examination. Any finding of abnormalities would be recorded.

The frequency of monitoring would be one sampling of ten turtles every 5 years. Midsummer is the best time to collect samples. (Can be performed simultaneously with macroinvertebrate sampling, described below.)

9.1.2.2. Measured parameter(s): PCBs and other organochlorine compounds, mercury

9.1.2.3. Location(s) of monitoring: Genesee dock area up to the Lower Falls

9.1.2.4. Estimated costs (approximate):

Preparation of turtles	\$ 20/turtle	
Organochlorine analysis (includes PCBs)	\$300/turtle	
Mercury analysis	<u>\$ 50/turtle</u>	
Handling and analyses total	\$370/turtle	
Handling and analyses: \$370/turtle x 10 turtles		\$3,700
Collection costs (2-person field crew for 5 days, boats, gear, gas, etc.):		<u>\$1,200</u>
	Total	\$4,900
Five-year monitoring costs:		\$4,900

9.1.2.5. Possible funding sources: U.S. Environmental Protection Agency (EPA); NYSDEC; local foundations, organizations, associations and businesses, such as the Industrial Management Council and its members

9.1.2.6. Responsible entities: Local universities, NYSDEC

9.1.3. Proposed monitoring method b: Species diversity and abundance of benthic and water-column macroinvertebrates

Biologists increasingly use indicator species to reflect the health of the environment. Benthic macroinvertebrates have been used extensively as indicator organisms because they play important roles in the cycling of nutrients and other materials, including pollutants, in the benthic zones of aquatic ecosystems. Two monitoring methods using macroinvertebrates are proposed:

- Species diversity and abundance
- Chironomid larvae deformities (see Action c)

A common strategy to collect chironomid larvae and other macroinvertebrates is presented. *(NYSDEC reviewer comment: The availability of the proper genus of midge is critical for a deformity study to be conducted. Such a study would be valuable, but its difficulty and feasibility should be recognized.)*

9.1.3.1. Description:

All macroinvertebrates will be sorted and identified to the lowest practicable taxonomic level. Community diversity and similarity indices available from ecological literature and the NYSDEC will be calculated to compare sample sites and to form a baseline for future studies. Methods will be according to Bode (1990, 1991).

Both benthic and water column macroinvertebrates would be sampled to allow differentiation between water column and sediment-associated contaminant problems. Benthic macroinvertebrates will be collected by ponar grab or dome suction samplers, depending on bottom substrate composition. Water column macroinvertebrates will be collected by multiplate samplers.

The frequency of monitoring would be every 5 years, with 2 sampling times during the sampling year. Midsummer is the best time to collect samples of macroinvertebrates. (One sampling time at the Genesee dock can be simultaneous with fish sampling.)

9.1.3.2. Measured parameter(s): Macroinvertebrate species abundance and diversity

9.1.3.3. Location(s) of monitoring: Three sites each in the Genesee River basin, the Salmon Creek/Braddock Bay basin and the Irondequoit Bay basin. The three sites will be upstream of, in, and downstream of densely populated areas.

9.1.3.4. Estimated cost: Sample number: 3 watersheds x 3 sites/watershed x 2 sampling times x 3 (triplicate) samples x 2 types (benthos and water column) = 108 samples

Benthic and multiplate sampling, processing and identification: \$100 per sample or \$10,800 total (if collection takes place at the same time as that for the chironomid deformity study described below)

Five-year monitoring costs: \$10,800

9.1.3.5. Possible funding sources: EPA; NYSDEC; local foundations, organizations, associations and businesses, such as the Industrial Management Council and its members

9.1.3.6. Responsible entity: University

9.1.4. Proposed monitoring method c: Benthic and water-column chironomid larvae deformities

Biologists increasingly use indicator species to reflect the health of the environment. Benthic macroinvertebrates have been used extensively as indicator organisms because they play important roles in the cycling of nutrients and other materials, including pollutants, in the benthic zones of aquatic ecosystems. Two monitoring methods using macroinvertebrates are proposed:

- Chironomid larvae deformities
- Species diversity and abundance (see Action b)

A common strategy to collect chironomid larvae and other macroinvertebrates is presented.

9.1.4.1. Description:

Chironomid (midge fly) larvae are one of the most diverse groups of benthic macroinvertebrates, and they inhabit most aquatic substrates ranging from mud and debris to gravel and cobble. Because chironomid larvae live in intimate contact with sediments, they have been shown to reflect the degree of contamination of an area. Higher incidences of morphological deformities, such as asymmetry or gaps in the labial plate, missing teeth, or extra or fused processes have been observed in chironomids living in contaminated sediments, including chironomids in the lower Genesee River (unpublished data, SUNY Brockport). Thus, monitoring the rates of deformities in chironomid larvae in the Rochester Embayment AOC over time will provide an indication of success in reducing pollutant levels in aquatic sediments. (Dickman et al. 1992; Warwick, 1991; Warwick, 1990)

Currently no agency monitors chironomid deformity rates in the Rochester Embayment AOC. However, the expertise to do this exists at SUNY Brockport. In the near future, graduate students will sample benthic macroinvertebrates and examine chironomid deformity rates in the three watersheds (Genesee River, Salmon Creek/Braddock, and Irondequoit Bay) in the Rochester Embayment as Master of Science thesis projects. The purpose will be to answer these questions:

- What are the deformity rates at various locations in Embayment watersheds? (A deformity rate for a level of concern will be chosen that is consistent with U.S. Environmental Protection Agency recommendations.)
- Is there a gradient of deformity rates along the axis of each watershed (south of, in, and north of densely populated areas)?
- Are deformity rates correlated with degrees of industrial, suburban or agricultural

- development in the watersheds?
- Are elevated deformity rates, if any, associated with sediment contamination levels? (If deformity rates >25% are detected at any site, sediments for the entire watershed will be analyzed.)
- Can deformity rates be replicated in laboratory toxicity tests using contaminated sediments from Embayment watersheds and chironomid larvae?

Chironomid head capsules will be prepared and evaluated for deformities according to recently published literature. Techniques used will be those described in W.F. Warwick (1991) and M. Dickman, I. Brindle, M. Benson (1992).

Sediment samples will be collected at each sampling site and saved for future analysis, if needed. *All* sediment samples must be analyzed for Acid Volatile Sulfide and Simultaneously Extracted Metals (AVS/SEM), grain size, and Total Organic Carbon (TOC). These analyses have 14-day holding times, so they cannot be stored and analyzed at a later date. The organics and metals analyses can be performed as needed on stored samples at a later date.

9.1.4.2. Measured parameters:

- Percent deformities of chironomid larvae
- Sediments, collected at all sites and analyzed as necessary (see below)

9.1.4.3. Location(s) of monitoring: Three sites each in the Genesee River basin, the Salmon Creek/Braddock Bay basin and the Irondequoit Bay basin. The three sites will be upstream of, in, and downstream of densely populated areas.

9.1.4.4. Estimated costs (approximate):

Chironomid larvae

Sample number: 3 watersheds x 3 sites/watershed x 2 sampling times x 3 (triplicate) samples x 2 types (benthos and water column) = 108 samples

Processing and analysis (108 samples): \$50 per sample or \$5,400 (if collection takes place at the same time as that for the species diversity and abundance study described above)

Sediments

Sample number: Three for each watershed, one at each site, if there are Chironomid deformities in the watershed (no duplicate or triplicate samples). Note that AVS/SEM, grain size and TOC must be analyzed for every sample whether or not there are Chironomid deformities.

Costs per sample:

AVS/SEM	\$ 150
Grain size	\$ 110
TOC	<u>\$ 40</u>
	\$ 300

Each of the 9 sediment samples must be analyzed for AVS/SEM, grain size and TOC: \$300 x 9 samples = \$2,700

Metals and organic analyses will occur only if deformities are detected.

Metals, including mercury:	\$ 300
Organics, not including dioxins and furans:	<u>\$ 900</u>
	\$1200

The metals cost is for a "target compound list" of metals. The organics cost includes volatiles, semi-volatiles, pesticides and herbicides, and PCBs. The additional cost could range from \$0 - \$1200 per sample or \$0 - \$10,800 for 9 samples. The total cost of sediment sampling would range from \$2,700 - \$13,500.

Five-year monitoring costs: \$8,100 - \$18,900 (chironomid deformities + sediment)

9.1.4.5. Possible funding sources: EPA; NYSDEC; local foundations, organizations, associations and businesses, such as the Industrial Management Council and its members

9.1.4.6. Responsible entity: Local university

Authors: Joseph Gorsuch, Eastman Kodak Company, James Haynes, SUNY Brockport, Gary Neuderfer, NYSDEC, Carole Beal

9.2. Monitoring of contaminated sediments

9.2.1. Background:

Impairment status: Most of the sediments in the lower Genesee River are considered to be moderately polluted or nonpolluted. Some sediments are considered to be heavily polluted. (See Stage I RAP, pages 4-16 and 4-20.)

Delisting guideline: The benthic macroinvertebrate community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. In the absence of community structure data, this use will be considered restored when toxicity of sediment-associated contaminants is not significantly higher than controls.

Stage I goal: The benthic macroinvertebrate community in the lower Genesee River is not degraded by pollution. (Contaminated sediments are one source of pollution.)

Ongoing monitoring? The U.S. Army Corps of Engineers monitors sediments as a part of its dredging activities in the Rochester harbor.

9.2.2. Proposed monitoring a: Establish chemical sediment quality goals for the Rochester harbor at the mouth of the Genesee River and sample sediments to monitor progress toward the goals

9.2.2.1. Description:

Sediment quality goals should be established by a Task Group formed by the Monroe County Water Quality Coordinating Committee specifically for this purpose. The Task Group should consist of a diverse group of people, including organic chemist, inorganic chemist, analytical chemist, toxicologist, habitat specialist and others. The Task Group should first evaluate existing standards and guidelines, and establish a set of criteria to determine appropriate levels of metals and organics. Then the Task Group would apply the criteria to the High Priority Pollutants for the Rochester Embayment that are commonly found in the lower Genesee River sediment. Background levels of the substances must be taken into account. Goals for sediment quality would provide an incentive and a realistic end point for remedial action.

As part of goal setting, decisions would be made about monitoring to evaluate progress toward the goals and the effectiveness of actions taken as part of the Stage II RAP. The analyses would also assist scientific understanding about the fate of metals and organics released to the River. The location(s) and frequency of monitoring would be determined. The monitoring method would be similar to that of the Genesee River Sediment Toxic Survey, Phase II. Samples would be analyzed for toxic metals and organic contaminants. Sampling results should be compared with historical data. Sources of historical data are listed in the Chapter 6 section on "Genesee River Sediment Toxic Survey".

(See also Chapter 9 section on "Monitoring for toxics", and Chapter 4 section on "Identify contaminants affecting the benthic community in the lower Genesee River")

9.2.2.2. Measured parameters: High priority pollutants identified in the Stage I RAP (see page 5-40 of the Stage I RAP and Chapter 3 of the Stage II RAP.)

9.2.2.3. Location(s) of monitoring: The sediments would be sampled at the sites utilized for the 1984 Genesee River Sediment Toxic Survey (see Chapter 6 section on "Genesee River Sediment Toxic Survey") and/or those utilized for the 1992-1993 Lower Genesee River Study (see Chapter 6 section on "Lower Genesee River Study").

9.2.2.4. Estimated costs (approximate): Goal setting: \$6,000 for 10 task group members to attend four meetings

Monitoring: The costs would depend on the number of sampling sites, the number of samples per site and the parameters chosen for analysis. Monitoring similar to that performed for the Genesee River Sediment Toxic Survey would cost \$50,000-60,000 for two sampling periods (total of four sites for both periods). This cost would include planning, sampling, analysis, data evaluation and report writing.

Five-year monitoring costs (not including goal setting): \$50,000 - \$60,000

9.2.2.5. Possible funding sources: New York State Department of Environmental Conservation; U.S. Environmental Protection Agency

9.2.2.6. Responsibility entity: Monroe County Water Quality Coordinating Committee (for goal setting), Monroe County Department of Health (for monitoring)

9.2.3. Proposed monitoring b: Obtain data from the U.S. Army Corps of Engineers on results of required sediment sampling in the Rochester harbor

9.2.3.1. Description:

The federal Clean Water Act Section 401 requires that a permit be obtained before any dredging and disposal is conducted in navigable waters. The Army Corps of Engineers, Buffalo District, obtains a permit for open-lake disposal of Rochester harbor dredged material via the New York State Department of Environmental Conservation (NYSDEC). The permit is called "Section 401 State Water Quality Certification". Periodic sediment sampling must be conducted before obtaining the permit. The Corps is required to sample at a minimum of every five years.

The personnel within the Monroe County Department of Health should request the results of periodic sediment sampling by the Corps. The receipt of the data could be facilitated by the proposed Intergovernmental Agreement with the Army Corps of Engineers (see Chapter 7

section by that name). The data can also be obtained from the NYSDEC who receive it automatically from the Corps.

9.2.3.2. Measured parameter: Metals, cyanide, pesticides, PCBs, semi-volatile and volatile organics are measured regularly. Other tests are conducted on an as-requested basis.

9.2.3.3. Location(s) of monitoring: Sites within the authorized navigation channel in the Rochester harbor

9.2.3.4. Estimated cost: Costs would be minimal - a few hours every few years to review data, note trends, and summarize results for the Monroe County Water Quality Coordinating Committee and Water Quality Management Advisory Committee.

Five-year monitoring costs: <\$200

9.2.3.5. Possible funding sources: Monroe County

9.2.3.6. Responsible entity: Monroe County Department of Health

Author: Carole Beal

9.3. Monitoring for eutrophication and *Cladophora*

9.3.1. Background:

Impairment status: Impaired in the littoral zone of the Rochester Embayment (Stage I RAP, p. 4-20)

Delisting guideline: There are no persistent water quality problems attributed to cultural eutrophication.

Stage I goal: The littoral zone (shoreline area) of the Rochester Embayment is mesotrophic (intermediate levels of algae production) rather than eutrophic (high levels of algae production). (Stage I RAP, p. 3-11)

Ongoing monitoring?

- Monroe County Environmental Health Laboratory (see also Chapter 6 section on "Beach monitoring/modeling program"): Monitors in the littoral zone of the Rochester Embayment during the summer beach season for bacteria and turbidity, and in the River at the Charlotte Pump Station year round for phosphorus and many other parameters.
- New York State Department of Environmental Conservation (NYSDEC) Routine Network: Annually monitors for total phosphate, nitrate, ammonia and dissolved oxygen. The Genesee River is sampled from the Genesee Dock off Boxart Street at milepoint 2.6 (on the western shore).
- U.S. Environmental Protection Agency (EPA). The EPA is funding a cooperative project with the NYSDEC and the U.S. Fish and Wildlife Service (FWS) on a year-by-year basis. The project is a study of lower trophic levels (nutrients and plankton) in some embayments along the south shore of Lake Ontario. The Rochester Embayment is not currently included. However, Irondequoit Bay is scheduled for study. The project began in 1995. Information is available through the FWS office in Amherst, New York.

9.3.2. Proposed monitoring a: Measure phosphorus at defined sampling sites in the littoral zone of the Rochester Embayment

9.3.2.1. Description:

The Monroe County Environmental Health Laboratory boat "Whaler 2" would be used to collect samples at the mouth of the Genesee River. Composite sampling could be performed at the Brockport and Williamson intakes. Sampling would be performed according to the following schedule:

		<u># samplings</u>
May	twice per month	2
June-September	once per week	17
October	twice per month	2
November-April	once per month	<u>6</u>
	Total =	27

9.3.2.2. Measured parameter(s): Total phosphorus, soluble reactive phosphorus, secchi disk (turbidity), water temperature and depth

9.3.2.3. Location(s) of monitoring: There will be three sampling locations:

- Charlotte Pump Station near the mouth of the Genesee River (ongoing monitoring). Measurement at this site will define the contribution of the River to phosphorus loading.
- Beyond the outer western boundary of the Embayment (drinking water intake at Brockport). This site represents the inflow to the Embayment.
- Beyond the outer eastern boundary of the Embayment (drinking water intake at Williamson). This site represents the outflow from the Embayment.

9.3.2.4. Estimated cost (sample collection and analysis):

Genesee River:

Sample collection:

3 hours/sample x \$20/hour labor +\$20 vehicle cost \$ 80/sample

Analysis: total phosphorus \$ 20/sample

soluble reactive phosphorus \$ 15/sample

\$115/sample

\$115/sample x 27 samples = \$3,105

Brockport intake:

Sample collection:

1 hour/sample x \$20/hour labor +\$20 vehicle cost \$ 40/sample

Analysis: total phosphorus \$ 20/sample

soluble reactive phosphorus \$ 15/sample

\$ 75/sample

\$75/sample x 27 samples = \$2,025

Williamson intake:

Sample collection:

1.5 hours/sample x \$20/hour labor+\$20 vehicle cost \$ 50/sample

Analysis: total phosphorus \$ 20/sample

soluble reactive phosphorus \$ 15/sample

\$ 85/sample

\$85/sample x 27 samples = \$2,295

Total = \$7,425

Five-year monitoring costs: Approximately \$37,125

9.3.2.5. Possible funding sources: NYSDEC

9.3.2.6. Responsible entity: Monroe County Environmental Health Laboratory

9.3.3. Proposed monitoring b: Measure phosphorus loading trends from the Genesee River at an agricultural and an urban location to learn their relative contributions to validate predictive models

9.3.3.1. Description: Composite sampling would be performed according to the following schedule: A maximum of three samples would be collected at each location each month year round. One sample per month, not during a storm event, would give a "base load". The other two samples each month would be taken after a storm event. "Storm event" would be defined. For example, it could be one-half inch of rain or greater within two hours. If there are no storm events within a month, there would only be one sample taken that month, the base load sample.

9.3.3.2. Measured parameter(s): Total phosphorus and soluble reactive phosphorus in an agricultural area and in an area downstream from both agricultural and urban areas. The difference between the two represents the contribution from the urban area.

9.3.3.3. Location(s) of monitoring: Jones Bridge in Avon near Routes 5 and 20 to assess loadings from a primarily agricultural area; head gates at the Middle Falls at Brewer Street to assess total basin loadings (the sum of agricultural and urban impact).

9.3.3.4. Estimated cost (sample collection and analysis):

Sample collection:

2 hours/sample x \$20/hour labor + vehicle cost = \$60/sample

Analysis: total phosphorus \$20/sample

soluble reactive phosphorus \$15/sample

\$95/sample

\$95/sample x 36 samples (maximum) = \$3,420

Five-year monitoring costs = \$17,100

9.3.3.5. Possible funding sources: NYSDEC

9.3.3.6. Responsible entity: Monroe County Environmental Health Laboratory

9.3.4. Proposed monitoring c: Prepare periodic status reports on *Cladophora* in Lake Ontario

9.3.4.1. Description:

A university professor consultant, with a student assistant, would search the literature for information on *Cladophora* growth conditions and the status of *Cladophora* in the littoral zone of the south shore of Lake Ontario. The consultant would also communicate with his/her peers on these topics.

Some additional information about *Cladophora* along the south shore of the Lake could be obtained from county health departments, planning departments and parks departments. Other contacts would include marinas, Sea Grant at SUNY Oswego and SUNY Brockport, and the New York State Office of Parks, Recreation, and Historic Preservation.

A report would be prepared and updated on an as-needed basis. The time required to complete a report would be about the equivalent of one month full-time, every five years.

9.3.4.2. Measured parameter(s): Not applicable

9.3.4.3. Location(s) of monitoring: Not applicable

9.3.4.4. Estimated costs: \$6,500 (a minimum, assuming that a paid intern is doing virtually all the work)

9.3.4.5. Possible funding sources: Monroe County, university

9.3.4.6. Possible implementors: Monroe County, university

9.3.5. Proposed monitoring d: Use aerial photography to monitor *Cladophora* beds

9.3.5.1. Description:

The purpose of the monitoring is trend analysis - to begin a database for future decision makers. It would provide information about aquatic habitat that Monroe County already has for terrestrial habitat.

Conventional color film or an off-the-shelf digital system would be used to photograph the south shore of Lake Ontario during an airplane flight from Pulaski to the Niagara River. A person knowledgeable about *Cladophora* growth would be consulted in advance to identify the best month to fly (probably July or August). There should be some surface checking (ground truthing) at the time of the flight to verify that *Cladophora* is being seen.

Weather conditions for the flight would be carefully chosen. *Cladophora* beds tend to be in relatively shallow water where there is wave action that interferes with viewing the algae bed. Also the Genesee River plume can mask the effect of *Cladophora* due to turbidity. Both of these conditions can be addressed by flying on a day that is still or when there is a light offshore breeze.

This method has been used with some success, but it is not an exact science. Better science means more expensive technology and more exotic aircraft that would cost approximately 10 times more.

The flight could be repeated in five years if there is still a need to learn more about the range and extent of *Cladophora* beds.

9.3.5.2. Measured parameter(s): The extent of *Cladophora* beds

9.3.5.3. Location(s) of monitoring: The south shore of Lake Ontario from Pulaski to the Niagara River

9.3.5.4. Estimated cost: Flight: \$250 for the job + \$125 per hour for the pilot and airplane. The duration of the flight would be from one to four hours, depending on the area covered. The total for the flight would be \$375 - \$750.

Analysis by consultant: \$575 - \$1500 depending upon the area covered.
Total: \$950 - \$2,250

Five-year monitoring costs: \$950 - \$2,250

9.3.5.5. Possible funding sources: New York State Department of Health

9.3.5.6. Responsible entity: Monroe County Environmental Health Laboratory

Authors: Anna Madden, Monroe County Department of Health; Carole Beal

9.4. Local atmospheric deposition monitoring

9.4.1. Background:

Impairment status: Not applicable

Delisting guideline: Not applicable

Stage I goal: Not applicable

Ongoing monitoring: This section describes an ongoing program.

9.4.2. Proposed monitoring method: Continue local atmospheric deposition monitoring

9.4.2.1. Description:

The atmospheric deposition monitoring program in Monroe County was initiated as part of the Nationwide Urban Runoff Program (NURP) to quantify the fraction of certain pollutant loads originating from wet and dry deposition processes. While the NURP Study focused on the Irondequoit Bay drainage basin, all water bodies in the Rochester Embayment watershed are affected by atmospheric deposition and subsequent runoff, especially from impervious surfaces.

Three stations are equipped with Aerochemetrics model 301 wet/dry precipitation collectors. An automatic sensor detects precipitation and activates a motor that removes the cover from the wetfall collection vessel and covers the dustfall vessel. When precipitation ceases, the cycle is reversed. The sampling vessels are polyethylene and have a collection diameter of 11.26 inches and a capacity of about 3.4 gallons. The Mendon Ponds site also includes a composite sample collector consisting of a straight-sided polyethylene funnel approximately 6.5 inches in diameter that drains into a Teflon receiving bottle. A looped plastic tubing connects the funnel with the receiving bottle to retard evaporation. The funnel is heated during the cold weather season to aid in complete collection of snow, and the bottle is enclosed in an insulated box. Samples are retrieved from all three stations on a monthly basis, and are analyzed for the constituents listed above.

9.4.2.2. Measured parameter(s): Samples are analyzed for the following constituents:

- Total phosphorus as P
- Ortho phosphorus as P
- Nitrogen, NO₂ + NO₃, dissolved as N
- Nitrogen, ammonia, dissolved as N
- Sulfate, dissolved as SO₄
- Chloride, dissolved as Cl
- pH
- Acidity, as CaCO₃

Specific conductance
Lead, total recoverable
Calcium, dissolved
Magnesium, total recoverable
Sodium, total recoverable
Potassium, total recoverable

9.4.2.3. Location(s) of monitoring (and date initiated): The current monitoring program involves stations at Mendon Ponds Park (1980-present), the Tryon slough area of the Irondequoit Creek wetlands (1992-present), and at the State University of New York at Brockport (1989-present). (See Figure 9-1.)

9.4.2.4. Estimated cost: \$18,000 per year

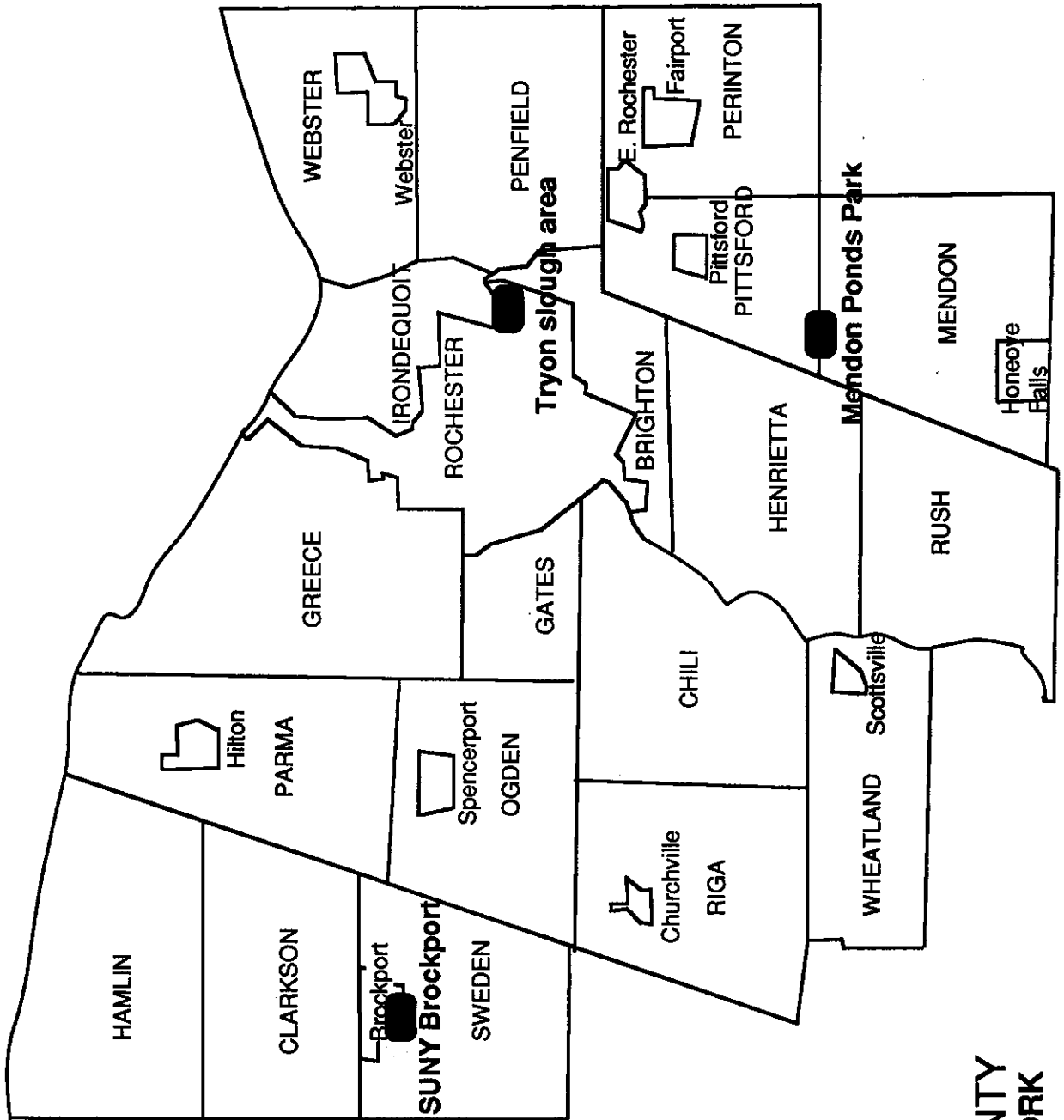
Five-year monitoring costs: \$90,000

9.4.2.5. Possible funding sources: Monroe County

9.4.2.6. Responsible entity: Monroe County Department of Health, Environmental Health Laboratory

Author: Charles L. Knauf

Figure 9-1
**Atomospheric Deposition
 Monitoring Sites**



▲
 NORTH
 (not to scale)

**MONROE COUNTY
 NEW YORK**

9.5. Monitoring of Drinking Water Taste and Odor Problems

Water suppliers who utilize the Rochester Embayment of Lake Ontario have already expanded their monitoring programs and improved their odor treatment capabilities. These efforts are described in the Chapter 6 section “Efforts to minimize drinking water taste and odor problems”. Therefore, no new monitoring programs directed at drinking water taste and odor problems are proposed as part of the Stage II RAP.

9.6. Monitoring for beach closings

9.6.1. Background:

Impairment status: Impaired for the Lake portion of the Rochester Embayment; there are no beaches on the lower Genesee River

Delisting guideline: Waters which are commonly used for total-body contact or partial-body contact recreation do not exceed standards, objectives or guidelines for such use.

Stage I goal: Public beaches in the Rochester Embayment are open for swimming, based upon best available health and safety standards.

Ongoing monitoring? Seasonal monitoring is conducted by the Monroe County Environmental Health Laboratory (see Chapter 6 section on "Beach monitoring/modeling program").

9.6.2. Proposed monitoring: Continue Monroe County Environmental Health Laboratory monitoring

9.6.2.1. Description:

The Monroe County Environmental Health Laboratory (EHL) monitor water quality on a daily basis from the end of June through Labor Day each year to determine whether conditions are suitable for swimming. During unusual events, water quality monitoring is also conducted at Slater Creek, Ontario Beach pier, Round Pond outlet, and Lighthouse Road pier.

9.6.2.2. Measured parameter(s): Bacterial levels, secchi disk (turbidity), algae type and extent, wind speed and direction, wave height and direction, water and air temperature

9.6.2.3. Location(s) of monitoring: Ontario Beach (just west of the mouth of the Genesee River) and the Genesee River at the Monroe County Pure Waters Charlotte Pump Station.

9.6.2.4. Estimated cost: Full-time support and report writing:\$12,070; part-time field program: \$10,950; total:\$23,020

Five-year monitoring costs: \$115,100

9.6.2.5. Possible funding sources: Monroe County Department of Health, New York State Department of Health

9.6.2.6. Responsible entity: Monroe County Department of Health

Author: Carole Beal

9.7. Monitoring for aesthetics - algae

9.7.1. Background:

Impairment status: *Cladophora* and other algae cling to rocks and wash up on the shoreline, causing visual impairments along the lake shore and contributing to beach closings. Algae is not a problem in the lower Genesee River portion of the Embayment due to the flow of the River.

Delisting guideline: Waters are devoid of any substance which produces a persistent objectionable deposit, unnatural color or turbidity, or unnatural odor.

Stage I goal: Shorelines and waterways are free of aesthetically objectionable materials.

Ongoing monitoring? Monitoring of algae at Ontario Beach is conducted seasonally by the Monroe County Environmental Health Laboratory. However, the distribution of algae is random and inconsistent, such that beach monitoring cannot be relied upon as a monitoring method for the shoreline as a whole.

9.7.2. Proposed monitoring: Establish volunteer *Cladophora* watches

9.7.2.1. Description:

Volunteers who have the opportunity to see the shoreline almost every day would report algae accumulations that they detect as part of their normal activities, which may be related to their residence or employment. Each volunteer would keep a written log from May through September of days that there is significant algae accumulation along a defined stretch of shoreline. The log could be an ordinary calendar that is not used for other purposes. Logs would be sent to the Monroe County Department of Health (MCDOH) Environmental Health Laboratory for tabulation in October.

Volunteers would be recruited by the MCDOH Environmental Health Laboratory from the following groups:

- Members of shoreline neighborhood associations.
- Monroe County Department of Parks personnel (for Durand Eastman and Webster Parks).
- New York State Department of Parks and Recreation personnel (for Hamlin Beach State Park).

All volunteers would be trained in the spring by MCDOH Environmental Health Laboratory personnel.

(Volunteer environmental watchdogs are also a suggested monitoring method for enforcement of existing regulations, aesthetics - litter, and habitat.)

9.7.2.2. Measured parameter(s): Not applicable

9.7.2.3. Location(s) of monitoring: Lake Ontario shoreline within the Rochester Embayment

9.7.2.4. Estimated cost: Costs for one-half week of MCDOH Environmental Health Laboratory staff time to tabulate reports is approximately \$400. Additional time to prepare for training and to train volunteers during the first year would also cost approximately \$400. If a training film was prepared during the first year, costs for training in successive years would be minimal.

Five-year monitoring costs: $(\$400 \times 5) + \$400 = \$2,400$

9.7.2.5. Possible funding sources: Monroe County, New York State Department of Health

9.7.2.6. Responsible entity: MCDOH Environmental Health Laboratory

Author: Carole Beal

9.8. Monitoring for aesthetics - chemical seeps

9.8.1. Background:

Impairment status: Objectionable odors from chemical seeps at the lower falls of the Genesee River are occasionally evident. (For more information about the chemical seeps, see Stage I RAP, pages 4-27 and 5-20, and the Stage II RAP Chapter 7 section on "Investigate contamination and opportunities for remediation in the Genesee River gorge".)

Delisting guideline: Waters are devoid of any substance which produces a persistent objectionable deposit, unnatural color or turbidity, or unnatural odor.

Stage I goal: Shorelines and waterways are free of aesthetically objectionable materials.

Ongoing monitoring? No

9.8.2. Proposed monitoring a: Determine the status of seeps on the face of the Lower Falls

9.8.2.1. Description:

Some observers have suspected that the chemical seeps at the Lower Falls have decreased significantly since the early 1970s when they were first observed. However, this has not been easy to verify because of the inaccessibility of the Lower Falls and the flow of water over the Falls. Although Rochester Gas and Electric Corporation (RG&E) operates headgates at the Middle Falls which can to some extent control flows over the Lower Falls, there are minimum flow requirements that must be maintained through this section of the River. It is possible, but unlikely, that the seeps would be visible even during minimum flow conditions. As an alternative, stoplogs located at the Lower Falls could be adjusted by RG&E to divert flow away from the area of the seeps, thus making observations possible. While the first approach would involve no direct costs, the second method would entail costs for the removal/replacement of the stoplogs.

The status of the seeps could be monitored by staff representatives of Rochester Gas and Electric Corporation, the City of Rochester, and Monroe County departments, and by volunteer representatives of the Monroe County Water Quality Advisory Committee. If seepage is observed during the field check, the rate of flow should be estimated and, if feasible, samples should be taken for analysis. The status of the seeps could be observed by the group approximately every five years, depending on River flow conditions. However, RG&E staff may have the opportunity to view the Falls more frequently. One or more interested persons could accompany the RG&E staff, by prior arrangement. Issues of safety and liability must be considered before any field trip to view the Falls.

9.8.2.2. Measured parameter(s): Would include benzene, toluene and xylene

9.8.2.3. Location(s) of monitoring: Face of the Lower Falls of the Genesee River

9.8.2.4. Estimated cost: If observations during minimum flows are possible, no costs would be incurred. If stoplog removal/replacement is required, the estimated costs are \$5,000. Additionally, there would be costs incurred if samples are collected and analyzed.

Five-year monitoring costs: \$0 - \$5,000

9.8.2.5. Possible funding sources: Rochester Gas & Electric Corporation

9.8.2.6. Responsible entity: Rochester Gas and Electric Corporation, representatives of City of Rochester and Monroe County departments, representatives of the Monroe County Water Quality Advisory Committee

9.8.3. Proposed monitoring b: Monitor other seeps in the Genesee River gorge

9.8.3.1. Description:

In addition to the seeps at the Lower Falls, there are other areas in the gorge where seeps have reportedly been observed, such as:

- North of the Eastman Kodak Company King's Landing Wastewater Treatment Plant (behind the former St. Bernard's Seminary).
- Near RG&E's Beebee Station.
- At Ambrose Street.
- East bank of River at RG&E's Brewer Street headgates

A Task Group would develop a list of sites to be monitored. The Task Group should include representatives of the Monroe County Department of Health (MCDOH), the New York State Department of Environmental Conservation (NYSDEC), RG&E, Eastman Kodak Company, and other owners of property where seeps have been observed. The Task Group must seek permission from property owners before the monitoring team enters any property.

Some of the sites will be more accessible for monitoring than others. The seeps will be visually inspected as closely as possible. Adherence to standard safety practices may require that some sites be viewed from a distance with binoculars. The distant viewing may determine whether or not a closer look is warranted in the future.

If the site is accessible, samples of the seeping material should be taken and analyzed by the Monroe County Environmental Health Laboratory, NYSDEC, NYSDOH Wadsworth Laboratory, Eastman Kodak Company, or a commercial laboratory.

The frequency of monitoring would be determined after the first viewing.

9.8.3.2. Measured parameter(s): Would include benzene, toluene and xylene

9.8.3.3. Location(s) of monitoring: See “description”

9.8.3.4. Estimated cost:

Development of a list of sites and permission for access:

5 environmental staff persons x 4 hours/person x \$24/hour = \$ 480.

Monitoring and sample collection:

2 environmental staff persons x 8 hours/person x \$24/hour = \$ 384

Sample analysis: \$1,000 per sample, estimate of 4 samples \$4,000

Total = \$4,864

Five-year monitoring costs cannot be determined until frequency of monitoring is determined.

9.8.3.5. Possible funding sources: MCDOH (staff time), NYSDEC, property owners where seeps have been observed

9.8.3.6. Responsible entity: MCDOH, NYSDEC, property owners

Author: Carole Beal

9.9. Monitoring for Aesthetics - Litter (including Fish Carcasses)

9.9.1. Background

Impairment status:

As part of the Stage I Rochester Embayment RAP, the Degradation of Aesthetics was identified as a Use Impairment in the Rochester Embayment Watershed. Evidence of this Use Impairment includes excessive litter and the remains of salmonids (discarded by fishermen) in the Lower Genesee River.

Delisting guideline:

When the waters are devoid of any substances which produces a persistent objectionable deposit, unnatural color or turbidity, or unnatural odor (e.g. Oil slick, surface scum).

Stage I goal: Shorelines and waterways are free of aesthetically objectionable materials.

Ongoing monitoring:

Currently, there is very little monitoring of litter (including fish carcasses) in or along waterways:

- As part of national Coastweeks, the Audubon Society conducts an annual beach clean-up at Durand Eastman Park in the city of Rochester. A number of other organizations participate in this project including the Sierra Club, the WMAX Green Team, and the Cornell Cooperative Extension 4H Club. As part of this effort, the type and quantity of litter collected is monitored. This data is submitted to the Center for Marine Conservation.
- A city of Rochester contractor operates fish cleaning stations in the Lower Falls and River Harbor areas. This contractor is responsible for keeping these areas free of fish carcasses. (Please note, not all of the fish carcasses are associated with fishing activities. Some of the carcasses are the result of die-offs.) The quantity of wastes removed is monitored. For more information, see the Chapter 6 section entitled "Fish Cleaning Stations".

9.9.2. Proposed monitoring: Use Volunteers to Collect and Monitor Litter in and along Waterways.

Background information:

In the Chapter 7 section entitled "Develop Public Education Structure", it is proposed that a local water quality not-for-profit organization be created. The purpose of the not-for-profit organization would be to serve as an advocate for water quality by planning, coordinating, funding, and implementing educational activities within the Rochester Embayment Watershed. In addition, the not-for-profit could be involved in implementation activities such as assisting municipalities in developing ordinances that protect water quality, coordinating citizen monitoring of water quality, and monitoring the implementation of the RAP.

In the Chapter 6 section entitled "Educational Efforts Designed to Develop Stewardship of the Watershed" Monroe County's Clean-A-Stream program is described. The Clean-a-Stream program is a voluntary activity involving volunteers in efforts to improve and sustain the quality of the waterways in the County. Citizen activities that might be conducted as part of this program include surveys, monitoring, litter clean up, and storm drain stenciling.

9.9.2.1. Description:

Volunteers should be used to collect and monitor litter in and along waterways. The locations of severe litter problems would be documented, especially those locations that could not be remediated by volunteers. The coordination of the volunteer litter monitoring would be conducted by the not-for-profit organization (as described above) or as part of Monroe County's Clean-A-Stream program (as described above). However, before this action could be implemented, liability issues associated with the use of volunteers would have to be resolved.

9.9.2.2. Measured parameters and documented conditions:

- Quantity of litter collected
- Locations of litter problems
- Locations of litter problems that could not be remediated

9.9.2.3. Locations of monitoring: As part of the Chapter 9 section entitled "Monitoring Fish and Wildlife Habitat", it is proposed that a local water quality not-for-profit organization utilize citizen volunteers to monitor stream habitat. The same locations that are monitored as part of this program could be monitored for litter problems. In addition, locations along the Lake Ontario shoreline and the Genesee River would need to be identified.

9.9.2.4. Estimated cost: Because most of the field work would be conducted by volunteers, the cost of this program would be minimal. The primary costs would consist of garbage bags, the use of trucks to haul the garbage, and tipping fees. Most likely, donors for these materials and services could be identified.

9.9.2.5. Possible funding sources: counties (provision of in kind services), grants, memberships (not-for-profit organization), and private donations.

9.9.2.6. Responsible entities: Monroe County Water Quality Management Advisory Committee (WQMAC), Water Quality Coordinating Committees, and the not-for-profit organization.

Author: Todd Stevenson

9.10. Monitoring for turbidity

9.10.1. Background:

Impairment status:

Impairments addressed and Stage I RAP references:

Restrictions on dredging activities, known cause (page 6-3)

Drinking water taste and odor problems, known cause (pages 4-21 and 6-3)

Beach closings, known cause (pages 4-22 and 6-4)

Degradation of aesthetics, known cause (pages 4-27 and 6-4)

Added costs to agriculture or industry, possible cause (pages 4-28 and 6-5)

Delisting guideline: Waters are devoid of any substance which produces a persistent objectionable deposit, unnatural color or turbidity, or unnatural odor.

Stage I goals:

Contaminated sediments in the lower Genesee River have no negative impact upon the water quality and biota in the Rochester Embayment; sediment quality is suitable for open lake disposal.

Public beaches in the Rochester Embayment are open for swimming, based upon best available health and safety standards.

Shorelines and waterways are free of aesthetically objectionable materials.

Drinking water produced from Lake Ontario has no unusual or unpleasant taste.

Ongoing monitoring? The Monroe County Water Authority (MCWA) monitors both influent and effluent for turbidity. Monitoring results are given monthly to the Monroe County Department of Health (MCDOH). (For map showing the location of the MCWA intake, see Stage I RAP, page 3-28. The intake is in the Lake portion of the Rochester Embayment.)

The Monroe County Environmental Health Laboratory (EHL) has established an hourly sampling procedure to monitor turbidity and other parameters. The sampling location is in the Genesee River near the mouth of the River. (See below.)

9.10.2. Proposed monitoring a: Continue Monroe County Water Authority monitoring of turbidity for the Lake portion of the Rochester Embayment

9.10.2.1. Description:

Instrumentation is on-line continuous monitoring (Hach Surface Scatter 6). Reports of monitoring results are given monthly to the MCDOH. The results would be available to the Water Quality Planning staff for use by the Monroe County Water Quality Management Advisory Committee (WQMAC).

9.10.2.2. Measured parameter(s): Turbidity

9.10.2.3. Location(s) of monitoring: Low lift pump station, Edgemere Drive, Greece. Monitors water brought in from intake located 8,400 feet offshore at a depth of approximately 45 feet

9.10.2.4. Estimated cost: It can be considered as "no added cost". The cost to Monroe County staff would be minimal - time to review data and pass it to the WQMAC, approximately one hour/year.

Five-year monitoring costs: <\$200 (not including equipment costs)

9.10.2.5. Possible funding sources: Raw water monitoring is part of existing Shoremont Water Treatment Plant internal quality control.

9.10.2.6. Responsible entity: Monroe County Water Authority

9.10.3. Proposed monitoring b: Continue monitoring the cause of turbidity (suspended sediments) in the lower Genesee River portion of the Embayment

9.10.3.1. Description:

The Monroe County Environmental Health Laboratory performs composite sampling twice per week. If turbidity is greater than 30 nephelometric turbidity units, suspended solids are measured also. If there is a storm event, every sample is tested for turbidity.

The data is entered into the U.S. Geological Survey (USGS) database, as part of a cooperative effort between the Environmental Health Laboratory and the USGS. The annual data reports and interpretative report, produced every five years are available to the Monroe County Water Quality Management Advisory Committee (WQMAC) via Water Quality Planning staff.

9.10.3.2. Measured parameter: turbidity, suspended solids

9.10.3.3. Location(s) of monitoring: Charlotte Pump Station

9.10.3.4. Estimated cost:

Sample collection:

1 hour/sample x \$20/hour + \$20 vehicle costs	\$40/sample
Analysis: turbidity	\$ 5/sample
suspended solids	<u>\$10/sample</u>
	\$55/sample

Suspended solids are analyzed only under defined conditions, so there is a cost range for the 104 samples/year of \$4,680 to \$5,720.

Five-year monitoring costs = \$23,400 to \$28,600

9.10.3.5. Possible funding sources: Monroe County, USGS

9.10.3.6. Responsible entity: Monroe County, USGS

9.10.4. Proposed monitoring c: Conduct a survey of Monroe County industries on the impacts of raw water turbidity on the cost of doing business

9.10.4.1. Description:

The survey would be sent to Monroe County industries that use *raw* water as part of a process or activity. (The same survey would also apply to the Chapter 9 section on "Monitoring for added costs to agriculture and industry - zebra mussel".) Questions would include: impacts of turbidity, impacts of zebra mussel or other exotic species, and treatment costs to prevent or mitigate impacts. The survey should be conducted as soon as possible after the completion of the Stage II RAP to provide baseline data, and should be repeated approximately every ten years thereafter.

The steps would be:

- Research as to which companies should receive the survey.
- Writing of the survey.
- Contact with nonrespondents.
- Compilation of results.
- Writing of a report.

9.10.4.2. Measured parameter(s): Not applicable

9.10.4.3. Location(s) of monitoring: Not applicable

9.10.4.4. Estimated cost: An intern would spend about 50 hours at a cost of \$0-\$350 (no pay if the intern is working for college credit). Mailing costs would be an additional \$20. Training and supervision of the intern would cost approximately \$500.

Total cost: \$520- \$870

Five-year monitoring costs: \$2,600 - \$4,350

9.10.4.5. Possible funding sources: Business or trade organizations related to industry

9.10.4.6. Responsible entity: Business or trade organizations related to industry, Monroe County Water Quality Management Advisory Committee (WQMAC)

Author: James Nugent, Carole Beal

9.11. Monitoring for added costs to agriculture and industry - zebra mussel

9.11.1. Background:

Impairment status: Impaired due to zebra mussel

Delisting guideline: There are no additional costs required to treat the water prior to use for agricultural purposes and industrial purposes.

Stage I goal: Water from the Embayment and its tributary drainage basins which is used for agricultural and industrial purposes can be used with minimum added cost due to exotic species (zebra mussels, etc.).

Ongoing monitoring?

Personnel of the Cornell University Biological Field Station conducted a lakewide survey in 1992. At that time, Lake Ontario and nearshore areas were dominated by zebra mussel (*Dreissena polymorpha*), as compared to another nonindigenous mussel, the quagga (*Dreissena bugensis*). A similar survey in 1995 showed that the quagga is displacing the zebra mussel. This displacement has already occurred in Lake Erie. The quagga can survive in deeper water and poorer food conditions than the zebra mussel. As the zebra mussel depletes the food supply, the quagga is able to survive and displace the zebra mussel. Because of the quagga, it will take longer for the lake to come into equilibrium than was expected for the zebra mussel alone. The quagga has no greater impact on water intakes or boats than the zebra mussel. The Field Station would like to repeat their survey in a few years.

Locally, Rochester Gas and Electric Corporation (RG&E) inspects water intakes at Russell Station twice a year. Eastman Kodak and the Village of Brockport inspect their Lake Ontario water intakes annually, and the Monroe County Water Authority (MCWA) inspects its intake once every other year. (For location of intakes, see map on page 3-28 of the Stage I RAP. The Brockport intake is in Lake Ontario due north of Brockport.)

9.11.2. Proposed monitoring a: Conduct a survey of county or regional industries, agriculture and golf courses on the impact of zebra mussel on the cost of doing business

9.11.2.1. Description:

(This survey would also apply to the Chapter 9 section on "Monitoring for turbidity".) To monitor for costs due to zebra mussel, the survey should be sent to industries that use *raw* water for a process, and to agricultural and golf course facilities that use *raw* water for irrigation.

Questions would include:

- Impacts of zebra mussel or other exotic species.
- Treatment costs to prevent or mitigate impacts, such as cost of chlorine (to prevent zebra

- mussel infestation) and capital costs to install a chlorine treatment system.
- Impacts of turbidity (if the survey is to be coordinated with the section on "Monitoring for turbidity").

The survey should be conducted as soon as possible after the completion of the Stage II RAP to provide baseline data, and should be repeated approximately every ten years thereafter.

The steps would be:

- Research as to which facilities should receive the survey.
- Writing of the survey.
- Contact with nonrespondents.
- Compilation of results.
- Writing of a report.

9.11.2.2. Measured parameter(s): Not applicable

9.11.2.3. Location(s) of monitoring: Not applicable

9.11.2.4. Estimated cost: An intern would spend about 120 hours at a cost of approximately \$840. However, there would be no cost for the intern if he/she was working for college credit. Mailing costs would be approximately \$80. Costs for training and supervision of the intern would be approximately \$500.
Total cost: \$580 - \$1,420

Five-year monitoring costs: \$2,900 - \$7,100

9.11.2.5. Possible funding sources: Business, professional and trade organizations related to industry, agriculture, and golf course management

9.11.2.6. Responsible entity: Business, professional and trade organizations related to industry, agriculture, and golf course management, Sea Grant, Water Quality Coordinating Committees, regional planning Councils (for regional projects in the rural counties of the Rochester Embayment watershed), Water Quality Management Advisory Committee in Monroe County (WQMAC)

9.11.3. Proposed monitoring b: Continue monitoring zebra mussel population trends as part of inspection of water intakes

9.11.3.1. Description:

The Monroe County facilities that inspect their water intakes (RG&E, Eastman Kodak, Brockport and MCWA) use underwater cameras. There are no quantitative measurements, but a trend can be spotted by comparing pictures from one year to the next.

All four facilities are willing to share their information with the Monroe County Department of Health Water Quality Planning staff. Information should be reported annually (or every other year in the case of the MCWA) for use by the WQMAC in tracking use impairments.

Treatment plants in the inland, rural counties of the Rochester Embayment watershed are in the planning stage or just beginning the construction of zebra mussel control systems. It can be expected that plant personnel will be willing to share any monitoring information.

9.11.3.2. Measured parameter(s): Zebra mussel (qualitative, not quantitative)

9.11.3.3. Location(s) of monitoring: See “description”

9.11.3.4. Estimated cost: No cost (an activity that is performed anyway)

Five-year monitoring costs: No cost

9.11.3.5. Possible funding source: Additional funding is not necessary.

9.11.3.6. Responsible entity: Water treatment plants, RG&E (in Monroe County), Water Quality Coordinating Committees, regional planning councils, WQMAC (in Monroe County)

Author: Carole Beal

9.12. Status of phytoplankton and zooplankton populations in the lower Genesee River portion of the Rochester Embayment

9.12.1. Background:

Impairment addressed:

Degradation of phytoplankton and zooplankton populations in the Lower Genesee River

Delisting guideline: Phytoplankton and zooplankton community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. In the absence of community structure data, this use will be considered restored when phytoplankton and zooplankton bioassays confirm no significant toxicity in ambient waters.

Stage I goal addressed: Diversity of plant and animal communities within the Rochester Embayment

Ongoing monitoring? No

9.12.2. Proposed monitoring: Status of phytoplankton and zooplankton populations in the lower Genesee River portion of the Rochester Embayment

9.12.2.1. Description:

The goal of this monitoring is to determine the status of the phytoplankton and zooplankton community of the lower Genesee River. The methodology should follow the work of Makarewicz for the U.S. Environmental Protection Agency (EPA).

Sampling methods:

Zooplankton: Zooplankton samples should be collected every other week at one site in the lower Genesee River (GR-1) (Figure 9-2). All samples would be preserved. Enumeration of zooplankton should follow Gannon (1971) while identification should follow Stemberger (1979), Edmondson (1959), Brooks (1957) and Ruttner-Kolisko (1974).

Phytoplankton: Phytoplankton is collected simultaneously with zooplankton by taking a water sample at 3 m at Site GR-1 and preserving it. Three permanent mount slides would be made of each sample (Crumpton 1987).

Chemistry: Accompanying the phytoplankton and zooplankton sampling, water samples would be collected for chlorophyll, soluble reactive phosphorus, total phosphorus, and nitrate/nitrite analysis. This will allow better interpretation of the phytoplankton data.

Identification and enumeration

Zooplankton: Identification and enumeration would be performed for the following groups of zooplankton:

- Total immature Copepods
- Total mature Copepods
- Total Cladocera
- Total Rotifera
- Total Zooplankton

Phytoplankton: Identification and enumeration would be performed for the following groups of algae:

- Total blue-green algae
- Total green algae
- Total flagellates
- Total other algae
- Total centric diatoms
- Total pennate diatoms
- Total algae

9.12.2.2. Measured parameter(s): Plankton species identification and enumeration

9.12.2.3. Location(s) of monitoring: Site in the lower Genesee River (GR-1) (Figure 9-2)

9.12.2.4. Estimated cost:

It would take approximately one year to complete this project at a cost of \$20,000 to \$25,000. This monitoring should be repeated every two-three years.

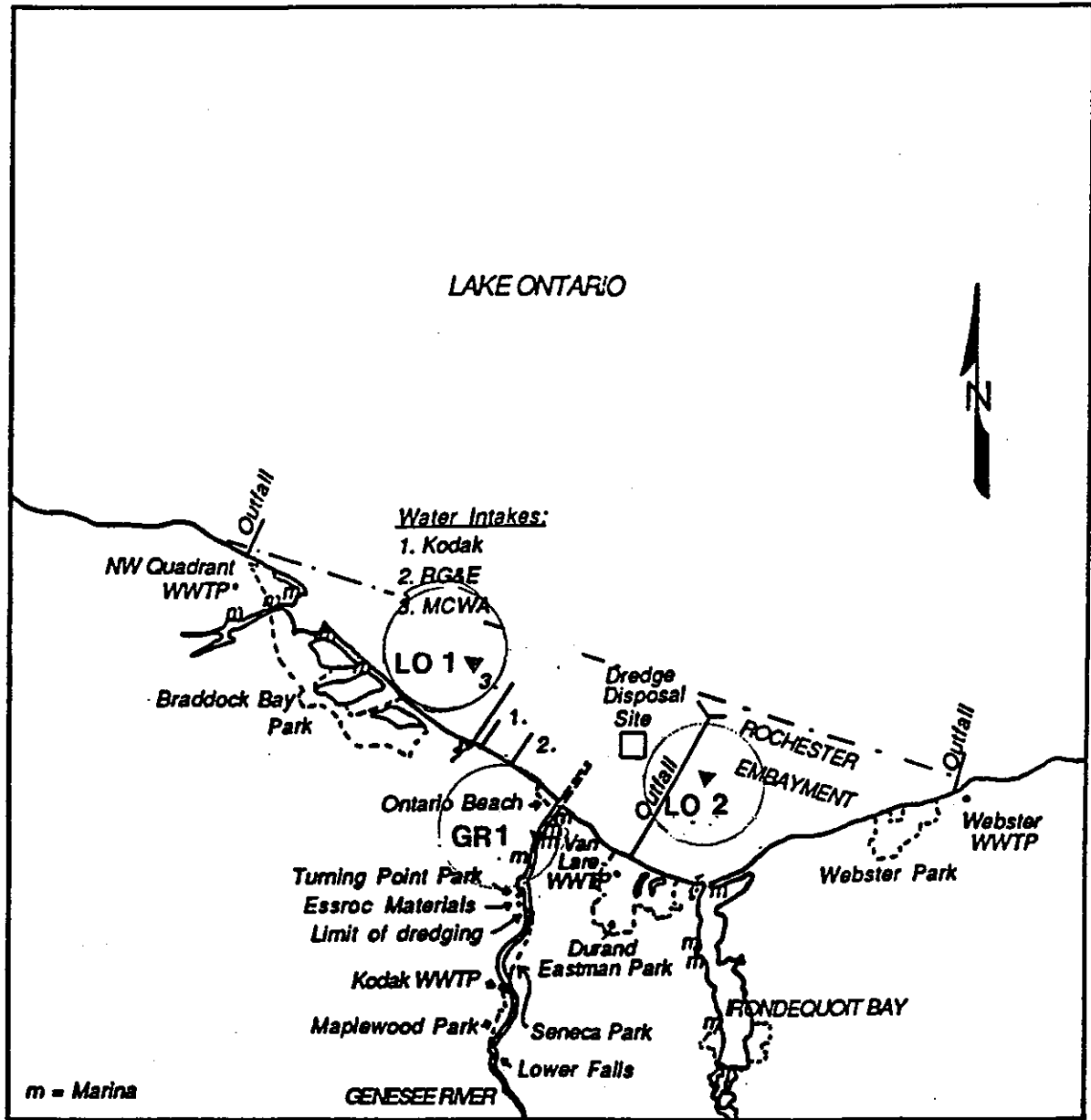
Five-year monitoring costs: \$40,000-\$50,000 (twice within the first five-year period)

9.12.2.5. Possible funding sources: NYSDEC, EPA

9.12.2.6. Responsible entity: Local university, NYSDEC

Author: Joseph Makarewicz, SUNY Brockport

Figure 9 - 2



SCALE



Miles

Phytoplankton, zooplankton, and benthos sampling sites on Lake Ontario and the lower Genesee River.

9.13. Monitoring Fish and Wildlife Habitat

9.13.1. Background

Impairment status: The Stage I RAP identified the Loss of Fish and Wildlife Habitat as a Use Impairment throughout the Rochester Embayment watershed. The causes of this impairment include filling/draining of wetlands, removal of riparian vegetation, and sedimentation.

Delisting guideline: When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected.

Stage I goal: Water and shore habitats within the Rochester Embayment support thriving fish and wildlife populations. There is diversity of plant and animal communities within the Rochester Embayment.

Ongoing Monitoring: Currently, monitoring of fish and wildlife habitat is conducted by both not for profit organizations and various government agencies. The following is a list of existing habitat monitoring programs in the Rochester Embayment watershed.

Long Point Bird Observatory Marsh Monitoring Program - The Marsh Monitoring Program is a cooperative project of the Long Point Bird Observatory and Environment Canada, with the current support of the U.S. Great Lakes Protection Fund. The objective of the program is to monitor the health of marshes by surveying indicator species that utilize these habitats during the breeding season. Two groups of vertebrates, birds and amphibians, were chosen as target groups because they are susceptible to environmental deterioration. They are also easily detected during the breeding season and thus more easily surveyed than other candidate groups.

The actual monitoring is performed by citizens utilizing protocol and training materials developed by the Long Point Bird Observatory. Beginning in 1995, several locations within the Rochester Embayment watershed are being monitored as part of this program. Data compilation and interpretation is performed by the Observatory.

Braddock Bay Raptor Research, Inc. Hawk Watch - Since 1977, raptors have been counted and/or banded during spring and fall migrations at the Braddock Bay Fish and Wildlife Management Area.

The Nature Conservancy (TNC) - The Central and Western New York Chapter of this not for profit conservation organization owns and manages a number of nature sanctuaries in the Rochester Embayment Watershed, including the Thousand Acre Swamp (Lake Ontario Central Basin). As part of its management of these properties, TNC monitors rare plant populations and distributions, as well as the distribution of exotic species. Informal monitoring of wildlife utilization is also conducted.

New York State Department of Environmental Conservation (NYSDEC) - The NYSDEC is engaged in several habitat monitoring efforts, including the following:

The NYSDEC maintains a Geographic Information System (GIS) which contains spatial and attribute data concerning state regulated wetlands. This system is updated on an infrequent basis.

Beginning in 1996, the NYSDEC will conduct a "Wetlands Status and Trend Analysis of New York State mid-1970's to mid-1980's". The goals of this project are as follows:

- Identify the status and trends of changes to New York's freshwater wetlands (both small wetlands and those larger than 12.4 acres), including any variations by ecological region
- Identify the causes (urban/suburban development, agriculture, or other) of changes to wetlands
- Create a documented information base for use in future status and trend studies

This analysis will be used to evaluate the success of existing conservation programs and to identify a long-range strategy to achieve no overall net loss of New York's remaining wetlands.

The NYSDEC is also pursuing funding to develop a system of reference wetlands in western New York State. Initially, selected emergent and deciduous forested wetlands will be studied in order to develop habitat characterizations. Analysis of the data will provide an objective base against which to measure the habitat value of these wetland types for management or regulatory purposes. This research will also provide criteria for maximizing the habitat value of mitigation sites. In order to maintain a data base for the reference sites over time, a volunteer network of monitors will be established. This data will be analyzed to provide information on changes in wetland habitat value, and the factors contributing to changes.

Monroe County/United States Geological Service - As part of the Irondequoit Creek Wetlands Water Quality Project, extensive ecosystem monitoring is being conducted before and after the installation of flow control structures in order to evaluate whether there are any adverse impacts on the wetland ecosystem. In 1991, baseline surveys of the natural flora (vegetation) and fauna (fish, macroinvertebrates, reptiles, amphibians, mammals, birds) of the Irondequoit Creek Wetlands were conducted. Similar monitoring of the Buttonwood Creek Wetlands was conducted as a control. The same transects that were used in developing the baseline will be surveyed following the installation of the flow control structures. If it is decided that permanent flow control structures should be installed in the Irondequoit Creek Wetlands, flora and fauna surveys would be conducted on a five year cycle.

Monroe County - As a condition of the landfill permit for the Mill Seat Landfill (Town of Riga, Monroe County, Genesee Basin), Monroe County developed a Biological Monitoring Plan and conducts monitoring on the site.

9.13.2. Proposed Monitoring a: Build upon the Existing Marsh Monitoring Program and the Proposed Reference Wetlands System to Monitor Wetland Habitat Quality and Quantity in the Rochester Embayment Watershed

9.13.2.1. Description:

Counties within the Watershed, or a newly created local water quality not-for-profit organization, should work with the Long Point Bird Observatory and the NYSDEC to develop a volunteer-based, coordinated and comprehensive wetland habitat monitoring program within the Rochester Embayment Watershed. Such a program would likely involve building upon the existing Marsh Monitoring Program and the proposed Reference Wetlands program. These programs vary somewhat in regards to the parameters that are (or would be) monitored and the methodologies that are (or would be) used. Most likely, the counties and/or the local water quality not-for-profit organization would be involved in recruiting and coordinating the volunteers while the Long Point Observatory and the NYSDEC would be responsible for training the volunteers and compiling and interpreting the data.

In developing this program, existing wetland habitat programs in other parts of the United States should be reviewed. For example, during 1993 the United States Environmental Protection Agency (USEPA) and Portland State University cooperated to conduct the Oregon Wetlands Study. As part of this project, USEPA scientists identified 150 wetlands in the Portland, Oregon metropolitan area to be monitored by local school teachers. The purpose of the program was to compare the habitat, water quality, and flood control value of created/restored wetlands with natural wetlands, as well as lay the foundation for future wetland monitoring projects involving students. As part of the project, two documents were developed that describe crew development, training, site selection and logistics, field and laboratory activities, data management and analysis, and quality assurance. The titles of these documents are Field and Laboratory Operations Report for the Oregon Wetlands Study and Research Plan and Methods Manual for the Oregon Wetlands Study.

For additional information regarding the creation and role of a local water quality not-for-profit organization, see the chapter 7 section entitled "Develop Public Education Structure". Also, please note that other sections of Chapter 9 involve the use of a not-for-profit organization including "Monitoring for Aesthetics" and "Monitor Enforcement of Existing Regulations".

9.13.2.2. Measured parameters:

- Wetland area
- Distance to other wetlands
- Plant species richness
- Cover of herbaceous and woody plant species
- Vegetation/open water interspersion
- Distribution of exotic species
- Populations of amphibians

- Populations of marsh birds
- Water quality parameters
- Soil nutrient levels

9.13.2.3. Locations of monitoring: As part of the proposed NYSDEC Reference Wetlands project, 12 representative forested swamps and emergent marshes in western New York would be identified (not all of these wetlands would be located in the Rochester Embayment Watershed). In addition, several locations within the Watershed are currently being monitored as part of the Long Point Bird Observatory's Marsh Monitoring Program. If it is decided that additional locations within the Watershed should be monitored, the NYSDEC could identify valuable and representative wetlands (including shoreline wetlands, as well as wetlands in urban/suburban and agricultural locations).

9.13.2.4. Estimated cost: The cost of implementing a volunteer-based wetland habitat monitoring program would be relatively modest because other organizations have developed training and protocol materials and most of the time consuming field work would be conducted by volunteers. In addition, a student intern could be used to recruit and coordinate the volunteers. It is estimated that the cost of implementing the program would be \$30,000 the first year. It is anticipated that the cost of the program in subsequent years would be less than \$30,000 because not as much time would need to be devoted to program development and volunteer training.

9.13.2.5. Possible funding sources: Counties, a local water quality not-for-profit organization, NYSDEC, and the United States Environmental Protection Agency (USEPA) (the NYSDEC has expressed interest in the possibility of developing a grant proposal with Monroe County to fund a wetland monitoring program)

9.13.2.6. Responsible entities: Counties, a local water quality not-for-profit organization, and the NYSDEC

9.13.3. Proposed Monitoring b: Implement Citizen Monitoring of Stream Habitat

9.13.3.1. Description:

A local water quality not-for-profit organization, with assistance from the NYSDEC and the Monroe County Health Department, would utilize citizen volunteers to gather baseline data regarding stream habitat and monitor long term trends.

A stream habitat monitoring program might be incorporated into, or coordinated with, the Monroe County Water Quality Management Advisory Committee's "Clean a Stream" project. The Clean a Stream program is a volunteer activity involving the residents of Monroe County in efforts to improve and sustain the quality of the waterways in the County. Citizen activities that might be conducted as part of this program include surveys, monitoring, litter clean up, and storm drain stenciling.

A stream habitat monitoring program would involve the following steps:

- Conduct stream surveys
- Select sampling locations
- Select parameters to be monitored
- Train the volunteers
- Conduct sampling
- Perform laboratory analysis
- Compile and interpret the results

Most likely, the not-for-profit organization would be responsible for recruiting and organizing the volunteers while the NYSDEC and the WQCCs would be involved with developing the monitoring program, training the volunteers, performing the laboratory analysis, and interpreting results.

9.13.3.2. Measured parameters:

The following parameters might be monitored as part of a stream habitat monitoring program:

- Shoreline character - cohesion of streambanks, evidence of erosion, and streambank vegetation
- Stream depths
- Stream width
- Water velocity
- Stream bottom composition
- Riffles and pools (quantity and quality)
- Temperature
- Dissolved oxygen
- pH
- Nutrients
- Total suspended solids
- Fecal coliform bacteria
- Benthic macroinvertebrates (species richness, species diversity, community balance, and presence/absence of indicator species)
- Land use

The monitoring of storm drain outfalls should also be considered as part of a stream monitoring program. The purpose of this type of monitoring would be to detect illegal or accidental dumping or cross-connections into the stormwater system. This type of monitoring would most likely focus on the following parameters:

- Chlorine
- Copper
- Detergents
- Phenols
- Ammonia-nitrogen

- Phosphorus
- pH
- Temperature
- Turbidity
- Color
- Presence of sewage, scum, and trash
- Antifreeze
- Oil

9.13.3.3. Locations of Monitoring: The New York State Department of Environmental Conservation (NYSDEC) along with county Water Quality Coordinating Committees (WQCC) would identify valuable and representative stream habitats (different character or land use) within the Rochester Embayment watershed that should be monitored by citizens. These locations may be upstream and downstream of suspected discharges such as construction sites or storm drain outfalls. Also, locations that have been monitored in the past or are monitored through existing programs should be considered for monitoring. Also, since it is more practical for citizens to monitor streams within close proximity of where they live, this factor would influence which locations could be monitored. If possible, at least one sampling site should be in a relatively undeveloped area so as to serve as a control site for purposes of comparison.

9.13.3.4. Estimated cost: The cost of implementing a citizen-based stream habitat monitoring program would be minimal because most of the field work would be conducted by volunteers. In addition, a student intern could be used to recruit and coordinate the volunteers. It is estimated that the cost of the program would be approximately \$30,000 for the first year. It is anticipated that the cost of the program in subsequent years would be substantially less because not as much time would need to be devoted to program development and volunteer training.

9.13.3.5. Possible funding sources: NYSDEC, counties, private donations

9.13.3.6. Responsible entities: Not for profit organization, NYSDEC, counties

9.13.4. Proposed Monitoring c: Compile and Interpret Data from Existing Monitoring Programs

9.13.4.1. Description:

Every five years, the data gathered through the programs described in the “Ongoing Monitoring” part of this section should be compiled and interpreted.

9.13.4.2. Measured parameters: Not applicable

9.13.4.3. Locations of monitoring: Not applicable

9.13.4.4. Estimated cost:

Costs for two weeks of county staff time to gather the data, interpret the results, and prepare a brief written report would be approximately \$1,600.

9.13.4.5. Possible funding sources: NYSDEC, counties, or a local water quality not for profit organization

9.13.4.6. Responsible entities: same as above

Author: Todd Stevenson

9.14. Monitoring enforcement of existing regulations

9.14.1. Background:

Impairment status: Would be applicable to several impairments.

Stage I goals:

Virtual elimination of toxic substances that impair (adversely affect) human health and/or cause fish consumption advisories.

Public beaches in the Rochester Embayment are open for swimming, based upon best available health and safety standards.

Shorelines and waterways are free of aesthetically objectionable materials.

Water and shore habitats within the Rochester Embayment support thriving fish and wildlife populations.

Ongoing monitoring? Compliance with water discharge permits is monitored by the New York State Department of Environmental Conservation (NYSDEC).

9.14.2. Proposed monitoring program a: Document changes in permit limits for chemicals on the List of High Priority Pollutants when permits of Rochester Embayment watershed facilities are renewed

9.14.2.1. Description:

As part of public participation in the SPDES permit renewal process, the Water Quality Coordinating Committee (WQCC) of each county would document changes in permit limits for facilities within the county at the time of a permit renewal. The WQCC would report the changes to the Committee overseeing RAP activities, currently the Monroe County Water Quality Management Advisory Committee (WQMAC). The WQMAC can use the reports to track progress toward virtual elimination, and can forward the reports to the Lake Ontario Lakewide Management Plan (LaMP) Workgroup as needed to demonstrate progress (or the lack of it). The reports would be maintained by the staff serving the WQMAC and by the LaMP Workgroup. The WQCCs could develop a liaison system or a working agreement with personnel from NYSDEC Regions 8 or 9 in order to be fully informed about the status of permit review.

The WQCCs should also monitor the SPDES operational reports submitted by permit holders to determine compliance with permit limits involving the High Priority Pollutants. In addition, it is important to collect Toxic Release Inventory (TRI) data on what is actually being discharged.

(See also Chapter 6 sections on "State Pollution Discharge Elimination System" and "Lake Ontario Lakewide Management Plan".)

9.14.2.2. Measured parameter(s): Parameters to be documented are High Priority Pollutants

listed within State Pollutant Discharge Elimination System (SPDES) permit renewals for facilities within the county. (For High Priority Pollutant list, see Stage I RAP, page 5-40, and Stage II RAP Chapter 3 section on "Ranking of High Priority Pollutants".)

9.14.2.3. Location(s) of monitoring: Not applicable

9.14.2.4. Estimated cost: Cost of staff time at the county WQCC level. This could range from 20 hours per year (about \$3,000) in a rural county to 120 hours per year (about \$6,000) in an industrialized county. There would also be the cost of LaMP Workgroup time to evaluate and maintain the reports, and incorporate the results into LaMP monitoring reports.

Five-year monitoring costs: Approximately \$30,000 (industrialized county), \$15,000 (rural county)

9.14.2.5. Possible funding sources: County, NYSDEC, U.S. Environmental Protection Agency

9.14.2.6. Responsible entity: County WQCCs, Monroe County WQMAC, LaMP Workgroup

9.14.3. Proposed monitoring program b: Establish volunteer environmental watchdogs

Note: Volunteer environmental watchdogs have also been suggested for monitoring for aesthetics (algae), aesthetics (litter) and habitat.

9.14.3.1. Description:

Volunteers would report on unusual discharges to water that they detect as part of their normal activities, which may be related to employment, recreation, education or other volunteer activities. Volunteers would report the discharges to the county health department (or the WQCC if the county does not have its own health department).

Approximately 80 volunteers would be recruited by the county health department (or WQCC) from among:

- County, town and municipal workers.
- Town planning board and conservation board members.
- Educators, such as college and high school teachers (as well as their students), and Cooperative Extension personnel.
- Members of nonprofit organizations, such as Clean-a-Stream groups, Audubon Society, Sierra Club, Boy Scouts, Girl Scouts, 4-H.
- Persons who frequently participate in outdoor activities such as fishing, hiking and birding.
- Owners of waterbodies or adjacent areas.

All volunteers would be trained by the county health department (or WQCC).

9.14.3.2. Measured parameter(s): Unusual discharges to water

9.14.3.3. Location(s) of monitoring: Throughout the Rochester Embayment watershed

9.14.3.4. Estimated cost:

Preparation of training materials and training (first year only): \$1,000

Logging in volunteer reports: \$500 per year

Follow-up by health department staff: Difficult to predict, but would probably cost at least \$2,500 per year for time, plus costs for analyses.

Five-year monitoring costs:\$15,000 (not including training costs and analyses)

9.14.3.5. Possible funding sources: County, towns, New York State Department of Health

9.14.3.6. Responsible entity: County health department or WQCC, towns

9.14.4. Proposed monitoring program c: Monitor enforcement efforts for NYSDEC SPDES permits for stormwater discharges (see Chapter 6 section on "Federal stormwater regulations")

9.14.4.1. Description:

The county WQCC would obtain information from the local municipalities about activities under the:

- General Permit for Storm Water Discharges Associated with Industrial Activity.
- General Permit for Storm Water Discharges Associated with a Construction Activity.

An Intergovernmental Agreement (IGA) between the county and a municipality would facilitate the process of exchanging information, but an IGA would not be essential. (See Chapter 7 section on "Institute intergovernmental agreements".)

The WQCC would ensure that:

- Stormwater Pollution Prevention Plans are prepared by the entities undertaking the activities, and are in compliance with permit requirements.
- Field checking takes place at least on a random basis, and always when there is a complaint.
- Stormwater permit violations at the site are reported to NYSDEC.
- Enforcement actions are carried out if reported to the NYSDEC.

These responsibilities would not have to be directly carried out by the WQCC. The WQCC could make arrangements with municipalities in the county through IGAs, the county health department, the county Soil and Water Conservation District or the county environmental management council to check plans and field check the sites. The WQCC should assist all implementors with education about the stormwater regulations or make arrangements with the county health department, the county environmental management council or the county Soil and

Water Conservation District to do so. Regional planning councils could serve as a liaison between counties and the NYSDEC.

The WQCC should also research other federal and state water quality programs and decide if this type of enforcement could be applied to them.

9.14.4.2. Measured parameter(s): Not applicable

9.14.4.3. Location(s) of monitoring: Not applicable

9.14.4.4. Estimated costs:

If handled at the municipality level: Time for reviewing Plans and field-checking sites for one year would be about 2/3 of a full-time position for an environmental professional in a rapidly developing and/or industrialized municipality (about \$27,000), but could be 1/10 time (\$4,000) or less in a rural municipality.

If handled at the county level: Time for reviewing Plans and field-checking sites for one year would be about two full-time positions for environmental professionals in a rapidly developing and/or industrialized county (about \$80,000), but could be 1/5 time (\$8,000) or less in a rural county.

Five-year monitoring costs:

Municipality: \$135,000 (developing/industrialized); \$20,000 or less (rural)

County: \$400,000 (developing/industrialized); \$40,000 (rural)

9.14.4.5. Possible funding sources: Counties, municipalities, NYSDEC

9.14.4.6. Responsible entity: County WQCCs, county health department, county Soil and Water Conservation District, or county environmental management council, regional planning councils

Author: Carole Beal

9.15. Public Attitudes and Knowledge

9.15.1. Background

Impairment status: Numerous citizen activities contribute to Use Impairments in the Rochester Embayment of Lake Ontario. In addition, there are many actions that citizens can take to address Use Impairments. Therefore, the focus of many of the remedial actions outlined in Chapter 7 is to increase public awareness of water quality issues and to involve the public in remediation activities. Monitoring and continuous program evaluation will be required to determine the effectiveness of these programs.

Ongoing monitoring: Currently, there is very little monitoring of public attitudes and knowledge regarding water quality. In 1983, Monroe County conducted a countywide water quality telephone survey to investigate citizen attitudes and perceptions regarding the quality of the water in Monroe County. This information was used by the County in developing a public information program and could be used as a baseline for comparison with future data.

9.15.2. Proposed monitoring a: Utilize Intern to Develop and Conduct Water Quality Survey

9.15.2.1. Description:

A student intern or graduate student (masters thesis) should be hired by the Monroe County Health Department in order to develop and conduct the survey, as well as interpret the results and prepare a report. This project would likely take two semesters to complete. The 1983 Monroe County Water Quality Attitude Survey should be used as a reference in developing the survey. Volunteers from the Water Quality Management Advisory Committee or other groups could be utilized to actually conduct the survey. The results of the survey would be used to focus water quality educational activities. The survey would need to be repeated every ten years in order to monitor progress in increasing public awareness.

9.15.2.2. Measured parameters:

- Knowledge of water quality concepts
- Knowledge of water quality problems
- Knowledge of remedial actions
- Support for water quality programs
- Degree of current citizen involvement

9.15.2.3. Locations of monitoring: Because activities throughout the watershed impact water quality in the Rochester Embayment, the entire watershed should be surveyed.

9.15.2.4. Estimated cost: The primary cost associated with this project would consist of funding the student intern. This cost would likely range between \$0 and \$2,500.

9.15.2.5. Possible funding sources: NYSDEC, Monroe County, local colleges, Sierra Club, Trout Unlimited, New York Water Environment Association, Federation of Monroe County Environmentalists, and League of Women Voters

9.15.2.6. Responsible entities: Monroe County and local colleges (Survey Research Center at SUNY Geneseo or Sociology Department at SUNY Brockport)

9.15.3. Proposed monitoring b: Coordinate with Professional Pollster to Conduct Water Quality Survey

9.15.3.1. Description of method: Monroe County Health Department staff should approach private pollsters in the Rochester area to determine whether they would be willing to add one or two questions relating to water quality to a survey that they are conducting. Professional pollsters will sometimes add questions that are in the public interest to surveys that they are conducting. Health Department staff would develop the questions in cooperation with the private pollster.

9.15.3.2. Measured parameters: same as proposal A

9.15.3.3. Locations of monitoring: same as proposal A

9.15.3.4. Estimated cost: Because the private pollster would be donating their services, the cost of the project would consist of staff time to develop the questions. It is estimated that 20 hours of staff time for an environmental professional would be required to write the survey questions, coordinate with the professional pollster, and interpret the results. Therefore the total cost of the project would be approximately \$480.

9.15.3.5. Possible funding sources: Monroe County

9.15.3.6. Responsible entities: Monroe County

Author: Todd Stevenson

9.16. Monitoring of events at the Akzo Nobel Salt Mine

9.16.1. Background:

Impairment status: There is no impairment related to the Akzo Nobel Mine.

Delisting guideline:

Stage I goal: There is no goal related to the Akzo Nobel Mine.

Ongoing monitoring? There is interest in continued monitoring of the now-closed mine because of current adverse impacts to groundwater and potential adverse impacts to the Genesee River due to subsidence. Accelerated erosion of channel banks along the River and increased sediment loading of the River are likely consequences of changes in the River gradient caused by dewatering and subsidence of the flood plain. If a new mine is proposed, there would also be interest in monitoring events related to its opening.

The NYSDEC coordinates all programs that relate to water quality. Public officials in Livingston County work closely with NYSDEC, Akzo Nobel officials, citizen groups, and the New York State Department of Health (NYSDOH). Officials in the Monroe County Department of Health (MCDOH) read reports and updates about the mine because Monroe County is downstream from Livingston County on the Genesee River.

Additional information: Akzo Nobel Salt, Inc. owns the Retsof Salt Mine in Livingston County (see Figure 9-3). The area of the underground mine is approximately 6,000 acres (4-1/2 miles x 5 miles). The Genesee River flows over the eastern portion of the mine on its way to the Rochester Embayment. A portion of the ceiling near the mine's southeastern corner collapsed on March 12, 1994. Groundwater began to pour into the mine from an aquifer above it. The entire mine was filled with water in January 1996. Several major environmental problems accompanied the collapse of the mine.

Changes in groundwater level:

The groundwater level in some areas near the mine dropped and some private wells dried up.

Changes in groundwater quality:

As a result of water drawn into the mine, lesser quality waters are being pulled into the aquifer supplying some water wells. Also, with the mine completely flooded and the mine roof slowly compressing, brine will likely be forced upward through natural and manmade pathways. Conservative estimates predict that 120 million gallons will be forced out of the mine each year.

Subsidence:

Depressions have formed at the ground surface above the collapse. The subsidence resulted in structural damage to buildings, roads, pipelines, power lines and a bridge. Further subsidence is expected as the mine cavity is compressed.

Genesee River channel changes:

As of March 1996, a report entitled Evaluation of Potential Effects of Subsidence on the Genesee River and Tributaries was prepared by Mussetter Engineering, Inc. for Akzo Nobel Salt, Inc. This document reports, among other things, that subsidence has lowered the channel bed and floodplain elevations in the Genesee River by up to 4.5 feet in the 1.5-mile reach upstream from the mouth of Beards Creek, a tributary of the Genesee River. In addition, local bed elevations in Beards Creek have been lowered by up to 12 feet. The report states that further bank erosion from a variety of existing and future conditions related to the subsidence is likely in the Genesee River in an area just upstream (south) of Route 20A and in Beards Creek.

The Mussetter Report has been criticized for omitting important data and, therefore, understating the potential for increased lateral erosion, channel widening and meander adjustments when natural or manmade changes are imposed on the River system (Young, 1996). Young notes that the authors of the Mussetter Report themselves state that available techniques do not allow for detailed predictions of the rate of channel bank migration that may occur in the future. Young also notes that the Report ignores an important bank failure mechanism that affects the Genesee River banks and contributes to lateral bank erosion and channel migration. During conditions of high River flow, the amount of groundwater permeating the River banks increases. When the River level subsequently falls, groundwater pore pressure and bank undercutting lead to accelerated bank failures.

Releases of methane and hydrogen sulfide:

These are two gases that commonly occur in mines. Both gases have been detected at boreholes and methane gas has been detected in private water wells. Hydrogen sulfide has been reported in water wells, but the gas was below the detection level of gas meters. If the gases were to accumulate in a building, or in low-lying areas due to certain weather conditions (very still air or during temperature inversion), there would be health concerns. As the groundwater level drops, new pathways may form for the upward movement of subsurface methane and hydrogen sulfide gases. Damage to rocks will determine where breakouts might occur in the future. New emissions, associated with water pressure changes caused by filling of the mine, have recently been reported in the residential area of Retsof.

Discharge to the Genesee River:

On April 15, 1994, The New York State Department of Environmental Conservation (NYSDEC)

issued a 30-day emergency discharge authorization to Akzo to discharge saltwater from the mine into the Genesee River. The authorization included stringent conditions and controls. At that time Akzo thought it would be possible to "plug" the leak into the mine and salvage it. NYSDEC set an in-river limit on chloride concentration of 1,000 ppm and required Akzo to implement an extensive physical, chemical and biological monitoring program to ensure protection of the Genesee River ecosystem. The emergency discharge lasted four days, during which chloride concentrations in the River were less than 200 ppm. The emergency discharge was discontinued because flooding could not be stopped and floodwaters threatened the in-mine pump station.

There is an ongoing State Pollution Discharge Elimination System (SPDES) permit for discharge to the River from the brine lagoon in Cuylerville. The SPDES permit conditions continue even though the company has closed the mine. The brine lagoon collects rain runoff from the salt piles. The salt piles are too big and "active" for covering to be successful. However, when it rains, the salt piles form a crust. Some of the rain runs off the piles to the lagoon and does not sink into the piles.

Mine closure:

The mine is being closed according to NYSDEC regulations. Closure of the Retsof mine included:

- Disposal of hazardous materials.
- Plugging of the mine shafts.
- Placing salt-saturated soils in the salt storage areas under a clay cap.
- Surface reclamation (restoration of disturbed areas of the ground surface above a mine so that it is revegetated and aesthetically pleasing, and can be reused). Akzo has closed the mine, but not the site. Surface reclamation will not be completed until the site is closed.

Administrative/planning activities:

Even though the mine is closed, Akzo is still responsible for the impacts of the mine. Akzo's responsibilities are outlined in memoranda of understanding.

Memoranda of Understanding (MOUs) among New York State, Akzo Nobel and Livingston County, have been signed. The MOUs include:

- Groundwater monitoring and modeling of impacts.
- A response plan for loss of well water to residents and businesses. (Independent of Akzo, the Livingston County Health Department checks 21 water wells for water quality and quantity.)
- A program to investigate complaints of structural impacts and negative effects on property sales.
- A monitoring plan that examines the extent and rate of subsidence related to the mine collapse and dewatering of aquifers.

- The establishment of a Technical Assistance Group "to obtain technical assistance in interpreting information submitted to the repository, in assessing the nature of any hazards and impacts associated with the mine collapse and related matters, in evaluating the nature and the extent of environmental investigations and feasibility studies, and in participating in public meetings".
- Monitoring and mitigation of the potential impact of movement of saturated brine from the mine upward into the aquifer system.
- Monitoring releases of gases, and notification and guidance for residents in the area of emitted gases.
- Water well alternative dispute resolution program.

Subsequently, the Retsof mine has been closed. There is potential for the construction of a new mine, also in Livingston County, in the future.

9.16.2. Proposed monitoring: Monitor events at the former Akzo Nobel salt mine and any potential new mine

9.16.2.1. Description:

NYSDEC will continue to coordinate all water quality related issues. Livingston County officials will continue to coordinate and communicate with NYSDEC, NYSDOH, mine officials and citizen groups.

Representatives of Monroe County government and advisory committees should monitor events at the former mine and any proposed new mine that may affect the water quality of the Genesee River and the Rochester Embayment in the following ways.

- The Monroe County Water Quality Coordinating Committee (WQCC) will participate in the public review process for SPDES permits. Any review should include consultation with the Livingston County WQCC.
- The Director of the Environmental Health Division of the MCDOH should receive and review written information on mine-related issues prepared by NYSDEC, NYSDOH, Livingston County, the Technical Assistance Group, Akzo, and others, and communicate issues related to Genesee River and Rochester Embayment water quality to the Monroe County WQCC and the Monroe County Water Quality Management Advisory Committee (WQMAC).
- The Director of Environmental Health Division of the MCDOH should continue the existing liaison with the NYSDEC Region 8 office in order to be informed of issues that have the potential to affect water quality in the Genesee River and the Rochester Embayment.
- The WQMAC should request periodic updates on water quality impacts of the mine(s) from its Livingston County representative, from NYSDEC (either directly or through its NYSDEC representative), the Director of the Environmental Health Division of the MCDOH, and the Technical Advisory Group. This may be accomplished by devoting all

- or a portion of one WQMAC meeting each year to this topic.
- The Monroe County WQCC should establish a task group to evaluate mine water quality related monitoring that is underway or proposed. The desired outcome for the task group would be to identify any additional monitoring needs to address water quality concerns for the Genesee River and the Rochester Embayment. The task group should work through the WQCC and the Monroe County Water Quality Management Agency to determine what to recommend to the NYSDEC regarding such monitoring.

Water quality related monitoring recommended by the Mussetter Report includes:

- A monitoring program to detect any changes in channel stability of the Genesee River upstream of the subsidence area.
- Evaluation of the riprap revetment in the Genesee River upstream of the Route 20A bridge to ensure that it has sufficient burial depth to prevent undercutting and subsequent failure.
- Detailed evaluation of the erosion potential at the bend in the River just upstream of the Route 20A bridge.
- Evaluation of the potential for increased bank erosion near the Highway 63 bridge associated with changes in sediment supply.
- Monitoring for increased sediment loading downstream due to accelerated bank erosion and channel adjustments caused by gradient changes from subsidence.

9.16.2.2. Measured parameter(s): Not applicable

9.16.2.3. Location(s) of monitoring: Not applicable

9.16.2.4. Estimated cost: \$1,000 per year or less for an environmental official to spend about 40 hours reviewing reports and news. However, if there are changes at the site of the old mine that impact water quality or if a new mine is proposed, the time and cost could increase significantly.

Five-year monitoring costs: \$5,000 or less in the absence of changes at the mines that would affect water quality.

9.16.2.5. Possible funding sources: Monroe County

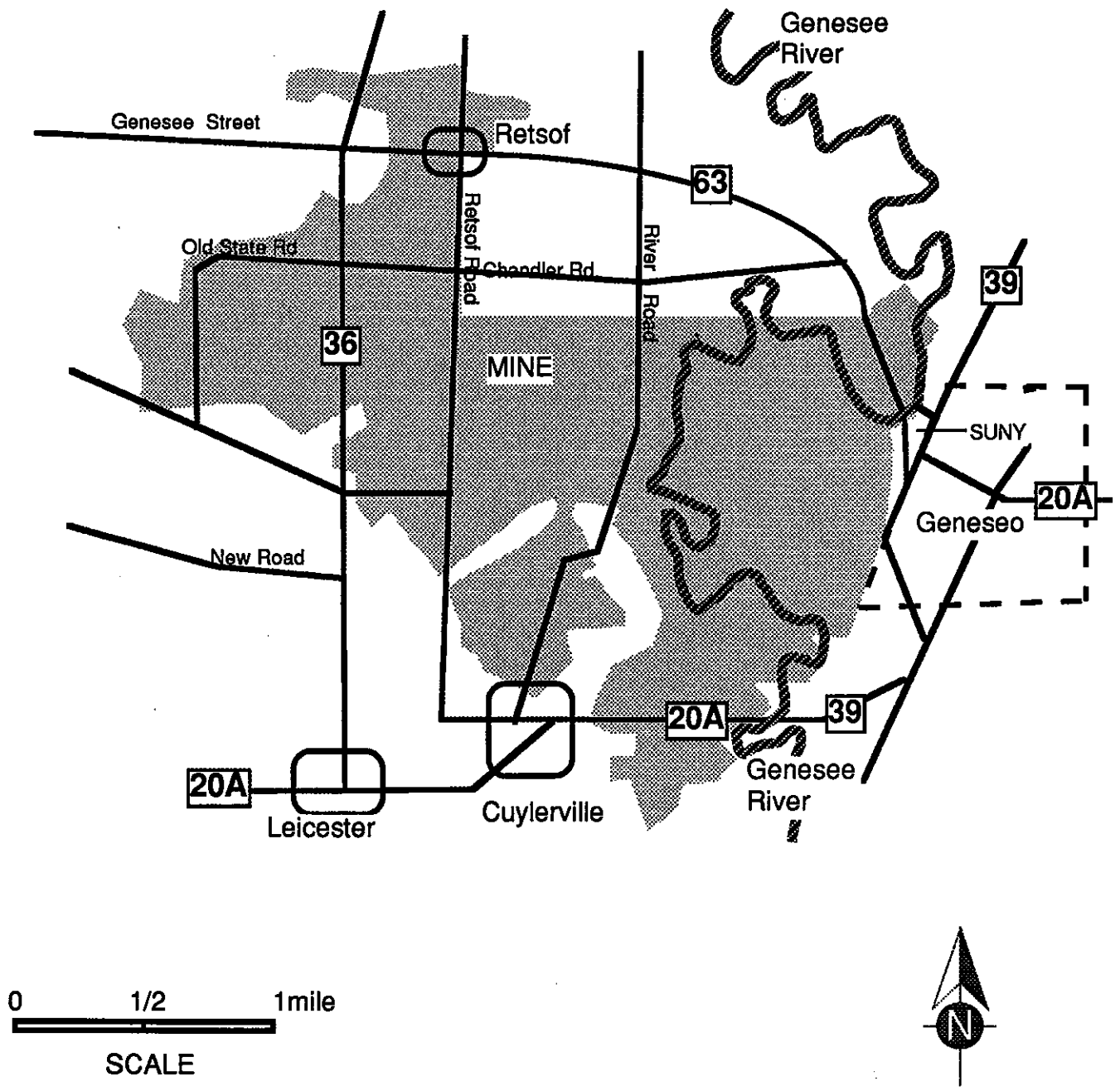
9.16.2.6. Responsible entity: Monroe County Department of Health

Author: Carole Beal

AKZO MINE

Livingston County
New York

 Akzo Salt Mine



9.17. Monitor the Impact of Road Salt on Fish and Wildlife Habitat

9.17.1. Background

Impairment status:

The Stage I Rochester Embayment Remedial Action Plan did not identify road salt (sodium chloride) as a cause of Use Impairments within the Rochester Embayment Watershed. However, during the development of the Stage II RAP, the Monroe County Water Quality Management Advisory Committee (WQMAC) expressed the concern that road salt may be contributing to the loss of fish and wildlife habitat in the Watershed.

Delisting guideline:

When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected.

Stage I goals:

- Water and shore habitats within the Rochester Embayment support thriving fish and wildlife populations.
- Diversity of plant and animal communities within the Rochester Embayment.

Irondequoit Basin Framework Plan objective:

- Reduce storm and melt water runoff chloride loadings to Irondequoit Bay from Irondequoit Creek from a maximum monthly load of 2,000 metric tons to 1,000 metric tons.

Ongoing monitoring:

The Monroe County Environmental Health Laboratory and the Monroe County Environmental Management Council conduct some monitoring of road salt. However, the impact of road salt on fish and wildlife habitat is not currently monitored.

Monroe County Environmental Health Laboratory (MCEHL):

MCEHL Water-Resources Data: The MCEHL, in cooperation with the United States Geological Survey (USGS), collects precipitation, stream-discharge, and chemical-quality data at selected sites in the Irondequoit Basin in order to document changes over time in sediment loads and the concentration of chemical constituents. The MCEHL also collects water quality data from a site near the mouth of the Genesee River and in Northrup Creek (Lake Ontario West Basin). Chloride concentration is one of the parameters that is monitored as part of this program. The chloride data is summarized in Figures 9-4 through 9-10.

With the exception of the Allen's Creek near Rochester, NY station, the chloride levels documented by the MCEHL are not sufficiently elevated for long enough periods of time to adversely affect fish and wildlife populations (G. Neuderfer). The New York State Department of Environmental Conservation (NYSDEC) has not established a chloride Ambient Water

Quality Standard for the protection of aquatic life. The Ambient Drinking Water Standard is 250 mg/L chloride. This Standard is based upon a "salty-taste" threshold. If the NYSDEC were to establish an Ambient Water Quality Standard for the protection of aquatic life, the toxicity literature indicates that it would be about 250 mg/L. The NYSDEC has used this number in many cases to protect aquatic life from chloride toxicity.

MCEHL Irondequoit Creek Wetlands Water Quality Project: In 1991, a flora study of the Irondequoit Creek Wetlands was conducted as part of the Irondequoit Creek Wetlands project (see Chapter 6 section "Irondequoit Basin Stormwater Research, Demonstration, and Implementation"). This study was published in the form of a report entitled Flora and Vegetation of the Irondequoit Creek and Buttonwood Creek Wetlands. As part of the study, the chemical contents of the plants in the Irondequoit Creek wetland was determined. The results of this research indicated that plants in the Irondequoit Creek Wetlands contain high levels of sodium compared to background sites.

Despite these results, road salt related damage to the wetland vegetation was not observed as part of the study (F. Seischab). Examples of road salt type damage include decreased species diversity (i.e. a monoculture of tolerant species such as reed (*Phragmites communis*)), stunted growth, and pockets of dead vegetation. The Irondequoit Creek Wetlands did not exhibit any of these problems. Instead, the flora study found that the Irondequoit Creek Wetlands were dominated by cattails (*Typha glauca*) and the biomass levels indicated lush growth.

Monroe County Environmental Management Council (EMC)

Road salt usage: EMC's The Use of Road Deicing Salt on State Roads in Monroe County report describes the use of road deicing materials by 19 different towns and two state jurisdictions over 6 or 7 seasons (1980/1981 to either 1985/1986 or 1986/1987). The physical characteristics and special problems of each town are also described. EMC found that the use of salt varies significantly. Conditions that dictate the use of salt also vary greatly, however the data suggests that there are still many unexploited opportunities for salt use reduction in Monroe County without sacrificing safety.

In May of 1995, EMC published a draft document entitled The Use of Road Deicing Salt on State Roads in Monroe County: An Update. As part of this update, a literature review was conducted of the environmental and economic impacts of deicing salt. The environmental impacts of road salt include damage to vegetation and soil, as well as the degradation of water quality.

The report states that excess salt has been found to hinder a plant's ability to take up water and nutrients. Sodium ions also decrease soil fertility, increase soil pH, and damage soil structure.

One of the primary local water quality problems associated with road salt, as described in the EMC report, is its impact on the natural overturn of the water in Irondequoit Bay. High salt

levels cause the lower portions of the water column to be more dense than the water above, thus impeding the Bay's ability to mix completely. The result of incomplete turnover is oxygen depletion in the deep portions of the Bay. A voluntary reduction in road salt usage by the municipalities surrounding the Bay from 76,000 tons in 1969-1970 to 43,000 tons by 1974-1985 has for the most part corrected this problem. However, in 1984 the Bay failed to completely overturn because of substantial usage of road salt during the spring turnover.

9.17.2. Proposed monitoring a: Monitor Chloride Concentrations in the Salmon Creek/Braddock Bay System

Background information: Braddock Bay and Salmon Creek comprise one of the largest and most important coastal wetland ecosystems in New York State. The Braddock Bay/Salmon Creek system supports a very diverse fishery and is a major concentration area for many species of migratory birds. As the Salmon Creek Watershed continues to develop, it is anticipated that road salt loadings to the system will increase.

9.17.2.1. Description of method: Long-term chloride monitoring at the existing stations in the Irondequoit Creek system, the Genesee River, and Northrup Creek should be continued and an additional station should be added in the Salmon Creek/Braddock Bay system. Long-term monitoring data would signal more widespread development of extended periods of chloride exceeding the 250 mg/L concern level. If that were to occur, then a more detailed biological/chemical impact study could be initiated.

9.17.2.2. Measured parameters: Chloride

9.17.2.3. Location of monitoring: Salmon Creek/Braddock Bay system

9.17.2.4. Estimated cost: The cost of partial monitoring (52 samples per year) of chloride concentrations in Salmon Creek would be approximately \$5,200 over a five year period. The cost of continuous monitoring (~150 samples per year) of chloride concentrations in Salmon Creek would be approximately \$18,300 over a five year period. It should be noted that these costs are relatively high if chloride is the only parameter that would be monitored. However, if chloride monitoring of Salmon Creek is initiated, a more complete suite of monitoring parameters may be desirable.

9.17.2.5. Possible funding sources: NYSDEC, Monroe County

9.17.2.6. Responsible entities: MCEHL, NYSDEC

9.17.3. Proposed monitoring b: Monitor Road Salt Usage

9.17.3.1. Description of method: A task group of the Monroe County Water Quality Management Advisory Committee (WQMAC) should work with the Monroe County Department of

Transportation to develop and conduct an annual survey of road salt usage by the municipalities and the New York State Department of Transportation on state roads in the urbanized part of the Rochester Embayment Watershed. Once the data is collected, it would have to be analyzed and a brief report compiled.

9.17.3.2. Measured parameters: The monitoring conducted by the EMC Salt Task Force focused on the use of road salt on state roads by each of the municipalities within Monroe County. One advantage of focusing on state roads is that the NYSDOT keeps records of municipal purchases of road salt for state roads. Because of limited time and staff resources, the Task Force chose not to collect data on salt usage in parking lots.

The following are realistic parameters that could be monitored.

- Total tons of road salt used by each municipality and the NYSDOT on state roads per year
- Tons of road salt used per lane mile by each municipality and the NYSDOT on state roads per year

9.17.3.3. Location of monitoring: The urbanized portion of the Rochester Embayment Watershed

9.17.3.4. Estimated cost: Assuming that two weeks of staff time would be required each year to coordinate the survey and compile the brief report, the cost of this monitoring activity would be approximately \$10,000 over a five year period.

9.17.3.5. Possible funding sources: Monroe County

9.17.3.6. Responsible entities: WQMAC, Monroe County, municipalities

Author: Todd Stevenson

Figure 9 - 4

Chloride Concentration East Branch of Allens Creek Pittsford

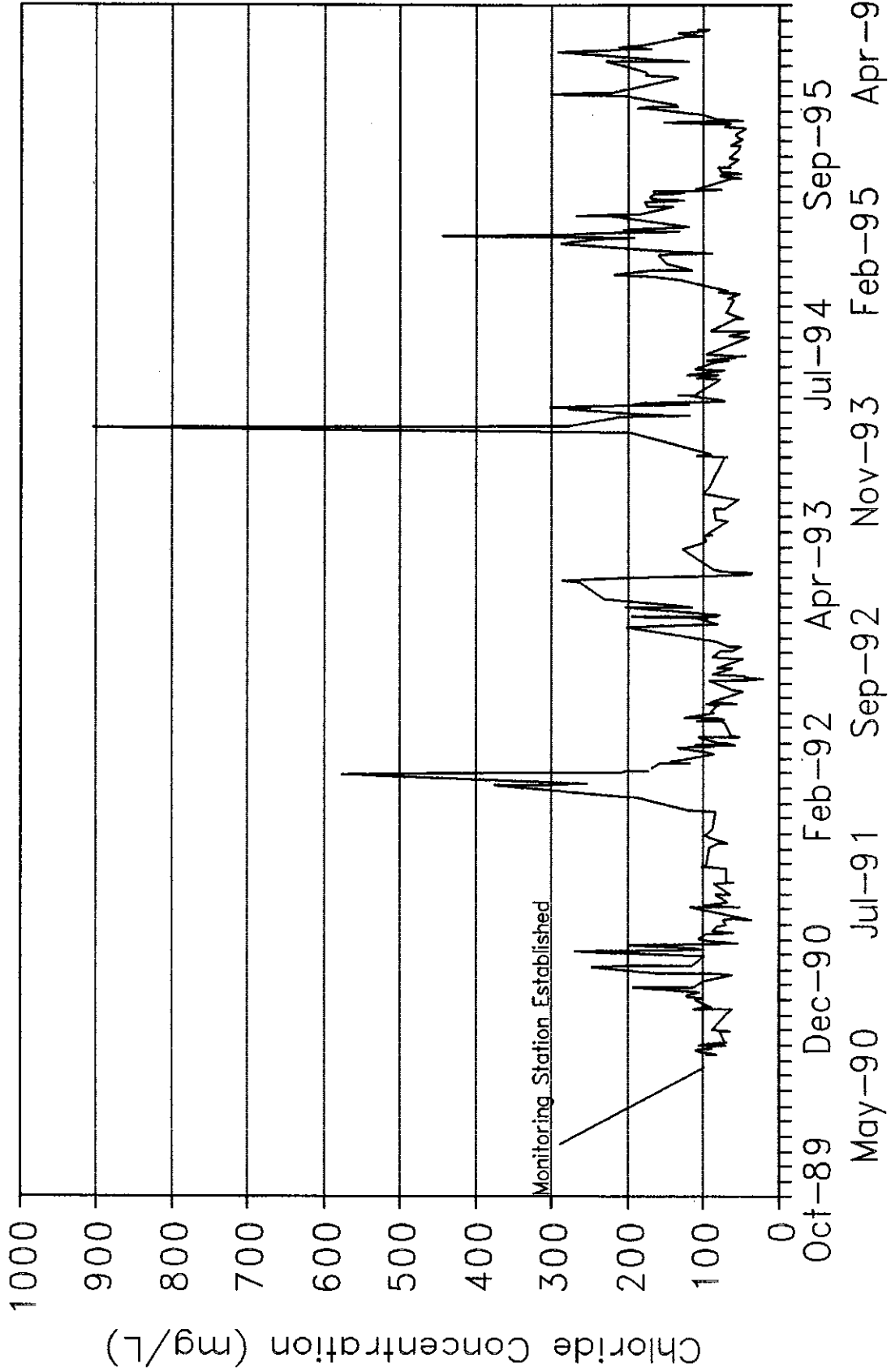


Figure 9 - 5

Chloride Concentration Allen's Creek near Rochester, NY

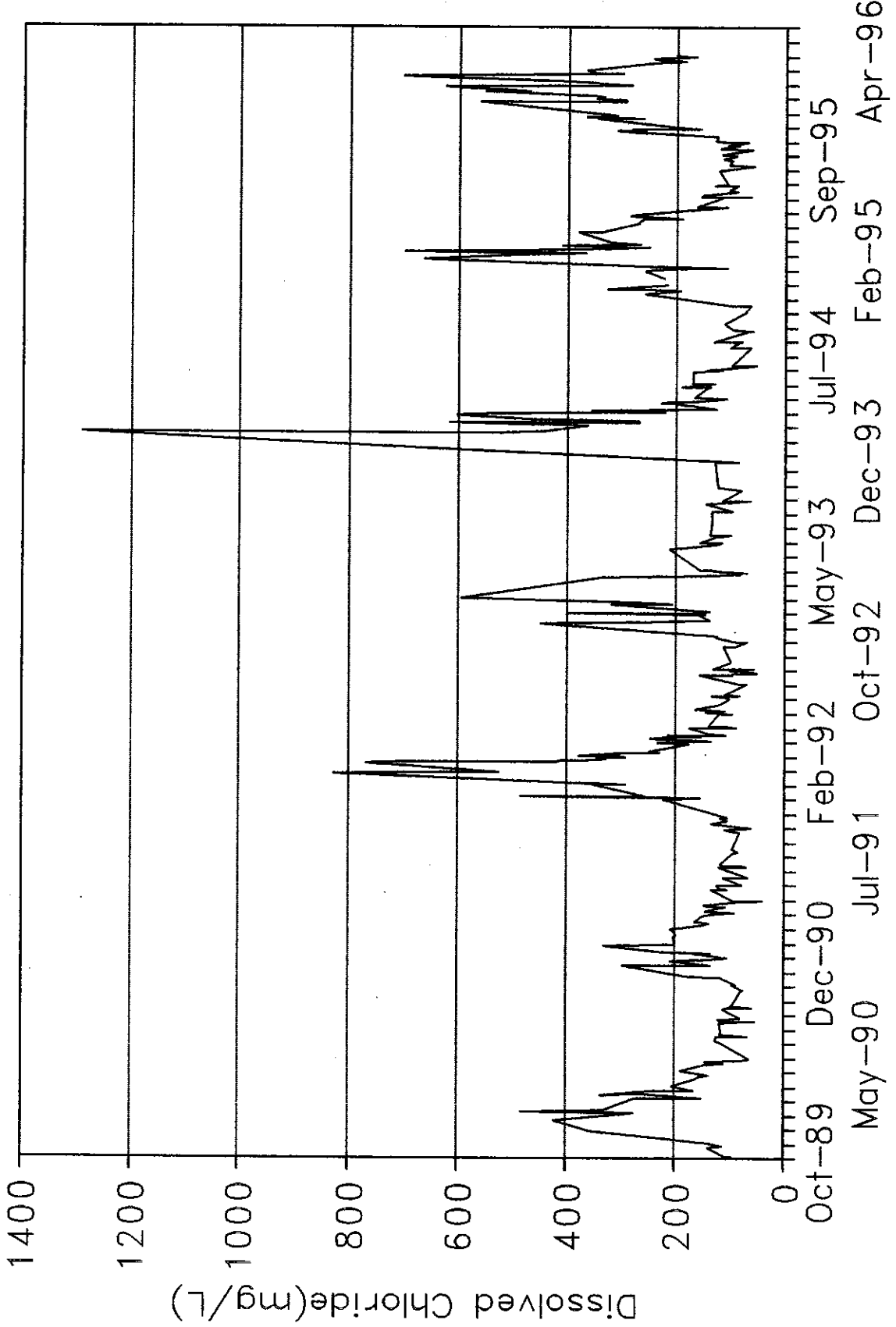


Figure 9 - 6

Chloride Concentration Irondequoit Creek at Thornell/RR Mills

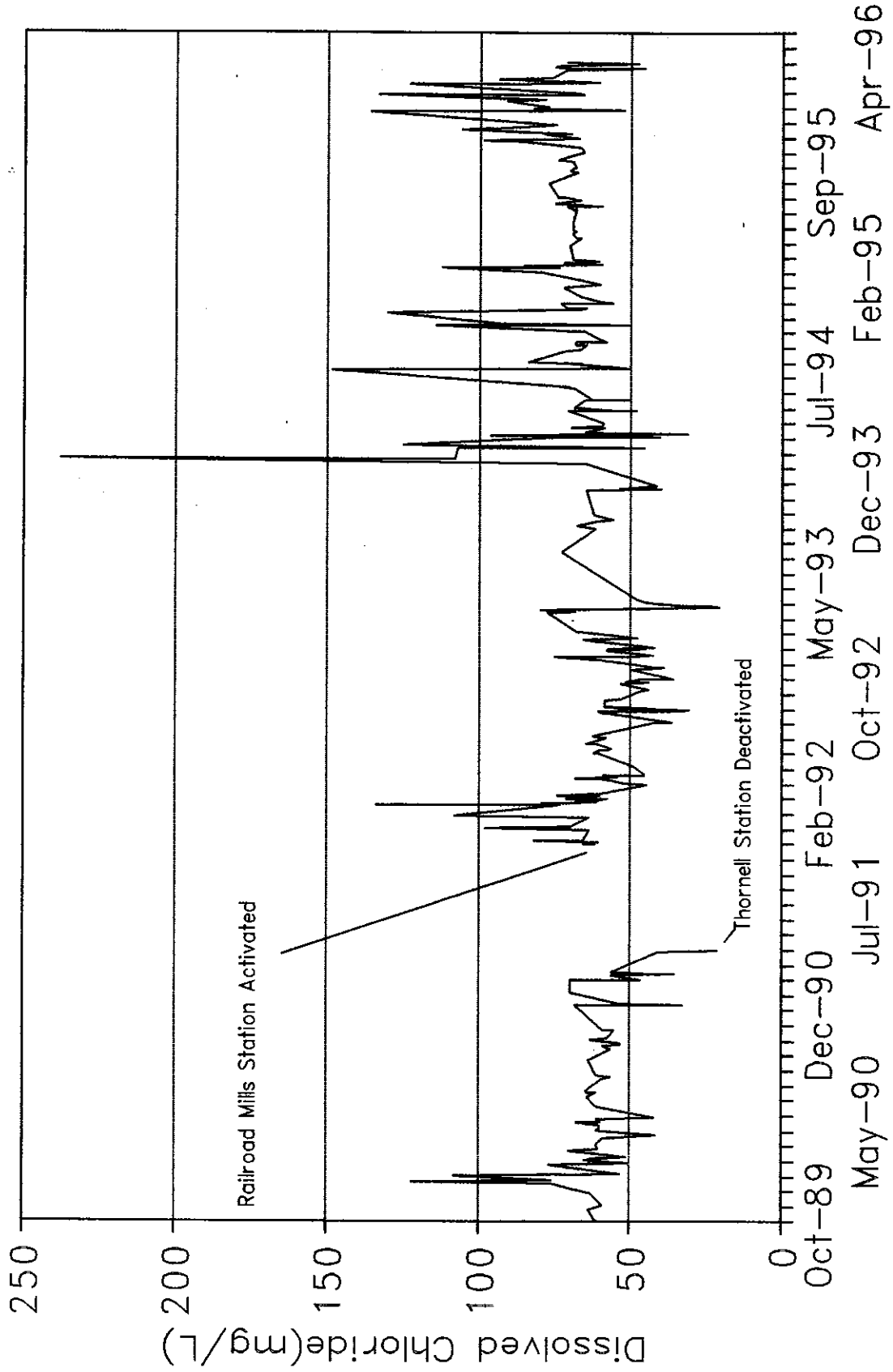


Figure 9 - 7

Chloride Concentration Irondequoit Creek at Blossom Road

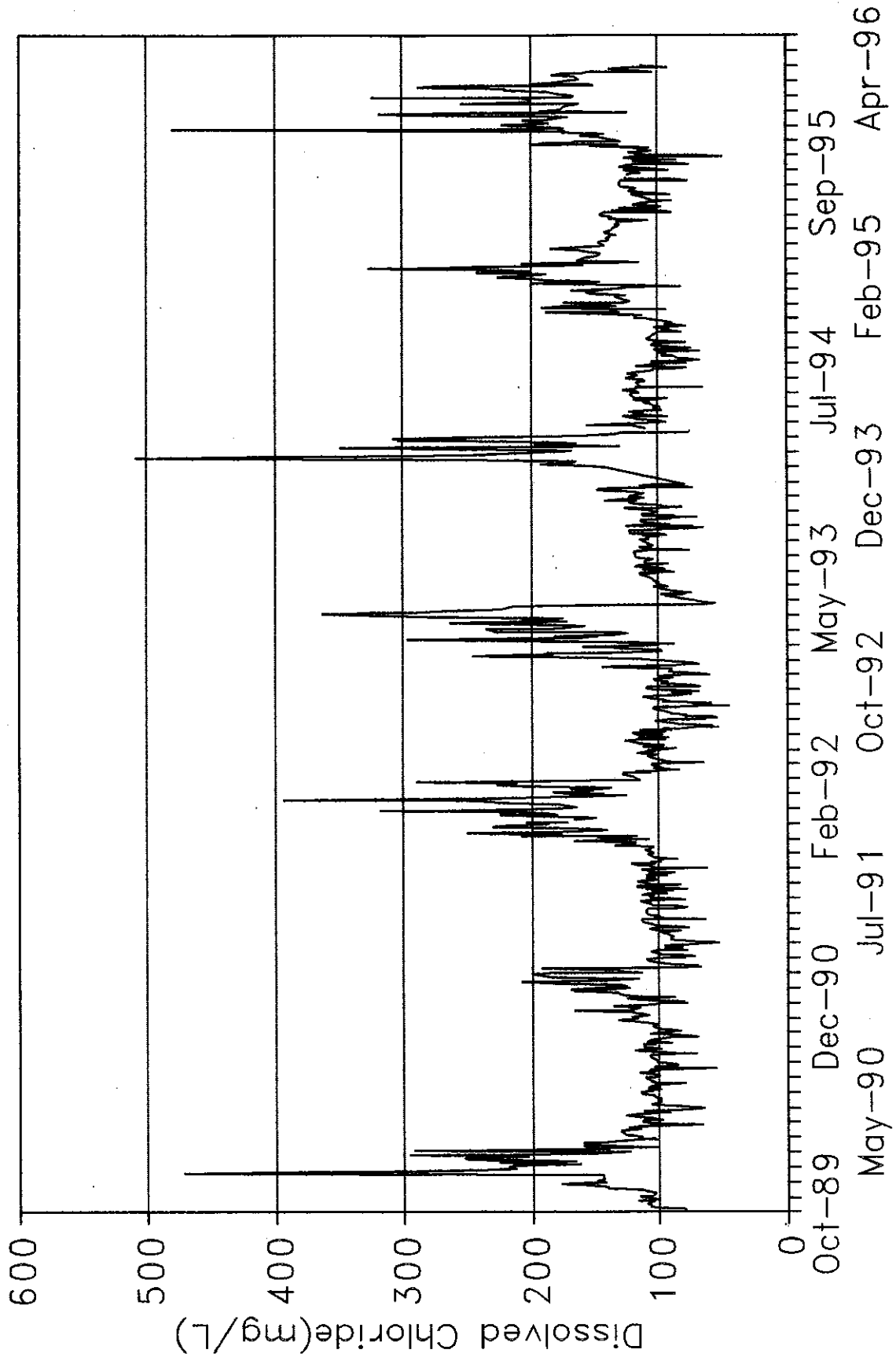


Figure 9 - 8

Chloride Concentration Irondequoit Creek at Empire Blvd.

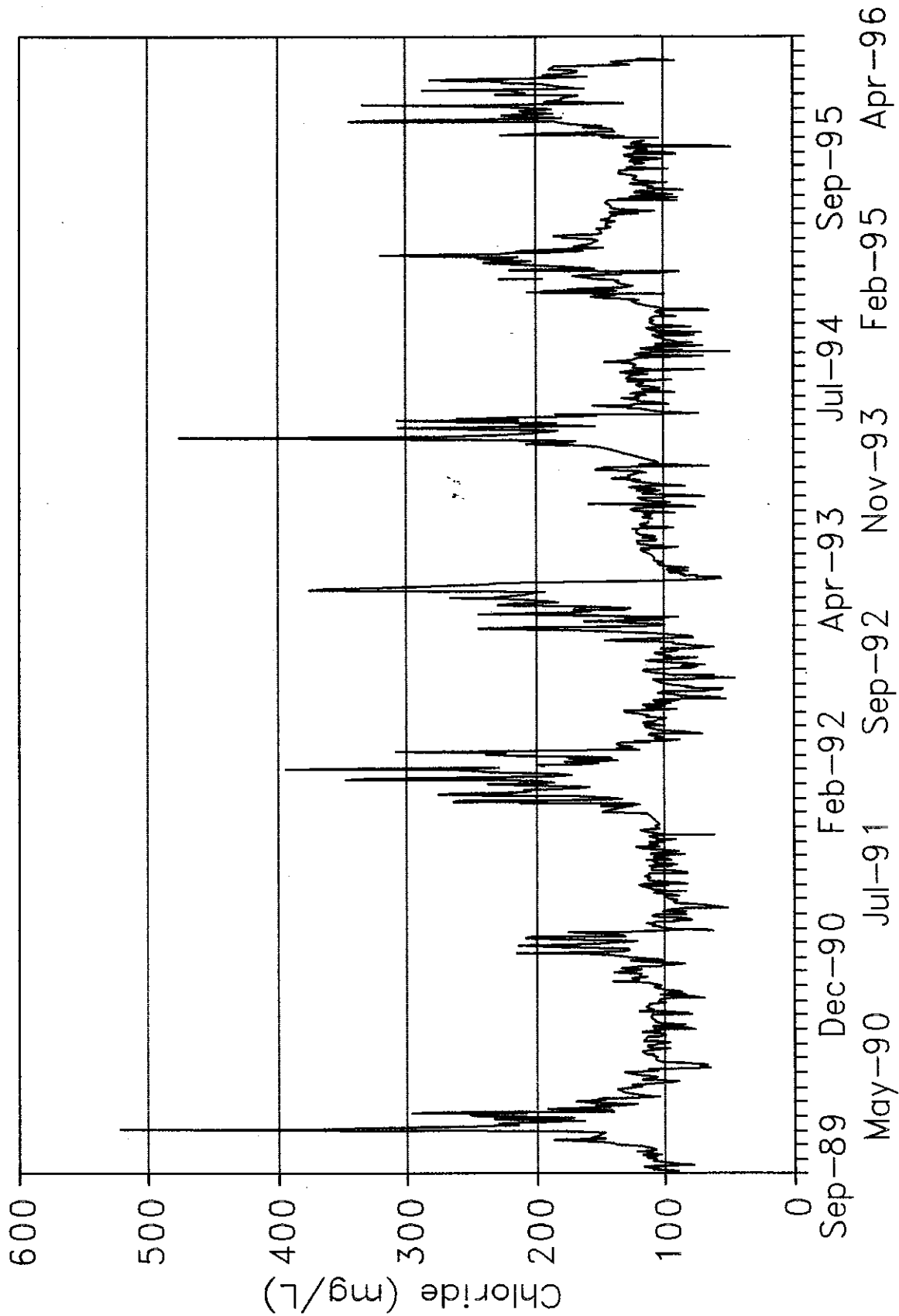


Figure 9 - 9

Chloride Concentration Genesee River at Charlotte, NY

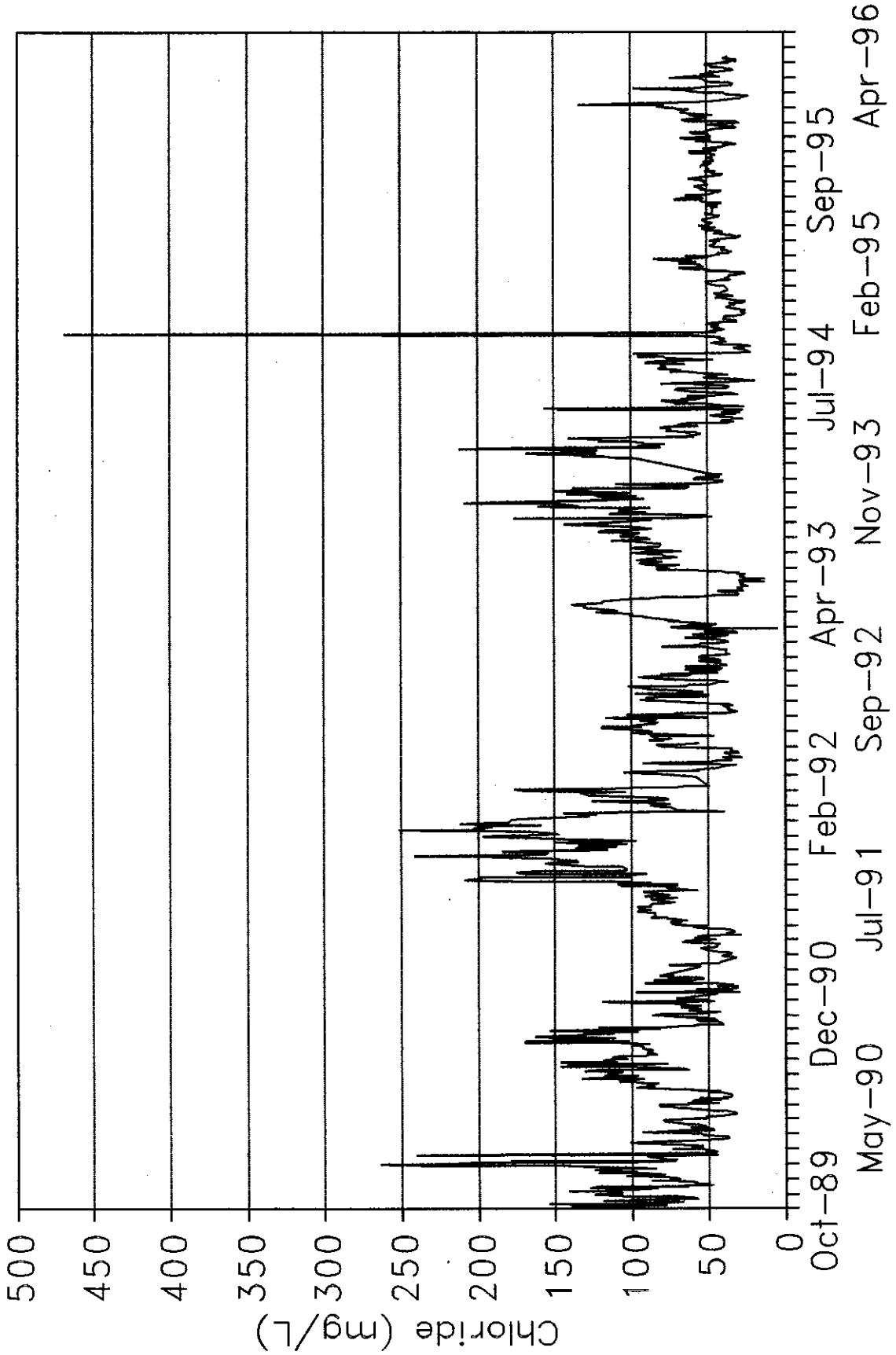
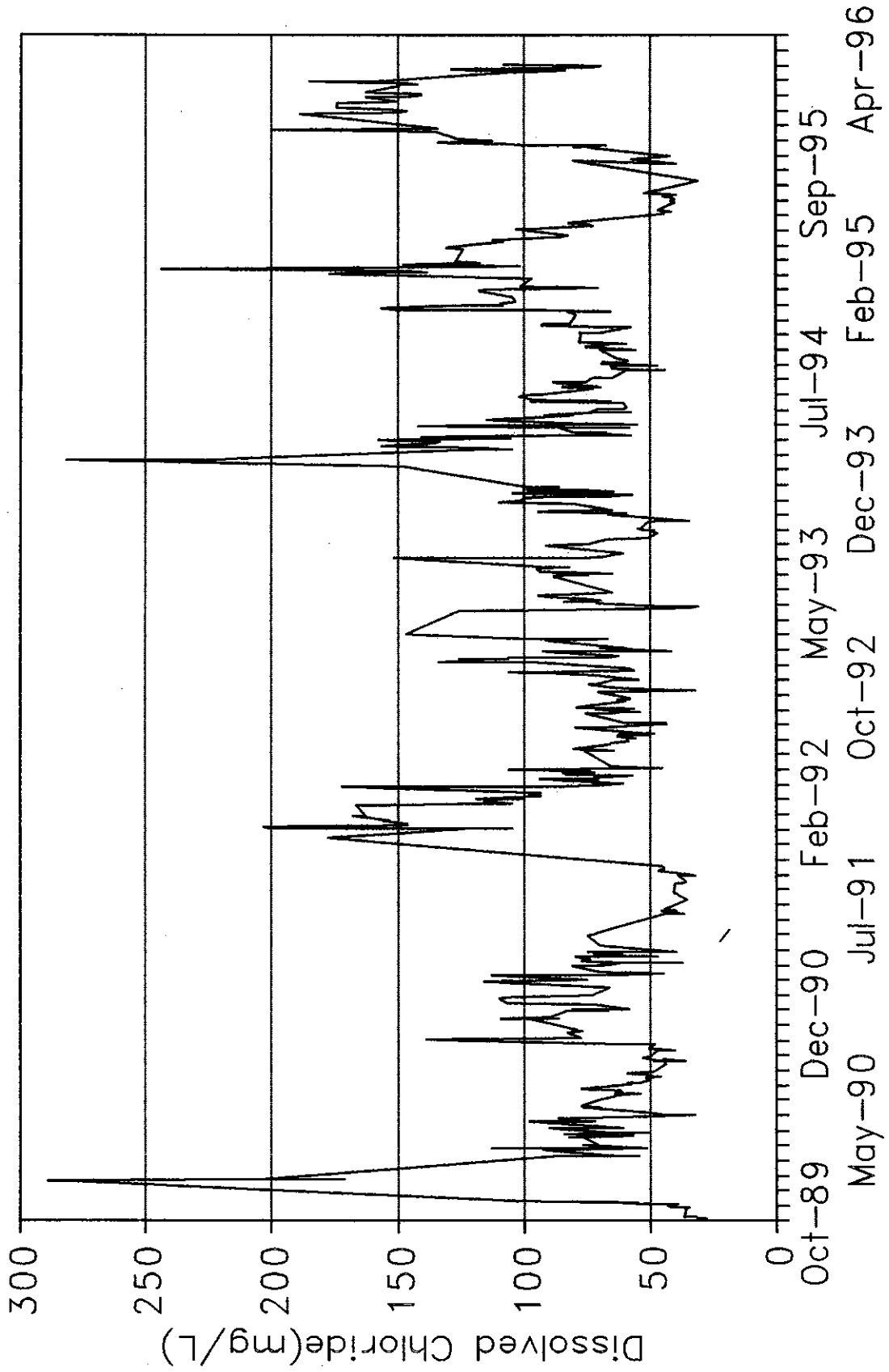


Figure 9 - 10

Chloride Concentration Northrup Creek at Latta Road



9.18. Data management

9.18.1. Background:

Impairment status: Not applicable

Delisting guideline: Not applicable

Stage I goal: Not applicable

Ongoing monitoring? Currently Monroe County has a cooperative agreement with the U.S. Geological Survey (USGS) whereby:

- The Monroe County Environmental Health Laboratory (EHL) collects water quality and flow data for surface waters within Monroe County, meeting USGS standards for data collection and analysis.
- USGS stores the data on the USGS database and incorporates Monroe County data in its annual U.S. Geological Survey Water-Data Report. Every five years USGS publishes an interpretative report that also incorporates the Monroe County data.

9.18.2. Proposed monitoring method: Create a centralized and easily accessible database for all high-quality water quality data produced within Monroe County

9.18.2.1. Description:

The goal of the project is to establish a data collection and retrieval system, in conjunction with the USGS, that would include all information of value generated within Monroe County, and would ensure compatibility of data generated by different agencies and private sector participants. This process should be phased so that public data generated by County agencies becomes available under sponsorship of the Water Quality Coordinating Committee (WQCC). Archival information should become available through the County library system. Appropriate private sector and university data should be incorporated under sponsorship of the Monroe County Water Quality Management Advisory Committee (WQMAC).

In 1996, the Monroe County EHL began meetings with the USGS in regards to a Monroe County database. There was consensus that:

- The Monroe County database would be separate from the USGS database.
- The USGS annual data report would reference the Monroe County database as a source of additional information.
- The USGS would incorporate Monroe County data (that is additional to data that is part of the current cooperative agreement) in interpretive reports if it is of high quality and is helpful for an interpretation. The schedule for the interpretive reports was not established. The County recommends every four years.

The USGS will assist Monroe County in establishment of the new database by providing technical expertise, and information on similar projects and on possible funding sources.

The establishment of the Monroe County database will require many steps:

- Develop criteria for inclusion of data.
- Describe a process for setting up the database, in cooperation with the Monroe County Department of Information Services and the County library system.
- Research funding options.
- Obtain approval of the project from the Monroe County Water Quality Management Agency.
- Communicate with Monroe County agencies about the project. Learn what kind of data the agencies can provide and what kind of quality control standards they are currently required to meet. Obtain agency commitments to the database project. (The establishment of the database with County agency data would essentially be a pilot project for the final database.)
- Communicate with other data-producing entities such as universities, consultants, private laboratories and industries. Learn what kind of data they can provide and what kind of quality control standards they are currently required to meet. Obtain commitments.
- Incorporate historical data to the extent possible.

In the initial planning stage, it is assumed that the data will be accessible electronically, rather than in print. It is foreseen that eventually the database will be accessible on the Internet, and may incorporate Geographic Information Systems (GIS).

A centralized and easily accessible database for Monroe County water quality data will greatly facilitate the monitoring of progress toward RAP goals.

9.18.2.2. Measured parameter(s): All water quality data meeting USGS standards

9.18.2.3. Location(s) of monitoring: All water quality data meeting USGS standards

9.18.2.4. Estimated cost: A start-up cost for inclusion of Monroe County data in the database would be on the order of \$10,000. Costs for the retrieval system and for the inclusion of archival data cannot yet be estimated.

9.18.2.5. Possible funding sources: U.S. Department of the Interior, U.S. Environmental Protection Agency, Monroe County, New York State Archives and Records Administration

9.18.2.6. Responsible entity: Monroe County Department of Health

Author: Carole Beal