6.20. Rapid response to spills on Lake Ontario

6.20.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies Lake Ontario and shoreline

Date program initiated: The authority for the Eastern Great Lakes Area Oil Pollution Contingency Plan is the federal Oil Pollution Act of 1990. The most recent Plan was promulgated in June 30, 1994. The Plan is to be updated annually through 1997 and every five years after 1997.

Completed or ongoing? Ongoing

Additional information: A spill into a water body or onto the surface of a water body damages or kills aquatic life. Oil or other hazardous substances contaminate drinking water supplies. On the shoreline oil or other hazardous substances may damage habitat and damage or kill wildlife.

6.20.2. Program: Rapid response to spills on Lake Ontario

6.20.2.1. Program description:

The Eastern Great Lakes Area (Lakes Erie and Ontario) Oil Pollution Contingency Plan is coordinated by the U.S. Coast Guard. The Area is divided into four subareas: Lake Erie, Buffalo/Niagara River Subarea, Rochester/Oswego Subarea, and St. Lawrence River Subarea. The Plan also addresses spills of other hazardous materials than oil.

Area Committees

The primary role of the Area Committee is to act as a preparedness and planning body. Area Committees are comprised of experienced environmental and response representatives from federal, state and local agencies. Each member is empowered by their own agency to commit the agency to carrying out roles and responsibilities in the response plan. In New York State, each shoreline county's emergency management office is represented on the appropriate Area Committee. Each Area Committee is under the direction of a pre-designated federal On-Scene Coordinator (OSC) who selects Committee members and subcommittee members.

The Area Committee, an oversight group, solicits advice, guidance and expertise from all appropriate sources and establishes subcommittees as necessary. The subcommittees are the working committees. Subcommittee members may include facility owners and operators, shipping company representatives, cleanup contractors, emergency response officials, marine pilots associations, academia, environmental groups, consultants, response organizations and

concerned citizens.

Each Area Committee is responsible for:

- Developing an Area Contingency Plan.
- Working with state and local officials to pre-plan for joint response efforts, including appropriate procedures for mechanical recovery, dispersal, shoreline cleanup, protection of sensitive environmental areas, and protection, rescue, and rehabilitation of fisheries and wildlife.
- Working with state and local officials to expedite decisions for the use of dispersants and other mitigating substances and devices.

Area Contingency Plan

The Area Contingency Plan, when implemented along with the National Contingency Plan, is intended to be adequate to remove a worst-case discharge of oil or a hazardous substance, and to mitigate or prevent a substantial threat of a discharge from a vessel, offshore facility or onshore facility operating in or near the geographic area. Each Plan must also describe the following:

- The area covered by the Plan, including areas of special economic or environmental importance.
- The responsibilities of an owner/operator and of federal, state and local agencies.
- The equipment, dispersants, or other mitigating substances and devices, and personnel available.
- How the Plan is integrated into other plans.

The Plan describes the strategy for the response, and includes fully developed response scenarios for a variety of types and sizes of oil spills and hazardous chemical releases at the locations where they would most likely occur, including worst-case discharges from fire or explosion. (The worst-case discharge of an oil product for a vessel is a release of its entire cargo in adverse weather conditions, approximately 3,500,000 gallons of #6 oil.) One section of the Plan covers hazardous chemical response exclusively.

An oil spill scenario includes information on:

- Notification.
- Preliminary assessment and initiation of action.
- Containment, countermeasures, cleanup and disposal.
- Documentation and cost recovery.

Some of the factors addressed in planning for scenarios include response actions and organization, environmental issues such as shoreline protection and wildlife preservation, and related administrative concerns such as funding. The Plan also serves as an instrument by which to coordinate response policies of governmental agencies with those of industry.

For the Rochester/Oswego Subarea, the Plan lists communications capabilities of various

agencies including:

- Coast Guard.
- New York State Department of Environmental Conservation (NYSDEC).
- Orleans, Monroe and Oswego emergency services officers. (See also Chapter 6 section on "Rapid Response to Spills.")
- Local and municipal law enforcement officers, fire departments, hazardous materials response teams, water intake owners, and response contractors.

If an oil spill incident on Lake Ontario is generated by a county entity (person, group, municipality or business), the county's Hazardous Materials Response Plan would be in effect, even if the Coast Guard assists. Whoever is aware of the incident (county or Coast Guard) notifies the other.

Sensitive areas

Sensitive areas in the Eastern Great Lakes Area include water intakes, bird and wildlife refuge areas, beaches, parks, marinas and coastal tourist establishments. Sensitive Areas are listed with a numerical protection priority value. The criteria for assigning protection priority values incorporates two existing systems: New York State's Significant Coastal Fish and Wildlife Habitats Program, and NOAA/U.S. Coast Guard Guidelines for the Development of Sensitive Area Protection Strategies.

New York State's Significant Coastal Fish and Wildlife Habitats Program assigns significance values based upon the following factors:

- Population level
- Species vulnerability
- Ecosystem rarity
- Human use
- Replaceability

NOAA/U.S. Coast Guard Guidelines assign a resource priority value based on four criteria:

- Specific sensitive resource
- Duration of Impact
- Likelihood of direct impact
- Seasonality (sensitivity varies depending upon season)

The priority values within the Rochester/Oswego Subarea vary from 4.51 to 59.03. Water intakes are always considered to be a first priority. Sensitive areas within the Rochester Embayment are:

• Hamlin Beach State Park	16.58
• Brockport Waterworks	water intake
• Sandy Creek	12.91
• Braddock Bay and Salmon Creek	59.03

•	Slater Creek	4.51
•	Genesee River	13.84
•	Monroe County Water Authority	water intake
•	Rochester Gas & Electric Corp.	water intake
•	Eastman Kodak Company	water intake
•	Irondequoit Bay and Creek	17.32

6.20.2.2. Costs and/or sources of funding: Sources of funding are the responsible party, U.S. Coast Guard, state, county

6.20.2.3. Current responsible entity: The Plan specifically commits only U.S. Coast Guard resources, but the NYSDEC is committed to the general concepts outlined in the Plan, as well as a multi-agency approach to resolving the problems associated with a pollution incident.

6.20.2.4. Effectiveness: There have been no major incidents to test the effectiveness of the Oil Pollution Contingency Plan. However, the planning process has fostered good interagency coordination and a cooperative attitude.

An oil emergency that would not be covered by the Oil Pollution Contingency Plan is the ejection of fuel over Lake Ontario by an aircraft before landing, in the case of a potential emergency. The oil would descend as a fine mist, or could blow a long distance, and thus be uncollectible.

Author: Carole Beal

6.21. Kodak Wastewater Treatment Plant

6.21.1. Background:

Use impairments addressed: See Table 6-1

Without proper treatment of industrial wastes, loadings from conventional, nonconventional, toxic, and persistent pollutants can cause degradation of benthos, phytoplankton, and zooplankton populations.

Affected water body: Genesee River and Lake Ontario

Date program initiated: 1970 (secondary treatment)

Completed or ongoing? Completed

6.21.2. Program: Kodak Wastewater Treatment Plant

6.21.2.1. Program description:

The Kodak Park Manufacturing Division of the Eastman Kodak Company lies along the Genesee River in Rochester, New York. When the first buildings were erected in 1880, the immediate area was in the Town of Greece and no Town sewers were available. Following the practice of the time, a sewer was laid directly to the Genesee River to convey the few thousand gallons per day of wastewater, sanitary and stormwater discharges. Since that time, Kodak Park has grown to be a 2,200-acre, 480-building facility employing approximately 17,000 people. During the manufacture of sensitized film and paper, laboratory chemicals, and other products aligned with photographic products, an average of approximately 28 million gallons per day (mgd) of industrial wastewater is generated. As the environmental regulations surrounding discharges to the waters of the United States, culminating with the Clean Water Act of 1972, have become more stringent, Kodak Park's treatment of its industrial wastewaters also had to improve.

In 1957, this treatment need was met with the installation of a primary treatment system having a capacity of approximately 25 Mgd on the bank of the River, later to be known as the King's Landing Wastewater Purification Plant (KLWPP). This new system was comprised of the following equipment:

- Bar screens - Two large, elevating screens, located at the end of the sewer pipe, designed to remove large pieces of debris from the wastewater stream.
- Grit chamber - A 48-foot long x 13-food wide x 14-foot deep chamber where large particulate matter settled out of the wastewaters. This "grit" was then piped down the hill into a collection chamber for disposal.
- Two primary clarifiers - Each a 120-foot diameter, 12-foot deep circular basin used to settle as much remaining particulate matter and remove as much floating scum from the

wastewaters as possible.

- Three vacuum filters - Used to dewater the "primary sludge" from the bottom of the two primary clarifiers.
- Hydroelectric turbine- Used to convert the kinetic energy (energy associated with motion) built-up in the wastewaters as they flowed down the approximately 120-foot vertical drop from the top of the River bluffs to the treatment plant at the River flats.
- Two sludge holding tanks, each with a 50,000 gallon capacity, used to store primary sludge from the clarifiers.

In 1962, a 70-foot long rotary kiln was installed to incinerate the dewatered sludge from the vacuum filters. This eliminated the need to ship the sludge off-site for disposal. The ash generated by the incineration of the sludge was sent to a silver smelter in Canada where the silver was reclaimed.

In 1967, two vibrating screens were installed at the foot of the hill to process the grit from the grit chamber. Grit and wastewater were poured onto a vibrating screen which would drain the water from the grit. The dewatered grit was subsequently incinerated in the rotary kiln along with dewatered primary sludge.

Knowing that the classification of use for the Genesee River was to be changed by New York State, Kodak informed the New York State Department of Health in 1964 that it intended to build a secondary treatment plant with a 36 Mgd capacity. In 1970 Kodak brought on-line its complete-mix activated sludge biological secondary treatment plant. Wastewaters from the primary clarifiers were now routed to the secondary plant for further treatment instead of being discharged directly to the Genesee River. The secondary plant consists of the following equipment:

- Three 2.5-million gallon (MG) aeration basins with a forced-air mixing/aeration system. These basins contain the wastewater treatment microorganisms, specialized types of bacteria which remove dissolved organic compounds by using them as a food source, converting them to energy and carbon dioxide. Heavy metals removal is achieved by adsorption of the molecule to the surface of the microorganism, or absorption of the molecule directly into the microorganism.
- Three 1.5-MG secondary clarifiers - The microorganisms and wastewater flow from the aeration basins to the secondary clarifiers. They then settle to the bottom where they are vacuumed off the floor. Some of the microorganisms are returned back to the aeration basins ("returned activated sludge"), and some are removed from the system and pumped to holding tanks ("waste activated sludge").
- A third 50,000 gallon sludge holding tank was installed, so three tanks are used to store the waste activated sludge from the secondary plant, and primary sludge from the primary clarifiers.
- Two trickling filters with a capacity of 12 Mgd. These 21.5-foot high, 58-foot diameter tanks are packed with filter media. The filter media are coated with the treatment plant microorganisms. Wastewaters from the primary clarifiers are pumped to the top and

sprayed onto the filters. The water then "trickles" down to the bottom, and is treated by the microorganisms prior to being discharged into the aeration basins. This acts as a pretreatment step during times of high organic loading.

Since the secondary plant is a biological system, it is very sensitive to pH. Therefore, lime and/or 50% sodium hydroxide addition systems were installed to buffer low pH influent loads, and a sulfuric acid addition system was installed to buffer high pH influent loads. As part of the Monroe County Department of Health's coliform control strategy, two 1-ton chlorine gas cylinders were installed to chlorinate the final effluent from the treatment plant. An intentional part of the design created a natural waterfall as the treated waters were discharged from the secondary plant to the River. This helps to reaerate the water before it gets to the River.

In 1973, a third primary clarifier was installed to accommodate increasing hydraulic flows from Kodak Park.

In 1974, two significant additions were made to the facility. Since the oldest portion of the Park, "Kodak Park East (KPE)," was built at a time when "industrial" and "storm" sewer systems were not separate, during heavy rainstorms the treatment plant would experience significantly higher than normal hydraulic loads. To help keep the facility from being hydraulically overwhelmed during such events, a 2-million-gallon storm tank was installed. This would allow incoming wastewater/rainwater flow to be partially diverted to maintain hydraulic equilibrium during the rain event. To help manage increasing loads of sludge, a 4-story, 7-stage Multiple Hearth Incinerator was installed to functionally replace the rotary kiln, which became a back-up unit instead of the primary sludge incinerator, along with a plate and frame pressure filter to augment the vacuum filters.

In 1982, to again help accommodate increasing sludge loads, a "dissolved air flotation (DAF)" system and another sludge holding tank were built. The DAF is designed to take a very dilute stream of wastewater and secondary sludge and concentrate the amount of sludge per gallon of wastewater. By having a higher concentration of sludge per gallon of wastewater, less overall mixture has to be stored in the holding tanks prior to filtering and incineration.

To help eliminate odor concerns as a result of the off-gassing of hydrogen sulfide during sludge management, two sodium hypochlorite (NaClO) scrubbers were installed in 1981. Air from the holding tanks, vacuum filters, and trickling filters were drawn into the scrubbers where the hypochlorite destroyed the hydrogen sulfide. To further enhance the control of off-gassing from the trickling filters, domes were installed in 1982 to make them fully enclosed units.

Since sodium hypochlorite was already used in the scrubbers, and it was found to be as effective as the chlorine gas as a final effluent disinfectant, the one-ton chlorine gas cylinder system was removed in 1983.

In 1986, to help control influent loads of solvents from Kodak Park manufacturing operations, a

gas chromatography (GC) system was installed. The GC analyzed a sample of the influent every 40 minutes for approximately 35 common organic solvents. This system would alert the operations staff to higher-than-normal influent loads, thus allowing them to take the appropriate steps to adjust the treatment process for optimum removal efficiency.

In 1989, two belt press filters were installed to replace the less efficient vacuum filter and plate and frame systems. This once again expanded the plant's ability to handle sludge loads.

In 1993, a highly sophisticated, four-GC system was brought on-line to replace the system originally installed in 1986. The new system not only analyzed for more solvents, but also analyzed the influent every 20 minutes instead of every 40 minutes, and had much lower limits of detection for almost all the chemicals.

In 1994, the rotary kiln was dismantled as it was no longer needed as a back-up to the Multiple Hearth Incinerator. In addition, new air pollution control equipment was installed on the Hearth.

Although the King's Landing Wastewater Purification Plant has evolved over the years from a single pipe discharging to the River to a highly sophisticated, state-of-the-art, activated sludge treatment plant, Kodak continues to look at the process and the equipment to find opportunities for improvement. It is expected that the next 25 years will bring as many changes and improvements as the last twenty-five years did.

It is important to note that King's Landing is an "industrial" wastewater treatment plant, and does NOT treat sanitary wastes from Kodak Park. As far back as the 1930s, concerted efforts on the part of the municipalities and Kodak carried out a program to separate sanitary from storm sewers. Kodak Park has continued that program by diverting all sanitary streams to Monroe County as they were discovered over time.

6.21.2.2. Costs and/or sources of funding: The source of funding is Eastman Kodak Company.

6.21.2.3. Current responsible entity: Eastman Kodak Company

6.21.2.4. Effectiveness:

Through the many upgrades of KLWPP, wastewater treatment for Kodak Park has evolved from the discharge of untreated waters directly to the River in the late 1800s and early to mid-1900s, to the removal of solids and some organics starting with the primary plant installation in 1957, to the destruction of most organics and the enhanced removal of metals with the installation of the secondary plant in 1970. The changes made since 1970 have provided odor control, more efficient removal and management of the solids removed from the system, reduced air emissions with the installation of the new air pollution control on the hearth, and enhanced understanding and control of influent loading with the installation of the online gas chromatography system. The future will hold upgrades and process enhancements that will be designed to optimize plant

performance, leading to reduced discharges as required by future New York State Pollution Discharge Elimination System permits and environmental regulations.

Author: Burt Gorton

6.22. Combined Sewer Overflow Abatement Program: Construction and Operation, Best Management Practices, and Additional Treatment Facilities

6.22.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: Lake Ontario, Genesee River, and Irondequoit Bay.

Date program initiated: 1964

Completed or ongoing: Ongoing

6.22.2. Program: Combined Sewer Overflow Abatement Program

6.22.2.1. Program Description:

The Rochester Pure Waters District's (RPWD) Combined Sewer Overflow Abatement Program (CSOAP) is a comprehensive approach to mitigate the environmental and socio-economic effects of combined sewer overflows (CSOs). The term CSO refers to the discharge, during wet weather, of untreated effluent that originates from a collection system which is designed to convey both wastewater and stormwater. This discharge occurs when large quantities of stormwater overwhelm the conveyance system thus allowing some of the combined wastewater-stormwater to be relieved from the system and enter receiving waters untreated.

CSOAP is an element of Monroe County's Pure Waters Master Plan which was prepared in order to outline activities needed to improve water quality in Monroe County. The program includes Best Management Practices (BMP) improvements to existing sanitary sewer facilities, a deep-rock storage and conveyance tunnel network for combined sewage, and additional treatment facilities to provide preliminary treatment of combined wastewater and stormwater collected during intense wet weather events. Currently in-place are: 30 miles of tunnels representing a storage volume of approximately 175 million gallons; additional treatment facilities which increase the plant's ability to provide preliminary treatment and disinfection of storm-related flow rates of up to 600 million gallons per day; and cleaned and re-lined existing trunk sewers which increase the surface sewers' conveyance capacity.

The abatement of CSOs was initiated by the City of Rochester in 1964. CSOAP commenced in the early 1970s with the construction of the major abatement facilities. Initially, a series of comprehensive sewerage studies was conducted by Monroe County in conjunction with the New York State Department of Health. The intent of these studies was to identify, and recommend solutions for pollution problems on a county-wide basis. The effects of CSOs on the Genesee River and Irondequoit Bay became a focal point for the Rochester Pure Waters District following

the elimination of the numerous small wastewater treatment facilities that were contributing to water quality degradation (for more information, see Chapter 6 "Pure Waters Program"). At this same time, the sewer system within the City of Rochester was incorporated into a Pure Waters District and the County's water quality goals, as established in the Pure Waters Master Plan, were extended to the City's combined sewer system. Ultimately, two approaches to the abatement of CSOs were implemented.

Non-structural Improvements:

A number of Best Management Practices (BMPs) were analyzed as strategies for reducing CSOs from existing facilities including sewer cleaning, sewer re-lining, porous pavement, hydrobrake regulators and off-line storage tanks, catchbasin/street sweeping, treatment plant operating schemes, and existing regulator modifications. Demonstration projects indicated that the porous pavement and catchbasin/street sweeping methods required too much maintenance to be effective. It was determined that the most effective methods were sewer cleaning and relining, along with limited regulator modifications. In addition, new methods of operational enhancement were developed to maximize the hydraulic capacity of the system. For example, the split flow concept was implemented at the Van Lare Waste Water Treatment Facility (WWTF). This method allows a portion of the higher volume wet weather flows to be routed around the secondary system and re-introduced prior to disinfection thus meeting all State Pollution Discharge Elimination System (SPDES) requirements.

Structural Improvements:

In order to address CSOs that could not be economically eliminated through the implementation of BMPs, a number of structural approaches were analyzed including storage/conveyance tunnels, point-source treatment, and the separation of the combined sewer system into storm and sanitary sewers. The separation of the combined sewer system was rejected because of the tremendous cost and disruption to about 75% of the City's streets (e.g. socio-economic impacts). Ultimately, it was decided that a deep-rock storage/conveyance tunnel system and storm water treatment facilities would be the most effective strategies.

The CSOAP system is comprised of four (4) operational components; the Eastside Tunnel System, the Frank E. Van Lare Wastewater Treatment Facility (WWTF), the Westside Tunnel System, and the collection/trunk sewer network. The Eastside Tunnel System protects Irondequoit Bay from combined sewer overflows by storing the combined sewage and then pumping it to the Van Lare WWTF for treatment. The Van Lare plant provides secondary treatment beyond its SPDES permitted rate of 135 million gallons per day (mgd), with preliminary treatment up to a storm-related rate of 600 mgd. The Westside Tunnel System prevents discharges from entering the Genesee River. Ongoing improvements within the 700 mile collection system (e.g. Best Management Practices) are intended to better utilize the surface sewers.

In order to facilitate the increased storm-related flows, Additional Treatment Facilities (ATF) were constructed at the Van Lare WWTF. These facilities provide preliminary treatment and chlorination to a portion of storm flows prior to discharge into Lake Ontario. Since becoming fully operational, CSOAP/ATF have provided that approximately 15% of storm generated flows have received preliminary treatment (i.e., have been routed through the complete ATF system). The other 85% received secondary levels of treatment and disinfection in addition to preliminary treatment. This is achieved through close coordination among the various components of the Pure Waters' system. In addition, an extensive Supervisory Control computer scheme is being developed that will provide the operators with operating recommendations based on important data from a multitude of control points.

With an average age of over 75 years, sewer system maintenance, upgrades and operational modifications are ongoing including cleaning and/or relining trunk sewers. These actions serve to maximize the surface network's capacity and minimize the potential for CSOs. As a result, the deep-rock storage tunnels can be better utilized for a wider range of storm events.

6.22.2.2. Costs and/or sources of funding:

Project costs to date are approximately $550,000,000. This includes the in-place facilities for CSOAP, the implementation of Best Management Practices, and the Additional Treatment Facilities. The program has been funded by general obligation bonds and federal and state grants and loans.

6.22.2.3. Current responsible entity: Monroe County Department of Environmental Services

6.22.2.4. Effectiveness:

The water quality benefits of CSOAP have been significant. The program has received national recognition including the prestigious "CSO Control Program Excellence Award" from the United States Environmental Protection Agency (USEPA) in 1991. CSOAP has substantially increased operational flexibility, thus reducing the potential for either dry or wet weather discharges. The program has significantly reduced the number of Ontario Beach closings due to high fecal coliform counts in the Genesee River. However, the total annual number of Ontario Beach closings have remained fairly constant because there are other sources of bacteria. Currently, the District is pursuing the analysis of water quality parameters for comparison to the values of the monitoring and sampling program undertaken during the design stage.

Authors: Mike Kent, Todd Stevenson

6.23. CSOAP Modeling Program

6.23.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: Lake Ontario, Genesee River, Irondequoit Bay, and small streams in and adjacent to the City of Rochester (e.g. Densmore Creek, Thomas Creek).

Date program initiated: 1992 ±

Completed or ongoing: The modeling study is scheduled to be completed in 1996.

6.23.2. Program: CSOAP Modeling Program

6.23.2.1. Program description:

A three phased computer-based mathematical model is being developed by the Monroe County Departments of Environmental Services and Engineering in order to illustrate and maximize the storage and treatment capabilities of the Combined Sewer Overflow Abatement Program (CSOAP). For additional information on CSOAP, see Chapter 6 "CSOAP: Construction and Operation, Best Management Practices, and Additional Treatment Facilities". The three phases of the modeling study are: (1) in-place storage volume, (2) design volume as identified in the Facilities Plan, and (3) operations/system management. As of the Spring of 1995, the study is in the final phase of development. Ultimately, the information obtained in the study will be used to minimize the occurrence of combined sewer overflow (CSO) discharges from the tunnel system and ensure the highest level of treatment to the largest volume of combined sewage at the Van Lare Waste Water Treatment Facility. Currently, an average of one or two small CSOs occurs each year during the most extreme storm events. However, during 1995 (as of June), there have been no CSOs because of less than average levels of precipitation.

6.23.2.2. Costs and/or sources of funding: $669,000 ± (local contribution: $417,000 ± from capital and $252,000 ± from Pure Waters' operating budget)

6.23.2.3. Current responsible entity: Monroe County Departments of Environmental Services and Engineering

6.23.2.4. Effectiveness:

The completed work on storage volume has proven to be very effective for predicting both static and dynamic storage requirements based on currently installed facilities and original design storm criteria. The Operations/System Management Model, which is currently under development, will be used to minimize the occurrence of CSOs and ensure the highest level of

treatment to the largest volume of combined sewage.

Author: Sean P. Murphy, P.E.

6.24. Greater Rochester International Airport Deicing Fluid Management

6.24.1. Background:

Use Impairments addressed: See Table 6-1

Affected water body: Genesee River, Little Black Creek, groundwater at GRIA

Date program initiated: Federal regulations published in 1990 on stormwater discharges include airport deicing fluids as one of the categories requiring a SPDES permit. A needs assessment, alternatives evaluation and recommendations were completed by a consultant in 1992 in order for the GRIA to comply with the regulations.

Completed or ongoing? The Study was completed in 1993. Decisions regarding the management of deicing fluids are ongoing.

Additional information:

Aircraft at the Greater Rochester International Airport (GRIA) are deiced during cold weather prior to takeoff with a heated solution of 50% propylene glycol, $CH_3CH(OH)CH_2OH$, and 50% water sprayed onto the aircraft surface. A glycol solution removes snow and ice from the aircraft and helps to delay the reformation of ice. Excess fluid drips from the aircraft onto the pavement. Deicing glycols currently flow from the GRIA to the Genesee River via the storm drainage system. Deicing glycol from a recently developed secondary deicing pad drains to Little Black Creek, a tributary of the Genesee River. The Monroe County Department of Environmental Services is developing a plan to accept deicing fluid from the secondary pad at the Gates-Chili-Ogden Wastewater Treatment Plant. The greatest environmental impact to be expected from the application of deicing glycols is depleted oxygen levels in the receiving waters. A degradation of downstream aquatic life can occur due to the increased Biological Oxygen Demand (BOD) caused by glycol discharges. (At the time of the Study, an ethylene glycol ($HOCH_2CH_2OH$) solution was being used at the GRIA. Since the Study, airlines serving the GRIA have all switched to a propylene glycol solution which also increases BOD, but not as much as ethylene glycol. The change was made for environmental reasons. Propylene glycol is not considered to be toxic.)

Laboratory tests show that stormwater immediately downstream of a deicing area exhibits extremely high BOD levels throughout the deicing season. These high levels have also been found in early June. Apparently residual deicing fluids from the pavement sub-base and from soils adjacent to the deicing area are carried to the storm drainage system via spring rainfalls.

6.24.2. Program: Greater Rochester International Airport Deicing Fluid Management

6.24.2.1. Program description:

Alternatives eliminated

The consulting engineer's study eliminated two alternatives from consideration: totally replacing ethylene glycol with another fluid, and mobile vacuum systems.

At the time of the Study, the primary deicing fluid was ethylene glycol. Other deicing chemicals approved by aircraft manufacturers are propylene glycol and diethylene glycol, $(C_2H_4OH)_2O$. The adverse effect of the latter two fluids on water quality is somewhat less, but not enough to change water quality concerns. (Since the Study, the GRIA has switched to propylene glycol.) The Study notes that future chemicals are likely to be developed that will have less impact on the environment.

A truck-mounted vacuum system to intercept fluid before it reaches the storm drainage system was ruled out due to several concerns:

- Operation of the equipment in adverse weather may be difficult.
- Nighttime conditions would reduce efficiency.
- Conflicting performance reports indicate that the equipment is only somewhat effective.
- Existing drainage inlets would have to be sealed before surface runoff reached them. Closed inlets would promote the formation of pools that could freeze after sufficient dilution of the deicing fluid.

(Vacuum trucks are currently being used at the Albany County Airport. The trucks are supplied by a different company than the trucks considered in the Study. According to the literature of the company serving the Albany County Airport, the trucks are "proven in worst weather conditions" and provide "total residue removal.")

Collection Alternatives Considered

Wide area collection and detention, with deicing at the main apron (the paved part of the airport immediately adjacent to the terminal area).
This would require altering the existing drainage system to divert flow to an onsite detention pond of about four acres, or to a pond offsite.

Localized collection and detention, with deicing at the main apron. Install a trench drain around the perimeter of the aircraft parking area at the terminal to intercept runoff. The trench drain would drain to a detention pond, which would be smaller than for the previous option because of a smaller drainage area. The pond would contain a controlled outlet pipe connecting to the existing drainage systems so the detention capability could be by-passed during the summer.

Deicing aprons. Relocate deicing from present aircraft parking positions to remote locations specifically designed for containment and collection of deicing fluid runoff. Each apron would be sized for simultaneous deicing of several aircraft.

Centralized gantry system (platform carrying a traveling crane and supported by towers or side frames running on parallel tracks). Relocate deicing from aircraft parking positions to a centralized deicing facility, a semi-automated gantry specifically designed for aircraft deicing.

Disposal alternatives considered

Diverting flow to sanitary sewer:

- Divert to an existing abandoned eight-inch main that eventually connects to the Gates-Chili-Ogden Wastewater Treatment Plant.
- Pump from a detention pond to an existing 54-inch trunk sewer to the Gates-Chili-Ogden Wastewater Treatment Plant.
- Use holding tanks to contain fluid until it is pumped to trucks for offsite disposal.

Onsite recycling. A recycling facility would probably require either a building which would need to be located outside the Building Restriction Line (beyond which there can be no permanent structures or parked aircraft that might endanger aircraft in transit), or a mobile recovery plant. Recycled glycol can be sold but is not approved by the Federal Aviation Administration (FAA) for use on aircraft.

Treatment for discharge to surface waters. The treatment strategy would be to reduce BOD loading to satisfactory levels. Anticipated treatment requirements are aeration and filtration. The treatment system could be located adjacent to detention ponds. Effluent would be discharged to the storm sewers.

Recommendation

In July 1992 and during development of the consultant's report, the FAA announced a proposed action to be taken to minimize the risk of accidents caused by snow and ice buildup on the wings of aircraft waiting to take off. It also announced that it would encourage the use of "Type II" deicing fluids (glycol solution with polymer additives to create a gel consistency, as opposed to "Type I" that has no additives and has a watery consistency) and would make Airport Improvement Program funds available for the construction of deicing pads on taxiways to reduce the time between deicing and takeoff. An interim rule took effect Nov. 1, 1992, and a final rule was developed prior to the fall 1993 deicing season. The rule does not dictate the type of fluid. However, it is likely to make the use of Type II fluids more prevalent and promote the establishment of a remote deicing station, closer to the point of takeoff.

Study recommendations were:

- Construction of a remote deicing apron to be sized to accommodate simultaneous deicing

of four aircraft using mobile deicing trucks.

- Construction of a storm runoff collection system on the deicing apron that is capable of diverting storm runoff to the existing storm drainage system, and deicing fluid runoff to holding tanks.
- Holding tanks designed to accommodate offsite disposal or recycling. Onsite recycling of the deicing fluid runoff would be considered as a future cost-saving measure.
- Construction of storm drainage diversion structures, piping and underground holding tanks to convert an existing taxiway hold apron into a secondary deicing apron.

The recommended plan was structured on the premise that all primary deicing and anti-icing of aircraft should be performed at a designated deicing apron. Re-deicing, if necessary would be performed there or at a taxiway hold apron deicing area. By the end of 1995, only the fourth recommendation was implemented.

6.24.2.2. Costs and/or sources of funding:

The estimated 1993 project cost is nearly $6 million. Annual operations, maintenance and treatment costs were estimated to be $500,000-$1 million.

Sources of funding: The study indicated that the recommended plan might be eligible for 90% FAA funding and 5% New York State Department of Transportation funding. Any investment by the GRIA would be reimbursed by the airlines.

6.24.2.3. Current responsible entity: The Greater Rochester International Airport

6.24.2.4. Effectiveness:

Since the 1992 study was completed, actions occurred which affected some of the study's alternatives:

- Completion of additional stormwater sampling and testing at GRIA that provided estimates of BOD for various alternatives.
- Utilization of a taxiway hold apron as a secondary deicing apron. A holding tank was constructed but it is not yet being used. (Significant improvements have been identified which would make the secondary deicing apron more functional.)
- Evaluation of the Gates-Chili-Ogden Wastewater Treatment Plant showed that treatment of deicing fluid runoff there is not feasible due to the magnitude of sludge generation from the extremely high BOD levels. (As of January 1996, deicing fluid from the secondary deicing apron *only* was directed to the Gates-Chili-Ogden Plant.)
- Further investigation into the use of vacuum trucks for collection of deicing fluids found that this option is very expensive for both equipment and personnel.
- The Van Lare Wastewater Treatment Plant has sufficient capacity to treat the deicing fluid runoff. Annual treatment costs would be $0.5-1.5 million. Flows could be conveyed via a new sanitary conveyance system which would be routed and sized to

collect and convey the deicing fluid runoff to Van Lare.

- Suggested detention of the deicing fluid runoff in manmade wetlands (suggestion of Richard S. Burton of the Monroe County Health Department) was considered not feasible because: (1) there is not enough land area to contain winter runoff, (2) deicing fluid runoff occurs in the winter when wetlands are less biologically active, and (3) wetlands attract birds, a hazard to aircraft.

The new information did not change the basic recommended plan as outlined above.

The new stormwater discharge permitting system has not yet forced the GRIA to a decision, but it will soon. The New York State Department of Environmental Conservation (NYSDEC) is currently working out permit conditions. In the meantime, the GRIA is using a smaller volume of deicing fluid than it once did, because of the overall smaller size of the aircraft landing at the GRIA.

Fluid management methods that are being tried or used at other airports can be considered:

O'Hare, Chicago: During the deicing season stormwater from the North Airfield "Scenic Taxiway" hold apron will be diverted to a detention basin with 45 acre-feet of storage capacity, and from there to an onsite biological treatment facility, all of which will cost $19 million.

Buffalo: A pilot project demonstrated a new deicing system that uses infrared energy instead of chemicals to remove ice formation. Tests were performed on airplane parts. When the infrared rays strike the parts or an aircraft, they stimulate the molecules within it, causing them to move more rapidly and generate heat.

The proposal is for an aircraft to taxi from the gate into an open-ended hangar-like structure adjacent to the takeoff runway. There the plane would be exposed to infrared energy at a level and wavelength matched to the aircraft being treated. The system would be to able deice an aircraft in about six minutes, depending upon ice thickness. The system for Boeing 727-size aircraft would cost about $1.4 million to acquire. Per-aircraft deicing costs would be between $200 and $500 depending on local gas prices (to fire the infrared heating units). The manufacturer claims that the new deicing system is more economical than glycol-based fluids, and has none of the environmental consequences. GRIA officials were expected to examine the Buffalo Airport's system during May 1995.

(A demonstration project on a full-size jet was performed at the GRIA on March 12, 1996. It was termed a "partial success".)

Albany County: The Albany County Airport constructed two eight-million gallon lagoons with aeration systems at a cost of $11 million. However, the lagoons weren't large enough to accommodate the storms of the winter of 1993-1994, and were full before the winter was over. Then the Airport hired Zenon Airport Environmental to design and manage a four-step process:

- Containment. Storm drains were retrofit with inserts that can be opened or closed. The airport services company closes the valves when a storm begins.
- Collection. Vacuum trucks with a 1600-gallon capacity also melt snow and ice and pick up debris. It takes 3-5 minutes for a truck to collect fluid from one aircraft. The trucks dump fluid into holding tanks when they are full.
- Testing. A 30-second "gross" test is performed on the apron surface liquid. When the glycol content is low enough, the drains are opened.
- Processing. Runoff fluid with a high glycol concentration is stored in holding tanks separately from that with a low glycol concentration. The high-glycol fluid is separated into glycol and water fractions by a fractional distillation process, and the airport services company brokers the glycol. The airport services company is in the process of constructing a biological reactor onsite to treat the low-glycol fluid.

Pittsburgh: The new Pittsburgh Airport constructed a $15 million central deicing pad with six pedestal-mounted gantries. Fluids dropping on the deicing apron drain by gravity to a piping system that leads to above-ground storage tanks (on lower elevation land). The fluid collected is not separated into high-glycol and low-glycol tanks. All the fluid is treated the same by separating the glycol and the water fractions. The glycol is concentrated onsite and is sold to Ecolocorp of Arlington, Virginia. The water separated from the glycol is clean enough to discharge to the storm drain.

Author: Carole Beal

6.25. Inspection / Monitoring of Dredging

6.25.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: Rochester Embayment of Lake Ontario

Date program initiated: not available

Completed or Ongoing: Ongoing

6.25.2. Program: Inspection / Monitoring Dredging

6.25.2.1. Program description:

Almost every year, there are citizen complaints that the contractor performing the dredging of the federal shipping channel in the Genesee River is engaging in "short dumping". The term "short dumping" refers to the practice of disposing dredged material in a location closer to shore than the designated disposal site thus reducing the dredging cycle time.

There is a concern on the part of the Monroe County Health Department that possible short dumping of dredged materials may result in the resuspension of bacteria and increased turbidity thus degrading water quality at nearby Ontario Beach and contributing to beach closings. For more information regarding beach closings, see the Chapter 6 section "Beach Modeling / Monitoring Program". However, the United States Army Corps of Engineers (USACOE) believes that even if short dumping were taking place, it would not contribute to beach closings. This belief is based in part upon 1994 USACOE sediment data which shows that phosphorous levels in the channel sediments are comparable to or lower than those of open-lake reference sediments. Therefore, under suitable conditions, the release of phosphorus from lake bottom sediments in general would contribute to algal blooms which impact the beach.

In order to ensure that the dredging contractor adheres to the terms of the contract such as disposal site location, the USACOE utilizes an on-site construction inspector and requires that the disposal location be recorded. However, depending on staffing resources, inspectors are not always continuously present throughout the dredging operation. Therefore, the USACOE has added a provision to the contract specifications which requires that the contractor keep a log of the exact location of each disposal of dredged material. Most dredging contractors now utilize Global Positioning System (GPS) to determine locations. This system has the ability to establish points within three feet of the actual location. When there are complaints, USACOE staff work with the inspector to ensure that the contractor is complying with the terms of the contract. This typically involves a review of the ship's logs and increasing the level of inspection.

6.25.2.2. Costs and/or sources of funding: not available

6.25.2.3. Current responsible entity: USACOE

6.25.2.4. Effectiveness:

There are two basic issues in regards to the effectiveness of the USACOE's dredging inspection / monitoring procedures. The first issue is whether or not the program is really effective in ensuring that disposal of dredged material is conducted properly. Because the USACOE's monitoring procedure depends upon accurate record keeping on the part of the dredging contractor (for those occasions when the construction inspector is not present) the effectiveness of the process remains unknown. This self-regulation arrangement creates a potential conflict of interest on the part of the dredging contractor.

The second issue is the perception on the part of residents that disposal is not occurring at the correct location. According to Scott Pickard of the USACOE, citizen concerns about short dumping are not uncommon. If dredging spoils from the Genesee River are being properly disposed of, and the problem is primarily one of public perception, there may be a need to increase public outreach. This may be accomplished by taking citizens on a tour of the dredging operation or by providing some other form of education. For more information on this subject, see Chapter 7 "Intergovernmental Agreement with Army Corps of Engineers".

Author: Todd Stevenson

6.26. Phosphate detergent ban

6.26.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: All waters of the Rochester Embayment watershed

Date program initiated: June 1, 1973.

Completed or ongoing? Completed (impact is ongoing)

Additional information:

The presence of excess algae and rooted plants due to the over-fertilization of waterbodies affects the quality and appearance of water. Excess algae and other plants cause taste and odor problems in water, gradually fill in lakes, deplete oxygen in waterbodies as they decay, and affect the costs of preparing water supplies for domestic and industrial use.

Phosphorus is the substance that limits the productivity of algae and other plants in most temperate latitude lakes. Dissolved phosphorus (organic and inorganic) has a far more important influence on algal growth than has the phosphorus attached to soil particles. Of the nutrients essential for plant growth (carbon, nitrogen and phosphorus), phosphorus is the only one that can feasibly be controlled in most cases. Studies of temperate lakes have shown that algae are present during the summer at densities closely proportional to the annual inputs of dissolved phosphorus per volume of water in the upper layers of the lakes. This relation holds true even for most lakes that are characterized by persistently low nitrate concentrations.

Sewage is one of the principal sources of dissolved phosphorus. The sewage may be discharged from municipal treatment plants, or it may leak from onsite sewage disposal systems. Secondary treatment at a municipal wastewater treatment plant removes about 20% of the phosphorus in the wastewater entering the plant. Tertiary treatment removes 75-90%.

Household laundry detergents containing phosphorus in the form of phosphates were an important contributor to the phosphorus content of sewage. Phosphates were one type of surfactant used in the detergents.

6.26.2. Program: Phosphate detergent ban

6.26.2.1. Program description:

The sale of laundry detergents containing added phosphates became illegal in New York on June 1, 1973. The State Legislature approved an exemption for dishwasher detergents, as

recommended by the New York State Department of Environmental Conservation (NYSDEC). The exemption was recommended on the grounds that no feasible substitute was available and that dishwasher compounds amounted to only 3% of the phosphate discharge. (All of the Great Lakes States have a ban on phosphate detergents.)

6.26.2.2. Costs and/or sources of funding: Funding sources were the New York State Department of Environmental Conservation, detergent manufacturers, consumers

6.26.2.3. Current responsible entity: The NYS Legislature passed the Environmental Conservation Law. The New York State Department of Environmental Conservation is responsible for enforcement.

6.26.2.4. Effectiveness:

A field experiment was conducted in Erie County after the County's ban on the sale of phosphate-based detergents (which was earlier than the State's). The table shows the reduction in phosphorus coming into the sewage treatment plants after the ban was enacted. (The plants did not have tertiary treatment.)

Table 6-13. Reduction in Phosphorus Discharge from Treatment Plants after Phosphate-Based Detergent Ban

Erie County Sewage Treatment Plants	Decrease after Ban
Buffalo Sewer Authority	44.1%
Lackawanna	53.6%
Blasdell	43.5%

Studies conducted in Monroe County in 1971 and 1972 (before and after the State limitation to 8.7% phosphate) showed substantial decreases in phosphorus in streams that received wastewater from municipal wastewater treatment plants:

Table 6- 14. Reduction in Phosphorus in Streams After Phosphate-Based Detergent Ban

	June-Sept. 1971 Average Phosphorus	June-Sept. 1972 Average Phosphorus	Decrease after Limitation
Allen's Creek at Nalge	1.102 mg/liter	0.960 mg/liter	13%
Irondequoit Creek, Linden Ave.	0.634	0.354	44%
Irondequoit Creek, Browncroft	1.208	0.589	51%
Thomas Creek at Baird Rd.	1.361	0.858	37%

(The municipal wastewater treatment plants from which these streams received wastewater are no longer in operation. Wastewater was diverted to Monroe County treatment plants.)

The following commonly used phosphate replacements are reported to be ecologically acceptable:

Sodium carbonate
Sodium silicate
Sodium aluminosilicate

Author: Carole Beal

6.27. Pure Waters Program

6.27.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: Lake Ontario, Irondequoit Bay, Genesee River

Date program initiated: 1968

Completed or ongoing: Ongoing

6.27.2. Program: Pure Waters Program

6.27.2.1. Program Description:

The Pure Waters program was established by the Monroe County Legislature in order to implement the 1969 Pure Waters Master Plan and thus reduce the discharge of pollutants into Irondequoit Bay, the Genesee River, Lake Ontario, and other waters of Monroe County. The Master Plan summarized the existing condition of sewerage facilities in Monroe County, the condition of receiving waters, and outlined a plan of action to manage municipal sanitary sewage and improve water quality. A number of wastewater-related water quality problems were identified in the Master Plan including severe oxygen depletion in several portions of the Genesee River, degradation of numerous small streams which served as receiving waters for municipal wastewater treatment facilities, cultural eutrophication of the Rochester Embayment of Lake Ontario, and unacceptable levels of fecal coliform bacteria at Ontario Beach. The following general policies were also outlined in the Master Plan:

• Receiving Waters - Only Lake Ontario and the Genesee River are recognized as having sufficient assimilative capacity to receive wastewater effluent. The elimination of effluent discharge into the Genesee River should be sought as a long term goal.

• Treatment Facilities - All treatment facilities should provide removal of 85% of biological oxygen demand (BOD) and suspended solids. Facilities should remove 80% of phosphorus, provide year-round disinfection of effluent, and outfalls should be placed beyond the bounds of the Rochester Embayment.

• Sewer Collection System - The maximum possible volume of combined sewage should be transported to treatment facilities, with the remaining to be chlorinated prior to discharge, and any new development should be constructed with separate storm and sanitary sewers.

• Industrial Wastewater - Except for coolants and process water relatively free of pollutants, industries should be encouraged to discharge wastewater into public sewer systems.

• Miscellaneous - Septic tanks should only be permitted where sewers are not available.

In order to address the water quality problems identified in the Master Plan, a network of interceptors, pump stations, and wastewater treatment facilities (Northwest Quadrant, Van Lare, and Gates-Chili-Ogden) were constructed and/or improved. Monroe County was able to leverage New York State and Federal funds for the construction of these facilities which, for the most part, were completed by 1978. In addition, five New York State recognized municipal sewer districts were formed in order to fund the development and operation of the system (Rochester, Gates-Chili-Ogden, Irondequoit Bay, South Central, and Northwest Quadrant). Revenues generated in a particular district are used exclusively for that district's benefit. Therefore, rates for wastewater collection, conveyance, and treatment vary according to services provided.

A major component of the implementation of the Master Plan was the construction of 100 miles of intercepter sewers so that 29 small waste water treatment facilities which had discharged to area streams could be taken off line. Monroe County's 1968 Comprehensive Sewerage Study had concluded that even if these facilities were upgraded, their discharge would continue to result in oxygen depletion, high bacterial levels, and eutrophic conditions because the assimilative capacity of the receiving streams was so limited, particularly during periods of low flow.

6.27.2.2. Costs and/or sources of funding:

The cost of constructing the interceptor system and the closing of the 29 small treatment facilities was $218.4 million with the following breakdown: $102.4 million federal, $62.7 million from New York State, and $53.3 million from local sources. The cost of the tunnels, additional treatment facilities, and implementation of best management practices was $550 million. The Division of Pure Waters' total budget for 1993 was $62 million, of which $40 million was used for the operations and maintenance of all sewerage facilities. The remainder was used to cover debt service. The primary sources of funding are rate payers within each of the municipal sewer districts and state and federal grants.

6.27.2.3. Current Responsible Entity: Monroe County Department of Environmental Services Division of Pure Waters

6.27.2.4. Effectiveness:

The Pure Waters Program has contributed to a substantial improvement in water quality in Irondequoit Bay, the Genesee River, and the nearshore areas of Lake Ontario through a significant reduction in the frequency and size of combined sewer overflows (see Chapter 6 "Combined Sewer Overflow Abatement Program: Construction, BMPs, and Additional Treatment Facilities"), the implementation of an industrial pre-treatment program (see Chapter 6 "Industrial Pretreatment Program"), and the elimination of 29 less effective treatment facilities. Daily, dry-weather sanitary sewage discharges to the Genesee River and Irondequoit Bay have

been eliminated and there has been a major reduction in the volume of combined sewer overflow (CSO) discharges to the Genesee River and Irondequoit Bay as a result of the deep rock CSOAP tunnel system.

In recognition of these accomplishments, the Division of Pure Waters was the recipient of the 1990 United States Environmental Protection Agency (USEPA) Pretreatment Award and the 1991 USEPA CSO Control Award. In 1994, the Division was the recipient of awards from the Association of Metropolitan Sewerage Agencies (AMSA). The Northwest Quadrant WWTF received the Gold Award and the Gates-Chili-Ogden WWTF and the Van Lare WWTF both received the Silver Award. The Gold Award is granted to facilities that consistently meet every permit limit for the calendar year. The Silver Award is granted to facilities with five or less permit violations within the calendar year. In addition, the Division of Pure Waters has developed a $2 million capital fund to ensure the timely rehabilitation of the aging sewer collection system.

Author: Mike Kent

6.28. Irondequoit Basin Stormwater Research, Demonstration, and Implementation

6.28.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: Irondequoit Creek, Irondequoit Bay, and Lake Ontario

Date program initiated: 1979

Completed or ongoing: ongoing

6.28.2. Program: Irondequoit Basin Stormwater Research, Demonstration, and Implementation

6.28.2.1. Program description:

Since the late 1970s, Monroe County has been engaged in researching the impacts of stormwater on water quality in the Irondequoit Basin, conducting demonstration projects which address these impacts, and implementing remedial programs. The highlights of the research program include the Irondequoit Basin Nationwide Urban Runoff Program (NURP), the Agricultural Runoff Study, and the Irondequoit Bay Clean Lakes Program. These research efforts provided the basis for the development of a two element watershed management plan. The watershed plan is outlined in the Irondequoit Basin Framework Plan and the Irondequoit Basin Policy Report. The research projects and the plans provide the basis for a series of demonstration and remedial projects including the Country Downs detention basin conversion, the Mill Road detention basin monitoring project, the Irondequoit Bay wetlands management project, the initiation of an erosion control technician position (also referred to as the stormwater management specialist), and the negotiation of intergovernmental agreements.

The Irondequoit Basin Nationwide Urban Runoff Program (NURP) was part of a federally funded effort to learn more about the significance of urban runoff in causing water quality problems. This project investigated the quantity and quality of urban stormwater runoff. It found that urban runoff is contributing significant amounts of phosphorus to Irondequoit Bay. One of the major recommendations of the NURP was to use the wetlands immediately upstream of Irondequoit Bay as a cost effective natural "treatment" area.

Another major research effort into stormwater impacts upon the Irondequoit Basin was the Agricultural Runoff Study led by the New York State Department of Environmental Conservation (NYSDEC). This study examined the amounts of phosphorus and sediment released from active agricultural land in the rural Thornell Sub-basin and the effectiveness of alternative agricultural practices in reducing phosphorus runoff. It was found that agricultural

runoff contributes significant amounts of phosphorus, especially during planting seasons with relatively high rainfall. Several practices were shown to reduce phosphorus runoff including contouring, strip cropping, and sod-based rotations.

The Clean Lakes Study was another important Irondequoit Bay research effort. This study investigated the effects of accumulated polluted sediments on the bottom of Irondequoit Bay. This study found that polluted sediments contributed substantial quantities of phosphorus to Bay waters. Phosphorus acts as a fertilizer to plants (especially algae), thus the Bay sediments were acting as an "internal" pollutant source to Bay waters. The study concluded that the accelerated eutrophication of the Bay would continue until the phosphorus-rich layer of sediments were covered by a layer of sediments which contain little recyclable phosphorus. As part of the Study, a demonstration was conducted of the feasibility of applying alum to the Bay in order to seal the bottom sediments and mitigate this "internal" pollutant source. For additional information about alum treatment see the Chapter 6 section entitled "Irondequoit Bay Alum Treatment Project".

Ultimately, the Irondequoit Basin Framework Plan was developed. This comprehensive technical plan outlined an overall management system for the Irondequoit Basin with the County taking a lead role. The findings of the Clean Lakes Study, the NURP, and the Agricultural Runoff Study, along with additional research and analysis, were incorporated into the Framework Plan. The Irondequoit Basin Policy Report, which summarized the Framework Plan, and outlined a phased implementation strategy to improve water quality in the Irondequoit Basin, was developed and adopted by the County in 1986.

Numerous actions have been implemented, or are being pursued, under the Policy and Framework Plans including the demonstration project at County Downs in Perinton. This demonstration project was a joint effort between the Monroe County Environmental Health Laboratory (EHL) and the United States Geological Service (USGS) to determine the effectiveness of detention basin designs in decreasing nutrient and sediment loads in urban runoff. The first phase of the study involved studying the effectiveness of the existing design. The next phase of the study involved making minor modifications to the basin in order to double retention time. These changes substantially increased trap efficiency for most constituents. The last phase of the study involved further modification of the basin so as to increase retention time ten-fold. It was discovered that these additional changes improved trap efficiency only slightly. As a result of the information obtained in this demonstration, the EHL has initiated a program designed to facilitate the conversion of dry basins into created wetlands (this program is discussed in the Chapter 6 section entitled "Dry Basin Conversions").

Additional stormwater projects in the Irondequoit Basin include work that has been ongoing as part of the intergovernmental agreements between Monroe County and the Town of Pittsford. The Town, County, and the U.S. Geological Survey have initiated monitoring of a mature vegetated detention basin at Mill Road in Pittsford. A number of parameters are being monitored including nutrients, metals, flow, and the temperature of water entering and leaving the vegetated basin.

In addition, the Town, County, and the U.S. Geological Survey have been cooperating in the design of the Allens Creek Stormwater Management Facility which has been designed to manage both quantity and quality of stormwater from the Allens Creek watershed. The construction of this regional flood detention facility is expected to allow conversion of upstream basins for water quality benefits while improving overall flood management capacity. Construction of this facility began in April of 1995.

The type of cooperation among different levels of government in evidence at the Mill Road and Allens Creek projects has been facilitated by the Intergovernmental Agreements (IGA) between Monroe County and the Towns of Pittsford and Penfield. The use of stormwater facilities to protect water quality is a major focus of the Pittsford IGA. In the years since the IGA was developed, the Town of Pittsford has emerged as a leader in ensuring that new development includes stormwater facilities that protect water quality.

The primary focus of the Penfield IGA is controlling erosion along Irondequoit Creek in Linear Park. Erosion in Linear park has contributed large amounts of sediment to Irondequoit Creek, thus, contributing to water quality degradation in Irondequoit Bay. As of April 1995, preliminary engineering plans have been developed to address this erosion problem. For additional information, see the Chapter 6 section entitled "Streambank Erosion Control". For more information about Monroe County's efforts to develop water quality IGAs, see the Chapter 7 section entitled "Intergovernmental Agreements".

The use of the wetlands at the south end of Irondequoit Bay to mitigate the impact of stormwater is another proposal which came out of the Irondequoit Bay research program. Specifically, this idea was one of the major recommendations of the NURP. Currently, most stormwater flows relatively quickly through channels rather than spreading out across the wetlands complex. The EHL has proposed constructing control structures in order to regulate water levels in the wetlands so that stormwater, especially the first flush which contains the highest concentration of nutrients and sediments, will be held for a longer period of time, and distributed over a larger area of the wetlands, than would occur under natural conditions. As a result, there would be increased contact between the stormwater and the wetland vegetation and biofilm (that lives on the vegetation), which would utilize the nutrients contained in the stormwater, thus reducing the quantities of nutrients which reach the Bay.

Thus far, water quality/quantity, atmospheric deposition quality, flora/fauna, sedimentation rate assessment, and sediment quality baseline monitoring have been performed in this wetland. As of March 1995, funding for the project is in place (Aid to Localities Funds and Non Point Source Implementation Funds). However, the necessary permits from the New York State Department of Environmental Conservation have not yet been obtained. (For additional information about the use of wetlands to treat stormwater runoff, see Section 6.34 Dry Basin Conversions)

In 1994, Monroe County purchased 14 acres of land south of Empire Boulevard and east of Irondequoit Creek as an addition to Ellison Park in the Town of Penfield at a cost of $172,000.

This acquisition will facilitate the development of the Irondequoit Bay wetlands management project. The parcel constitutes an important addition to the Ellison Park wetlands area and serves as a link among the existing parks in the environmentally sensitive Irondequoit Creek area.

An erosion control technician position was also initiated as part of the implementation of the Irondequoit Basin Policy Report. The technician position was initiated to insure that appropriate erosion control measures were included in new development in the Irondequoit Basin. This position now serves the entire county and is discussed in the Chapter 6 section entitled "Stormwater Management Specialist". In addition, a procedure was developed in order to review development proposals in the direct drainage area of Irondequoit Bay. This procedure is discussed in the Chapter 6 section entitled "Irondequoit Bay Coordinating Committee".

6.28.2.2. Costs and/or sources of funding: not available

6.28.2.3. Current responsible entities: the Monroe County Environmental Health Laboratory, the Water Quality Planning Section of the Monroe County Health Department, the United States Geological Survey, and the Towns of Pittsford and Penfield

6.28.2.4. Effectiveness:

Irondequoit Bay and its drainage basin have been studied intensively as a pilot water quality management project for the Rochester region. Numerous projects, including the diversion of wastewater from the watershed, the in-lake alum treatment of sediments, and deep-water oxygen supplementation have contributed to improved water quality in the Bay. For instance, since the early 1970s the trophic state of the Bay has improved from a highly eutrophic state to a moderately eutrophic state. However, the goal of a mesotrophic state in the Bay has not yet been achieved. The continued implementation of stormwater management practices such as dry basin conversions and the Irondequoit Bay Wetlands management project will be needed to ensure that water quality in the Bay continues to improve.

Author: Todd Stevenson

6.29. Irondequoit Bay Alum Treatment Project

6.29.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: Irondequoit Bay

Date program initiated: 1982

Completed or ongoing: completed

6.29.2. Program: Irondequoit Bay Alum Treatment

6.29.2.1. Program description:

With the elimination of the small sewage treatment plants which discharged into the Irondequoit Creek Watershed (see Chapter 6 section on the CSOAP) major point-sources of nutrient loadings to Irondequoit Bay were eliminated. As a result, the trophic state of the Bay improved from highly to moderately eutrophic. However, the Bay continued to receive significant nutrient loadings from non-point sources, as well as from internal nutrient recycling. Results of the Phase I Clean Lakes Study indicated that substantial amounts of phosphorus were being released from the deep-water sediments of the Bay. Internal phosphorus loadings were sufficient to prevent the achievement of the desired mesotrophic state in the Bay.

As part of the Clean Lakes Study, a pilot project was conducted in Ides Cove (in Irondequoit Bay) which showed that alum flocculation was successful in removing phosphorus from the water column. Monitoring, conducted over several years following this project, indicated that the alum layer formed a relatively effective impediment to the release of phosphorus from the sediments. It was concluded that alum treatment of the deep sediments of the Bay should greatly reduce internal phosphorus loadings and thereby improve the trophic state of the Bay.

In 1986, Alum was applied to those areas of Irondequoit Bay where the water depth is six meters or greater (about 45% of the total surface area of the Bay). A total of 924,000 gallons of 48% aluminum sulfate was applied to the sediment surface in order to achieve an average dose of about 0.3 gallons per square meter.

6.29.2.2. Costs and/or sources of funding: This project was supported by 25% County, 25% New York State Legislature member item, and 50% United States Environmental Protection Agency 314 Clean Lakes Phase II funds.

6.29.2.3. Current responsible entity: Monroe County Environmental Health Laboratory

6.29.2.4. Effectiveness:

Extensive water quality monitoring performed after the alum treatment revealed dramatic improvements in water quality. Hypolimnetic phosphorus levels were 60 to 75% lower than before treatment. Summer average concentration of epilimnetic total phosphorus were reduced by 24%, to a level about 1.4 times above the 30 ug P/L upper limit of the target range. Summer average epilimnetic soluble reactive phosphorus levels were reduced by 64%. A 36% reduction in summer average chlorophyll concentration was achieved and total algal volume was reduced during most of the growing season. Summer average water clarity, as measured by secchi disk depth, was improved by 14%, to levels within the 1.5 to 2.5 m Water Quality Management Plan range. However, these improvements may be threatened by apparent increases in external nutrient loadings.

Author(s) and Resources:
Adapted by Todd Stevenson from the Irondequoit Bay Phase II Clean Lakes Project Final Report as prepared by L. Spittal and R. Burton of the Monroe County Environmental Health Laboratory of the Monroe County Health Department, March 1991.

6.30. Irondequoit Bay Oxygen Supplementation Project

6.30.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: Irondequoit Bay

Date program initiated: 1993

Completed or ongoing: ongoing

6.30.2. Program: Irondequoit Bay Oxygen Supplementation Project

6.30.2.1. Program description:

The Irondequoit Bay Water Quality Program has achieved a dramatic improvement in water quality and system potential. Following the alum treatment project, the trophic status of the Bay improved to the point, that with the supplementation of oxygen, the Water Quality Management Advisory Committee (WQMAC) goal of a mesotrophic state in the Bay might be achieved. A mesotrophic state is necessary in order to restore the Bay's cold-water fishery (e.g. Lake Trout). Eutrophic conditions in the Bay have resulted in oxygen depletion, thus rendering it unsuitable for native cold-water fish species. It is anticipated that oxygen supplementation will increase control of phosphorus by both biological and chemical processes and thus lead to an improved trophic state.

Beginning in August of 1993, the feasibility demonstration of oxygen supplementation was implemented using two diffuser grids located near the midpoint of the deep area of the Bay. The intent is to diffuse oxygen into the hypolimnion (deep waters) of the Bay in sufficient quantity to accommodate the high benthic oxygen demand which results from decomposition of settled/settling organic matter (e.g. dead algae). In recent years, the hypolimnion has been anoxic (oxygen deprived) throughout the period of summer stratification and dissolved oxygen has been less than 4 mg/L within the metalimnion (middle zone) for much of that period. It is not expected that sufficient oxygen will be added to prevent anoxia in the hypolimnion but it is anticipated that the metalimnetic dissolved oxygen target of 5 mg/L will be achieved. This level of dissolved oxygen is necessary in order to support cold-water fish species such as salmonids.

In order to fine tune and evaluate the project, the existing water quality monitoring program in Irondequoit Bay has been expanded. Monitoring is conducted year-round at a number of sites within the Bay. A wide range of parameters are measured and analyzed including turbidity, suspended solids, suspended volatile solids, chlorophyll-a, total dissolved solids, specific conductance, microscopic examination, alkalinity, total phosphorus, soluble reactive phosphorus, total kjeldahl nitrogen, membrane filter fecal coliform, hardness, dissolved oxygen, temperature,

oxidation-reduction potential, and pH.

Oxygen diffusion into Irondequoit Bay was also conducted during the period of summer stratification in 1994 and will be continued during the 1995 season as well. During this implementation stage, five diffuser grids, located at 1000 foot intervals, are being utilized to add oxygen to the deepest area of the Bay. Water quality monitoring is also being continued in order to evaluate the progress of the project.

Oxygen supplementation will also contribute to an improved trophic state in Irondequoit Bay by increasing control of phosphorous through biological and chemical means. As conditions improve, and cold-water fish species are enticed back into the system, they will graze on the plankton, thereby reducing the amount of algal material settling to the bottom, and thus will naturally reduce the hypolimnetic oxygen demand. In addition, increased oxygen will enhance the natural chemical processes which remove phosphate from the water column by absorption to iron (and other metal) oxides, which precipitate and settle to the bottom when sufficient oxygen is present (this already occurs in the Bay during periods of mixing in spring and fall).

6.30.2.2. Cost and/or sources of funding:
Funding for the feasibility demonstration project was awarded to the Monroe County Environmental Health Laboratory from New York State through the Finger Lakes Association Water Resources Board. Oxygen supplementation during 1994 and 1995 is being funded by the United States Environmental Protection Agency's (USEPA) Great Lakes National Program Office (GLNPO).

6.30.2.3. Current responsible entity: Monroe County Environmental Health Laboratory

6.30.2.4. Effectiveness: not available

Author: Adapted by Todd Stevenson (May 31, 1995) from a document by Richard Burton entitled "Project Overview: 30 June 1993".

6.31. Irondequoit Bay Coordinating Committee (IBCC)

6.31.1. Background:

Use impairments addressed: See Table 6-1

Affected water body:
Irondequoit Bay

Date program initiated:
The Irondequoit Bay Coordinating Committee was initiated by intermunicipal agreement in August 1984.

Completed or ongoing: Ongoing

6.31.2. Program: Irondequoit Bay Coordinating Committee (IBCC)

6.31.2.1. Program Description:

Irondequoit Bay has benefitted from a series of major programs to improve its water quality. This, along with the opening of the Bay to boat traffic from Lake Ontario, resulted in a significant increase in water related recreational use and development pressure around the Bay. The Towns of Penfield, Irondequoit, and Webster along with Monroe County and the New York State Department of Environmental Conservation (NYSDEC) recognized a need to coordinate land use decisions and to provide a forum for cooperative planning efforts in this area.

Irondequoit Bay is a body of water located just 5 miles northeast of the City of Rochester. It is a long narrow bay approximately 3 miles long and ranging from 1000 feet to 4000 feet in width. The immediate area around Irondequoit Bay is primarily high bluffs which drop off as much as 200 feet to the shoreline. The area around the shoreline is steep with very little flat area conducive to development. Irondequoit Creek empties into the Bay through an extensive cattail marsh to the south. Much of this area is within Ellison Park, part of the County Parks system. Irondequoit Bay is separated from Lake Ontario by a narrow barrier of sand which has been developed for residential purposes.

Due primarily to improvements in the sewage collection and treatment systems, the water quality in the Bay has significantly improved in the last 15 years. This improvement, along with the removal of a small bridge across the outlet of the Bay, has resulted in a significant increase in demand for recreational opportunities and development around the Bay. This has resulted in serious conflict between these interests, each with legitimate stake in the development of the Bay.

The natural resources around the Bay provide critical fish and wildlife habitat which includes

habitat for shorebirds, songbirds, raptors, and spawning habitat for a variety of fish species including northern pike and large and small mouth bass. The protection of the Bay along with the ability to access Lake Ontario from the Bay makes the area very attractive for recreational use by the 750,000 residents of Monroe County as well as people from surrounding counties. The development community has also shown a serious interest in developing the area around the Bay for residential and water dependent uses. The provision of shelter from weather and waves from Lake Ontario and improvements in water quality have resulted in the Bay becoming a prime area for residential and commercial development. The topography and natural features, however, have resulted in severe limitations on development, and made the development approval process long and controversial for many proposals. Trying to balance the interests around the Bay has been a real challenge for all regulatory agencies with jurisdiction, most notable the three towns which have shoreline (Irondequoit, Penfield, and Webster).

The Irondequoit Bay Coordinating Committee was established by intermunicipal agreement between Monroe County and the three Towns as a way to communicate and coordinate land use decisions made around Irondequoit Bay. This agreement was made in 1984 and included the NYSDEC as a critical participant in the Committee. The purpose of this Committee was to prepare an overall plan for development of Irondequoit Bay which balanced the development and recreation interests and protected the ecological value of the Bay. Once developed the Committee would oversee implementation of the plan and monitor development around the Bay.

The IBCC has published numerous reports including the Irondequoit Bay Plan, a long-range plan for the development of the Bay, and the Environmental Objectives and Development Management Measures for Irondequoit Bay which includes guidelines and specifications for development around the Bay. The Committee has also reviewed over 600 development proposals ranging from additions to homes to very large commercial and residential developments.

6.31.2.2. Costs and/or sources of funding:

The costs associated with the Irondequoit Bay Coordinating Committee are in-kind services from each of the three Towns around Irondequoit Bay, Monroe County, and the NYSDEC. Administrative costs such as printing and mailing are provided by Monroe County. Projects directly undertaken by the IBCC, such as planning studies are generally funded through grants or contributions from the member agencies.

6.31.2.3. Current responsible entity: The IBCC is administered through the Monroe County Department of Planning and Development.

6.31.2.4. Effectiveness:

There is generally a range of opinions on the effectiveness of the IBCC. The member agencies and many other related agencies feel the IBCC has been very effective in providing a forum for

exchange of information and coordination of land use decisions around Irondequoit Bay. Other members of the community have criticized the IBCC for not being more effective in limiting development around the Bay. Since the IBCC is an advisory committee, the recommendations may or may not be accepted or supported by the regulatory agencies. This has led to the perception of some parties that the IBCC is powerless and ineffective. It is generally more accepted, especially by the member agencies, that the advisory capacity of the organization allows for flexibility and activity which would not be appropriate for a regulatory agency. The IBCC has been used as a model for intermunicipal/interagency cooperation. It is one of the few formal mechanisms for direct interaction between agencies for the purpose of protecting a resource such as Irondequoit Bay.

Author: Tom Goodwin

6.32. Stormwater Management Specialist

6.32.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: All surface waters in Monroe County

Target audience: Monroe County residents and businesses, civil engineers, consultants, developers, contractors, public works departments and other municipal staff, and planning and conservation boards involved with development

Date program initiated: 1989

Completed or ongoing? Ongoing

Additional information:

The demands of suburban development create development-related water quality degradation. Sediment and associated nutrients in stormwater runoff from construction sites restrict stream flow, degrade fish habitat, and increase aquatic weed growth, thus limiting efforts to restore best-use classifications of waters. In addition to the temporary land disturbance at construction sites, long-term effects of an increasingly impervious watershed are higher stormwater pollutant loads delivered to bodies of water within the Embayment.

6.32.2. Program: Stormwater Management Specialist

6.32.2.1. Program description:

The Stormwater Management Specialist (SMS), also known as the Erosion Control Technician, is employed by the Monroe County Soil and Water Conservation District (MCSWCD), which has over 40 years of experience assisting the people of Monroe County in voluntarily managing their natural resources. The SMS has ready access to the Natural Resource Conservation Service staff who specialize in erosion control.

The SMS reviews proposed development projects through the Development Review Committee process of the Monroe County Department of Planning and Development and by request from others. The plans are reviewed for construction-phase erosion and sediment control and long-term water quality impacts. The SMS is a member of the Monroe County Water Quality Coordinating Committee, keeps Committee members aware of substantial development problems, and coordinates related water quality projects and task groups. Responsibilities include:

- Complaint response and investigation.

- Review of final construction plans submitted to the Monroe County Department of Health and to towns.
- Attendance at preconstruction meetings for significant projects.
- Routine inspections during construction.
- Conducting periodic training programs for developers, engineers, municipal officials, etc.
- Response to requests by towns and developers to evaluate and assist with special site problems.

6.32.2.2. Costs and/or sources of funding:

Costs: Annual funding required to support this position and associated expenses is $35,000-$40,000.

Sources of funding: The SMS position has been filled on and off since 1989, according to the availability of funding. Most recently, the SMS has been funded by a two-year grant from the Great Lakes Commission, and some in-kind contributions by the MCSWCD. Continued sources of funding the SMS program are uncertain. A subcommittee of the WQCC and the MCSWCD has been formed to investigate ways to permanently fund this program. Monroe County's Water Quality Coordinating Committee, Department of Health, Department of Planning and Development, and SWCD all recommend that the SMS position be permanent.

6.32.2.3. Current responsible entity: Monroe County Soil and Water Conservation District.

6.32.2.4. Effectiveness: The SMS makes detailed comments which include needed development plan revisions that enable an applicant to comply with the State Pollutant Discharge Elimination System (SPDES) General Permit for Construction Activity. (See also Chapter 6 section on "Federal stormwater regulations.") The General Permit program is administered by the New York State Department of Environmental Conservation (NYSDEC) which has had little or no staff available to review or enforce the General Permit. NYSDEC Region 8 often requests the SMS and MCSWCD to assist in voluntary compliance through project site visits and plan reviews.

Construction site visits are made randomly throughout the County at the request of NYSDEC, a municipal official, or as a result of a citizen's complaint. At projects which lack needed erosion and sediment controls, the SMS first contacts the site foreman and reviews deficiencies and needed corrections with him/her. Since the role of the SMS is not that of an enforcement officer, compliance is voluntary, which has made the presence of the SMS less adversarial to developers and contractors. However, if needed modifications are not made in a timely manner, the SMS will notify the NYSDEC, the Monroe County Department of Health or the appropriate municipality of the deficiencies. These agencies can then take further action as regulations or permits require. Usually, correspondence to all interested persons is used as a follow-up to onsite meetings.

The SMS provides resource information and education to target audiences on stormwater management, erosion and sediment control, and related new technologies. The SMS coordinated the first Western New York Stormwater Management Conference and Trade Show in Rochester, which was attended by 180 professional engineers, public works officials, product trades people, and government employees. Because of the favorable turnout and responses, the Conference is expected to become an annual event where new products and technologies will be demonstrated to key people.

The SMS make more people at the town and contractor level aware of how their activities affect water quality. However, monitoring has not taken place to demonstrate how the SMS position has improved water quality, and this needs to be done. An example of effectiveness of the SMS position is the increase in stormwater wetlands in new project designs. This is assumed to be in response to recommendations by the SMS through the Development Review Committee process to construct stormwater wetlands to mitigate the increased pollutants from impervious surface areas in new developments.

Author: Paula L. Smith

6.33. Greece Ponds Monitoring, Study, & Planning

6.33.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: Greece Ponds (Cranberry, Long, Buck, & Round) and Lake Ontario

Date program initiated: 1989

Completed or ongoing: ongoing

6.33.2. Program: Greece Ponds Monitoring, Study, & Planning

6.33.2.1. Program description:

In 1989, as a result of limited water quality sampling, Long Pond was identified as hypereutrophic. Data suggested that the trophic state of Long Pond was linked to excessive nutrient loading from Northrup Creek and internal recycling of phosphorus between the Pond sediment and the water column. Monroe County then proceeded to apply for federal Clean Lakes Program funding in order to conduct a more thorough study of the water quality in the Ponds and embark on a restoration project.

The project was put on a waiting list for Clean Lakes funding. Meanwhile, the County used State Aid to Localities funding for Aquatic Vegetation Control to do further work. The Monroe County Planning and Development Department, the Town of Greece, and the Lake Ontario West Basin Subcommittee sponsored a public forum on July 21, 1993. The purpose of the forum was to present the public with the latest information concerning the Ponds, as well as to gather public input regarding future management of the Ponds. More than 100 residents and users of the Greece Ponds area attended the meeting. In addition, more than 60 "pond user survey forms" and letters were submitted to the Planning & Development Department.

With this public input and research, a Draft Findings Document for Cranberry Pond, Long Pond, Round Pond, Buck Pond was prepared. This report documented existing uses and problems, gathered current water quality data, and established goals and required actions. The following proposed goals and objectives were established through the planning process:

1. Shorelines and ponds are free from debris, trash, oil, and other visible pollutants.
2. The water in the four ponds is of optimum quality (e.g., Long Pond should be mesotrophic, as opposed to hypereutrophic)
3. Water and shore habitats along the four ponds support thriving and diverse fish and wildlife populations.
4. Exotic species are controlled.

5. Habitat maintenance / enhancement for species that are threatened.
6. There is broad public awareness and public involvement in water quality improvement.
7. Human uses of the ponds are reasonably compatible with uses by fish and wildlife.
8. Ponds and the surrounding watersheds are managed with careful consideration for future generations.
9. Future development is limited in areas which are currently not developed.
10. Water quality in ponds is safe for swimming.
11. There is improved enforcement of existing water use rules and regulations.
12. There is improved communication between all parties involved in water quality management.

The Findings Document also identified the following ongoing actions which should contribute to improved water quality in the Greece Ponds:

1. Control of purple loosestrife
2. Habitat restoration for black terns
3. Prohibit power boat launches by non-residents on Cranberry Pond
4. Switch grass planting
5. Nesting boxes for wood ducks
6. Nature Conservancy efforts to restore songbird populations
7. Vehicle barriers and littering fines

Many additional actions were proposed at the public meeting by citizens or public officials. The following list is a sample of some of these:

1. Identify and implement alternative methods of road deicing
2. Educate homeowners on methods to minimize use of lawn care chemicals
3. Protect existing wetlands and promote new wetlands to improve water quality
4. Establish water quality goals for each of the four ponds
5. Survey areas without sewers to identify possible problems
6. Evaluate the feasibility of creating no-wake zones and/or speed limits on the Ponds
7. Establish fishery goals for the four Ponds
8. Develop more scenic areas for the public
9. Limit development
10. Utilize neighborhood associations to implement actions

A public meeting on the draft findings document was held in February of 1994. It is anticipated that an updated final version of the Findings Document will be completed in 1995. This update will incorporate data collected in 1993/1994. The data was collected by Dr. Makarewicz of SUNY Brockport in order to obtain a more updated and comprehensive set of water quality data. Dr. Makarewicz's report, entitled Water Quality of Long, Cranberry, Buck and Round Ponds 1993-1994, determined that three of the Ponds are suffering from cultural eutrophication. That is, they are degraded by excessive levels of nutrients (primarily phosphorus) resulting from

human activities.

The study determined that Cranberry, Long, and Buck Ponds are well above the threshold of 100 ug/L of Total Phosphorus thus indicating a hypereutrophic state. Phosphorus levels in the three Ponds are much greater than in most other area waters. For instance, the mean annual concentration of Total Phosphorus in Long Pond (the most severely eutrophic of the Ponds) was 168.1 ug/L compared to 13.0 ug/L in Lake Ontario and 19.8 in Conesus Lake. In the report, Dr. Makarewicz states that these results suggest that the Ponds are receiving excessive amounts of nutrients from the watershed and/or through auto-fertilization. The term auto-fertilization refers to the resuspension of nutrients (thus making them available to algae) through wind action or various human activities which disturb the bottom sediments.

Interestingly, the Total Phosphorus concentration in Round Pond is relatively low compared to the other Ponds. Dr. Makarewicz suggested that this may be related to the large wetlands through which Round Pond Creek must pass prior to reaching the Pond itself. The ability of wetland plant species to utilize excess nutrients is well documented.

Dissolved oxygen levels, which are another important indicator of the health of a water body, were also included in the Makarewicz study. The level of oxygen is a critical factor in determining what types of organisms can inhabit a particular water body. For instance, cold-water species of fish, including salmonids, require high concentrations of oxygen in order to survive. However, warm-water species of fish such as Northern pike, bass, and perch can thrive at lower oxygen levels.

Many factors can impact oxygen concentrations, including water temperature and the quantity of respiring organisms. Despite the warmth and the eutrophic state of the Ponds, Dr. Makarewicz found them to be well oxygenated throughout the year. Oxygen values recorded in the Ponds ranged between 5 and 16 mg/L. Long Pond contained the highest mean annual concentration of dissolved oxygen followed by Buck, Cranberry and Round Ponds.

As an additional component of the Greece Ponds planning project, during the Autumn of 1994, the Monroe County Health Department hired an intern to assist in the preparation of an Intergovernmental Agreement with the Town of Greece, facilitate citizen activities designed to improve water quality, and research the feasibility of establishing fishery goals for the Ponds.

The Intergovernmental Agreement with the Town of Greece was drafted in the Fall of 1994 and signed in early 1995. In the Agreement, the County and the Town agreed to a number of goals including the following: (1) design stormwater management systems which protect water quality, (2) initiate public education efforts regarding the benefits of created wetlands, (3) develop watershed plans, and (4) enhance Town ordinances which protect water quality.

In regards to possible citizen activities designed to improve water quality, the intern met with the local neighborhood associations to discuss appropriate projects such as storm drain stenciling,

lawn care education, and water quality monitoring. The associations expressed strong interest in all three options and participated in a storm drain stenciling project during the Spring of 1995.

The Greece Ponds planning project is not the first planning effort in the area. The Town of Greece and the State of New York have worked together to create the Braddock Bay State Fish and Wildlife Management Area and to develop a management plan to guide the conservation of this resource. The Braddock Bay Fish and Wildlife Management Area encompasses a significant portion of the Greece Ponds area including the southern ends of Cranberry and Long Ponds.

6.33.2.2. Costs and/or sources of funding:

The funding for both the monitoring and the development of the Draft Findings Document for Cranberry Pond, Long Pond, Round Pond, Buck Pond came from State Aid to Localities awarded to Monroe County through the Finger Lakes Water Resources Board. A total of $8,967 was allocated for the project. The intern was paid through the Water Quality Section's budget.

6.33.2.3. Current responsible entity:

The Monroe County Health Department is responsible for producing the Findings Document, contracting for monitoring, and providing staff support for the planning effort. The Town of Greece and the NYSDEC are jointly responsible for the Braddock Bay Fish and Wildlife Management Area Plan.

6.33.2.4. Effectiveness:

Cultural eutrophication is the result of excessive nutrient loading, primarily phosphorus, into a water body. In the case of Long Pond, the most significant source of phosphorus is the discharge of the Spencerport Sewage Treatment Plant into Northrup Creek which flows into Long Pond. The elimination of this source of pollutants would require changes in the operation of the plant or hooking into the County Pure Waters system. Clearly, major capital projects of this type are beyond the scope of this planning and monitoring effort. However, this type of project can be very effective in compiling information and educating residents and officials regarding actions that they can take in order to improve water quality.

Currently, several water quality actions relating to the Greece Ponds are being explored or implemented. For instance, staff representing the Monroe County Health Department , the Pure Waters District, and the Village of Spencerport have been meeting since March 1994 in order to explore the potential to make operational improvements at the sewage treatment plant that would reduce phosphorus loadings into Northrup Creek. At the suggestion of Pure Waters staff, ferrous sulfate has been added to the treatment process during 1995. As a result, total phosphorous discharge from the Spencerport sewage treatment plant has been reduced from 2-3 mg/L to 0.7-0.9 mg/L.

In addition, the Marland Shores and Grandview Beach neighborhood associations collected petitions in order to make known their desire to have the impacts of the Spencerport sewage treatment plant upon Long Pond remediated. Citizens will also be implementing projects such as storm drain stenciling which is designed to discourage people from dumping motor oil or other wastes into storm drains.

Author: Todd Stevenson

6.34. Dry Basin Conversions

6.34.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: the urbanized areas of the Rochester Embayment watershed

Date program initiated: 1993

Completed or ongoing: ongoing

6.34.2. Program: Dry Basin Conversions

6.34.2.1. Program description:

The Nationwide Urban Runoff Program (NURP) indicated that atmospheric deposition and subsequent wash-off from impervious surfaces during storm events in urban areas is a major source of pollutants to the Irondequoit Basin. Pollutant loadings (primarily phosphorus) from developed urban areas are 2-3 times the pre-development loadings. These contaminants contribute to eutrophication and subsequent oxygen depletion in Irondequoit Bay which degrades its value both aesthetically and as habitat for fish and wildlife.

In 1990, in an effort to gain additional information on methods for mitigating stormwater impacts on water quality, Monroe County and the USGS completed a cooperative study to demonstrate stormwater quality improvements through low-cost modifications of a dry basin. This study indicated that simple modifications to the outlet can substantially increase detention time and dramatically improve trap efficiency for most pollutants.

In Monroe County, there are several hundred developments constructed since the mid-1960's whose imperviousness yields a significant pollutant load to area streams through stormwater runoff. Many of these developments include flood prevention detention basins. In order to gain water quality benefits from these facilities, Monroe County is pursuing the conversion of many existing flood detention basins, which are dry between storm events, into wet basins/created wetlands, with between-storm water depths of two feet or less.

This project, supported by State and Federal Nonpoint Source Implementation Program funds, provides technical and cash assistance to the Towns through cooperative cost share, in which the Towns and the County share the cost of basin conversions. At projected levels, 30-75 basins could be converted through this project, depending on the size of selected sites.

In order to maximize participation in the program, an outreach team (consisting of representatives from the Monroe County Environmental Health Laboratory, the Monroe County

Soil and Water Conservation District, and the Natural Resources Conservation Service) was formed in order to meet with municipal staff regarding possible conversion sites. As of September 1995, dry basin conversion have been completed, or are under construction, in the Towns of Perinton, Pittsford, Brighton, and Mendon. The receipt of applications from the Towns of Greece and Webster, the Village of Scottsville, and the Monroe County Parks Department are anticipated. Discussions with the remaining municipalities regarding possible projects are ongoing.

6.34.2.2. Costs and/or sources of funding: The County's share of the program is being funded by $150,000 in grants from the New York State Nonpoint Source Implementation Program and the Great Lakes National Program Office of the United States Environmental Protection Agency.

6.34.2.3. Current responsible entity:
The Monroe County Environmental Health Laboratory and the municipalities of Monroe County.

6.34.2.4. Effectiveness: Research has shown that the conversion of dry basins to created wetland ecosystems reduces nutrient and sediment loadings to water resources. Unfortunately, the Towns and Villages have shown some reluctance to participate in the program because of the public perception that the creation of wetlands will result in increased mosquito populations. In addition, some residents continue to think of wetlands as swamps, and therefore, aesthetically unattractive and detrimental to property values. The outreach team has tried to address these concerns by discussing design solutions (such as side-slope control, safety benches and landscaping) with municipal officials. As an additional incentive to encourage participation, the County has removed the fixed limit on the size of individual grants.

Also, the New York State Department of Environmental Conservation (NYSDEC) has expressed concern regarding possible thermal impacts upon receiving waters as a result of the conversion of dry basins to stormwater wetlands. These concerns are described in the Chapter 7 section entitled "Manage Stormwater Quality in Existing and Newly Developing Urban Areas."

The NYSDEC has also expressed concern regarding the maintenance and seasonal variations in performance of created wetlands. The Monroe County Environmental Health Laboratory is conducting extensive monitoring in order to verify maintenance costs and seasonal pollutant removal effectiveness. The Laboratory will share this data with the NYSDEC.

One of the primary maintenance issues associated with created wetlands is the removal and disposal of accumulated sediments. In order to address this issue, the Laboratory is measuring sedimentation rates at both the Mill Road detention facility and at the Empire Wetlands project (for further information regarding these projects, see Chapter 6 Section 28 "Irondequoit Basin Stormwater Research, Demonstration, and Implementation"). In addition, the Laboratory is examining the flow of pollutants through these systems in order to better understand where they are stored. While created wetlands have the capacity to retain pollutants, whether or not sediment disposal will become a problem will be determined with data from the Mill Road

project. Also, it is important to note that the municipalities are required to accept responsibility for maintenance in order to be eligible for grant funds through the current dry basin conversion program.

In regards to winter performance of created wetlands, monitoring is being conducted at the Mill Road detention facility. The Laboratory does not believe that winter performance will be significantly reduced.

Author: Todd Stevenson

6.35. Streambank Erosion Control Projects

6.35.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: streams throughout the Rochester Embayment watershed are experiencing erosion

Date program initiated: not available

Completed or ongoing: ongoing

6.35.2. Program: Streambank Erosion Control Projects

6.35.2.1. Program description:

In 1986, the Irondequoit Basin Management Plan identified severe stream bank erosion as a serious water quality problem. In the basin, excessive stream bank erosion is impairing fish propagation, reducing water clarity, and transporting undesirable nutrients.

In order to further document the extent of water quality problems, including erosion, Monroe County sponsored volunteer stream surveys from the Fall of 1990 through the Spring of 1992. Volunteers found stream bank erosion throughout the watershed.

During 1994 Monroe County pursued funding for several stream bank erosion control projects. Linear Park in Penfield was selected as a high priority site for an erosion control project because the high bluffs along Irondequoit Creek within the Park are experiencing the most serious erosion within the watershed. Using aerial photographs, researchers estimated that between 1940 and 1980, the rate at which the Linear Park bluffs are eroding has doubled. Researchers also concluded "...that as much as half of the total sediment loading in Irondequoit Creek delivered to the wetlands at Blossom Road originates as erosion of the bluffs in Linear Park."

A project in Powder Mills Park in Perinton was selected as a high priority because a quickly eroding bend in Irondequoit Creek is threatening several park facilities including a handicap fishing dock, picnic shelter, and parking lot. In addition, this rapid erosion is contributing significant amounts of silt and attached nutrients to the Creek. Stream bank erosion, such as that in Irondequoit Creek, is a problem throughout the Rochester Embayment Watershed.

The Linear and Powder Mills Parks erosion control projects are being implemented in concert with several other efforts within the watershed to address non-point source pollutants. Both projects are contributing towards the goal of improved water quality in Irondequoit Bay and its tributary waters. The implementation of these projects also contributes to an improvement in

water quality in Lake Ontario.

As soon as funding can be secured, construction of the Linear Park erosion control project will commence. As of December, 1994, an engineering study has been funded which describes various alternatives and their associated costs. The most viable alternative would involve minor relocation of the stream by creating a new stream bank constructed of large stone and boulders. A base would be built on the bottom of the stream channel on which boulders would be stacked. This new "stream bank alignment" would curtail the erosion of the bluff and help prevent further sediment loading.

Scheduled to be completed in early 1995, the erosion control project in Powder Mills Park involves the installation of sheet piling along 100 feet of Irondequoit Creek. It is expected that this will stabilize the stream bank, thus, protecting park facilities and preventing further sediment loading.

6.35.2.2. Costs and/or sources of funding:
The funding for Linear Park project planning was obtained from State Aid to Localities. In addition, $10,000 of Clean Water Act Section 604(b) grant funds, and $3,333 in matching funds from the Town of Penfield, have been secured for implementation of erosion controls. The County will also be seeking additional contributions from the Town of Penfield, the New York State Non-Point Source Fund, and from Trout Unlimited. The total projected budget for this project is $267,000 which includes the construction of a haul road, stone armoring, restoration, and engineering, legal, and administrative expenses.

A total of $30,000 in Clean Water Act Section 604(b) grant money was awarded for the erosion control project in Powder Mills Park. An additional $10,000 in matching funds from the Monroe County Parks Department budget was also spent on the project. The total projected budget for this project is $40,000 which includes installation of sheet piling bulkhead, landscaping, and administration.

6.35.2.3. Current responsible entity: The Monroe County Parks Department will be responsible for monitoring the improvements in Powder Mill Park and reporting on their effectiveness to the Water Quality Coordinating Committee.

6.35.2.4. Effectiveness: It will be important to measure the effectiveness of these programs. Linear Park is owned by the Town of Penfield, and Penfield will be responsible for monitoring any structure put in place to prevent stream bank erosion at the site. Monroe County has an Inter-Governmental Agreement with the Town to cooperate in advancing this project. It is expected that Monroe County and the Town of Penfield will continue to cooperate in monitoring and assessing the effectiveness of this project.

Author: Todd Stevenson

6.36. Erosion and sediment control

6.36.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: All surface waters within the Rochester Embayment watershed

Date program initiated: The Development Review Committee began in the 1970s. Part 74 of the State Sanitary Code became effective in 1967, and Part 653 of the State Environmental Conservation Rules and Regulations became effective in 1972.

Completed or ongoing? Ongoing

Additional information:

Erosion is the process of soil particle detachment and transport. Land-disturbing activities, such as farming, removal of vegetation and land development expose soil to erosion. The force of rain on bare ground erodes soil particles and carries them in suspension (sediment). Snowmelt and freeze-thaw cycles have a greater impact on disturbed soils than on undisturbed soils. Detached soil particles add to the sediment load in stormwater runoff. Sediment is deposited as water slows down, usually blanketing the bottom of a waterway. If there are existing spawning beds, they may be destroyed by the blanket of sediment.

Urbanization reduces the amount of pervious area where stormwater percolates into the ground, resulting in more stormwater runoff leaving a site during storm events. Downstream channels can experience destabilization from more frequent, bank-full conditions increasing erosion and sediment problems.

Certain soils are more susceptible to erosion than others. Streams or rivers which flow through erodible soils continually add sediment to the water. The large flow of water in the Genesee River, coupled with the fine-grained erodible soils of the upper watershed, makes sediment load a major water quality problem of the River and the Rochester Embayment Area of Concern.

6.36.2. Program: Erosion and sediment control (Monroe County example)

6.36.2.1. Program description:

Construction sites

Studies of the Irondequoit basin found that construction sites contributed 14 times the sediment load of all other sites tested (Irondequoit Bay Framework Study). Currently, erosion and sediment control measures are included on development plans by the design engineer. The most

widely used erosion and sediment control reference manual is the New York Guidelines for Urban Erosion and Sediment Control which, after three printings is being revised.

Towns and villages in the Area of Concern that have erosion and sediment control regulations or ordinances review plans for compliance. Pre-preliminary plans are reviewed by the Monroe County Department of Planning and Development through a Development Review Committee (DRC). Members on the Committee who comment on erosion and sediment control are:

Monroe County Department of Health (DOH)
Monroe County Soil and Conservation District (SWCD)
Monroe County Department of Transportation (DOT)

In addition to this pre-preliminary review, the Monroe County Department of Health has review authority of erosion and sediment control designs for realty subdivisions, residential building lots or plots, under Part 74 of New York Public Health Law Sanitary Code and Part 653 of the State Environmental Conservation Rules and Regulations. Also, under an agreement with the New York State Department of Environmental Conservation Region 8 office, the Department of Health reviews erosion and sediment control designs as part of review and approval of plans for sewerage projects required by Article 17 of the New York State Environmental Conservation law, except those projects funded with federal and/or state monies.

Agriculture

See Chapter 6 section on "Promotion of Agricultural BMPs" and Chapter 7 section on "Promote Agricultural BMPs."

Highway repair and construction

During 1995 the Highway Drainage Task Group of the Monroe County Water Quality Coordinating Committee conducted an effort to review plans for County highway and bridge projects. The goal is to fully integrate water quality considerations into transportation planning. (See also "Manage stormwater quality in existing and newly developing urban areas.")

As part of the Development Review Committee, the Monroe County Department of Transportation comments on all permit applications for road cuts. The applicant must seed and stabilize the site within 15 days of final grading or when incomplete construction is suspended. Site-specific comments are also made when appropriate.

6.36.2.2. Costs and/or sources of funding:

Sources of funding for construction sites - Monroe County, municipalities that have regulations or ordinances for erosion and sediment control, developers

Sources of funding for highway projects - Monroe County Department of Transportation, New

York State Department of Transportation

6.36.2.3. Current responsible entity:

Construction sites - Monroe County Department of Health, other Monroe County departments when applicable to their projects, Monroe County Soil and water Conservation District, New York State Department of Environmental Conservation, municipalities that have regulations or ordinances for erosion and sediment control

Highway projects - Monroe County Department of Transportation, New York State Department of Transportation

6.36.2.4. Effectiveness:

Construction sites

The most significant factor that contributes to improving erosion and sediment control (ESC) designs is a planning process that results in a complete site-specific schedule of earth disturbing and restabilizing measures, including appropriate oversight management practices. Continuing education of engineers and land surveyors aids in better ESC designs.

Review and comment by the DRC on ESC proposals for new development are most favorably received by project engineers at the preliminary approval stage. Before construction begins, a meeting of the developer, contractor, subcontractors and a municipal representative takes place to plan and coordinate the sequence of operations. The ESC plans should be reviewed and discussed at this time. To help promote the implementation of the ESC plan the municipal representative should give detailed information and direction to the developer and contractor.

Once construction is started, the following factors influence the effectiveness of erosion and sediment controls:

- Location of site. Degree of community environmental awareness, direction given or not given by local elected officials, ability of municipal staff to inspect projects, knowledge of the municipal staff and the priority or value placed on the natural resource in the project site area.
- Developer and contractor. The knowledge of the developer and contractor about the ESC plan, water quality impacts of sedimentation and water quality regulations. The knowledge of the construction workers about proper installation of ESC practices.
- Consulting engineer. The degree to which the engineer stresses plan compliance affects the overall implementation of ESC on many construction sites.

Recommendations that are frequently made are to improve the outlet control of a sediment basin so it is more effective, and to re-establish vegetation. Recommendations such as these are most likely to be adopted if the Stormwater Management Specialist visits the site and follows through

with phone calls (see Chapter 6 section on "Stormwater Management Specialist"). When site visits are the result of a complaint, the benefits for water quality of following the recommendations can readily be seen.

Highway repair and construction

The NYSDOT has effectively applied many of the ESC practices described in the New York Guidelines for Urban Erosion and Sediment Control, and recommended by the Stormwater Management Specialist. One practice that has dramatically reduced erosion on bare soil on almost all sites observed is the use of straw mulch. Used in conjunction with a seeding of grass, straw mulch spread evenly over bare ground absorbs the impact of rain drops, slows runoff, and creates an excellent microenvironment for seed germination by holding moisture and controlling soil temperature fluctuations.

Also see Chapter 6 section on "Federal stormwater regulations."

Author: Paula Smith

6.37. Promotion of Agricultural Best Management Practices

6.37.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: The Rochester Embayment watershed

Date program initiated:

Completed or ongoing: ongoing

6.37.2. Program: Promote Agricultural Best Management Practices

6.37.2.1. Program description:

A wide range of government agencies and other organizations are engaged in educating the agricultural community regarding Agricultural Best Management Practices (BMPs), encouraging voluntary implementation, and in some cases providing financial support in order to facilitate implementation. Agricultural BMPs are proven strategies custom designed to address specific nonpoint source water quality problems (most frequently, nutrient runoff or erosion), on a case by case basis, by preventing or reducing the availability, release, or transport of substances which adversely affect surface and ground water quality. The use of BMPs also benefit agricultural producers in that these practices ensure that soil and nutrients are kept on the land where they are needed for farming. Typically, BMPs have standards associated with their installation, operation, or maintenance, however, they do not impose runoff limits for specific contaminants. Agricultural best management practices can be categorized as operational, vegetative, or structural, depending upon their purpose, function, and design. Operational practices are those that involve changes in farm management, usually resulting in a change in day-to-day decision making. Examples include fertilizer management and land application of manure.

Vegetative best management practices increase the amount of herbaceous and/or woody vegetation on a field or critically eroding area. Permanent vegetative cover and filter strips are examples of vegetative practices.

Structural best management practices generally require engineering design and, in most cases, are installed in order to control surface runoff, the primary transporter of most agricultural pollutants. Terraces and barnyard runoff management systems are examples of structural practices. Depending on the lifespan of the management practice, they may be temporary or permanent in their ability to control pollutants from agricultural nonpoint sources.

In the Rochester Embayment watershed, agriculture is a widespread land use and a primary source of non-point source water pollution. The improper management of tillage, fertilizer,

pesticides, manure, or waste water can result in nutrient and sediment contamination of water resources. In the Stage I Rochester Embayment Remedial Action Plan, agricultural runoff was identified as an important contributor to eutrophication or undesirable algae which has resulted in drinking water taste and odor problems, beach closings, degradation of aesthetics, degradation of phytoplankton and zooplankton populations, and loss of fish and wildlife habitat.

Numerous agencies and organizations are involved in the promotion and implementation of agricultural BMPs. Each county within the watershed has a Soil and Water Conservation District (SWCD) office which identifies agricultural nonpoint source pollution and works with landowners to develop remedial strategies and objectives. In some cases, landowners who implement an approved conservation practice may be eligible for federal cost-share assistance through the Consolidated Farm Service Agency (CFSA, formerly known as the Agricultural Stabilization and Conservation Service) of the United States Department of Agriculture. The Natural Resources Conservation Service (NRCS) and the Cornell Cooperative Extension offices are also engaged in promoting agricultural BMPs with local agricultural producers.

6.37.2.2. Costs and/or sources of funding: Not available

6.37.2.3. Current responsible entities: SWCDs, Cornell Cooperative Extension Offices, CFSA, and NRCS.

6.37.2.4. Effectiveness:

Staff from NRCS, SWCD, and Cornell Cooperative Extension are in contact with most of the agricultural producers in the Rochester Embayment watershed regarding best management practices. This outreach takes place through implementation of the provisions of the federal Food Security Act and through various educational efforts. In addition, some cost-share and educational efforts are funded by the New York State Environmental Protection Fund as administered by the New York State Soil and Water Conservation Committee and the New York State Department of Agriculture and Markets.

The federal Food Security Act of 1985 contains important provisions designed to encourage the implementation of agricultural BMPs. The Act prohibits farmers who receive United States Department of Agriculture (USDA) farm program benefits (including commodity price supports, agricultural conservation program payments, disaster payments, crop insurance, and Farmers Home Administration loans) from draining wetlands and requires that they develop conservation plans for Highly Erodible Land (HEL). The NRCS and SWCDs assist farmers in the development and implementation of these plans by identifying and interpreting soil types and limitations, erosion potential, crop adaptability, production potential, and resource problems. As shown in the following table, these plans have been developed and are being implemented throughout the Rochester Embayment watershed.

Table 6-15. Conservation Plans for Highly Erodible Lands (HEL)

County	# of HEL Tracts	Acres of HEL	# of HEL Tracts w/ Plans Applied[1]	Acres of HEL with Plans Applied[1]	# of HEL Tracts with Plans[1]	Acres of HEL with Plans[1]
Allegany	964	32,912	901	36,612	942	41,137
Genesee	186	6,101	163	4,769	265	9,283
Livingston	1,363	68,620	1,301	67,673	1,576	83,114
Monroe	576	22,673	375	18,445	514	20,353
Ontario	265	11,315	265	9,444	306	11,643
Steuben	220	13,815	206	13,238	205	13,149
Wyoming	765	31,716	891	38,702	813	35,694
Total	4,339	187,152	4,102	188,883	4,621	214,363

1- These figures may be inflated because as land is transferred the Plans may be altered, therefore, the same parcel of land may be counted twice.

As an example of the effects of BMPs, it is estimated that Plan implementation in Monroe County has reduced soil loss from highly erodible cropland from eight to four tons per acre per year. During the course of the year, staff from the NRCS review 5% of these plans in order to insure compliance. Staff also respond to reported problems.

As an illustration of the outreach efforts conducted by the local agricultural agencies, in 1994, the Monroe County SWCD and the local office of the NRCS received more than 1,100 requests for technical assistance, installed more than 900 conservation practices, and served 300 agricultural producers. As a result of these efforts, most local producers are in compliance with the Highly Erodible Land and Wetland Requirements of the Food Security Act.

Another federal program which facilitates the implementation of agricultural BMPs is the Conservation Reserve Program (CRP) of the 1985 federal Food Security Act. This program provides incentives to farmers not to farm very highly erodible lands. These incentives include financial assistance in establishing vegetative cover and an annual rent of $55 per acre held in reserve. As displayed in the following table, this program is widely used in the Rochester Embayment watershed.

Table 6-16. Participation in the Conservation Reserve Program (CRP)

County	Est. acres of farmland held in reserve under CRP which are located in the Rochester Embayment watershed
Allegany	2,100
Wyoming	1,200
Livingston	7,000
Ontario	600
Genesee	200
Monroe	663
Total	11,763

According to estimates, erosion rates on lands which are now protected by CRP have declined from 14 to 2 tons per acre.

The CFSA's Agricultural Conservation Program is another important program designed to encourage the voluntary implementation of BMPs. Under the program, agricultural producers who bear a part of the cost of an approved conservation practice (i.e. BMPs) are eligible for cost-share assistance. There are an extensive range of approved conservation practices including stream protection, sediment retention structures, cropland protective cover, the establishment of permanent wildlife habitat, and integrated crop management. As displayed in the following table, agricultural producers throughout the Rochester Embayment watershed are making use of this program. However, in recent years federal funding has been cut drastically. Fortunately, beginning in 1994, agricultural BMPs cost-share grants became available through the New York State Environmental Protection Fund. For example, in 1995 the Monroe County SWCD was awarded $37,000 from this source to provide BMP cost-share assistance, with an emphasis on education, to local agricultural producers. This effort will emphasize nutrient management through soil testing and the use of cover crops.

Table 6-17. Participation in the Agricultural Conservation Program - 1993

County	Number of Participants	Total Dollars Awarded
Allegany	152	$187,357.
Genesee	56	92,026.
Livingston	130	330,569.
Monroe	48	96,101.
Ontario	33	58,738.
Steuben	25	71,285.
Wyoming	114	169,075.
Total	558	1,005,151.

The NRCS, SWCD, and Cornell Cooperative Extension also conduct demonstrations of various agricultural BMPs in order to increase acceptance and implementation. For example, demonstrations and/or assistance with rotational grazing and no-till farming have been provided.

Authors: Frank Winkler, Todd Stevenson

6.38. Identification, remediation and prevention of onsite sewage disposal system problems

6.38.1. Background:

Use Impairments addressed: See Table 6-1

Affected water body: Lake Ontario and Rochester Embayment tributaries, groundwater

Completed or ongoing? Ongoing

Additional information:

When onsite sewage disposal systems are improperly designed or maintained, overflows of liquid wastes to the ground surface may occur. An older system may have been designed prior to current standards, or designed for a lower volume of use than it is currently receiving. Overflows not only create offensive odors, they also become a potential health hazard due to disease-causing organisms, and a potential environmental hazard due to disease-causing organisms and nutrients. A failing system near a waterway can directly affect water quality.

6.38.2. Program: Identification, remediation and prevention of onsite sewage disposal system problems

6.38.2.1. Program description:

A county that has a county health department and a county sanitary code will be responsible for individual sewage disposal systems. A county without a health department may assume responsibility for upholding the State Sanitary Code by adopting its own sanitary code which may be stricter than the State's. In a county with neither a health department nor a code, the local code enforcement officer administers the New York State Sanitary Code. Examples of activities are described for counties in the Rochester Embayment that have their own health departments and sanitary codes. In each of these counties, the Department of Health (DOH) is involved in planning and prevention of onsite sewage disposal system problems, in responding to system failures, and in education. An example is also given of a county that has neither a department of health, nor a county sanitary code.

Planning and prevention.

Typically the county sanitary code requires the design of every new system, and in some cases every repaired system, to be approved through a written permit by the county DOH before construction. The DOH is part of every stage of new development in an unsewered area: observation of soil testing, review of plans, and post-construction inspection (or requirement that construction be "engineer certified"). The permit can be written with conditions. It may need renewal after a certain number of years and/or may be revoked "for cause".

In Genesee County, when the DOH approves a septic system design, the homeowner is notified that tanks should be pumped out every two years. However, the pumpout is the homeowner's responsibility. The DOH inspects the system only if an inspection is required by a financial institution for a property transfer.

A revision in the Livingston County Sanitary Code in 1993 requires that onsite sewage system installers be registered with the County. Each one must fill out an "Application for Approval for Individual Sewage Treatment Installers". Registrants must show a letter of recommendation from a design engineer or from another county. If they are new to the business of system installation, they must show that they have worked for approved contractors, or that they are experienced in following plans. The registration has eliminated the problem of incompetent installers.

If a large subdivision or commercial enterprise is planned, extension of a public sanitary sewer may be part of the plans instead of individual systems. Nearby homeowners with individual systems may have the opportunity to hook into extended sewers. Extending sanitary sewers is particularly appropriate in densely settled areas where lots are not large enough for modern septic systems. However, sewer extension is not appropriate or feasible everywhere. Existing sanitary sewers may be too far away or extension may be too expensive. It is important that the treatment plant to which the waste is conveyed operates properly and does not discharge into a small water body incapable of handling the waste. In some areas the need to extend sanitary sewers will put citizen pressure on local politicians to find means for financing local districts. The extension of sewers to rural areas may also arouse opposition among those who wish to inhibit further growth in the area, those who wish to maintain farming operations, and those who have recently made expensive repairs to a system.

Ontario County does not have its own department of health or sanitary code. However, the Ontario County Building Officials Association meets regularly to coordinate and provide consistency for the activities of the local building and code officials who enforce the State Sanitary Code.

Response to system failure

DOH personnel have several means of detecting failing onsite systems. Evaluation of systems may be the result of a complaint, a limited survey, a project, or a property transfer. Evaluation may result either in a septic system repair or replacement or in a sewer extension.

Complaint. The DOH responds to individual homeowner or neighborhood complaints. Examples of response time are the Monroe County DOH goal of responding to all complaints within 24 hours, and the Livingston County DOH response to all severe failures on the same day the complaint is received.

If an isolated problem is found, the DOH advises the individual homeowner on further action. In some areas problem soils or small lot sizes make system repairs very difficult to achieve.

Requiring repairs when problems are evident may meet with resistance from property owners due to high costs. The need for financial assistance can be a major problem. Programs that may provide funding assistance include The Farmer's Home Program, the Home Improvement Loan Program (HILP), and the Genesee Valley Rural Preservation Council.

Limited community surveys. A county may do a limited survey of systems if requested by a neighborhood group or a municipality. The DOH can work in conjunction with town employees to determine the status of septic system performance at targeted locations. The purpose of the surveys is to identify any sewage disposal problems or violations in order for the town to determine the need and/or feasibility of extending sanitary sewers into the area.

A limited survey can be initiated by the DOH as a response to a significant number of system failures in a specific area. This is most likely to occur where older systems were installed before today's standards were in effect, or were designed for a seasonal use that has since become a year-round use.

Project surveys. Onsite systems can be surveyed as part of a project. For example, the DOH can ask the county's department of transportation to report, during a road construction project, any front-yard systems suspected to be failing and discharging to the roadside ditch.

Property transfer. Some banks require that an onsite system be evaluated as part of a property transfer. These inspections have limited usefulness if the house has already been vacated by the time of the inspection, or if the incoming family is larger than the outgoing family.

Education

Health departments and other agencies, such as Cooperative Extension, Soil and Water Conservation District and planning departments educate onsite system owners on maintenance through the use of printed materials and/or workshops.

Examples of printed materials on maintenance are:

- Pamphlets prepared by the county.
- Northern Virginia Planning District Commission pamphlet Your Septic System: A Reference Guide for Homeowners.
- NYS DOH pamphlet Septic Systems: Operation and Maintenance.
- Cornell Cooperative Extension Septic Tank Additives.
- Michigan State Cooperative Extension Maintaining Your Septic System.

Printed materials on maintenance may be sent to homeowners when their permit or construction approval is mailed, or may be given to homeowners via the developer's engineer. They may also be available at health departments, town halls and cooperative extensions.

Allegany, Livingston and Monroe Counties are among the counties that distribute information

about percolation tests and soil evaluation to homeowners constructing new onsite systems. Livingston County sends homeowners the "Homeowner Evaluation: Individual Sewage Treatment Systems" to record satisfaction, or the lack of it, with the County's involvement with their onsite sewage system.

In addition, Livingston County conducts workshops on wastewater treatment:

- For homeowners on maintenance.
- For small communities on wastewater treatment facilities (includes funding sources, alternative treatment technologies, NYSDEC permit process).
- For installers, inspectors and designers as a group, or for installers only or designers only (includes soils, design, construction, problem avoidance and problem solving).

Participation at the workshops is 50-100 people. Many participants come from out of the County.

Ontario County, through the Cooperative Extension, Soil and Water Conservation District and Planning Department provides educational programming and training related to onsite septic system placement and maintenance.

6.38.2.2. Costs and/or sources of funding: Sources of funding are fees for permits, county, New York State

6.38.2.3. Current responsible entity: Counties and New York State

6.38.2.4. Effectiveness:

In counties where town code enforcement officers administer the NYS Sanitary Code, it may be difficult to enforce the Code in a consistent manner. Counties who adopt the State Code may also be inconsistent in applying it. In counties that have their own health departments and sanitary codes, standards across the county are more likely to be uniform. Each individual onsite system is only a small potential source of pollution, but if many failing sources are prevented or mitigated, there is a positive effect on water quality, especially in areas immediately adjacent to waterbodies.

Activities that county health departments have found to be effective to prevent or mitigate onsite sewage disposal problems are:

- Health department involvement with design approval, soil testing and construction inspection for new systems.
- Sanitary sewer line extension.
- Registration of installers.
- Rapid response to complaints of onsite system failure.
- Limited surveys of neighborhoods for onsite system failures.
- Educational materials and workshops for homeowners, installers, designers and inspectors.

(See also Chapter 7 section on "Identify and solve onsite sewage disposal system problems.")

Author: Carole Beal

6.39. Educate the Public Regarding the Proper Use of Lawn Care Fertilizers and Pesticides

6.39.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: the Rochester Embayment watershed

Date program initiated: Since 1950, Cornell Cooperative Extension (CCE) of Monroe County has had a targeted educational program to encourage the safe and proper use of lawn care fertilizers. Since 1988, CCE's program has focused on Integrated Crop Management.

Completed or ongoing: ongoing

6.39.2. Program: Educate the Public Regarding the Proper Use of Lawn Care Fertilizers and Pesticides

6.39.2.1. Program description:

Cornell Cooperative Extension's lawn care fertilizer and pesticide education program targets consumers, commercial lawn care companies, and golf courses. A wide range of outreach methods are utilized including response to direct phone inquiries, personal visits, the provision of laboratory diagnostic services, monthly newsletters, regular spots on radio and television advocating environmentally sound lawn care management, newspaper articles, demonstrations, and educational meetings. Topics include nutrient management, variety selection, pest scouting/identification, pest control (both natural and chemical), and maintenance techniques. A major focus of CCE's education program is Integrated Crop Management (ICM). ICM may be defined as a holistic management strategy which emphasizes nutrient and pest monitoring, information-based and precise application of fertilizers and pesticides only as and where needed, and cost efficiency. Actions which might be taken as part of an ICM strategy include soil testing, pest identification and population counts, and equipment calibration and refinement.

6.39.2.2. Costs and/or sources of funding: Educational programs of Cornell Cooperative Extension are funded by Monroe County government, Integrated Pest Management grants, trade association grants, and private donations.

6.39.2.3. Current responsible entity: Cornell Cooperative Extension

6.39.2.4. Effectiveness:

The success of CCE's fertilizer and pesticide education program can be measured both in terms of the number of persons reached and the types of changes observed. On an annual basis, 10,000

people are reached by means of CCE meetings, demonstrations, or personal consultations, 500 are reached through the services of the diagnostic laboratory, and 9,000 are reached through the Garden Help Line. In addition, more than 200,000 people are exposed to CCE's outreach services by means of the mass media. The Monroe County Cornell Cooperative Extension has prepared a demonstration project proposal to quantify the impact that lawn care education can have on water quality maintenance. For more information on this proposal see the Chapter 7 section entitled "Intensify and Focus Public Education Effort Regarding the Proper Use of Lawn Care Fertilizers and Pesticides".

A number of trends have also been documented which illustrate the success of CCE's educational efforts. For instance, sixteen golf courses participate in Integrated Pest Management programs, a number of commercial lawn care companies now offer integrated pest management services, and Lesco Chemical Company, a lawn care products manufacturer, changed the formulation on its products to better accommodate integrated pest management.

Authors: Liz Berkley, Tom Nally, Todd Stevenson

6.40. The New York State Coastal Nonpoint Pollution Control Program

6.40.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: All surface waters

Date program initiated: 1995

Completed or ongoing? Ongoing

Additional information:

Nonpoint pollution from sources such as urban runoff, agriculture, and onsite wastewater treatment systems is responsible for over 90% of the water quality impairments in New York State, based on water quality information collected by the New York State Department of Environmental Conservation (NYSDEC) over the past decade.

6.40.2. Program: New York State Coastal Nonpoint Pollution Control Program

6.40.2.1. Program description:

As part of the federal Coastal Zone Act Reauthorization Amendments of 1990, Congress enacted Section 6217, entitled "Protecting Coastal Waters." This new section requires states with federally approved coastal zone management programs, such as New York, to develop and implement coastal nonpoint pollution control programs.

The New York State Coastal Nonpoint Pollution Control Program was developed jointly by NYSDEC and the New York State Department of State (NYS DOS). It was available for public comment before its submittal to the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA).

The State Program is required to demonstrate an effective approach to:

- The management (including public education and outreach) of nonpoint pollution which affects or may affect coastal waters.
- The protection of wetlands.
- The management of critical coastal areas.

The State Program was developed using the following criteria:

- Build on existing programs.
- Avoid duplication.
- Use existing knowledge.

- Use a common sense approach, focusing efforts on priority issues.
- Provide flexibility to deal with future changes in technology and knowledge.
- Address underlying problems rather than merely achieve technical compliance with Coastal Zone Act Reauthorization Amendment requirements.

The emphasis on existing programs and mechanisms has led to coordination mechanisms including:

- State Nonpoint Source Coordinating Committee - Formal representation from 15 State agencies.
- Recognition of existing Memoranda of Agreement between the NYSDEC and the NYS DOH regarding the management of onsite wastewater treatment systems, and between the NYSDEC and the New York State Department of Transportation (NYS DOT) regarding procedures to be used in many road projects.
- County Water Quality Coordinating Committees.

The Management Measure Guidance Document, developed by NOAA and EPA, divides nonpoint pollution sources into several categories. Within each category are a series of "management measures," each of which focuses on one activity which may cause nonpoint pollution. For each measure, the State must either:

- Demonstrate that there is an existing program for management,
- Demonstrate that the nonpoint source category or subcategory is not present or does not present significant adverse effects and is not expected to in the future, or
- Develop a program for management.

Agriculture

- Minimize the delivery of sediment from agricultural land to receiving water.
- Limit discharges from confined animal facilities by reducing runoff and storing (where applicable) wastes and contaminated runoff.
- Limit nutrient application to that required by comprehensive nutrient management plans.
- Minimize water quality problems by applying pesticides appropriately.
- Protect sensitive areas from livestock grazing overuse and degradation.
- Minimize pollution due to return flows, leachate, and runoff from irrigation.

The State believes that Soil and Water Conservation Plans can achieve most agricultural management measures. A Conservation Plan is required by Soil and Water Conservation District (SWCD) law for all but the smallest agricultural operations. The NYSDEC estimates that 90% of farms have Conservation Plans, although not all types of pollutants are considered in every Plan. There is no penalty for not implementing a Plan. The State Pesticide Management Program is seen by the State as addressing pesticide issues. A Working Group has established criteria for a proposed program to achieve the goals of the Coastal Nonpoint Pollution Control Program as it affects agriculture.

Other existing resources that address the agricultural measures include voluntary and educational

programs through the Cornell Cooperative Extension and SWCDs, and NYSDEC's Agricultural Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State.

Forestry

NYSDEC does not consider forestry to be a significant source of the pollution of New York's coastal waters.

Urban Areas

Urban runoff

- Mitigate the impacts of new development on water quality.
- Encourage comprehensive planning on a watershed basis.
- Plan individual site development to minimize impacts on water quality.

The State believes that these objectives are met by proposed revisions to the New York State Uniform Fire Prevention and Building Code, State Pollution Discharge Elimination System (SPDES) stormwater permits, the work of WQCCs, the Coastal Erosion Hazard Areas Program, the freshwater wetlands program, State Environmental Quality Review Act (SEQRA) and the proposed Critical Coastal Area program discussed below.

Construction activities

- Reduce erosion from construction sites to surface water.
- Reduce levels of toxic materials and nutrients from construction to surface waters.

The State has limited ability to implement the construction measures. Programs which may apply are the SPDES stormwater permits for sites of five or more acres, the freshwater wetlands program, the Coastal Erosion Hazard Areas program, the State Pesticide Management Program, waste disposal programs, and proposed revisions to the Fire Prevention and Building Code.

Existing development

- Develop and implement watershed management programs.

The State's strategy is to target resources in areas with identified problems using the priority water problem list. Other programs to address this measure include the proposed Critical Coastal Areas program discussed below, State watershed programs and county water quality strategies.

Onsite disposal systems

- Protect waterbodies from pollutants and nutrients from new onsite disposal systems. Goals are achieved through New York State DOH and NYSDEC rules and regulations.
- Improve operation and maintenance of existing onsite disposal systems to reduce pollution loadings. Many private lending institutions require inspections. Educational programs are carried out by many groups. New York is investigating options to improve onsite disposal system maintenance, such as insurance and tax incentives.

Pollution prevention

- Implement pollution prevention and education programs to address a variety of pollution threats, including turf management, lawn and garden activities, oil recycling, household hazardous waste collection, etc.

Cornell Cooperative Extension, NYSDEC and New York Sea Grant are among those that have educational programs.

Roads, highways and bridges

- Plan, site and develop roads and bridges to minimize pollution potential.
- Use an erosion and sedimentation control plan for construction projects.
- Ensure proper use, storage and disposal of toxic materials.
- Incorporate pollution prevention in operation and maintenance.
- Reduce pollutant concentrations in runoff from existing roads, highways and bridges, using a priority system.

Programs that address these measures include SEQRA, the freshwater wetlands program, SPDES stormwater permits, the State pesticide management program, spill and waste disposal programs, guidelines for deicing chemicals and practices, and the Cornell Local Roads Program.

Critical Coastal Areas

The NYSDEC and the New York State DOS have jointly drafted a bill to authorize the identification of watersheds for restoration and management. Areas to be identified are those adjacent to coastal or inland waters which are either water quality impaired or are waters that significantly exceed applicable quality standards. The program would coordinate State and local nonpoint pollution control efforts, develop partnership programs between State and local governments, and assign priorities for the development and implementation of watershed restoration and management.

Marinas and recreational boating

Siting and design

- Allow adequate flushing of the site's waters.
- Assess the water quality impacts of new marinas.
- Protect against adverse impacts on wetlands, submerged aquatic vegetation, and other important habitat areas.
- Where erosion is a problem, stabilize shorelines, with a preference for vegetative means.
- Properly manage the runoff from hull maintenance areas.
- Locate and design fueling stations to allow easy cleanup of spills.
- Install restrooms, pumpouts, and pump stations where necessary, design them to allow ease of access, and post signs to promote their use.

These management measures can be achieved through permit processes:

- Dredging: Section 404 permit under the federal Clean Water Act.
- Building in water or a wetland: NYSDEC permit.

The amount of follow-through inspection for these permits depends on the type of permit,

funding, and the size of the project.

Marina and boat operation and maintenance

- Properly dispose of solid wastes generated by boat operation, cleaning, maintenance, and repair. Addressed through the permit processes described above.
- Where fish waste is a problem, promote proper waste management through education, proper disposal of waste, and cleaning restrictions.
- Properly store, transfer, contain, and dispose of liquid materials such as oil, solvents, antifreeze and paints. Addressed through the Petroleum Bulk Storage Law, oil recycling, and NYSDEC Assessment Form for Marinas.
- Reduce leakage of fuel and oil from boat bilges and fuel tank air vents. Achieved through provisions of Navigation Law.
- Minimize release to waters of harmful solvents, cleaners, and paints from in-water hull cleaning. Can be addressed though permit conditions for new marinas and educational programs.
- Institute public education programs for boaters and marina owners and operators to minimize improper waste disposal. Educational programs through the NYSDEC, Cornell Cooperative Extension and New York Sea Grant are in place. *Reviewer comment: Education needs to be emphasized. It should include prevention of fuel release to the water during the refueling process.*
- Maintain sewage pumpout facilities and encourage their use. Can be addressed as a permit condition for new marinas. Also, New York is in the process of implementing a grant received under the Clean Vessel Act that will improve access to pumpout facilities.
- Where necessary, restrict boating activity to minimize destruction of shallow habitat and turbidity. Addressed under Navigation Law.

Boat operation issues are addressed under several State laws and programs.

Hydromodification

Channelization and channel modification

- Ensure that impacts on surface water characteristics are considered.
- Ensure an assessment of impacts on riparian and in-stream habitat.

Applicable programs are the Protected Streams program, the Section 401 Water Quality Certification, and Navigable Waters permit programs. Existing permit programs address the pollution potential of channelization activities.

Dam management

- Reduce erosion during and after construction of new dams.
- Properly manage the use, storage, and disposal of toxic materials and nutrients in constructing new dams and maintaining existing dams.
- Assess dam operation for impacts to surface water quality and habitat, both in-stream and riparian.

Existing permit programs address the pollution potential of dam construction. Dam operation

and management concerns are also addressed through a variety of specialized programs and education efforts.

Streambank and shoreline erosion
Where erosion is a problem, streambanks and shorelines should be stabilized, with a preference for vegetative methods. Addressed through the Protected Streams and Navigable Waters permit programs and other State programs.

Wetlands

Wetlands, unless already degraded, are not sources of nonpoint pollution. Rather, wetlands and riparian areas warrant protection for their roles in limiting the impact of pollution-generating activities.

Management measures are:

- Maintain the water quality benefits of wetland and riparian areas and ensure they are not degraded.
- Promote the restoration of existing wetlands that are degraded.
- Promote the development of artificial wetlands or other vegetated treatment systems.

No new programs are deemed necessary to protect existing wetlands, to allow for remediation of degraded wetlands or to encourage the use of vegetated systems as a pollution management approach. Authority for the first two measures exists under New York's freshwater wetlands program and Article 15, Title 5 of Environmental Conservation Law (Use and Protection of Waters).

Monitoring

The State believes that existing monitoring programs provide an adequate base of information. Monitoring for nonpoint pollution management should focus on:

- Assuring implementation of management practices.
- Extending the base of existing knowledge about the effectiveness of specific management practices under selected circumstances.

New York proposes to incorporate monitoring requirements in grants provided for nonpoint pollution control projects. Additional management measures may be needed in the future, depending on the results of monitoring programs.

Related RAP sections

See Chapter 6 sections on "Promote agricultural Best Management Practices," "Federal stormwater regulations," "Identify, solve and prevent onsite sewage disposal system problems," "Erosion and sediment control," "Rapid response to spills," "Educate the public regarding the proper use of lawn care fertilizers and pesticides," "Educational efforts to develop public stewardship of watershed," "Fish cleaning stations" and "Erosion and sediment control."

See Chapter 7 sections on "Promote agricultural Best Management Practices," "Identify and solve onsite sewage disposal system problems," "Manage stormwater quality in existing and newly developing urban areas," "Intensify and focus public education efforts regarding the proper use of lawn care fertilizers and pesticides," "Reform lake level management plan to mitigate impacts on wetlands," "Develop streambank erosion control program," "Promote the use of local governmental land use powers to protect fish and wildlife habitat" and "Identify and restore/enhance/protect critical habitat along waterways."

6.40.2.2. Costs and/or sources of funding: Sources of funding are New York State DOS, NYSDEC, SWCDs, Cornell Cooperative Extension, New York Sea Grant

6.40.2.3. Current responsible entity: New York State Department of State

6.40.2.4. Effectiveness: The Coastal Nonpoint Pollution Control Program in many ways duplicates actions that are ongoing in the Rochester Embayment watershed or are being proposed as part of the Remedial Action Plan (RAP) process. It is too soon to evaluate the effectiveness of the Program as a whole. The RAP will help to put the Program into practice. The effectiveness of the Program will be maximized by local awareness, participation and enhancement.

Author: Carole Beal

6.41. Efforts to Minimize Taste and Odor Problems

6.41.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: Lake Ontario

Date program initiated: NA

Completed or ongoing: ongoing

6.41.2. Program: Efforts to Minimize Taste and Odor Problems

6.41.2.1. Program description:

In recent years, Water suppliers who utilize Lake Ontario have experienced episodic drinking water taste and odor problems. For example, the Monroe County Water Authority (MCWA) has experienced earthy/musty taste and odor problems of the kind most often associated with algae growth. This has occurred despite the continuing trend of lower nutrient input and decreased planktonic algae and turbidity levels in Lake Ontario. In order to address these taste and odor problems, the MCWA and the Village of Brockport Water System have expanded their monitoring programs and improved their odor treatment capabilities.

Monroe County Water Authority:

In order to identify the source of drinking water taste and odor problems and better direct in-plant treatment strategies, the MCWA has expanded its monitoring program to include the following:

1. Analysis of Methyl-Iso-Borneol (MIB) and Geosmin - These are the compounds most often associated with musty/earthy taste and odor events.

2. *Actinomycetes* analysis - This bacteria has been identified as a source of earthy/musty taste and odor problems and is frequently associated with *Cladophora* algae.

3. Algae counts - Algae is usually identified as the primary cause of taste and odor problems. However, it has been difficult to identify a correlation between specific algae blooms in Lake Ontario and taste and odor problems. MCWA algae monitoring includes identification by genus and biovolume measurements.

The MCWA has also made a number of improvements in its treatment process in order to address taste and odor problems. Improvements have included increased powdered activated carbon feed system capabilities, testing designed to select the most effective carbon products for

the type of taste and odor problems in Lake Ontario, and a pilot plant evaluation of different alum/oxidant/absorption treatment schemes. In addition, flavor profile analysis and a complaint tracking system designed to provide improved feedback on treatment effectiveness have been implemented.

In order to provide a forum to share research results and operational experiences, the MCWA, in conjunction with New York Sea Grant, hosted a symposium on drinking water taste and odor causes and control in January of 1995. Lake utilities were provided the opportunity to share their research and experiences. A follow-up meeting is planned for autumn 1995.

Village of Brockport:

The Village of Brockport Department of Public Works has also expanded its monitoring program in response to drinking water taste and odor problems. In recent years, the type of odor problems experienced by the Brockport water system have shifted form a damp/musty odor (generally associated with certain algae types) to a more earthy odor. The Department attributes this shift to the proliferation of zebra mussels in Lake Ontario. During storm events, detached zebra mussel shells may be carried into the intake and cause short term taste and odor problems. In addition, the mussels may create conditions in the Lake which allow odor producers to thrive. Therefore, an integral component of the Department's monitoring program is working to quantify zebra mussels in their various life-cycle stages. In addition, algal types and quantities are being monitored.

The Department has made a number of operational changes in order to address these taste and odor problems including increasing disinfectant and coagulant doses and returning to the use of powdered activated carbon. Primary disinfection is accomplished using chlorine dioxide at the intake. This chemical is more powerful than chlorine and oxidizes zebra mussel veligers (larval mollusks) and algae more rapidly and completely (thereby destroying a larger amount of the residual organic materials which can impart taste and odor problems).

6.41.2.2. Costs and/or sources of funding: NA

6.41.2.3. Current responsible entity: MCWA and Village of Brockport Department of Public Works

6.41.2.4. Effectiveness:

As of October, taste and odor problems with water drawn from Lake Ontario have been minimal thus far in 1995. This is attributed to both conditions in the Lake and improved treatment processes.

Although the MCWA and Village of Brockport's programs do not address the causes of eutrophication and zebra mussel proliferation in the Rochester Embayment of Lake Ontario (and

related drinking water taste and odor problems), they do address the drinking water taste and odor use impairment as identified in the Stage I RAP.

Author: Todd Stevenson

6.42. Beach Monitoring/Modeling Program

6.42.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: Ontario Beach on Lake Ontario

Date program initiated: 1976

Completed or ongoing: Ongoing

6.42.2. Program: Beach Monitoring/Modeling Program

6.42.2.1. Program description:

From 1967 until 1976, Ontario Beach on Lake Ontario was closed to bathing because it did not comply with New York State Public Health Law standards for coliform bacteria. The Monroe County Environmental Health Laboratory (EHL) conducted extensive monitoring of water quality at Ontario Beach in order to develop a model to determine what conditions will result in bacterial levels that render the beach unsafe for bathing. In 1976, Monroe County was granted a permit to reopen the beach for bathing with the condition that bathing restrictions would be implemented on days when the model predicted unacceptable water quality. The current suspected sources of the bacteria which result in beach closings include Slater and Round Pond Creeks in the Town of Greece (Lake Ontario West basin) and the Genesee River. In addition, the large quantities of Cladophora algae which periodically accumulate on the beach also result in beach closings because decaying algae serves as a breeding ground for bacteria.

The EHL continues to monitor water quality on a daily basis at both Ontario Beach and the Genesee River (at the Pure Waters Charlotte Pump Station) to determine whether conditions are suitable for bathing. During unusual events, water quality monitoring is also conducted at Slater Creek, Ontario Beach pier, Round Pond outlet, and Lighthouse Road pier. A number of criteria are measured including wind speed and direction, wave height and direction, secchi disk depth, water and air temperature, algae type and extent, and bacterial levels.

The following criteria are used to determine when the beach should be closed for bathing:

Table 6-18. Ontario Beach: 1995 Operating Criteria

CRITERIA	ACTION
(1). Genesee River mean 24 hour flow is ≥ 3500 cubic feet/second (cfs) and < 5000 cfs	A pollution watch is in effect as long as flow remains > 3500 cfs. The beach is closed when the river flows west from the mouth
(2). Genesee River mean 24 hour flow is ≥ 5000 cfs	The beach is closed until flow decreases to watch condition or a stable eastward river flow is established
(3). Lake Ontario West Basin (LOWB) 24 hour rainfall is 0.3" - 0.7" or at an intensity of 0.2"/hour, LOWB rainfall is 0.2" - 0.4"	The beach is closed when the lakeshore current is flowing west to east or there is a northwesterly wind
(4). LOWB 24 hr rainfall total is 0.7" - 1.5"	The beach is closed for 24 hours
(5). LOWB 24 hr rainfall total is > 1.5"	The beach is closed for 48 hours
(6). Cladophora algae is on the beach	The beach is closed until the cladophora is removed
(7). Secchi disk depth is ≤ 0.6 meters	The beach is closed until the secchi disk is 0.8 meters
(8). Log mean fecal coliform densities in samples from the previous day are ≥ 400/100 ml, but the above criteria do not require closure	The beach is closed until the source of contamination can be identified and abated

The following table summarizes which criteria were most often associated with beach closings for the years 1992 through 1994. Each column totals to more than 100% because more than one criteria was exceeded for some beach closings.

Table 6-19. Criteria most often associated with beach closings

CRITERIA	1992 (%)	1993 (%)	1994 (%)
(1). Genesee River mean 24 hour flow is ≥ 3500 cubic feet/second (cfs) and < 5000 cfs	17	0	0
(2). Genesee River mean 24 hour flow is ≥ 5000 cfs	44	0	6
(3). Lake Ontario West Basin (LOWB) 24 hour rainfall is 0.3" - 0.7" or at an intensity of 0.2"/hour, LOWB rainfall is 0.2" - 0.4"	28	6	12

CRITERIA	1992 (%)	1993 (%)	1994 (%)
(4). LOWB 24 hr rainfall total is 0.7" - 1.5"	11	6	15
(5). LOWB 24 hr rainfall total is > 1.5"	3	0	0
(6). Cladophora algae is on the beach	11	56	41
(7). Secchi disk depth is ≤ 0.6 meters	72	81	38
(8). Log mean fecal coliform densities in samples from the previous day are ≥ 400/100 ml, but the above criteria do not require closure	14	6	6

6.42.2.2. Costs and/or sources of funding: The cost of the program is approximately $23,000 per year.

6.42.2.3. Current responsible entity: The Monroe County Environmental Health Laboratory

6.42.2.4. Effectiveness: The development of the model and the continued water quality monitoring make it possible to protect public health and still keep Ontario Beach open as much as possible. The model is continuously improved based upon experience. The Stage I Rochester Embayment Remedial Action Plan contains a table which provides a summary of Ontario Beach closure statistics from 1976 through 1991. The following table provides the same information for 1992 through 1994.

Table 6-20. Ontario Beach closings 1992-1994

Year	Season	Total #Days	Open #Days	Closed #Days
1992	27Jun-01Sep	67	31 (46%)	36 (54%)
1993	25Jun-30Aug	67	51 (76%)	16 (24%)
1994	24Jun-05Sep	74	40 (54%)	34 (46%)

Author: Todd Stevenson

6.43. Aquatic harvester to remove algae from Ontario Beach

6.43.1. Background:

Use Impairments addressed: See Table 6-1

Affected area: Ontario Beach, along the shoreline of Lake Ontario, in Monroe County, just west of the mouth of the Genesee River

Date program initiated: The use of the aquatic harvester will begin in 1996.

Completed or ongoing? Ongoing

Additional information:

When masses of *Cladophora* algae wash onshore, they serve as breeding grounds for the coliform bacteria that cause beach closings. As the algae decays, it also creates an odor problem. Masses of algae must be removed from the beach before swimming can be allowed. When algal amounts are too great, raking is not feasible.

6.43.2. Program: Aquatic harvester

6.43.2.1. Program description:

In the past, when particularly large quantities of algae washed onshore, it was not unusual for Monroe County Parks employees to spend two days with large loaders, trucks, and handrakes cleaning the beach. In 1995 an aquatic harvester was designed and constructed for more efficient removal of the filamentous (threadlike) *Cladophora* algae from Ontario Beach. The barge-type vessel was designed specifically for use at the shoreline and it can be launched at the beach. It is equipped with a bow-mounted conveyor pickup, storage area for several tons of algae, side cutters, and spud anchors that push into the water and hold the barge in a fixed position. The barge works perpendicular to the shoreline and turns around to unload via a conveyor system from the stern end into a dump truck. The harvested algae was expected to be composted in Durand Eastman Park (for which a New York State Department of Environmental Conservation permit will be needed.)

6.43.2.2. Costs and/or sources of funding (aquatic harvester):

Costs are $112,000 for design and construction.

Sources of funding: Design and construction: New York State Aid to Localities aquatic vegetation grant via the Finger Lakes Water Resources Board. Operations: Interdepartmental (Monroe County Departments of Health, Environmental Services, and Parks).

6.43.2.3. Current responsible entity: Monroe County Departments of Health, Environmental Services, and Parks

6.43.2.4. Effectiveness:

The mass harvesting of *Cladophora* algae will prevent it from decomposing on the beach and from becoming a breeding ground for coliform bacteria. The harvester will be able to handle significantly greater volumes of algae than hand raking. In 1995 the algae problem at the beach was aggravated by zebra mussels that latch on to the plants and break the algae strands into tiny segments. The harvester is expected to be able to handle the algae as tiny segments. With minor modifications, the aquatic harvester is also expected to be used at other sites to attack a variety of problems.

The harvester was the best of the three possible options to address the algae problem. The other options were beach closure, which is not acceptable to the community, or installation of an off-shore boom, that could negatively impact beach neighbors to the west.

Effectiveness will not be known with certainty until the summer of 1996.

Authors: Dennis Vercolen, Todd Stevenson, Carole Beal

6.44. Van Lare Stormwater Management Effort

6.44.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: Durand Beach on Lake Ontario

Date program initiated: not available

Completed or ongoing: completed June 1995

6.44.2. Program: Van Lare Stormwater Management Effort

6.44.2.1. Program description:

In 1966, Durand Beach (see Figure 6-2) along Lake Ontario was closed to swimming after New York State established health standards for fecal coliform bacteria which could not be attained. During storm events, fecal coliform bacteria counts as high as 2000 colony forming units (CFU)/100 ML have been recorded along Durand Beach. Fecal coliform levels in excess of 200 CFU/100 ML are considered unsafe for bathing. Water quality sampling conducted by the Monroe County Departments of Health and Environmental Services identified the stormwater runoff associated with the Van Lare Wastewater Treatment Facility (WWTF), local streams, and the Genesee River as the primary sources of this contaminant. As of the summer of 1995, Durand Beach remains closed because of a lack of public facilities.

A number of site drainage improvements were made at the Van Lare Wastewater Treatment Facility (WWTF) in order to prevent stormwater runoff at the facility from contaminating Durand Beach. These improvements allow all stormwater runoff from the WWTF to be collected and treated. The treated stormwater is then discharged to Lake Ontario through the plant outfall.

The Van Lare Stormwater Improvement project was constructed in two phases. The first phase involved connecting runoff from the west side of the plant to the old Charlotte forcemain. This old forcemain now functions as a sewer and discharges into the west leg of the lakeshore interceptor. The second phase of the project consisted of connecting runoff from the east and north sides of the plant to a new sewer connected to the lakeshore interceptor. This last phase included a new stormwater detention pond and the enclosure of a site drainage ditch.

6.44.2.2. Costs and/or sources of funding: The estimated cost of the stormwater improvement project at the Van Lare WWTF was $550,000.

6.44.2.3. Current responsible entity: Rochester Pure Waters District

6.44.2.4. Effectiveness:

The drainage improvements at the Van Lare WWTF have eliminated one of the primary sources of contaminants to Durand Beach. However, if the public beach is to be reopened for swimming, other sources of contamination such as local streams will need to be addressed. In addition, the necessary public facilities would need to be constructed.

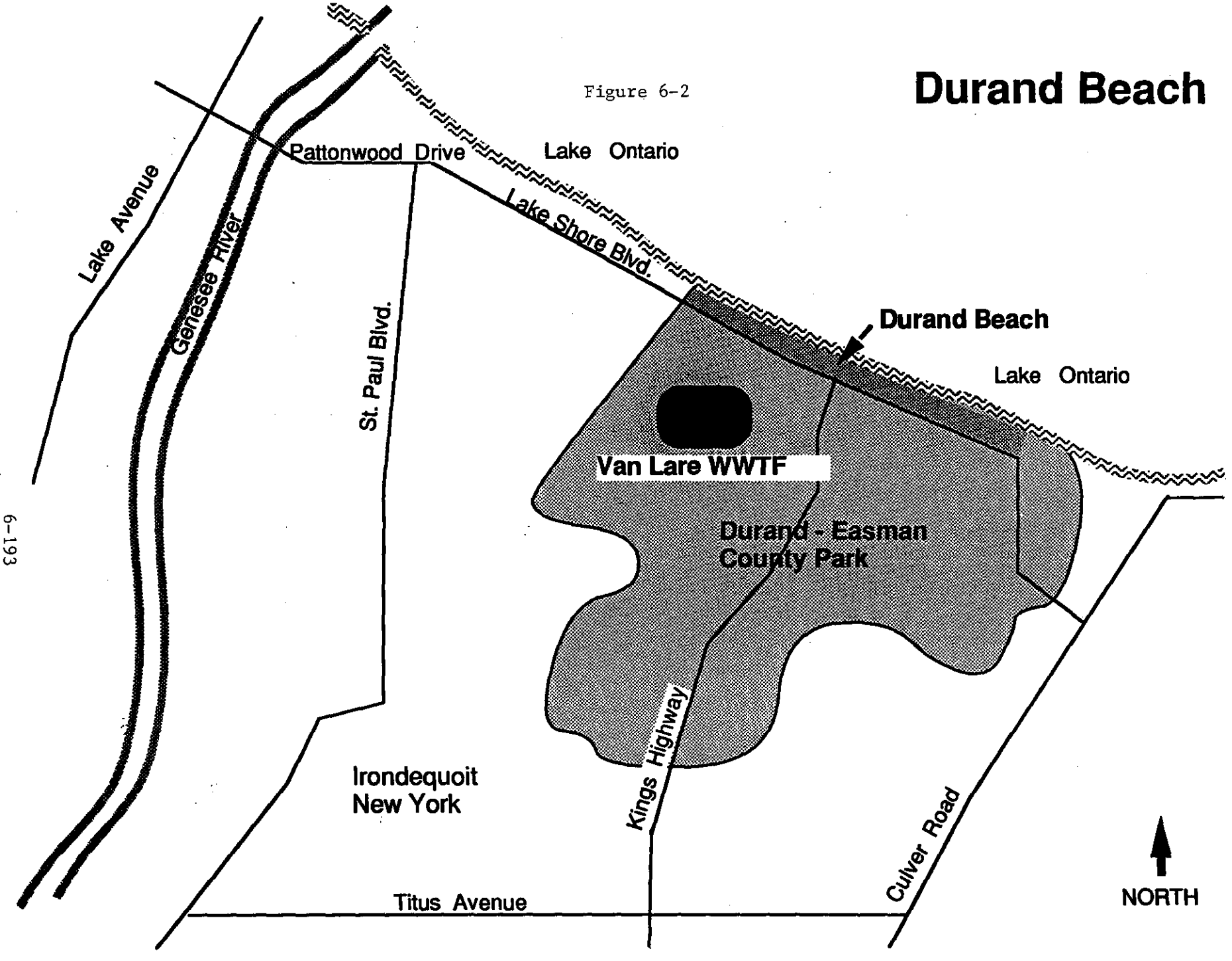
In 1985, Monroe County completed the Durand Eastman Park Comprehensive Plan. The Plan established both short and long-term goals for the Park. One of the long-term goals is to develop bathing facilities and formally reopen Durand Beach. However, no time frame was established.

In regards to the remediation of other sources of fecal coliform bacteria to Durand Beach, there is a proposal to pipe one of the local streams through the old Van Lare outfall pipe in order to minimize the impact of the stream on the beach. Preliminary design work for this proposal has been completed. However, a decision regarding implementation of this proposal has not been made.

Author: Todd Stevenson

Figure 6-2

Durand Beach



6.45. Elimination of Overflow Dredging

6.45.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: Lower Genesee River and Lake Ontario

Date program initiated: 1980s

Completed or ongoing: Ongoing

6.45.2. Program: Elimination of Overflow Dredging

6.45.2.1. Program description:

Since the late 1960's, Monroe County and other interested parties have been concerned with the impact of overflow dredging in the Rochester Harbor on water quality in the Embayment. Overflow dredging is a technique which allows low density muds to overflow from the hoppers (of a hopper dredge ship) at the dredging site. Unfortunately, many of the most important pollutants in the Genesee River sediment including coliform bacteria, pathogenic bacteria, heavy metals, organic compounds and nutrients tend to be associated with low density sediments and therefore are returned to the River during overflow dredging. This material does not settle quickly and results in a marked degradation in water quality. It is also important to note that concentrations of fecal coliform and other pathogens are greatest in the top centimeter of the mud water interface. Therefore, the first sediment loads taken at the initiation of overflow dredging tend to wash large quantities of fecal coliform and pathogenic bacteria back into the river.

Over the years, there were a number of meetings between interested parties and the United States Army Corps of Engineers (USACOE) regarding the dredging of Rochester Harbor. However, many of the "agreements" that were reached were not binding and did not survive personnel changes.

In 1977, the USACOE expressed its intent to reduce the impacts from dredging the Genesee River by eliminating overflow dredging. However, in the Autumn of 1982 overflow dredging performed in the River resulted in some of the highest coliform bacterial levels ever measured at nearby Ontario Beach thus necessitating the closing of the public beach. The Monroe County Health Department also observed marked reductions in dissolved oxygen and increases in certain pollutant levels.

In 1983, the USACOE agreed to implement an overflow testing program at the next suitable opportunity. In 1986, the USACOE commissioned a report by Aqua Tech Consultants, Inc. entitled "Monitoring Project at Rochester Harbor". The results of this study indicated that

elevated fecal coliform levels could result from resuspension in dredge overflow. As a result, the USACOE agreed not to allow further overflow dredging "at this time". In addition, at the request of Monroe County, the DEC has restricted the type of dredging permitted in Rochester Harbor. Overflow dredging is prohibited. Through this continued action Monroe County hopes to reduce the re-suspension of contaminants which can impact the nearby public beach, as well as wildlife habitat.

6.45.2.2. Costs and/or sources of funding: An economic study performed by the USACOE found that the elimination of overflow dredging, in favor of other dredging methods, would not be significantly more expensive or time consuming because of the colloidal nature of the Genesee River sediments. The dredging of the Rochester Harbor is funded through the budget of the USACOE.

6.45.2.3. Current responsible entities: USACOE and the Monroe County Health Department

6.45.2.4. Effectiveness:
The elimination of overflow dredging has reduced turbidity in the Genesee River and nearby Ontario Beach during dredging operations. However, dredging during the bathing beach season continues to cause some turbidity in the River and nearby Beach during certain wind conditions.

Author: Todd Stevenson

6.46. Fish Cleaning Stations

6.46.1. Background:

Use Impairments addressed: See Table 6-1

Affected water body: Genesee River.

Date program initiated: 1990

Completed or ongoing? Ongoing.

6.46.2. Program: Fish Cleaning Stations

6.46.2.1. Program description:

The City of Rochester is currently licensing Tempotech Industries, Inc., to manage fish cleaning stations along the Genesee River within the City. In exchange for services such as security, area clean-up, and fish carcass disposal, the City grants to Tempotech the sole right to purchase salmon eggs on City property in the Lower Gorge. Tempotech also pays the City a license fee.

There are two stations in the City which are managed by Tempotech. The stations are located in the following areas:

- River/Harbor area between Warehouses #2 and #3, consisting of an area approximately 20 by 20 feet.

- Seneca Park north of the RG&E access road, bordered by Seth Green Drive and consisting of an area approximately 20 by 20 feet.

6.46.2.2. Costs and/or sources of funding: Not available

6.46.2.3. Current responsible entity: City of Rochester.

6.46.2.4. Effectiveness:

In an attempt to avoid creating a public nuisance, controls are imposed upon the licensee through conditions of the license. One condition which pertains specifically to aesthetics is as follows:

> "Keep the area around the fish cleaning station clean and sanitized at all times as not to permit obnoxious odors from fish offal and debris. Further, the licensee will 'police' the surrounding areas of the station and keep said area clean of any debris and/or fish waste. During its sanitation program, licensee will use sanitizing chemicals (approved by the

FDA) for proper sanitization of the facility and post 'MATERIAL SAFETY DATA SHEETS' on site for use of these chemicals in accordance with federal laws for employees."

Tempotech has contracted A&M Bait Inc., to haul the waste generated by the stations. This waste hauler has a permit (6NYCRR 364 Article 27, Waste Transporter) from the New York State Department of Environmental Conservation. Waste will be hauled in 45 to 55 gallon sealed barrels to High Acres Sanitary Landfill.

In addition to licensing fish cleaning stations, the City is committed to enforcing the regulation pertaining to discarding fish carcasses along the banks of the Genesee River. With the combination of fish cleaning stations and increased enforcement, nuisances derived from fishing in the Genesee River will be greatly reduced.

Author: City of Rochester

6.47. Zebra Mussel Control Systems

6.47.1. Background:

Use impairments addressed: See Table 6-1

(The zebra mussel does not neatly fit the International Joint Commission listing criteria of "additional costs required to treat *the water* prior to use for agricultural or industrial purposes." The problem is not water *quality*. In fact, zebra mussels filter phytoplankton and other particles from the water. However, it is a water-*related* problem, and definitely an added cost to industry. Therefore, the Water Quality Management Advisory Committee decided to include the problem as part of the Remedial Action Plan.)

Affected water body: Lake Ontario, Genesee River

Date program initiated:
Monroe County Water Authority: Initiated August 1990.
Installation of chemical delivery system completed spring 1991.
Rochester Gas and Electric Corporation: Fall 1990

Completed or ongoing? Ongoing

Additional information:

The zebra mussel (*Dreissena polymorpha*) is a non-native mollusk, newly arrived to North American fresh waters via the ballast water of ocean-going vessels. It is capable of attaching firmly to surfaces, such as stone, wood, rooted aquatic vegetation, concrete, metal and plastic. Thus it attaches to and clogs water intake facilities, causing damage and increased operating expenses for municipalities, electric power generators, industry, navigation, irrigation, and private residents.

For systems in which no zebra mussels can be tolerated, control may need to be implemented on a continuous basis during the mussel spawning season from early spring to fall. When some mussel growth can be tolerated, periodic control, followed by mussel removal may be appropriate. Control technologies are summarized in Table 1.

6.47.2. Program: Monroe County Water Authority Zebra Mussel Control System

6.47.2.1. Program description:

The Monroe County Water Authority uses a chemical delivery system to control the attachment of zebra mussel to its water intake, 8,300 feet offshore. The system has been approved by the Monroe County Health Department. Potassium permanganate is used year around, and sodium

hypochlorite is used annually for about a two-week period. The chemicals are delivered in three high density polyethylene (HDPE) lines installed in the interior of the intake pipe (4168 linear feet of 78-inch diameter pipe joined by a transition piece to 4000 linear feet of 72-inch diameter pipe). One 1-inch line delivers potassium permanganate, and two $1^1/_2$- inch lines deliver sodium hypochlorite, and are used for raw water sampling.

6.47.2.2. Costs and/or sources of funding:

Cost: $800,000 for installation
Source of funding: Monroe County Water Authority capital budget

6.47.2.3. Current responsible entity: Monroe County Water Authority

6.47.2.4. Effectiveness:

A 2% permanganate solution is prepared for an applied dosage of 0.2-0.3 mg/l. Permanganate is fed year around to allow for enhanced taste and odor control and veliger (larval stage) inactivation. A 12.5% hypochlorite solution is fed at a dosage of from 2.2-2.5 mg/l periodically as a "shock" treatment. The addition of permanganate alone will significantly deter the growth and attachment of adult zebra mussels in the intake, but it does not totally prevent it. Periodic application of the more powerful oxidant hypochlorite is needed to remove adult, attached mussels.

During the time that hypochlorite is fed to the intake, chlorination is decreased in the treatment plant. The operating goal is to maintain a residual of 0.4 mg/l of free chlorine in the water entering the treatment plant. The microbiological quality of water (as measured by the heterotrophic plate count) is improved by the feeding of hypochlorite at the intake.

Addition of permanganate and/or hypochlorite does not appear to have a significant impact on water quality. Feeding hypochlorite results in a slightly higher pH of water entering the treatment plant (0.1-0.2 pH units). However, the pH of hypochlorite-treated water is no higher than pH values which have historically been noted.

Taste and odor problems have been associated with storm events disturbing established mussel growth. The detached shells have been carried into the intake and have caused short-term taste and odor problems. Operational procedures are available to quickly detect and react to changing raw water taste and odor characteristics.

Testing has shown that the addition of hypochlorite does not increase the generation of total trihalomethanes (a by-product produced by reaction with naturally occurring organic matter) to a level of concern. Although there is an increase, levels are well below the drinking water standard.

Because the intake crib structure and portions of the chemical delivery lines are outside of the area protected by chemicals, mechanical means of cleaning were undertaken during Fall 1992. A contractor was retained to mechanically remove attached shells with high pressure equipment. Periodic inspections will determine when additional cleaning is warranted.

6.47.3. Program: Rochester Gas & Electric Corporation Zebra Mussel Control System

6.47.3.1. Program description: Rochester Gas & Electric Corporation (RG&E) treatment differs from that of a water authority because the water is used for cooling, then discharged back into Lake Ontario or the Genesee River. The RG&E State Pollution Discharge Elimination System (SPDES) permit outlines the details of the treatment.

Under the SPDES permit, RG&E may perform up to three treatments per year with sodium hypochlorite. Each treatment consists of 30 days of continuous contact with hypochlorite such that the total residual chlorine in the discharge water does not exceed 0.1 ppm. There must be at least a 30-day interval between treatments. The treatments are applied in the plant and not at the intake.

RG&E performs periodic inspections of the intakes with underwater cameras and, if needed, scrapes mussels off the intakes.

6.47.3.2. Costs and/or sources of funding:

For RG&E's two generating stations in the Rochester Embayment area that use fossil fuel, capital costs for zebra mussel control have been $170,000. Annual operating and maintenance costs are around $64,000.

Source of funding: Rochester Gas & Electric Corp.

6.47.3.3. Current responsible entity: Rochester Gas & Electric Corp.

6.47.3.4. Effectiveness: The program is effective, but RG&E also has an ongoing research and development program for zebra mussel control and for optimization of the existing program.

6.47.4. Program: Zebra Mussel Control at Other Municipal Water Treatment Plants

6.47.4.1. Program description:

Most treatment plants are using hypochlorite and/or permanganate. Some use gaseous chlorine, which is cheaper but harder to work with. The plant in Brockport, Monroe County, uses chlorine dioxide because it was already using it for water disinfection. Inland from Lake Ontario, the treatment plants are in the planning stage or just beginning the construction of zebra mussel control systems. They also will be using permanganate and hypochlorite. According to an

official at Sea Grant's Zebra Mussel Clearinghouse, the above-mentioned treatments affect neither the environment nor the quality of the water.

6.47.4.2. Costs and/or sources of funding: Not available

6.47.4.3. Current responsible entity: Not available

6.47.4.4. Effectiveness: Not available

Author: Carole Beal

Table 6-21. Zebra mussel control technologies

Physical-mechanical	Prevent entry	Sand filter intakes Replace surface water with groundwater Use public water supply
	Prevent settling	Copper, copper alloy or galvanized metal surfaces Antifouling coatings Electrified surfaces Acoustics Cavitation (formation of partial vacuum) UV radiation
	Mortality	
Remedial		Thermal Drying Freezing System lay-up Scraping Pigging (scrubbing device) High pressure water Abrasive blasting
Chemical	Oxidizing biocides	Chlorine, chlorine dioxide, ozone, potassium permanganate, hydrogen peroxide, chloramine
	Nonoxidizing biocides	Molluscicides
	Oxygen scavengers	Hydrazine, sodium metabisulfites
Biological	Predators	Some species of fish, diving ducks, crayfish, raccoons
	Parasites	(Being studied)
	Microbes	(Being studied)

6.48. Establishment and Operation of the Braddock Bay Fish and Wildlife Management Area

6.48.1. Background:

Use impairments addressed: See Table 6-1

Affected water bodies: Buck Pond, Long Pond, Cranberry Pond, Braddock Bay, and Rose Marsh

Date program initiated: 1980

Completed or Ongoing?: Ongoing

6.48.2. Program: Establishment and Operation of the Braddock Bay Fish and Wildlife Management Area

6.48.2.1. Program description:

In 1982, in recognition of the habitat value of the wetland complex in the Braddock Bay/Greece Ponds area, the Braddock Bay Fish and Wildlife Management Area was created (see map). The Management Area consists of five units including Buck Pond, Long Pond, Cranberry Pond, Braddock Bay, and Rose Marsh. Located along the shoreline of Lake Ontario northwest of the City of Rochester in the Town of Greece (Lake Ontario West Basin), the Management Area constitutes a shallow water bay-marsh complex. Braddock Bay is connected with Lake Ontario through a broad, shallow outlet while the ponds are connected with the Lake through intermittent channels.

The Braddock Bay Fish and Wildlife Management Area contains one of the largest and most important coastal wetland ecosystems in New York State. The Management Area hosts one of the largest concentrations of migratory birds of prey in North America. During the February through June 1987 survey, more than 106,800 raptors, representing 19 species, were counted. Endangered species are commonly sighted, especially eagles and falcons. The Management Area also provides critical habitat for a great diversity of migratory and/or nesting waterfowl, water/shore birds, gallinaceous birds (i.e. pheasants, ruffed grouse, and wild turkey), and songbirds (more than 200 species).

The Bay and marshes also provide important spawning habitat for a number of species of fish including northern pike and largemouth bass. Recently, there have been seasonal concentrations of salmonids (coho, rainbow, chinook, brown trout, and lake trout) running up Salmon Creek and its tributaries. Habitat also exists for a wide range of mammals including muskrat, raccoon, mink, red and grey fox, skunk, weasel, and opossum. Recreational opportunities abound for fishermen, hunters, trappers, hikers, naturalists, and photographers.

The actual formation of the Management Area involved the transfer of 2125 acres from the New York State Office of Parks and Recreation to the New York State Department of Environmental Conservation (NYSDEC). An additional 375 acres, including Braddock Bay Park, Braddock Bay Marina, and Beatty Point were transferred to the Town of Greece (Lake Ontario West Basin) under a long term lease.

In 1983, in order to ensure the effective and efficient management and development of this valuable natural resource, the NYSDEC and the Town of Greece entered into a Management Agreement which outlined the responsibilities of each party and created a local review committee with representatives from various interest groups. The review committee assists and advises the NYSDEC and the Town on matters relating to the Management Area.

The Town of Greece and the NYSDEC have also developed and continuously updated a Management Plan. The Plan establishes objectives and outlines development, management, maintenance, and public use goals, strategies, and procedures for the Management Area. The Plan also outlines recommendations and concerns, research needs, acquisition opportunities, and possible funding sources.

In the 1995 draft revised Management Plan, objectives and associated development projects were established for both wildlife resource management and public use. For example, a wide range of actions are planned which include the placement of nesting structures, developing permanent grasslands, the creation of channels and dugouts in the major wetland units, purple loosestrife control, and stabilizing the water level of Buck pond.

6.48.2.2. Costs and/or sources of funding: Not available

6.48.2.3. Current responsible entities: NYSDEC, Town of Greece

6.48.2.4. Effectiveness:

The establishment and operation of the Braddock Bay Fish and Wildlife Management Area has both protected and enhanced critical habitat for numerous species of fish and wildlife and set an example of intergovernmental cooperation. The cooperative management of the Area by a state agency and a town, with input from a review committee, is unique in New York State. This system has both eased the administrative burden and facilitated the involvement of citizens in the management process.

A number of activities have been implemented in order to enhance and protect the habitat value of the Management Area. These include annual bird surveys and banding, the restoration of Beatty Point, and the control of Purple Loosestrife.

The Beatty Point restoration project was completed in approximately 1992 and involved the removal of piles of topsoil and the establishment of switch grass. This area was originally

disturbed as part of a failed golf course construction project.

In 1994, biological control of purple loosestrife was initiated with the release of two types of beetles and a weevil into a 4' x 8' enclosure within the Management Area. Initial results appear to be very promising. These insects (imported from Europe where purple loosestrife is native) survived the winter of 1994-1995 and were released from the enclosure during the 1995 season. The control of purple loosestrife is critical because this invasive plant chokes out desirable native wetland plant species. Field observations indicate that following the invasion of a wetland by purple loosestrife, there is a decrease in use by migratory and nesting waterfowl, decline in muskrat populations, and decrease in plant and wildlife diversity.

Attempts have also been made to minimize threats to the habitat value of the Management Area from human activities. For example, a fence barrier has been constructed at Beatty Point in order to discourage illegal garbage dumping and to discourage trespassing by all-terrain vehicles.

Author: Todd Stevenson

6.49. Non-Governmental Organizations Habitat Protection & Acquisition

6.49.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: the Rochester Embayment Watershed

Date program initiated: NA

Completed or ongoing: Ongoing

6.49.2. Program: Non-Governmental Organizations Habitat Protection & Acquisition

6.49.2.1. Program description:

In the Rochester Embayment Watershed there are numerous non-governmental organizations dedicated to acquiring and/or protecting fish and wildlife habitat. These include the Central & Western New York Chapter of the Nature Conservancy, the Bergen Swamp Preservation Society, the Genesee Land Trust, and the Finger Lakes Land Trust. In addition to these local organizations, the Long Point Bird Observatory of Port Rowan, Ontario, Canada is working with local citizens, organizations, and governments to develop a baseline assessment of wetland biodiversity in order to facilitate habitat protection and restoration.

The Nature Conservancy is an international membership organization committed to the global preservation of natural diversity. Its mission is to identify and preserve the world's best remaining examples of plants, animals, and natural communities by protecting the lands and water they need to survive. The Central and Western New York Chapter of the Nature Conservancy has protected more than 13,000 acres, and owns and manages 26 nature sanctuaries. However, many of these sanctuaries are outside of the Rochester Embayment watershed.

The Nature Conservancy's largest sanctuary within the Rochester Embayment watershed is the Thousand Acre Swamp Sanctuary which currently contains about 350 acres. This Sanctuary is located at the headwaters of Hipp Brook within the Irondequoit Creek Watershed in the Town of Penfield. Established in 1971, the Sanctuary is managed by the Thousand Acre Swamp Preservation Committee which continues to seek to expand the Sanctuary through gifts and purchases. The Swamp, totaling about 800 acres, contains a rich and diversified habitat including upland hardwood forest, deciduous swamp, and a cattail marsh.

The Nature Conservancy also owns significant parcels at Rush Oak Openings and Bergen Swamp. The Nature Conservancy's Rush Oak Openings parcel is 12 acres in size and located adjacent to the 125 acre New York State-owned Quinn Oak Openings property in the Genesee

River Basin. The Oak Openings community is characterized by native prairie grass savannah "openings" surrounded by Oak/Hickory forests. These openings may vary from 1/4 acre to 100s of acres in size and are maintained by fire. Fire is essential in order to prevent the encroachment of other types of vegetation into the "opening". The NYSDEC has engaged in some very limited burning on its property. The Rush Oak Openings is considered to be the finest example in New York State of this now rare community. Rare limestone woodlands are also located in this area.

Both the Nature Conservancy and the Bergen Swamp Preservation Society protect valuable habitat in the Bergen Swamp System. The Bergen Swamp Preservation Society is a non-profit membership organization dedicated to acquiring, maintaining, and educating about wetlands. The Bergen Swamp System is located in the Genesee River Basin and contains numerous rare plant communities including Marl fen, Northern white cedar swamp, and a number of state rare species. The Nature Conservancy owns 80 acres within the Swamp and the Preservation Society owns more than 1700 acres. Significant portions of this important resource remain unprotected.

Another important non-governmental organization working to protect wildlife habitat in the Rochester Embayment Watershed is the Genesee Land Trust. This organization is a not-for-profit corporation founded in 1989 in order to promote the preservation and protection of valuable land resources including those which have exceptional value for scenic, recreational, open-space, habitat and other reasons. The Trust seeks to meet these objectives by acquiring property or conservation easements, and by working with government agencies, individuals, and other private groups.

As of March 1995, the Trust has protected more than 200 acres through direct ownership or through conservation easements. Several of the properties under the stewardship of the Trust are located along waterways and therefore are particularly valuable in terms of both water quality and wildlife habitat protection. These include the Salmon Creek Preserve in the Lake Ontario West Basin and two properties in the Irondequoit Creek Watershed in the Lake Ontario Central Basin. The 40 acre Salmon Creek Preserve is located at the mouth of the Creek on Braddock Bay and contains valuable nesting habitat for the threatened black tern. The five acre Baldwin Property at Lincoln Mills is located on Irondequoit Creek and the 38 acre Hipp Brook Preserve, with its valuable wetlands, is located near the Nature Conservancy's Thousand Acre Swamp Preserve.

In addition, the Trust has targeted the area known as "Island Cottage Woods" in the Town of Greece, in the Lake Ontario West Basin, for preservation. The Nature Conservancy's Migratory Bird Survey found that the Island Cottage Woods area contained the greatest bird species diversity among 240 survey sites along New York State's Lake Ontario shoreline. In recognition of the importance of this area as wildlife habitat, the Trust is working with the local birding community and the Town of Greece to raise the financial support so that this resource may be preserved.

The Trust has also initiated a model "Land Registry Program" focused on Oatka Creek in the

Genesee Basin. The goal of this effort is to encourage responsible land-owner stewardship of natural resources. In order to achieve this goal, a resource database will be compiled and a land-owner outreach effort will be undertaken. The Registry Program will allow land-owners to pledge responsible stewardship of their land without entering into permanent agreements involving easements or donations. Ultimately, the program may be expanded throughout the Rochester Embayment watershed.

The Trust also works with local governments to preserve open space. For instance, the Trust is working with the Town of Victor, in the Lake Ontario Central Basin/Irondequoit Basin, to identify important land resources which might be targeted for protection and is also assisting in the development of strategies that could be implemented to protect such resources.

The Long Point Bird Observatory is another non-government organization engaged in habitat research and protection efforts in the Rochester Embayment Watershed. The Observatory is a non-profit bird research organization dedicated to involving the public in the conservation of birds and their habitats. In coordination with the Remedial Action Plan program, the Observatory is conducting a baseline assessment of wetland biodiversity within the 43 areas of concern (AOC). Birds and amphibians will be used as indicators of biological health. The assessment will be conducted as a collaboration between the Observatory and volunteer citizen observers. In the Rochester Embayment watershed, the Burroughs Audubon Nature Club, the Rochester Birding Association, and others will be participating in the assessment.

Using the information collected by the volunteers, a detailed final report will be produced. This report will present the results of data analysis regarding species abundance and diversity in AOC and non-AOC wetlands. Introductory analyses will deal with the effects of habitat variation, observer quality and weather conditions. The report will conclude with a "state of the environment" report for each AOC wetland and a series of recommendations, both broad-based and specific. Ultimately, regional biodiversity goals will be established which will serve as a benchmark against which to measure the effectiveness of wetland rehabilitation efforts.

6.49.2.2. Costs and/or sources of funding: not available

6.49.2.3. Current responsible entity: The Nature Conservancy, the Bergen Swamp Preservation Society, the Genesee Land Trust, and the Long Point Bird Observatory

6.49.2.4. Effectiveness: In the Rochester Embayment watershed, non-government organizations play a critical role in the protection of fish and wildlife habitat. These organizations possess the expertise and flexibility to act quickly to protect important land resources. However, the financial resources of these organizations is limited. Currently, numerous critical habitats remain unprotected including parts of the Thousand Acre Swamp, the Rush Oak Openings, and the Bergen Swamp.

Author: Todd Stevenson

6.50. City of Rochester Programming

6.50.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: the Genesee River and Lake Ontario

Date program initiated: NA

Completed or ongoing: Ongoing

6.50.2. Program: Land use planning

6.50.2.1. Program description:

City of Rochester Local Waterfront Revitalization Program (LWRP)

The LWRP has identified two goals which specifically pertain to habitat protection. First most of the development proposed by the LWRP in the coastal area will take place in areas that are already disturbed. No development as proposed will eliminate or disturb existing habitat area. Second, trails that are proposed will be designed to retain mature vegetation. It is a goal of the City to maintain as much of the natural environment around the trails as possible.

In more general terms, all local waterfront plans must identify what New York State coastal policies are relevant to the municipality's LWRP goals. Identified as a "very relevant" policy in Rochester's LWRP is to "expand recreational use of fish and wildlife resources and considers the other activities dependent on them." Identified as "relevant" policies are: 1. "Significant coastal fish and wildlife habitats will be protected, preserved and where practical, restored so as to maintain their viability as habitats;" and, 2. "Protect habitats from hazardous wastes and other pollutants."

South River Corridor Land Use and Development Plan (SRCP)

A goal identified in the SRCP is that all development will be in areas containing overgrown scrub growth, lacking aesthetic or ecological value. Areas of significant vegetation have been inventoried and will be protected and enhanced by the SRCP. The SRC plan also called for the development of new passive park land on both banks of the Genesee River in the South River Corridor. One of the parks is actually replacing a roadway, thereby increasing the amount of green space along the River.

Rattlesnake Point

A very recent activity by the City of Rochester is the acquisition of Rattlesnake Point along the east bank of the River north of Seneca Park. The City purchased, through condemnation, 40 acres of riverfront property from private land owners who intended to develop the property. The property contains environmentally sensitive areas including two DEC designated wetlands. The City intends to preserve the area and create trails for passive recreation. Eventually the City will attempt to make the area a part of Seneca Park.

6.50.2.2. Costs and/or sources of funding: Not available

6.50.2.3. Current responsible entity: City of Rochester

6.50.2.4. Effectiveness: The City of Rochester has been very conscientious in preserving fish and wildlife habitats along the Genesee River. This is observed as you travel along the River and see much mature vegetation and undeveloped shoreline. Much of the River's shoreline has been dedicated as park land and will remain undeveloped. In addition to the dedicated park land, several activities/plans to preserve fish and wildlife habitat along the Genesee River have been accomplished recently. City land use plans that include provisions for habitat preservation include the Local Waterfront Revitalization Program and the South River Corridor Land Use and Development Plan.

6.50.3. Program: Hazardous waste remediation

6.50.3.1. Program description:

Another City program that may have an impact on fish and wildlife habitat is the remediation of the contamination at the Rochester Fire Academy site. This is a 21 acre tract of land used as a training facility by the City of Rochester Fire and Police Departments. The site is located on the west bank of the Genesee River and is bordered to the west by the former Genesee Valley Canal.

The site is listed on the New York State Registry of Inactive Hazardous Waste Disposal Sites. A remedial investigation report was done for the site and included in that report is an ecological risk assessment. This assessment provides an inventory of vegetation and wildlife on the site. It also identifies the various chemicals of concern and the effects of each contaminant. This is followed by a discussion of the risks to on-site fish and wildlife as well as impacts to Genesee River sediment and water quality. The conclusion of the assessment is as follows:

> "Although the presence of the four inorganic compounds, cadmium, iron, lead, and zinc may be due, in part, from contamination at the Rochester Fire Academy site, the risk to wildlife from exposure to these compounds in the Genesee River is considered low. The risk to wildlife utilizing contaminated areas on-site appears to be somewhat higher, since the highest levels of contaminants detected were generally found on-site. During the

April 14, 1992 field survey, wildlife species were observed utilizing both the North and South Disposal Areas. Organisms lower on the food chain which utilize these areas can potentially pass contaminants up through the food chain, and game species such as mallards may pass contaminants to humans as well."

The risk to on-site wildlife will be significantly reduced when areas of contaminated soil on site are remediated. It is the goal of the City of Rochester to have the soils at the Fire Academy site remediated by mid-year of 1996. Risks to wildlife in the Genesee River will be reduced by the operation of a Groundwater Treatment System that will treat contaminated groundwater before it reaches the river. It is unknown at this time when groundwater remediation will be completed.

6.50.3.2. Costs and/or sources of funding: Not available

6.50.3.3. Current responsible entity: City of Rochester

6.50.3.4. Effectiveness: See 6.50.2.4.

6.50.4. Program: City site plan approval process

6.50.4.1. Program description:

Through the site plan approval process in the City of Rochester, there has been a recent attempt to improve water quality in the Genesee River as it pertains to storm water runoff. Often, an applicant will present a site plan for a project along the Canal or the River which proposes to discharge storm water runoff from a parking lot or other project component directly to the Canal or River. The Director of Zoning is now requiring treatment (generally some form of filtration) of the runoff before it is discharged.

6.50.4.2. Costs and/or sources of funding: Not available

6.50.4.3. Current responsible entity: City of Rochester

6.50.4.4. Effectiveness: See 6.50.2.4.

Author: City of Rochester personnel

6.51. Educate Public on the Value of Wetlands

6.51.1. Background:

Use impairments addressed: See Table 6-1

Affected water body: Rochester Embayment Watershed

Date program initiated: varies

Completed or ongoing: ongoing

6.51.2. Program: The Nature Conservancy and its Thousand Acre Swamp Preservation Society

6.51.2.1. Program description:

The Nature Conservancy is an international membership organization that commits itself to the "global preservation of natural diversity". The Conservancy is a non-profit, tax-exempt organization. The Conservancy's Central and Western New York Chapter sponsors many educational field trips and hikes to a variety of natural areas. The Conservancy also owns and protects other parcels of land. (Nature Conservancy Brochure and personal communication with Rochester Office of Nature Conservancy on March 2, 1994)

6.51.2.2. Costs and/or sources of funding: The Conservancy 's funding comes primarily from donations and membership fees.

6.51.2.3. Current responsible entity: The Nature Conservancy

6.51.2.4. Effectiveness: The Nature Conservancy, through its Thousand Acre Swamp Preservation Committee, provides guided tours of Thousand Acre Swamp in the Town of Penfield, Monroe County. In 1976, citizens established the Thousand Acre Swamp Preservation Committee of the Nature Conservancy to protect the Swamp through acquisition of parcels of land not yet under the Nature Conservancy's ownership. The Committee also fosters appreciation of this area by offering guided nature walks and educational and scientific programs. Thousand Acre Swamp is open to the public and visitors are welcome to take self-guided tours and nature walks in the area. These activities afford participants an appreciation for wetland areas by allowing them to visit and explore its beauty. (Personal communication with Shirley Shaw on April 18, 1994, and Nature Conservancy Thousand Acre Swamp brochure).

6.51.3. Program: The Bergen Swamp Preservation Society

6.51.3.1. Program description:

The Bergen Swamp Preservation Society owns Bergen/Byron Swamp, Zurich Bog and Taylor Marsh, all significant wetlands. Bergen/Byron Swamp is located in Genesee County, in the Towns of Bergen and Byron. Zurich Bog is in Wayne County in the Town of Arcadia, and Taylor Marsh is in Ontario County in the Town of Richmond. Because these areas are fragile, large groups and frequent visits by the general public are not possible.

6.51.3.2. Costs and/or sources of funding: Not available

6.51.3.3. Current responsible entity: Bergen Swamp Preservation Society

6.51.3.4. Effectiveness: The Society leads hikes into these three properties. Groups wishing to visit the properties must contact the person responsible for scheduling group trips and must have written permission. The Society has a scientific and education committee to screen proposals for research on its properties. Members of the Bergen Swamp Preservation Society also conduct presentations on the value of wetlands to interested audiences.

6.51.4. Program: Town of Pittsford

6.51.4.1. Program description:

As of April 1994, the Town of Pittsford, Monroe County, proposes to construct a stormwater wetland on a middle school property. The constructed wetland will be used for stormwater management including improvement of water quality and it is anticipated that wetlands education will be incorporated into the curriculum of the adjacent middle school. The created wetland may include special designs to facilitate education. No cost estimates are available as of April 1994. (Personal communications with Marty Brewster-March 2, 1994 and April 13, 1994)

6.51.4.2. Costs and/or sources of funding: One potential funding source would be the proceeds derived from the abandonment and sale of an existing detention pond at the Copper Woods subdivision.

6.51.4.3. Current responsible entity: Town of Pittsford

6.51.4.4. Effectiveness: Not available

6.51.5. Program: Environmental Management Councils (EMC)

6.51.5.1. Program description:

Several of the Counties in the watershed have Environmental Management Councils. Environmental Management Councils are supported by their County Governments and the New York State Department of Environmental Conservation. Their purpose is to advise and educate the public on environmental issues.

6.51.5.2. Costs and/or sources of funding: Supported by county governments and the New York State Department of Environmental Conservation

6.51.5.3. Current responsible entity: Environmental Management Council

6.51.5.4. Effectiveness: As of April, 1994, the Monroe County Environmental Management Council (EMC) is completing a slide show on wetlands that will be shown to municipal officials and the public. The slide show focuses on why wetlands are significant, why they warrant preservation and protection, and how they support aquatic and wildlife habitats. (personal communication with Louise Hartshorn, and viewing of slide show February 16, 1994). The wetlands committee of the Monroe County EMC will be designing a slide show presentation plan.

6.51.6. Program: Braddock Bay Fish and Wildlife Management Area: New York State Department Environmental Conservation (NYS DEC) and the Town of Greece

6.51.6.1. Program description:

The Braddock Bay Fish and Wildlife Management Area includes 2,500 acres of land between the shoreline of Lake Ontario and the Lake Ontario State Parkway in the Town of Greece, Monroe County. This tract originally fell under the jurisdiction of the New York State Office of Parks and Recreation (NYSOPR). In 1981, 375 acres of this land were leased to the Town of Greece. In 1982, the remaining 2125 acres, were transferred from NYSOPR to the New York State Department of Environmental Conservation (NYSDEC). The area was named the Braddock Bay Fish and Wildlife Management Area.

The Town of Greece and the NYSDEC entered into a management agreement in 1983 to ensure that the entire area would be consistently managed. The agreement stated that, "the parties shall operate, maintain, and develop the Leased Areas and the Management Area in conformance with the Management Plan" (Greece and NYSDEC Management Agreement, 1983). A 16 - member review committee was established to make recommendations to the Town and State on management area improvement opportunities.

In 1986, the Town of Greece tried to establish a Program Coordinator position for Braddock Bay

Park. Unfortunately, no funding was available for such a position. A report outlined a program of nature-related activities based upon the community needs as identified by interviewing community leaders, educators, and citizens. The report outlines educational activities relating to wetlands, but as of April, 1994 funding has not been appropriated.

6.51.6.2. Costs and/or sources of funding: Funding sources are the New York State Department Environmental Conservation and the Town of Greece

6.51.6.3. Current responsible entity: New York State Department Environmental Conservation and the Town of Greece

6.51.6.4. Effectiveness: This area is on a major flyway corridor for bird and raptor migration. It provides an optimum habitat for birds, raptors, mammals, reptiles, amphibians, and fish. The area is used by individuals for nature walks, bird watching, walking, canoeing, nature photography, drawing, and painting. The management area also offers a lodge and pavilion, the Cranberry Pond Nature Trail, Braddock Bay Trail, Braddock Bay Hawk Watch Platform, an owl interpretive trail, small boat launches, and a photography observation blind. All of these activities have the potential to promote appreciation and a desire to preserve wetland areas as a valuable resource. (Findings Draft of Greece Ponds, 1994 and Program Coordinator report to Town of Greece by Trenholme, December, 1986).

6.51.7. Program: Mendon Ponds Park, Monroe County Parks Department

6.51.7.1. Program description: See "Effectiveness".

6.51.7.2. Costs and/or sources of funding: Funding source is Monroe County

6.51.7.3. Current responsible entity: Monroe County

6.51.7.4. Effectiveness:

At Mendon Ponds Park, the Monroe County Parks Department operates a "Pond Pyramid" program that includes teaching fourth and fifth graders about aquatic systems. Some area schools involve their students and a half day educational program is done with children who attend summer camps visiting Mendon Ponds Park.

Mendon Ponds Park is also the site of Conservation Field Days for sixth grade classes from area schools. In the May 1994 program, approximately 25 area schools participated. The program and a corresponding contest of conservation education essays, posters, and dioramas are sponsored by the Monroe County Soil and Water Conservation District, Natural Resources Conservation Service, Consolidated Farm Service Agency, and Cornell Cooperative Extension. Conservation Field Days is an outdoor educational experience for children who go through seven stations where they have 15-minute presentations. Presentation topics in 1994 included

Wetlands, Water Quality, Pond Life, Wildlife Conservation/ Management, and Pond Biology. The purpose of the accompanying contest (open to all students attending a Conservation Field Day at Mendon Ponds Park) is "to stimulate interest and participation in environmental conservation". (Personal communication with Mendon Ponds Park staff member on March 2, 1994 and Field Days 1994 flyer).

6.51.8. Program: The Helmer Nature Center, West Irondequoit School District, Monroe County

6.51.8.1. Program description:

The Helmer Nature Center is operated by the West Irondequoit School District. The primary purpose of the Center is to provide environmental education for the West Irondequoit School District. However, the Center does contract out its services to private schools and schools outside of the West Irondequoit School District.

6.51.8.2. Costs and/or sources of funding: Members are an important part of the Nature Center's funding . Once a month the center holds a members' event that is usually adult or family orientated and environmentally focused.

6.51.8.3. Current responsible entity: West Irondequoit School District

6.51.8.4. Effectiveness:

The Helmer Nature Center offers pond study for children and teaches history, succession, environmental impact of construction, and more. The younger children focus on wildlife identification. Older children and ecology classes from schools visit the Nature Center once in the fall and once in the spring to do chemical testing, observing, and photo inventories of the pond. The Helmer Nature Center functions as an outdoor classroom.

The West Irondequoit schools use the nature center for field trips focusing on environmental education activities. These activities stress the importance of wetlands and their value as habitats for numerous fish and other wildlife. The importance of maintaining the natural balances of these eco/aquatic systems is also emphasized. On Saturdays and after school, other organizations such as the Boy Scouts and 4-H use the centers.

6.51.9. Program: U.S. Department of Agriculture Natural Resources Conservation Service and County Soil and Water Conservation Districts

6.51.9.1. Program description:

Each County in the Rochester Embayment watershed has a Soil and Water Conservation District and staff from the federal Natural Resources Conservation Service.

6.51.9.2. Costs and/or sources of funding: U.S. Department of Agriculture Natural Resources Conservation Service and County Soil and Water Conservation Districts

6.51.9.3. Current responsible entity: U.S. Department of Agriculture Natural Resources Conservation Service and County Soil and Water Conservation Districts

6.51.9.4. Effectiveness: These agencies make available pamphlets on the Federal Wetlands Reserve Program and watersheds.

6.51.10. Program: Rushford Environmental Education Camp

6.51.10.1 Program description:

The New York State Department of Environmental Conservation operates a summer environmental education camp for student ages 12-14. This camp is located in the Town of Caneadea in Allegany County.

6.51.10.2. Costs and/or sources of funding: Funding sources are the New York State Department of Environmental Conservation and camping fees

6.51.10.3. Current responsible entity: New York State Department of Environmental Conservation

6.51.10.4. Effectiveness: There are wetlands and a bog in the camp and many of the educational programs focus on water and wetlands. Students attend this camp for one-week periods, and are sponsored by organizations in western New York. Students report on their experiences to their sponsors.

6.51.11. Program: U.S. Fish and Wildlife Service

6.51.11.1. Program description:

The U.S. Fish and Wildlife Service office in Cortland, New York provides teacher training activities on environmental issues, including wetlands.

6.51.11.2. Costs and/or sources of funding: Funding source is the U.S. Fish and Wildlife Service

6.51.11.3. Current responsible entity: U.S. Fish and Wildlife Service

6.51.11.4. Effectiveness: The office has put together a Finger Lakes Activity Packet that uses an issue-based approach to the study of aquatic ecosystems. It meshes neatly with the sixth grade Ponds and Wetlands science kit that is available through some Boards of Cooperative Educational Services. Teacher training on this packet can be arranged through the author:

Sherry Middlemis, U.S. Fish and Wildlife Service, 3817 Luker Road, Cortland, NY 13045. The U.S. Fish & Wildlife Service also has available several other written resources on wetlands.

6.51.12. Program: U.S. Environmental Protection Agency

6.51.12.1. Program description: See "Effectiveness"

6.51.12.2. Costs and/or sources of funding: Funding source is the U.S. Environmental Protection Agency

6.51.12.3. Current responsible entity: U.S. Environmental Protection Agency

6.51.12.4. Effectiveness: The U.S. EPA publishes 32 Wetlands Fact Sheets that are available to individuals at no cost. One free copy of the fact sheets will be sent to any individual by calling 1-800-832-7828.

Author: Marie Lewis

6.52. Educational Efforts Designed to Develop Public Stewardship of the Watershed

6.52.1. Background

Use impairments addressed: See Table 6-1

Affected water bodies: the Rochester Embayment watershed

Date program initiated: varies

Completed or ongoing: ongoing

6.52.2. Program: Educational Efforts Designed to Develop Public Stewardship of the Watershed

6.52.2.1. Program description:

In the Rochester Embayment Watershed, numerous actions have been implemented to develop greater public appreciation for water resources and increase public involvement in the remediation and/or protection of these resources. This public sense of responsibility, or stewardship, for water resources is essential if the goals of the RAP are to be achieved. Numerous organizations are involved in these stewardship efforts including the Monroe County Soil and Water Conservation District, the Cornell Cooperative Extension of Monroe County, and the Monroe County Health Department (the Environmental Health Division and the Environmental Health Laboratory). In recent years, stewardship related actions have included environmental education events, as well as the initiation of educational projects such as storm drain stenciling, watershed road signs, the clean-a-stream program, water resource education at the Seneca Zoo, and the development of a water quality slide show.

A number of annual environmental education events are held in the Rochester Embayment Watershed including the Earth Day Festival/Energy Fair, the Monroe County and Western New York State Drinking Water Contests, the Envirothon, Conservation Field Days, and Water Week. In 1995, the annual Earth Day Festival/Energy Fair was sponsored locally by the Center for Environmental Information and was designed as an opportunity for a wide range of environmental organizations to showcase their programs or services to the general public. In the past, Earth Day events have been held at local universities and a range of public locations. These opportunities are used by the Water Quality Planning Section of the Monroe County Health Department to reach the public regarding the RAP effort, as well as other water quality issues and initiatives. The annual Monroe County and Western New York State Drinking Water Contests are used as additional opportunities to reach the general public regarding water quality issues. The public is encouraged to participate in "blind taste tests" of several public water suppliers.

In contrast, the Envirothon and Conservation Field Days are programs designed to increase educational awareness among students. The Envirothon is a national outdoor environmental competition among teams of high school students and is sponsored by local Soil and Water Conservation Districts. In 1994, the Monroe County Envirothon Team placed third in the national competition. Most of the counties within the Rochester Embayment watershed participate in the envirothon. A wide range of community organizations contribute to this program by providing staff to serve as instructors for the local teams.

The Conservation Field Days is an annual hands-on environmental education event for sixth grade students sponsored by the Monroe County Soil and Water Conservation District. The program is held at Mendon Ponds Park and consists of a series of stations each focusing on a different subject. Each of these stations is developed and staffed by different organizations from within the community. Typically, several of these stations cover water quality/lake ecology issues each year. The other soil and water conservation districts within the Rochester Embayment watershed also sponsor Conservation Field Day events.

"Water week", which is sponsored by the New York State Department of Environmental Conservation (NYSDEC), is another annual stewardship building event. In Monroe County, the Environmental Health Division of the Monroe County Health Department helps to coordinate this event with a number of agencies and organizations participating. The 1995 water week included tours of a waste water treatment facility and water filtration plant, a river clean-up, an environment day at a local school, storm drain stenciling, a drinking water contest, and the unveiling of the first watershed road sign.

In addition to these educational events, a number of long-term educational projects are being initiated in the Rochester Embayment watershed by the Monroe County Water Quality Management Advisory Committee (WQMAC), along with its subcommittees and task groups. These include storm drain stenciling, the installation of watershed signs, a clean-a-stream program, and a water quality slide show. The goal of these projects is to educate the public regarding water quality issues and what actions citizens can take to improve water quality.

Storm drain stenciling involves the painting of signs onto the pavement adjacent to storm drains with the message "Don't Dump - Drains to Lake, Bay, etc." The purpose of these signs is to discourage citizens from dumping wastes, such as motor oil, into storm drains, as this practice can seriously degrade water quality. Thus far, several community groups have conducted storm drain stenciling projects in the Rochester Embayment watershed. Demonstration storm drain stenciling projects were conducted during the May 1995 Water Week in order to educate additional community groups about water quality and how they may undertake this type of project.

The installation of road signs at various points along the boundaries of the Rochester Embayment Watershed, and its sub-basins, is another long-term stewardship building project. The purpose of these signs is to inform citizens that they are part of a watershed and to promote interest in water

quality. The signs read "Entering Genesee River Basin - Protect Water Quality" and are being installed by the Monroe County Department of Transportation. Naturally, the message on the signs will be changed as appropriate for each of the different watersheds.

The Clean-A-Stream program is another long-term educational effort which has been initiated. The purpose of this program is to facilitate and coordinate citizen involvement in improving stream water quality. The Clean-A-Stream Task Group of the Water Quality Management Advisory Committee (WQMAC) designed two pamphlets in order to promote the program. One is aimed at educating the general public about what individuals can do to help keep streams clean. The second is addressed to groups who are potentially interested in working on stream clean-up or monitoring. Watershed walks have also been conducted in order to field test program methodologies.

Another educational effort involves incorporating water quality information into the Seneca Zoo's programs and displays. As of the summer of 1995, the Seneca Zoo Task Group of the WQMAC has developed a water quality promotional rack for the Zoo and is working on obtaining funding for an aquarium display which will depict "healthy" versus "unhealthy" lake ecosystems.

The 1993 Water Quality Management Agency (WQMA) Annual Report, which was developed in the form of a slide show, is also being used as an educational tool. The Presentations Task Group of the WQMAC was formed in order to develop a protocol for the use of the slide show and facilitate its presentation to a wide range of community groups. As of the summer of 1995, the Monroe County Health Department has received funding in order to develop a video utilizing the slide show.

6.52.2.2. Costs and/or sources of funding: not available

6.52.2.3. Current responsible entities: Numerous organizations, both public and private, are involved to varying degrees in water quality education and stewardship building in the community including the Monroe County Health Department and the Monroe County Soil and Water Conservation District. The Monroe County Cornell Cooperative Extension also provides extensive educational programs, many of which apply to water quality. These programs are discussed in the Chapter 6 sections entitled "Lawn Care Educational Program" and "Septic System Educational Program". Many private organizations are also engaged in water quality education. Some of these are mentioned in the Chapter 6 section entitled "Non-Governmental Organizations Habitat Acquisition and Protection".

6.52.2.4. Effectiveness:

It is difficult to quantify the effectiveness of any program whose goal is to educate the community and encourage "green" lifestyles. The public education programs described in this section encourage a wide range of stewardship activities. Possible indicators of effectiveness

may include an increase in the quantity of products brought to the household hazardous waste facility, a decrease in lawn chemical usage, an increase in the number of residents that compost or leave lawn clippings in-place, a decrease in municipal solid waste, etc. Unfortunately, with the exception of household hazardous waste facility usage, these types of statistics are not currently available. In addition, although the above indicators help to measure the effectiveness of projects, they do not account for the long-term benefits of education.

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