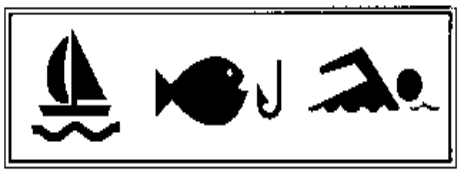
THE ROUGE RIVER PROJECT
A WORLD CLASS EFFORT



BRINGING OUR RIVER BACK TO LIFE

Rouge River National Wet Weather Demonstration Project

Wayne County, Michigan

TASK PRODUCT MEMORANDUM
Wetland Biological Monitoring Program – 2000

RPO-NPS-TPM65

March 2001

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Rouge River National Wet Weather Demonstration Project

MISSION STATEMENT

The mission of the Rouge River National Wet Weather Demonstration Project is to demonstrate effective solutions to water quality problems facing an urban watershed highly impacted by wet weather and develop potential solutions and implement projects which will lead to the restoration of water quality in the Rouge River. The project will address both conventional and toxic pollutants to:

- provide a safe and healthy recreational river resource for present and future generations;
- re-establish a healthy and diverse ecosystem within the Rouge River Watershed;
- protect downstream water resources such as the Detroit River and Lake Erie; and
- help ensure compliance with federal, state, and local environmental laws which protect human health and the environment.

This will be accomplished through the development, implementation, and financial integration of technical, social, and institutional frameworks leading to cost-efficient and innovative watershed-based solutions to wet weather problems. This watershed-based national demonstration project will provide other municipalities across the nation facing similar problems with guidance and potentially effective solutions.

PREFACE

The Rouge River and its watershed are a primary source of pollution to the Great Lakes. The Clean Water Act of 1972 intended to make waterways "fishable and swimmable" by 1972. Although that goal has not been reached, great progress has been made in improving water quality in most waterways. The Rouge River Remedial Action Plan (RAP) provided a basis for which The Rouge River National Wet Weather Demonstration Project (Rouge Project) efforts were created: it identified the major sources of pollution and measured the relative contributions of each. The RAP is the continuing foundation for the Rouge Project and presents a framework for addressing the problems within the Rouge River by looking beyond treatment and focusing instead on prevention methods.

The Rouge Project was established under the initial Rouge Grant 1 from the United States Environmental Protection Agency, Region 5, and enabled Wayne County to initiate a comprehensive watershed-wide pollution-control approach that addresses combined sewer overflow (CSO), stormwater management and other nonpoint source controls through the application of innovative technologies, progressive financial and institutional arrangements, and creative public involvement and education programs.

Rouge Grant 2 provides the framework for the progression and implementation of Project goals as Wayne County continues its mission to develop potential solutions and implement projects which will lead to the restoration of water quality in the Rouge River. The Project will address both conventional and toxic pollutants to:

- provide a safe and healthy recreational river resource for present and future generations;
- re-establish a healthy and diverse ecosystem within the Rouge River Watershed;
- protect downstream water resources such as the Detroit River and Lake Erie; and
- help ensure compliance with federal, state, and local environmental laws that protect human health and environment.

This will be accomplished through the development, implementation, and financial integration of technical, social, and institutional frameworks leading to cost-efficient and innovative watershed-based solutions to wet weather problems. This watershed-based national demonstration project will provide other municipalities across the nation facing similar problems with guidance and potentially effective solutions.

Under Rouge Grants, the Rouge Project concentrates on the following key Project areas:

- **Watershed Management** including the development and evaluation of wet weather and stormwater alternatives, the planning of long-term monitoring programs, and the ongoing efforts to enhance instream water quality, monitor rain and flow levels, interpret data analysis, and present recommendations.

- **Nonpoint Source Pollution Control** including stormwater management, permit applications, and development of financial and institutional alternatives for wet-weather watershed management in concert with enhanced efforts to establish institutional partnerships. Toward the goal of institutional partnering, several community projects have been undertaken with watershed communities. Additional efforts have included the inventory of wetlands and measurement of pollutant loads from abandoned dumps and air deposition with possible remediation of some sites.

- **CSO Construction Coordination** to monitor the construction of CSO demonstration projects established under Grant 1. Additional planning and assistance will allow project coordinators to make additional recommendations on the design criteria of future CSO abatement facilities.

- **Public Involvement and Information** including the interaction with stakeholders, institutions, and regulatory agencies, thus fostering a renewed understanding and continued commitment to reducing pollution, and continuing the transfer of watershed management approaches beyond the project. It will be the central mechanism for transmittal of the Projects Decision Support System tools, processes, and information necessary for sustaining a watershed management support system directly to varied audiences both within and outside the Rouge watershed.

Additional information on the Rouge River Project is available from many sources, including the Wayne County Department of the Environment (WCDOE) and the Rouge Program Office (RPO).

This document has been generated under the Nonpoint Program Element. Its purpose is to continue to monitor the condition of the floodplain vegetation and other biota in areas that have been subjected to greater inputs of water from storm sewers. These data will be important for understanding long-term environmental impacts of water resource management in wetland ecosystems. Biological monitoring of the RPO wetland demonstration projects at Inkster will focus on hydrology, wildlife, aquatic biology, and plant community. The biological monitoring will also comply with the terms of the Michigan Department of Environmental Quality (MDEQ) permit which requires monitoring for a five year period after the project is initiated.

ABSTRACT

This 2000 report is the sixth in a series of annual wetland monitoring reports for a wetland demonstration project located in the City of Inkster, Michigan. The goal of this report is to chronicle changes in plant and aquatic macroinvertebrate communities brought about by recent alterations to the hydrology of the Lower Rouge River floodplain.

Wet meadow, emergent, and open water wetland communities have established in Areas 1 and 3-West. The wet meadow and emergent types are densely vegetated, but plant cover remains very low in the open water community. The relative lack of plants in the latter type is probably due to high turbidity and its negative effect on the establishment and proliferation of aquatic plant species. The observed high turbidity levels can perhaps be attributed to a fine basin substrate and the continued suspension of these sediments by wind action and the foraging activities of bottom-feeding fish species. The stormwater treatment capacities of Areas 1 and 3-West are below their maximum potential due to incomplete plant coverage.

Purple loosestrife (*Lythrum salicaria*) has established in Areas 1 and 3-West. This Eurasian weed species often forms dense monotypic stands that exclude native wetland plants. The proliferation and spread of purple loosestrife is counter to the Rouge River National Wet Weather Demonstration Project objective to "re-establish a healthy and diverse ecosystem within the Rouge River Watershed". It is recommended that measures be taken to control or eliminate purple loosestrife populations in Areas 1 and 3-West.

Aquatic macroinvertebrate diversity continues to increase. Aquatic macroinvertebrate populations in Areas 1 and 3-West are typical of those found in newly created wetlands. It is likely that future growth of aquatic macroinvertebrate populations in size and diversity will be limited by a lack of submergent vegetation (resulting from elevated turbidity levels) and predatory fish. Establishment of aquatic vegetation within the open water areas of the wetlands will result in increases in diversity and abundance of aquatic macroinvertebrates.

Yearling fish species including carp and green sunfish continue to inhabit the two created wetland areas. Area 3-West is very shallow and will likely support seasonal fish populations. Re-introductions of fish via overflow from the Lower Rouge River and other sources will probably re-supply wetland each year with new fish. Area 1 appears to support more and larger carp than Area 3-West. The high turbidity caused by bottom foraging activity of these fish species may hinder establishment of emergent and submergent aquatic vegetation within Area 1.

Waterfowl (including wading and shorebirds), several common species of mammals, and reptile and amphibian species continue to utilize the wetland areas.

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1.0 INTRODUCTION

This report is the sixth annual monitoring report to be prepared as part of the biological monitoring program of the Rouge River National Wet Weather Demonstration Project.

The purpose of the monitoring program is to measure the impacts of stormwater runoff on plants and other biota in Rouge River floodplain wetlands used for temporary retention and treatment of stormwater. By annually monitoring the vegetation and comparing the results to the baseline data compiled in 1995 (prior to the construction of the stormwater retention system), it is possible to discern and measure any major changes.

The ultimate objective of this wetland demonstration project is to determine the effectiveness of, and develop model design guidelines for, the use of existing and newly created wetlands for treating nonpoint source pollution received from storm sewers.

The first in this series of monitoring reports (1995) presented baseline (pre-construction) information about the floodplain flora in two areas (Area 2 and Area 3-East) located on the south side of the river where hydrologic modifications were planned. The second (1996), third (1997), fourth (1998), and fifth (1999) reports documented the status of the vegetation shortly after the modifications were completed, and after two additional growing seasons. This (the sixth) report continues to describe the impact of the fully operational stormwater discharge system on floodplain vegetation in the two remaining wetlands (Area 1 and Area 3-West) for which additional monitoring is required.

2.0 PROJECT LOCATION AND DESCRIPTION

The two sites that were monitored (Area 1 and Area 3-West) are located in the City of Inkster, north of US-12 and between Middlebelt and Inkster Roads (NE 1/4 of Sec. 25, T2S, R9E) (Figure 2-1).

Area 1

Area 1 is a 5.3-acre emergent, wet meadow, and open water wetland located on the north side of the Lower Rouge River immediately to the south of the Rosewood and Harrison Avenue intersection (Figure 2-2). It is bounded by a steep slope and single family residences to the north and surrounded by four fairways of the Inkster Valley Golf Club. The site falls entirely within the river's 100-year floodplain. Area 1 receives stormwater from an adjacent 42-inch storm sewer. The stormwater is first discharged into a sediment forebay and then released into the wetland over a concrete weir. The area was seeded with a variety of native wetland plant species to establish vegetative cover.

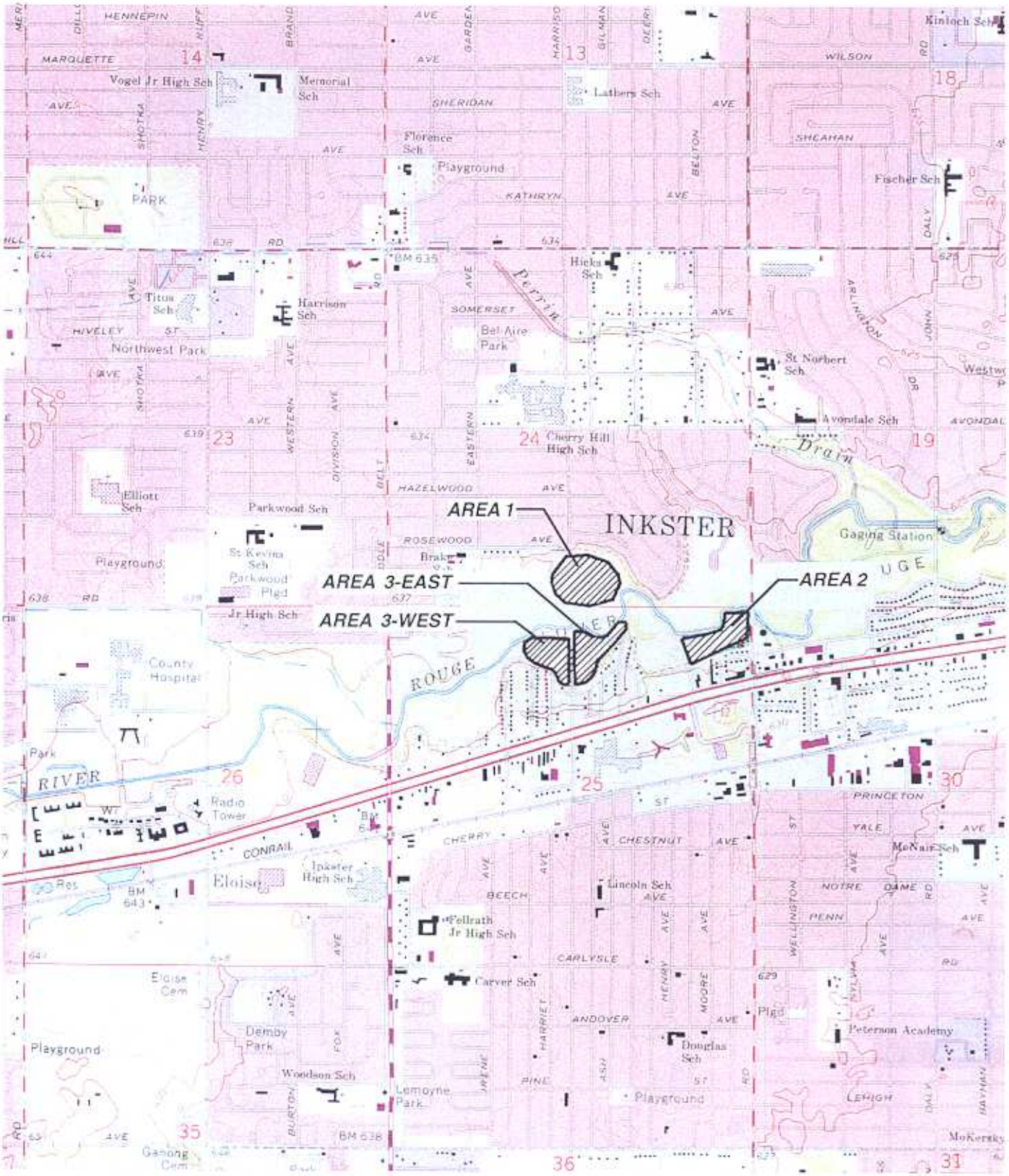
The soil in this area is identified in the Wayne County Soil Survey as Shoals silt loam. The Shoals series is somewhat poorly drained and occurs on floodplains. This series is not considered to be hydric by the USDA Natural Resource Conservation Service.

Area 3-West

Area 3-West is a 5-acre constructed wetland located on the south side of the Lower Rouge River directly to the north of the terminus of Harriet Avenue (Figure 2-3). The site falls entirely within the river's 100-year floodplain. Area 3-West is bounded to the south by a steep slope and single-family residences, forested wetlands to the west, the river to the north, and Area 3-East to the east. This area receives stormwater from an adjacent 36-inch storm sewer. The source of this water is the 183-acre commercial and residential watershed to the south. Water enters this area at its south end, flows to the northwest, and then is discharged into the Lower Rouge River. Area 3-West was planted with a variety of native plant species similar to those commonly found in wetland communities in the Lower Rouge River Watershed.

The soil in Area 3-West is mapped in the Wayne County Soil Survey as Shoals silt loam and Sloan silt loam. The Sloan series is considered to be hydric by the USDA Natural Resource Conservation Service because it is very poorly drained with a high water table within one foot of the surface during the growing season. The Shoals series is not listed as hydric.

Figure 2-1
Location of Monitoring Areas



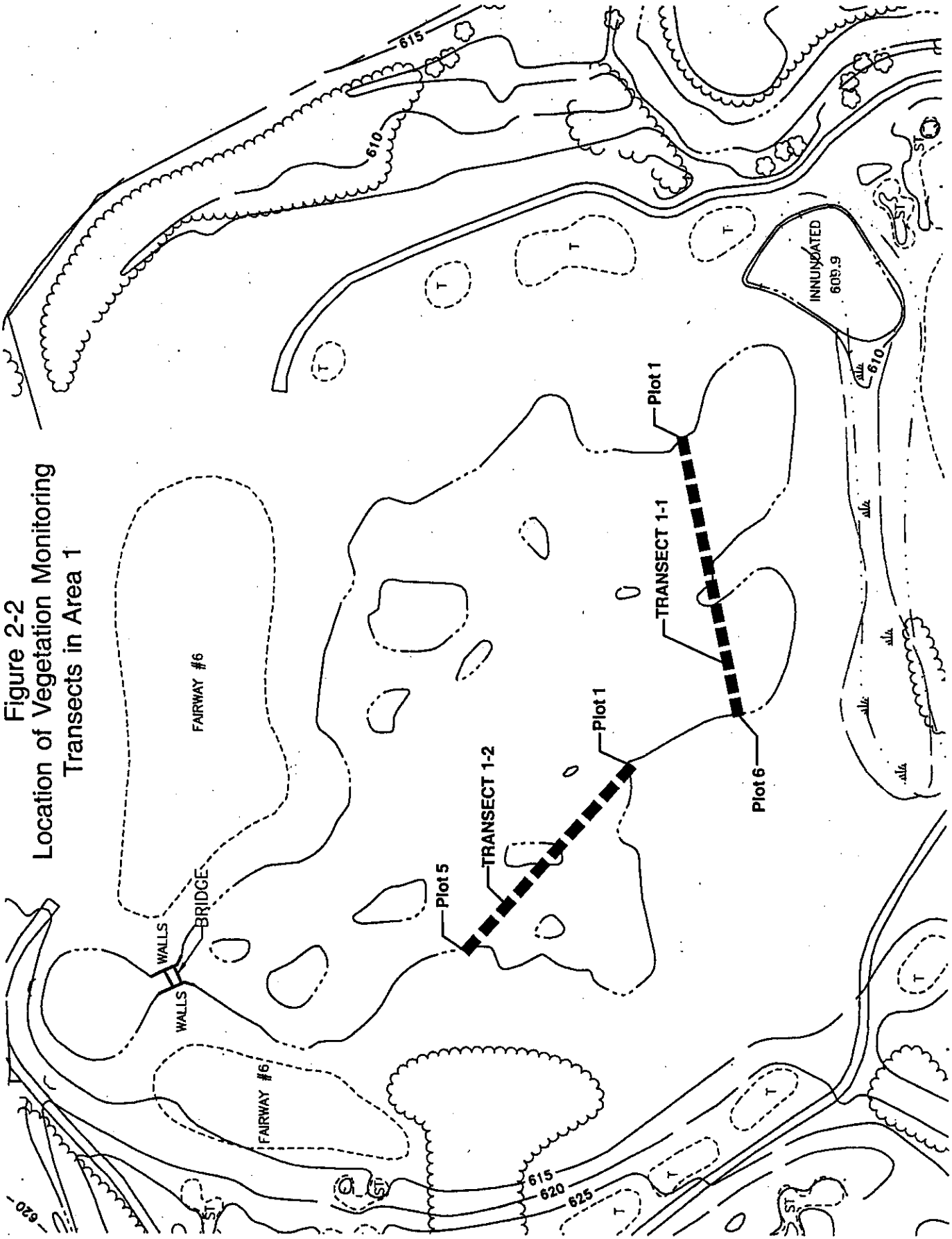
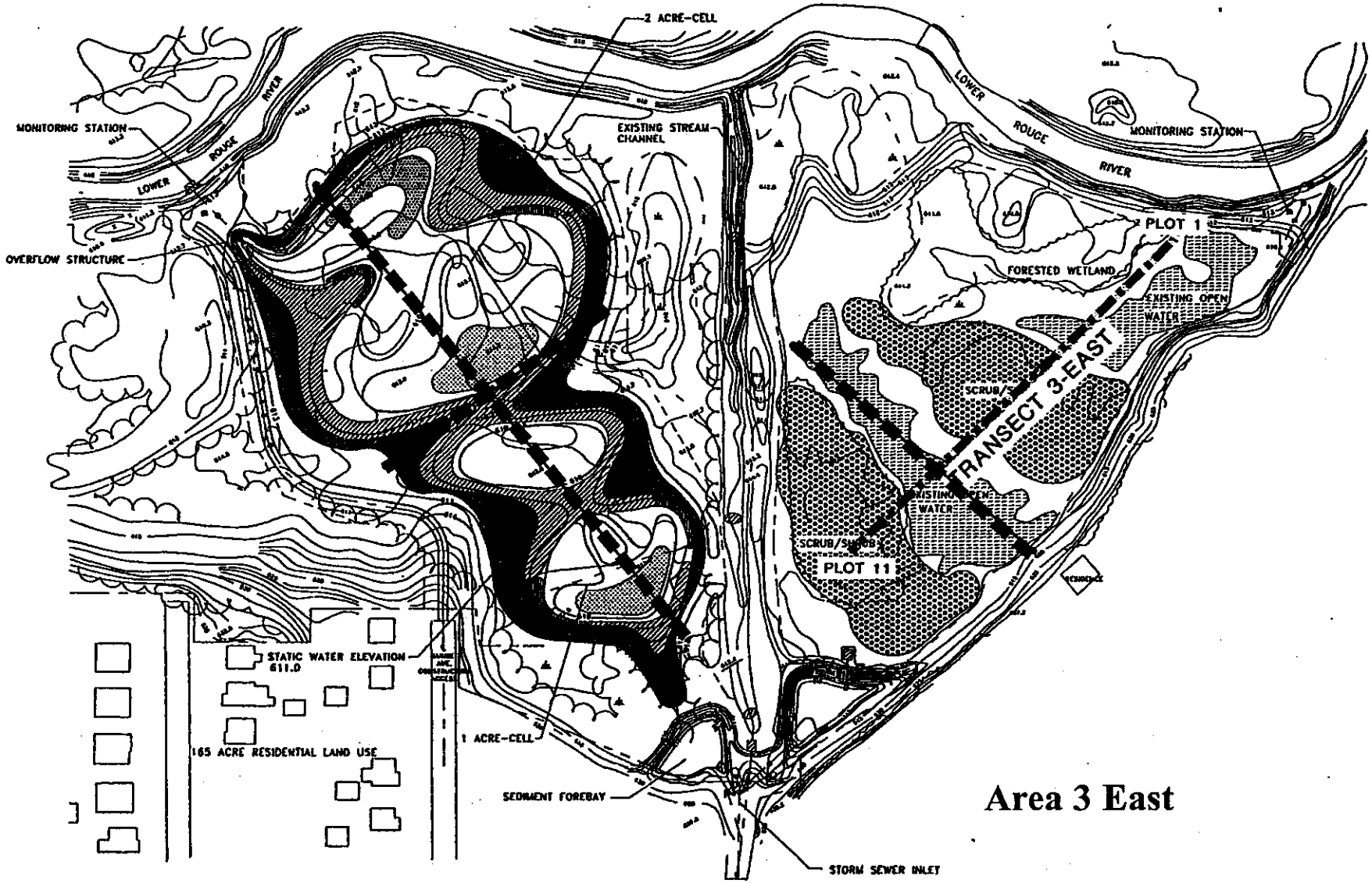


Figure 2-2
Location of Vegetation Monitoring
Transects in Area 1

Figure 2-3
Location of Vegetation Monitoring Transects in Areas 3 East and 3 West



3.0 METHODS

VEGETATION SAMPLING

The Rouge River National Wet Weather Demonstration Project Field Sampling Plan (Wetland Biological Monitoring Program) [RPO-NPS-FSP12.00] called for biological monitoring in three existing or restored wetlands (Area 2, Area 3-East, and an emergent wetland) for a period of two years, and three created wetlands (Area 1, Area 3-West, and Area 4) for five years. A minimum of two vegetation monitoring transects were to be established in each wetland. The existing or restored emergent wetland has not yet been specified, and Area 4 (which was proposed to be located to the north of the Lower Rouge River just west of Middlebelt Road), has not been constructed. In October 1995 one transect was located in Area 2 and one transect in Area 3-East. Monitoring was conducted on these transects for two years and is now complete. In order to conform to the Field Sampling Plan, additional transects were established in 1998: two in Area 1 (Figure 2-2), one in Area 2, one in Area 3-East, and two in Area 3-West (Figure 2-3). Monitoring is now complete on the transects in Areas 2 and 3-East. The transects in Areas 1 and 3-West require an additional three years of monitoring (including that for 2000).

The locations of the transects were chosen to represent typical conditions in the four wetlands. Square meter plots were established at 50 foot intervals along each transect. White PVC stakes were used to permanently mark the center of each plot.

The first site visit was scheduled for mid-spring, but did not occur until July 4, 2000 due to a delay in obtaining funding and authorization for the project. The early fall site visit took place on October 12, 2000. Within each plot, the overall percent coverage of vegetation was estimated, and all vascular plant species were recorded (including those whose canopies extended over the plot). The relative abundance of each species was estimated according to the following scale:

1 = 0 - 20 percent coverage
2 = 21 - 40 percent coverage
3 = 41 - 60 percent coverage
4 = 61 - 80 percent coverage
5 = 81 - 100 percent coverage

A photograph was taken of each plot. When standing water was present in a plot, its depth was recorded.

VEGETATION DATA ANALYSIS

To help assess the degree to which the vegetation in the wetlands consisted of wetland species, the wetland indicator ranking system developed by the U.S. Fish and Wildlife Service was used. Under this system, most plant species in the United States have been classified into one of eleven ranks based upon their estimated probability of occurrence in wetlands. Assigning a numbered ranking order to the wetland indicator codes provides a basis for quantitatively determining the degree to which the vegetation at a particular site consists of wetland species. The following ranking assignments were made:

Wetland Indicator Code	Probability of Occurrence in Wetlands	Wetland Indicator Number
UPL	< 1 %	5
FACU-	1 - 11 %	4
FACU	12 - 22 %	3
FACU+	23 - 33 %	2
FAC-	34 - 44 %	1
FAC	45 - 55 %	0
FAC+	56 - 66 %	-1
FACW-	67 - 77 %	-2
FACW	78 - 88 %	-3
FACW+	89 - 99 %	-4
OBL	> 99 %	-5

The average of these numbers serves as a rough index for evaluating the wetland affinity of the vegetation at a site. When the average is greater than zero, the vegetation primarily consists of non-wetland species (i.e., those ranging from FAC- to UPL), whereas a negative average indicates a prevalence of wetland species (those ranging from FAC+ to OBL).

In addition, the vegetation was analyzed using the Floristic Quality Assessment program developed by the Natural Heritage Program of the MDNR Wildlife Division. This program was fully explained in Field Sampling Plan (RPO-NPS-FSP12.00) for the Rouge Project. Briefly, the program assigns a value from zero to ten to each plant species that occurs in Michigan. These values, called "coefficients of conservatism", attempt to represent the "*estimated probability that a plant is likely to occur in a landscape relatively unaltered from what is believed to be a presettlement condition.*" Weedy species are assigned a value of zero, while highly conservative species are assigned a value of 10. By averaging the coefficients of conservatism of all the species in a plot (or transect), and then multiplying this average by the square root of the number of species in the plot (or transect), an index called the "Floristic Quality Index" is obtained. This index can be used for charting changes in species quality over time. Such a change could, for instance, be produced by a significant increase in water input to the Lower Rouge floodplain woods.

AQUATIC MACROINVERTEBRATE SURVEY

Aquatic macroinvertebrates were collected from Areas 1 and 3-West on July 14, 2000 and October 14, 2000. Sampling was conducted in accordance with protocols described in the field sampling plan RPO-NPS-FSP12.00. Approximately one-half hour was spent sampling all habitats in each area. Organisms were preserved in 90 percent ethanol. Identification was to the level of genus, except for midges, which were identified to family.

WILDLIFE OBSERVATIONS

Observations including tracks, nests, scats, calls, and wildlife utilization of plants or animals as food were conducted on July 14, 2000 and October 14, 2000. A fishery survey was conducted in Areas 1 and 3-West on July 14, 2000. The fish survey was conducted in shallow water using a Smith Root Model 12 A, backpack electrofishing unit. Documentation included identification to species.

4.0 VEGETATION MONITORING RESULTS

Area 1

A summary of the monitoring results from the mid-spring and early fall site inspections can be found in Table 4.1. Complete lists of the plant species observed along Transects 1-1 and 1-2 during the two site visits are found in the appendix.

Table 4.1
Transect 1-1 and 1-2 Vegetation Monitoring Summary

Transect	Plot	No. of Native Species	No. of Non-native Species	Average Wetland Indicator No.	Floristic Quality Index	Community Type	Hydrology
1-1 Mid-Spring	1	11	2	-2.17	5.79	Emergent	Saturated Soil
	2	0	0	-	-	Open Water	Water 16" Deep
	3	0	0	-	-	Open Water	Water 10" Deep
	4	10	3	-2.00	4.92	Wet Meadow	Saturated Soil
	5	0	0	-	-	Open Water	Water 11" Deep
	6	6	0	-5.00	7.16	Emergent	Water 4" Deep
1-1 Early Fall	1	12	1	-2.92	6.34	Scrub-shrub	No Water
	2	0	0	-	-	Open Water	Water 17" Deep
	3	0	0	-	-	Open Water	Water 9" Deep
	4	9	2	-2.10	5.38	Wet Meadow	No Water
	5	0	0	-	-	Open Water	Water 13.5" Deep
	6	8	0	-4.50	8.15	Emergent	Water 4.5" Deep
1-2 Mid-Spring	1	9	2	-1.73	4.51	Wet Meadow	Saturated Soil
	2	0	0	-	-	Open Water	Water 8" Deep
	3	6	3	0.11	4.32	Upland Island	No Water
	4	0	0	-	-	Open Water	Water 11" Deep
	5	7	1	-5.00	7.17	Emergent	Water 1" Deep
1-2 Early Fall	1	10	1	-2.09	6.04	Wet Meadow	No Water
	2	0	0	-	-	Open Water	Water 9.5" Deep
	3	6	3	-0.11	6.00	Wet Meadow	No Water
	4	0	0	-	-	Open Water	Water 11" Deep
	5	8	1	-5.00	8.85	Emergent	Water 0.5" Deep

Area 1 is composed of open water, emergent, and wet meadow community types. Most of the wetland is characterized by the open water type. The maximum water depth in this community is approximately twenty-seven inches. As in previous years, vegetative cover in this type remains low. In July discontinuous bands of algae up to about four feet in width were sometimes present around the perimeter of this community in shallow water up to approximately nine inches in depth. In October, no plants were observed in the open water type. The water in this community continues to be very turbid, and it is

hypothesized that low subsurface light levels are inhibiting the establishment and growth of aquatic vegetation. The high turbidity can probably be attributed to a fine basin substrate and agitation of the sediments by wind action and the foraging activities of waterfowl, carp (*Cyprinus carpio*), and other bottom-feeding fish species.

The emergent community occurs along the margins of the open water areas in saturated soil and standing water up to about three inches in depth. The width of this type is variable and dependant upon the slope of the wetland margins. The emergent community is well-developed where the slopes are gradual, but narrow elsewhere. Vegetative cover in the emergent wetland is generally high. The dominant plant species in this type are cat-tails (*Typha angustifolia* and *T. latifolia*), water-plantain (*Alisma plantago-aquatica*), red-footed spike-rush (*Eleocharis erythropoda*), three-square bulrush (*Scirpus americanus*), seedbox (*Ludwigia palustris*), Dudley's rush (*Juncus dudleyi*), ditch stonecrop (*Penthorum sedoides*), needle spike-rush (*Eleocharis acicularis*), burreed (*Sparganium eurycarpum*), and tooth-cup (*Ammannia robusta*). At the interface between the emergent and wet meadow communities there is sometimes an incipient scrub-shrub community composed of chiefly of eastern cottonwood (*Populus deltoides*) saplings. Sandbar willow (*Salix exigua*) and other willows are sometimes also present.

The wet meadow type occurs around the perimeter of the wetland where the soil is intermittently saturated. As with the emergent community, the extent of this type is determined by the slopes of the wetland margins. Vegetative cover in the wet meadow is very dense. The dominant plant species in this type are green bulrush (*Scirpus atrovirens*), lance-leaf aster (*Aster lanceolatus*), calico aster (*A. lateriflorus*), fringed loosestrife (*Lysimachia ciliata*), New England aster (*Aster novae-angliae*), frost aster (*Aster pilosus*), drooping bulrush (*Scirpus pendulus*), rice cut-grass (*Leersia oryzoides*), and nodding beggar-ticks (*Bidens cernuua*). The vegetation in this community is chiefly herbaceous, but a few intermixed eastern cottonwood saplings are also present. If not managed, the wet meadow will eventually succeed to a forested wetland type.

The only major weed species in Wetland 1 is purple loosestrife (*Lythrum salicaria*). Based upon qualitative observations, this plant appears to have increased in abundance since monitoring was initiated in 1998. Purple loosestrife is a Eurasian species that can form dense stands that exclude native plants and reduce species diversity. One of the objectives of the Rouge River National Wet Weather Demonstration Project is to "re-establish a healthy and diverse ecosystem within the Rouge River Watershed". The proliferation of this species is counter to that objective and measures should be taken to eliminate purple loosestrife. Control options for *Lythrum salicaria* include the application of herbicides, hand pulling, hand removal of the inflorescences prior to seed maturation, and the introduction of purple loosestrife beetles.

There has been a steady increase in average floristic quality index per plot in Wetland 1 since monitoring was initiated in 1998. For the mid-spring site visit, average floristic quality index has increased from 3.15 in 1998 to 4.06 in 1999 and 5.65 in 2000. The increase for the early fall site inspection has been from 5.62 in 1998 to 6.14 in 1999 and 6.79 in 2000. The increase in this statistic can probably be attributed to the replacement of weedy, early-successional species with plants characteristic of more mature wetland systems.

The plot data show that except for a sudden mid-spring increase from 1999 to 2000 (which might be attributable to the widely separated points in the growing season at which the two site inspections were conducted), average overall percent cover of plants per plot in Wetland 1 has remained more or less

constant since 1998. The data show a maximum average of approximately fifty percent, but over the wetland as a whole coverage is much lower. The lack of vegetative cover corresponds to a reduced capacity of the wetland to treat stormwater. Pollutants in treatment wetlands are removed through the processes of sedimentation, precipitation, adsorption to soil particles, assimilation into plant tissue, and microbial transformation. Plants facilitate sedimentation by slowing the velocity of water moving through a wetland and promote the microbial transformation of pollutants by providing substrates and suitable environments for microorganisms to act. The magnitude of the role of plants in stormwater treatment is directly proportional to their productivity. Rooted emergent plants and free-floating species have been found to have greater productivity than fully submergent plants (Brix, H. 1993. Wastewater treatment in constructed wetlands: system design, removal processes, and treatment performance. *In* G. G. Moshiri (ed.), *Constructed Wetlands for Water Quality Improvement.* Lewis Publishers, Boca Raton. 632 pp.). Increasing vegetative cover in Wetland 1 would increase its wastewater treatment capacity. One possible way to do this would be to reduce turbidity. If the wetland was drained, it is likely that dense vegetation would occupy its basin. It is hypothesized that the dense mat of plants would stabilize the fine sediments, and that upon reflooding, the water would be clear enough for submergent vegetation to establish and proliferate. Another way to increase plant cover would be to lower the water level in the wetland. This would allow emergent vegetation now established around the perimeter to spread inwards through seed and rhizome growth. However, this option might result in a reduction of the overall size of the wetland and no net gain in stormwater treatment capacity.

Area 3-West

A summary of the monitoring results from the mid-spring and early fall site inspections can be found in Table 4.2. Complete lists of the plant species observed along Transects 3-West-1 and 3-West-2 during the two site visits can be found in the appendix.

Area 3-West is composed of open water, emergent, and wet meadow community types. The open water type can be subdivided into shallow and deep water areas. The shallow open water community occurs in the southeastern half of the wetland in water up to about ten inches in depth. The water is this area is relatively clear, and during the mid-spring site visit vegetative cover was as high as eighty percent in some sample plots. Vegetative cover declined over the course of the growing season, and the maximum during the early fall site visit was sixty percent. The mid-spring dominants in the shallow open water type were pondweeds (*Potamogeton foliosus* and *P. pectinatus*), algae, and floating-leaf water-plantain (*Alisma plantago-aquatica*). At the time of the early fall visit, only filamentous green algae were observed in this type. The disappearance of water-plantain is due to the development of juvenile plants with floating leaves into emergent adults. The loss of the pondweed species can not be explained with the available data.

The deep open water type is found in the northwestern half of Area 3-West where the maximum water depth is about twenty-nine inches. In contrast to the shallow open water community, vegetative cover in the deep water type was very low during both site visits. The only observed plant species were filamentous green algae. The water in the deep water area was considerably more turbid than that in the shallow open water type. High turbidity levels and their negative effect on the establishment and growth of submergent plant species are probably responsible for continued low vegetative cover in the deeper open water areas.

The emergent wetland type is found in water up to about ten inches in depth. The vegetation in this community is generally dense and tall, and composed chiefly of cat-tails, burreed *(Sparganium eurycarpum)*, pickerelweed (*Pontederia cordata*), softstem bulrush (*Scirpus validus*), water-plantain, and red-footed spike-rush (*Eleocharis erythropoda*). Based upon the photographic record and the plot data, it appears that the emergent community type has increased in areal extent at the expense of the open water community since monitoring was initiated in 1998. For example, in 1998, plot 6 of transect 3-West-2 was located in the open water type and separated from the edge of the emergent community by about five feet. At the time of the second 2000 site visit, this plot was located at the boundary between the open water and emergent communities and divided more or less equally between both types.

The wet meadow type is located around the outer perimeter of Area 3-West where hydrology ranges from saturated soil to standing water about two inches in depth. The occurrence and extent of this type is limited by the slopes surrounding the wetland. The wet meadow is best developed along the southern margin of the wetland where the surrounding slopes are gradual. The wet meadow type is absent or of limited extent elsewhere. Vegetative cover in this community is very high. The dominant plant species are sedges (*Carex annectens* and *C. cristatella*), red-footed spike-rush, lance-leaf aster, rice cut-grass (*Leersia oryzoides*), and fragrant-goldenrod (*Euthamia graminifolia*). At the boundary between the wet meadow and the emergent community type there is often a shrub zone composed chiefly of eastern cottonwood (*Populus deltoides*) saplings. If not managed, tree and shrub saplings will establish throughout this community and the wet meadow will eventually succeed to a forested wetland type.

The wet meadow and emergent zones of Area 3-West have been invaded by purple loosestrife and overall this species is occasional. It is possible that over time purple loosestrife will proliferate and spread to the detriment of native plant species. As discussed for Area 1, the presence of purple loosestrife is counter to one of the objectives of the Rouge River National Wet Weather Demonstration Project. It is recommended that this species be eliminated or controlled through the application of herbicides, hand removal of inflorescences prior to the maturation of seed, or hand removal of the entire plants.

There has been a steady increase in average floristic quality index per plot in Area 3-West since monitoring was initiated in 1998. For the mid-spring site visit, average floristic quality index has increased from 2.53 in 1998 to 3.94 in 1999 and 5.75 in 2000. The increase for the early fall site inspection has been from 3.21 in 1998 to 5.11 in 1999 and 5.65 in 2000. The increase in this statistic can probably be attributed to the replacement of weedy, early-successional species with plants characteristic of more mature wetland systems.

As discussed above, data collected since 1998 show that there has been an increase in the areal extent of the emergent wetland community. Nevertheless, vegetative cover in the open water type remains very low, and the stormwater treatment capacity of the wetland as a whole is below its maximum potential. Realizing this potential will require an increase in vegetative cover. Methods by which this may be accomplished are identical to those suggested for Area 1.

Table 4.2
Transect 3-West-1 and 3-West-2 Vegetation Monitoring Summary

Transect	Plot	No. of Native species	No. of Non-native Species	Average Wetland Indicator No.	Floristic Quality Index	Community Type	Hydrology
3-West-1 Mid-Spring	1	4	1	-5.00	4.02	Emergent	Water 1" Deep
	2	3	0	-5.00	4.24	Open Water	Water 9" Deep
	3	5	1	-4.33	8.05	Emergent	Water 5" Deep
	4	3	0	-5.00	3.54	Emergent	Water 6" Deep
	5	3	0	-5.00	3.54	Open Water	Water 9" Deep
	6	0	0	-	-	Open Water	Water 16" Deep
	7	1	0	-5.00	-	Open Water	Water 8" Deep
	8	0	0	-	-	Open Water	Water 16" Deep
	9	1	0	-5.00	-	Open Water	Water 19" Deep
	10	0	0	-	-	Open Water	Water 26" Deep
	11	0	0	-	-	Open Water	Water 23" Deep
	12	0	0	-	-	Open Water	Water 29" Deep
	13	9	2	-4.00	8.46	Emergent	Saturated Soil
3-West-1 Early Fall	1	4	1	-5.00	5.37	Emergent	Saturated
	2	3	0	-5.00	4.24	Open Water	Water 8" Deep
	3	2	0	-5.00	1.00	Open Water	Water 4" Deep
	4	1	0	-5.00	-	Open Water	Water 6" Deep
	5	1	0	-5.00	-	Open Water	Water 9" Deep
	6	1	0	-5.00	-	Open Water	Water 15" Deep
	7	1	0	-5.00	-	Open Water	Water 8" Deep
	8	0	0	-	-	Open Water	Water 15" Deep
	9	0	0	-	-	Open Water	Water 18" Deep
	10	0	0	-	-	Open Water	Water 24" Deep
	11	0	0	-	-	Open Water	Water 21" Deep
	12	0	0	-	-	Open Water	Water 26" Deep
	13	8	2	-3.60	7.91	Emergent	Saturated
3-West-2 Mid-Spring	1	5	0	-4.20	5.81	Wet Meadow	Saturated Soil
	2	4	0	-5.00	7.00	Emergent	Water 9" Deep
	3	1	0	-5.00	-	Open Water	Water 14" Deep
	4	0	0	-	-	Open Water	Water 19" Deep
	5	0	0	-	-	Open Water	Water 22" Deep
	6	2	0	-5.00	4.00	Open Water	Water 6" Deep
	7	11	0	-3.00	7.83	Wet Meadow	Saturated Soil
3-West-2 Early Fall	1	5	0	-4.20	5.81	Wet Meadow	No Water
	2	2	0	-5.00	5.66	Emergent	Water 8" Deep
	3	0	0	-	-	Open Water	Water 13" Deep
	4	0	0	-	-	Open Water	Water 18" Deep
	5	0	0	-	-	Open Water	Water 21" Deep
	6	2	0	-5.00	6.36	Emergent	Water 6" Deep
	7	10	0	-3.50	8.85	Wet Meadow	Saturated Soil

5.0 AQUATIC MACROINVERTEBRATE SURVEY RESULTS

Area 1

The following aquatic macroinvertebrates were collected in Area 1 on 14 July 2000 and 14 October 2000:

Table 5.1
Area 1 Aquatic Macroinvertebrate Survey Results

Area 1 – 7/14/2000 (Spring)		Area 1 – 10/14/2000 (Fall)	
Genus	Relative Abundance	Genus	Relative abundance
Berosus	Occasional	*Plathemis*	Uncommon
Caenis	Uncommon	*Caenis*	Occasional
Callibaetis	Occasional	*Callibaetis*	Occasional
Callicorixa	Common	*Callicorixa*	Abundant
Chironomidae	Locally Abundant	*Chironomidae*	Locally-Abundant
Culex	Occasional	*Erythemis*	Occasional
Gerris	Common	*Gerris*	Locally Common
Ischnura	Abundant	*Hesperocorixa*	Occasional
Laccophilus	Occasional	*Hyalella*	Locally Abundant
Mesovelia	Abundant	*Ischnura*	Common
Notonecta	Common	*Notonecta*	Abundant
Peltodytes	Common	*Laccophilus*	Occasional
Physa	Dominant	*Laccornis*	Occasional
Sigara	Common	*Mesovelia*	Common
Trichocorixa	Abundant	*Peltodytes*	Common
Tropisternus	Uncommon	*Physa*	Dominant
		Sigara	Common
		Trichocorixa	Abundant
		Tropisternus	Uncommon

Sixteen aquatic macroinvertebrate taxa were collected from Area 1 on July 14, 2000. The composition of the aquatic macroinvertebrate community has shown little change since 1998. However, there have been small increases in the number of genera identified over the course of the monitoring program. During the spring survey, the snail (*Physa*) was the most abundant organism collected. Water-boatman (*Trichocorixa*), water-treader (*Mesovelia*) and damselfly (*Ischnura*) were also abundant. Midge (*Chironomidae*) were common in mats of algae located in the fringe of emergent vegetation that ringed the wetland.

During the fall survey, twenty aquatic macroinvertebrate taxa were collected from Area 1. The snail (*Physa*) continues to be the most abundant organism collected. Notable new species collected include the backswimmer (*Notonecta*). The water in this wetland continues to be very turbid, resulting in poor development of submergent and emergent plant communities. High turbidity may also prevent the establishment of predators that strongly depend upon visual location of prey such as giant water bug (*Belastoma*) and backswimmers (*Notonecta* and *Buenoa*). Macroinvertebrate diversity continues to

increase, but in the absence of an increase in the abundance of aquatic macrophytes, fish will probably continue to maintain the aquatic macroinvertebrate population at a marginal level of abundance.

Area 3-West

The following aquatic macroinvertebrates were collected in Area 3-West on July 14, and October 14, 2000:

Table 5.2
Area 3-West Aquatic Macroinvertebrate Survey Results

Area 3-West – 7/14/2000 (Spring)		**Area 3-West** – 10/14/2000 (Fall)	
Genus	Relative abundance	Genus	Relative abundance
Anax	Occasional	*Anax*	Occasional
Callibaetis	Occasional	*Anopheles*	Occasional
Berosus	Occasional	*Berosus*	Occasional
Chironomidae	Abundant	*Callibaetis*	Occasional
Culex	Uncommon	*Chironomidae*	Abundant
Erythemis	Occasional	*Dineutus*	Occasional
Gerris	Locally Abundant	*Erythemis*	Locally Common
Hyalella	Common	*Gerris*	Common
Ischnura	Abundant	*Hyalella*	Locally Abundant
Laccophilus	Locally Common	*Ischnura*	Dominant
Mesovelia	Locally Common	*Laccophilus*	Locally Common
Microvelia	Occasional	*Laccornis*	Occasional
Notonecta	Occasional	*Mesovelia*	Locally Abundant
Peltodytes	Dominant	*Microvelia*	Locally Common
Physa	Abundant	*Notonecta*	Common
Planorbula	Common	*Peltodytes*	Abundant
Plathemis	Occasional	*Physa*	Abundant
Trepobates	Locally-Common	*Planorbula*	Occasional
Trichocorixa	Common	*Plathemis*	Locally Common
		Ranatra	Occasional
		Hesperocorixa	Occasional
		Salda	Occasional
		Trepobates	Locally-Common
		Trichocorixa	Occasional
		Tropisternus	Occasional

During the spring survey a total of nineteen taxa of aquatic macroinvertebrates was collected from Area 3-West. The total is the greatest yet observed over the course of monitoring program in Area 3-West. Crawling water beetles (*Peltodytes*) continue to be the most abundant aquatic macroinvertebrate collected in the spring. Damselfly larvae (*Ischnura*), midge (*Chironomidae*), and snail (*Physa*) were also abundant. In general, diversity was good and abundance was low.

A total of twenty-five taxa of aquatic macroinvertebrates was collected during the fall survey. Damselfly (*Ischnura*) was the most abundant aquatic macroinvertebrate collected. Overall diversity of aquatic organisms is good, but the highest abundance of aquatic macroinvertebrates continues to be found within fringe of emergent vegetation along the wetland edge. This is likely the result of fish predation pressure and the lack of aquatic macrophyte cover in the open water areas. Overall, the aquatic macroinvertebrate community continues to increase in diversity.

During periods of heavy rainfall, the Lower Rouge River may overflow its banks and exchange water with Area 3-West. At such times fish may access the wetland. Fish may also enter the wetland Area 1 and Area 3-West via eggs attached to the feet and feathers of waterfowl and planting by local residents surrounding the wetland.

A fishery survey was conducted within Area 1 and Area 3-West during the fall sampling event. A total of 71 individuals was collected from Area 1 and Area 3-West combined. The fish community consisted of six species; green and bluegill sunfish (*Lepomis cyanellus* and *L. machrochirus*), bluntnosed minnow (*Pimephales notatus*), spotfin shiner (*Notropis spilopterus*), black bulhead (*Ameiurus niger*) and common carp (*Cyprinus carpio*). A total of 57 individuals, including green sunfish and bluegill sunfish (yearlings and adults), was collected in Area 3-West. A total of 14 individuals was collected from Area 1. Three species were identified in Area 1, including green and bluegill sunfish and common carp.

Actual sightings or other evidence of the following wildlife were observed during the 2000 site visits: white-tailed deer (*Odocoileus virginianus*), muskrat (*Ondatra zibethica*), raccoon (*Procyon lotor*), mallard duck (*Anas platyrhyncos*), great blue heron (*Ardea herodias*), red-winged blackbird (*Agelaius phoeniceus*), green heron (*Butorides verescens*), common egret (*Casmerodius albus*), Canadian goose (*Branta canadensis*), painted turtle (*Chrysemys picta*), snapping turtle (*Chelydra serpentina*), garter snake (*Thamnopis sauritis*), and green frog (*Rana clamitans*).

6.0 SUMMARY

In summary, the following observations were made during the 2000 monitoring year:

- Wet meadow, emergent, and open water wetland communities have established within Areas 1 and 3-West. Vegetative cover is high in the wet meadow and emergent types, but remains low within the open water areas. The low vegetative cover characteristic of the most of the open water wetlands is probably due to high turbidity levels and their negative effect on the establishment and proliferation of aquatic plant species. The stormwater treatment capacities of the two wetlands are below their potential due to low plant cover in the open water type.

- Areas 1 and 3-West have shown a steady increase in floristic quality index since monitoring was initiated in 1998. The increase in this statistic is probably due to the replacement of weedy, early successional species with plants characteristic of more mature wetland communities.

- Purple loosestrife, a Eurasian weed species that often forms dense stands that exclude native plants, is present in both wetland area. The threat posed by this species is counter to the Rouge River National Wet Weather Demonstration Project objective to "re-establish a healthy and diverse ecosystem within the Rouge River Watershed". Measures should be taken to eliminate purple loosestrife from Areas 1 and 3-West.

- Populations of aquatic macroinvertebrates are stable and do not appear to exhibit major changes in community composition. In some areas elevated levels of turbidity appear to adversely affect diversity of the aquatic macroinvertebrate community. Aquatic macroinvertebrate populations in Areas 1 and 3-West are typical of those found in newly created wetlands and continue to exhibit increases in diversity.

- The areas continue to be used by a number of fish, birds, and mammals.