July 1, 1997
Report to the Legislative Commission on Minnesota Resources

# Spring Peeper Meadow Restoration


Project Manager: **Peter Olin**

Cooperators: **Susan Galatowitsch**
**Fred Rozumalski**

Agency Affiliation: **Minnesota Landscape Arboretum**
**P.O. Box 39**
**3675 Arboretum Drive**
**Chanhassen, MN 55317**

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| **TITLE:** | **Arboretum Boundary Land Acquisition** |
| **PROJECT MANAGER:** | **Peter J. Olin** |
| **ORGANIZATION:** | **Minnesota Landscape Arboretum**<br>**University of Minnesota** |
| **ADDRESS:** | **P.O. Box 39**<br>**Chanhassen, MN 55317** |
| **LEGAL CITATION:** | **ML 95, Chp 220, Sec. 19, Subd. 8(h)** |
| **APPROPRIATION AMOUNT:** | **$680,000** |

Statement of Objectives

The first objective of this project has been to protect the biological and experimental quality of the Arboretum by purchasing 30 acres of land contiguous with Arboretum boundaries which was slated for light industrial development. This was accomplished in August of 1995. Secondly, the goal was to create a model research wetland, restored for public display and education. Wetlands of very low plant and animal diversity have been created in the past by the process of restoring the site hydrology and allowing the new wetland to revegetate from existing seed in and around the site. In order to avoid the poor quality wetlands that result, this project demonstrates how the introduction of plants will restore wetland biodiversity.

Overall Project Results

As result of the past two years of work on the newly acquired Arboretum property a wetland restoration has been initiated. Phase one eradication of invasive plant species has occurred by repeated herbicide applications, wetland hydrology has been restored through the breaking of drain tiles, and wetland plants and seed have been reintroduced to the site. These are only the initial steps in wetland restoration. Time is now required for the vegetation and hydrology to reach a sort of equilibrium as the wetland matures. To guide this process of restoration, control of invasive species like reed canary grass *Phalaris arundinacea* and hybrid cattail *Typha x glauca* will be essential to maintain biodiversity.

The site has been designed for long-term research in wetland plant and animal recolonization. As the restoration slowly progresses, researchers will collect data that will give answers to questions such as: 1) What is the most effective method of plant reintroduction - seed or live plant? 2) Which species establish best from seed or live plant? 3) How does plant establishment relate to site hydrology? 4) Which plant and animal species recolonize the site without direct reintroduction? 5) To what extent will invasive species recolonize the site and how can they best be controlled? 6) What is the pattern of long-term hydrologic changes after the breaking of drain tile?

Project Results Use and Dissemination

The site will become a center for wetland education. A 570 foot boardwalk and an 80 foot observation pier have been constructed to bring students and visitors into the wetland. Soon, two interpretive shelters will complement the boardwalk and trail system. Interpretive signs have also been constructed, and outdoor galleries along the boardwalk serve as classrooms. The interpretive signs and the site itself provide information on 1) the restoration process, 2) values of wetlands, 3) the history of the wetland, 4) invasive species, 5) wetland research, 6) fragmentation of habitat, and 7) how each visitor can become a wetland steward. Interpretive programs and annual symposia will continue to be developed through the Arboretum.

Research on the site will continue with the aid of an LCMR appropriation in the 1997-1999 biennium. The project title is Wetland Ecosystem Monitoring and the results will be available through Dr. Susan Galatowitsch.

July 1, 1997
LCMR Work Program 1997

I. **Arboretum Boundary Land Acquisition G1**


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|---|---|
| Project Manager: | Peter J. Olin |
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A. **Legal Citation:** ML 95, Chp 220, Art.___, Sec. 19, Subd. 8(h)

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|---|---|
| TOTAL BIENNIAL LCMR APPROPRIATION: | $680,000 |
| BALANCE: | $ 0 |

Appropriation language: This appropriation is from the future resources fund to the University of Minnesota for a grant to the University of Minnesota Landscape Arboretum Foundation to expand the boundary of the Minnesota landscape Arboretum and, if money is available after the intended acquisition to develop a wetland restoration demonstration. This appropriation must be matched by at least $400,000 non-state money.

B. **Status of Match Requirement:**

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| MATCH REQUIRED: | $400,000 |
| AMOUNT COMMITTED TO DATE: | $784,000 |
| MATCH BALANCE: | $ 0 |

II. **Project Summary.** The goals of this project are two-fold: 1) to protect the biological and experiential quality of the Arboretum and; 2) to create a model, research wetland for public display and education.

The rapid growth of development in the Chanhassen, Chaska, and Victoria area has begun to create negative influences on the quality of the Arboretum, its programs, collections and gardens. Light industrial and commercial development and even intensive housing creates problems with water, air, noise and visual pollution, soil erosion, and negatively impacts the existing natural systems. To protect itself, the Arboretum has developed a plan of action which includes purchase of all lands within the boundaries of State Highway 5, Highway 41, 82nd Street and Bavaria Road. The highways are imposed barriers and as they are upgraded, become the logical boundaries of the Arboretum. Outside the highways the Arboretum will negotiate with the three abutting cities to keep some visual and environmental controls on development.

This project is to purchase at least 30 acres of land within the projected Arboretum Boundary which is slated for light industrial, commercial, and high density residential development within the next year.

In addition, a restored wetland will be created on the site which will be a public model of restoration and a research area for biological diversity in created wetlands.

The Minnehaha Creek Watershed District considers the model wetland restoration to be an important project and allocating $163,400 of a total $194,400 cost. This leaves $31,000 for

the wetland project to be funded by LCMR. Of the original $180,000, $149,000 has been freed to purchase additional land within the land acquisition Master Plan proposed boundaries which are State Highway 5, State Highway 41, 82nd Street and Bavaria Road.

**III. Six Month Work Program Update Summary, July 1, 1997:**

The past six months have seen the greatest visible changes in the wetland basin. With the drain tiles closed, snow melt finally produced a wet wetland. Ducks, geese, gulls and sandpipers flocked to the open water early in the spring. People also began to arrive - carrying plants, hoes and lumber.

Planting live plants began in May. 70,000 seedlings are currently being installed and planting is proceeding on schedule. These plants complement the seed distributed in the fall and comprise the primary experiment of comparing wetland revegetation success from seed verses live plants. Seed germination has been vigorous, although at this point we are not sure of which of the 108 species planted will establish well from seed. Long-term monitoring by Dr. Susan Galatowitsch will determine how wetlands are best revegetated.

As we expected, the invasive reed canary grass and hybrid cattail seed has also germinated on site. These invasive plants are the biggest obstacle to successful wetland revegetation with native species. We are strategizing its removal - quick action is necessary before they get a good foot hold. Hand weeding and herbicide applications are the choice methods of removal at this point.

Final details for design of the boardwalk and interpretive trail were completed this spring for June construction. A boardwalk that features three galleries for student instruction was designed to zigzag through the southern end of the basin. Interpretive signs will be mounted at each of these galleries. The structure will allow easy access for anyone interested in learning about wetlands, including the handicapped. Along with the boardwalk an eighty foot pier will extend into the wetland in the secluded north end of the basin. This feature will allow for excellent wildlife viewing in the quietest end of the wetland.

Design of the interpretive signs concluded with the hiring of Steve Adams as artist rendering illustrations to complement the text. Twelve 2 x 3 foot embedded fiberglass signs are being printed and will be installed this summer. These signs will creatively instruct the visitor on complex wetland issues.

**IV. Statement of Objectives:**

A. Acquire at least 30 acres of land adjacent to Arboretum property.

Purchase of this land, slated for light industrial, commercial, and high density residential development is the critical first acquisition step in the Arboretum's long term protection strategy. The expected outcome is fee simple purchase of the 30 acres of land from Chaska Gateway Partners. Additional outcome is purchase of additional land adjacent to Arboretum.

B. Restore a wetland of 3-5 acres on property acquired. Restoration of a degraded wetland on the site will provide a research area to develop knowledge about recreating biological diversity in restored or constructed wetlands. It will also provide a model for public education. Expected outcomes include a restored wetland of 3-5 acres, a gravel

parking lot for visitor parking and educational information for visitors. Over the next twenty years we expect at least 1,000 visitors per year.

Timeline for Completion of Objectives:

| | 7/95 | 1/96 | 6/96 | 1/97 | 6/97 |
|---|---|---|---|---|---|
| Objective A. Acquire 30 acres of land adjacent to Arboretum property. | x | | | | |
| Acquire additional property adjacent to Arboretum property. | | | | x | |
| Objective B. Restore a wetland of 3-5 acres on property. | | | | | x |

V. **Objectives/Outcome:**

A. **Title of Objective/Outcome:**

A.1. **Activity:** Purchase land.

Purchase will include 30 acres from Chaska Gateway Partners for $1,041,620 (50% LCMR) and additional property for a total of approximately $1,741.620. This will require about $649,000 of LCMR funding.

A.1.a. Context of Project: Provide protection for Arboretum lands and create place for restored wetland.

A.1.b. Methods: Negotiations with Chaska Gateway Partners and others for legal purchase.

A.1.c. Materials: Legal fees, closing costs.

A.1.d. Budget:

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|---|---|
| TOTAL BIENNIAL LCMR BUDGET: | $649,000 |
| LCMR BALANCE: | $ - 0 - |
| MATCH: | $667,620 |
| MATCH BALANCE: | $ - 0 - |

A.1.e. Timeline:

| | 7/95 | 1/96 | 6/96 | 1/97 | 6/97 |
|---|---|---|---|---|---|
| Product #1. 30 acres of land in ownership of Minnesota Landscape Arboretum Foundation | x | | | | |
| Product #2 other property in Minnesota Landscape Arboretum ownership. | | | | <u>x</u> | |

A.1.f. Thirty acres of property was purchased from Chaska Gateway Partners on August 4, 1995 for $1,041,620 including interest, taxes, and closing costs. $500,000 of LCMR funding was used and $541,620 was provided by the Minnesota Landscape Arboretum Foundation.

B. Restore wetland of 3-5 acres on property acquired.

The Minnehaha Creek Watershed District is allocating $163,400 for this objective. This will free up LCMR funds for land purchase, objective A, and increase the funding available for educational materials, objective B.5.

B.1. **Activity:** Develop wetland plant nursery to provide a diversity of plants for restored wetland. **Match from Minnehaha Creek Watershed District.**

B.1.a. Context Within the Project: Plants are needed to create the plant diversity in the restored wetland. Most are not available commercially. It is estimated that the Arboretum's staff and University students will contribute over $2,000 in work plus greenhouse expenses to grow plants.

B.1.b. Methods: Existing controlled water sites formally used for wild rice research have been readapted. Plants will be put in as plugs and grown to a size that is transplantable into the restored wetland.

B.1.c. Materials: Wetland plants, labor for hand harvesting and planting. (Some already paid for out of existing research funds and Arboretum budget). Planting supplies $1,000.

B.1.d. Budget:

| | |
|---|---|
| TOTAL BIENNIAL BUDGET: | - 0 - |
| LCMR BALANCE: | - 0 - |
| MATCH: | $ 24,800 |
| MATCH BALANCE: | $ - 0 - |

B.1.e. Timeline:

| 7/95 | 1/96 | 6/96 | 10/96 | 6/97 |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Product #1. Plants for restored wetland | x | x | x | x |

B.1.f. July 1, 1997. A significant accomplishment of this project has been the propagation of a diversity of wetland species (particularly sedges) which have not been propagated in the past. Approximately 30,000 divisions of plants that had grown for a year in raised beds and 40,000 seedlings grown in a greenhouse were planted in Spring Peeper Meadow. Much has been learned in the propagation of these difficult to grow species. All of the plants were propagated from seed gathered in local wetlands. Future wetland vegetation restorations will require a source of plants of this kind. Currently they are not available in the nursery industry.

B.2. **Activity:** Planning/Designing Wetland

B.2.a. Context Within the Project: In order to create a viable wetland which will be a demonstration and research model, plans will be needed for wetland design and reconstruction, access and on-site parking and information points. The Arboretum's collateral effort will provide about $13,000 in time from the project leaders and other Arboretum staff.

B.2.b. Methods: A designer/project supervisor will be hired to develop the design and oversee the reconstruction and completion of the project. Consideration will be given to the level of water to be maintained in the wetland; the size and shape of the wetland; the location of the parking lot and access paths; where specific plantings should be located; what information should be available to the public and to professionals; in what form the information should be distributed (signage, handouts, references); and what research opportunities exist.

B.2.c. Materials: N/A

B.2.d. Budget:

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|---|---|
| TOTAL BIENNIAL LCMR BUDGET: | - 0 - |
| LCMR BALANCE: | - 0 - |
| MATCH: | $30,000 |
| MATCH BALANCE: | $ - 0 - |

B.2.e. Timeline:

| | 7/95 | 1/96 | 7/96 | 3/97 | 6/97 |
|---|---|---|---|---|---|
| Product #1. Plan for restored wetland | x | x | x | x (revisions) | x |

B.2.f. July 1, 1997. Although planting has been the primary activity in the last six months, some detailed design was necessary for the construction of the boardwalk. Careful design of the plantings, the hydrology alterations, the interpretive signs and the human circulation through the site was essential and will insure proper function of the site for many years to come. All this design was based on essential information gathered in the first phase of design, the site analysis. This activity illustrated exactly what was present on the site when we came to it and what was necessary to accomplish the restoration.

*Careful planning is critical to the success of every wetland restoration.*

B.3. **Activity:** Reconstruction of Wetland

B.3.a. Context Within the Project: Necessary step to have restored wetland. The Arboretum's collateral effort will include garden staff, supervisory staff and graduate students, and project overhead. Estimated value is $65,000.

B.3.b. Methods: Wetland area will be excavated, soil replaced if necessary, dam construction and other water control installed if necessary, appropriate side slopes constructed, land form contoured to plan specifications, parking lot and accessible walkway constructed, wetland and surrounding site made ready for planting. Soil borings and water samples taken, ground water wells constructed and topographic maps made.

B.3.c. Materials: Soil, gravel, dozer and backhoe (contracted work or internal Arboretum staff using existing machinery) dam and water control materials $16,000.

B.3.d. Budget:

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| TOTAL BIENNIAL LCMR BUDGET: | $14,000 |
| LCMR BALANCE: | $ - 0 - |
| MATCH: | $37,100 |
| MATCH BALANCE: | $ - 0 - |

B.3.e. Timeline:

| | 7/95 | 11/95 | 6/96 | 8/96 | 6/97 |
|---|---|---|---|---|---|
| Product #1. Reconstructed wetland | x | x | x (parking, trails, etc.) | x | x |

B.3.f. July 1, 1997. Construction in the wetland recently included the creation of a 500 foot boardwalk through the south end of the basin. Its purpose is to bring visitors in direct contact with this complex plant community in order to understand its subtleties and vulnerabilities. An 80 foot pier into the northern end of the basin has also been constructed and will bring people into the quiet end of the basin where wildlife can be experienced. Interpretive signs mounted

on these structures provide great insight into the nature of wetlands and wetland restorations.

A gravel parking lot and school bus drop-off loop is also being constructed along with a quarter mile of handicap accessible gravel trails that lead to the boardwalks. All of these quality structures make this wetland a premiere educational site for the citizens of Minnesota.

B.4. **Activity.** Planting wetland.

B.4.a. Context Within the Project: Necessary step to completion of restored wetland. The Arboretum's collateral effort will include students, gardeners and maintenance staff estimated at $15,000.

B.4.b. Methods: Plants will be moved by hand from nursery and planted in the wetland. Some plant material will be purchased but will also be hand planted by staff. Planting can only occur in spring and fall.

B.4.c. Materials: Plants, garden tools. Estimated cost of purchased plants $4,000.

B.4.d. Budget:

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|---|---|
| TOTAL BIENNIAL LCMR BUDGET: | 0 |
| LCMR BALANCE: | 0 |
| MATCH: | $63,800 |
| MATCH BALANCE: | $32,200 |

B.4.e. Timeline:

| | 7/95 | 1/96 | 6/96 | 10/96 | 6/97 |
|---|---|---|---|---|---|
| Product #1. Planted wetland | x | x | x | x | x |

B.4.f. July 1, 1997. 40,000 seedlings propagated in the greenhouse and another 30,000 mature plant divisions grown in raised outdoor beds are currently being planted into the meadow. This process is projected to be completed by the end of July. The primary experiment in this project is to compare the revegetation success of wetland sedges from seed verses from live plants. Seed was distributed last fall and has germinated quite successfully. For comparison, half of the basin is planted with live plants. On-going research on the site by Dr. Susan Galatowitsch will record the progress of plant and animal recolonization in this restoration.

Failure in revegetation wetlands is typically caused by the colonization of invasive plant species such as reed canary grass *Phalaris arundinacea*, hybrid cattail *Typha x glauca* and purple loosestrife *Lythrum salicaria*. A great effort was put forth during the first year of the restoration to eradicate pre-existing reed canary grass from the basin. Repeated sprayings proved successful in killing its promiscuous root system, but seed left dormant in the soil has germinated in the wetland along with the desirable native species. This is a significant complication in the process and much labor is being put forth to eradicate the weed. It is important to aggressively control the weeds early

in the restoration to avoid complete takeover. Once the native vegetation is established and a mat of thatch is formed, it will be more difficult for the invasive plants to become established. It will be essential, however, to monitor and eradicate these plants as they appear for as long as the wetland exists. The wetland will never be maintenance free.

B.5. **Activity:** Develop Educational Material

B.5.a. Context Within the Project: In order to make the model the best possible learning experience information must be made available to the public. The process of creating the wetland, how it operates and how it is expected to be maintained must be defined in understandable terms. There may be professionally oriented material for developers and planners and more public information for other interested visitors. The Arboretum's education staff and grounds crew will provide collateral effort valued at about $10,000.

B.5.b. Methods: A combination of signage, handouts and references will be used. Some interaction activities may be made available as well. The expanded educational material activity will include additional signage at a cost of approximately $1,600/2x4 sq. ft. embedded fiberglass sign, and a brochure (about $5,000) as well as flyers.

B.5.c. Materials: Signs, handouts. Estimated cost $10,000

B.5.d. Budget:

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|---|---|
| TOTAL BIENNIAL LCMR BUDGET: | $17,000 |
| LCMR BALANCE: | $ - 0 - |
| MATCH: | $7,700 |
| MATCH BALANCE: | $ - 0 - |

B.5.e. Timeline:

| | 7/95 | 1/96 | 6/96 | 1/97 | 6/97 |
|---|---|---|---|---|---|
| Product #1. Handouts | | x | x | x | x |
| Product #2. Signs | | | | | x |

B.5.f. July 1, 1997. Twelve interpretive signs have been completed and will be mounted on site in July. Instructive and humorous, these signs deal with tough wetland issues such as: habitat fragmentation, invasive species, human threats from the watershed, the restoration process and wetland research. The colorful signs have been written for a wide audience and will be read primarily by school children. With the Arboretum's primary mission of education, additional educational events and activities are being planned. This will be an active site.

For years to come this site will provide valuable information into the process of wetland restoration. Data will be collected on site as part of Dr. Sue Galatowitsch's

long-term research. Much practical information will come from this project and will be distributed to the public in various media.

VI. **Evaluation:**

Objective A. Success will be the purchase of 30 acres of property and additional acres.

Objective B. Success of the re-established wetland will be measured by two criteria: 1) The number of species that become established over the next five years and; 2) the number of people who visit or express interest in the wetland restoration process. In both cases the greater number will equal the greater success.

VII. **Context within Field:** The knowledge base in wetland restoration is rather undeveloped. Knowledge on how to ameliorate pollutants and control excessive flooding is better understood than is establishing biodiversity in restored wetlands. The proposed restored wetland will produce cutting-edge knowledge in reestablishing biodiversity.

Research and educational programs at the Arboretum are now moving toward involvement in natural and cultural landscapes and the ecosystems that operate within them. Projects range from introducing more cultivars of native plants adapted to the urban environments; development of an interactive science curriculum for K-12 classes with the Chaska School District (112); and more emphasis on interpreting native landscapes (woodland, prairie, and wetland).

VIII. **Budget Context:**

Monies being spent on the land purchase and wetland project during the 1993-1995 fiscal years include $35,000 on planning, visual analysis (LMIC), presentations to LCMR, legal fees, appraisals, preparing the wetland nursery and plants for the nursery.

Monies projected to be spent for the fiscal years 1995-96 and 1996-97 beyond what has been budgeted may be upward of $100,000. The collateral effort by the project managers, University of Minnesota graduate students, gardeners and research plot coordinators, grounds' crews and the Arboretum's education department staff will have significant input into this project. Further, funding from other sources, for wetland research and private donations for other land acquisition or site amenities will also be forthcoming.

IX. **Dissemination:** What is learned on the project will be disseminated primarily through the signage and handouts at the site. However, refereed scientific papers and popularized articles, Arboretum classes, UM field trips, Arboretum newsletter articles and news items in local newspapers will all bring information on the project to professionals and non-professionals.

X. **Time:** The project will be completed within the time frame allotted (before 6/97).

XI. **Cooperation:**

Cooperators:

Dr.Susan Galatowitsch, Asst. Professor, of Landscape Ecology, Dept. of Horticultural Science, will help design the wetland study and carry out scientific studies within the restored wetland.

Paul Neuman, District Manager, Carver County Soil and Water Conservation District, will assist in developing the model wetland.

XII. **Reporting Requirements:**

Semi-annual six-month work program update reports will be submitted not later than January 1, 1996, July 1, 1996, January 1, 1997, and a final six-month work progress update and final report by June 30, 1997.

XIII. **Attachments:**

Document one: Analysis Document

Document two: Spring Peeper Meadow Conceptual Masterplan