US Army Corps
Of Engineers
St. Paul District

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM

DEFINITE PROJECT REPORT AND INTEGRATED ENVIRONMENTAL ASSESSMENT (SP-26)

LONG MEADOW LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT

Minnesota River
Hennepin County, Minnesota

July 2004

EXECUTIVE SUMMARY

Long Meadow Lake is a shallow floodplain lake located on the left bank of the Minnesota River between river miles 5.0 and 10.00. The lake is separated from the river by a natural levee generally a few hundred feet wide. The lake is divided into two basins separated by an abandoned roadway and bridge (Old Cedar Avenue). The two basins are called Upper and Lower Long Meadow Lake. At low river stages, shallow channels passing under the Old Cedar Avenue Bridge connect the basins. At high river stages, the two basins become one. Long Meadow Lake lies within the Minnesota Valley National Wildlife Refuge. The lake covers about 607 hectares (1500 acres), during most growing seasons. Long Meadow Lake provides habitat for migratory waterfowl, other migratory birds, and aquatic furbearers.

Long Meadow Lake can experience highly variable water levels from year to year, much of which is the result of high water events on the Minnesota River. During years of high water, the water in Long Meadow Lake is too deep for the growth of aquatic vegetation, especially emergent vegetation. During years of low water, emergent vegetation chokes the lake, reducing habitat value for waterfowl and other wildlife. There is no capability at this time for the Refuge to manage water levels in Long Meadow Lake to improve this situation.

The Refuge has recently purchased several agricultural fields adjacent to Long Meadow Lake. The opportunity exists to plant trees in this field in a manner that will accelerate its reforestation and promote reforestation with a species mix similar to the native floodplain forest in this region.

The plan formulation process considered a number of alternatives for the habitat problems and opportunities in the Long Meadow Lake area. For Long Meadow Lake itself, the alternatives focused on providing the capability for the Refuge to manage water levels in Long Meadow Lake to promote optimal growth of aquatic vegetation, especially emergents. Alternatives were identified and evaluated that would allow the Refuge to draw down Long Meadow Lake and to impound water in Long Meadow Lake.

For the agricultural fields a number of planting options were considered ranging from species composition to measures that would enhance survival and growth of the trees, such as pretreating planting sites and use of tree tubes, mats, and mulch.

The alternatives that achieved habitat objectives in the most cost-effective manner were selected for the recommended plan. The recommended plan for Long Meadow Lake is the construction of a 2-bay stop log control structure at the outlet in Lower Long Meadow Lake that would provide the Refuge with the capability to raise/lower/maintain Long Meadow Lake water

levels for habitat management capability. The Refuge would be able to optimize aquatic vegetation growth for migratory birds and other wildlife.

The recommended plan for the agricultural fields is to plant seedlings of floodplain forest tree species. The species mixture would be an approximation that which occurs in the natural floodplain forest in this area. Some measures would be used on a limited basis to enhance survival and growth of the trees. These include mechanical and chemical pre-treatment of planting sites, and the use of tree tubes, mats, and mulch for a limited number of trees.

Total direct construction costs for the recommended plan are estimated to be $432,000. Costs for plans and specifications and construction management bring the total implementation costs to $526,000. (These costs are 'fully indexed", i.e., indexed for inflation). Project construction is scheduled to begin in the summer of 2004 and be completed in the winter of 2004.

Because the project is located entirely within the Minnesota Valley National Wildlife Refuge, the construction cost of the project would be 100 percent Federal, in accordance with Section 906(e) of the Water Resources Development Act of 1986, as amended. Average annual operation and maintenance costs are estimated to be $8,087. The operation and maintenance requirements would be the responsibility of the U.S. Fish and Wildlife Service.

DEFINITE PROJECT REPORT AND INTEGRATED ENVIRONMENTAL ASSESSMENT

LONG MEADOW LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE HENNEPIN COUNTY, MINNESOTA

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INTRODUCTION

1.1 AUTHORITY

The authority for this report is provided by Section 1103 of the Water Resources Development Act of 1986, as amended (Public Law 99-662). The proposed project would be funded and constructed under this authorization. Section 1103 is summarized as follows:

Section 1103. UPPER MISSISSIPPI RIVER PLAN

(a) (1) This section may be cited as the Upper Mississippi River Management Act of 1986.

(2) To ensure the coordinated development and enhancement of the Upper Mississippi River system, it is hereby declared to be the intent of the Congress to recognize that system as a nationally significant ecosystem and a nationally significant commercial navigation system....The system shall be administered and regulated in recognition of its several purposes.

(e) PROGRAM AUTHORITY

(1) AUTHORITY

(A) IN GENERAL. The Secretary, in consultation with the Secretary of the Interior and the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, may undertake, as identified in the master plan -

(i) a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement; and....

1.2 PARTICIPANTS AND COORDINATION

Participants in the planning for the Long Meadow Lake project include the Minnesota Valley National Wildlife Refuge and the Region 3 Offices of the U.S. Fish and Wildlife Service (USFWS), the Minnesota Department of Natural Resources (Minnesota DNR), and the St. Paul District, Corps of Engineers.

The USFWS and the Minnesota DNR were most heavily involved in project planning because the study area is located within the boundaries of the Minnesota Valley National Wildlife Refuge (Refuge) located within the Twin City metropolitan area. The USFWS would be considered a cooperating agency under Federal regulations governing the implementation of the National Environmental Policy Act of 1969.

The following individuals played an active role in the planning and design of the Long Meadow Lake project. For St. Paul District personnel, the discipline and contribution of the individual planning team members is listed. For resource agency personnel, the individual's position title is listed.

ST. PAUL DISTRICT, CORPS OF ENGINEERS

Name	Discipline	Contribution
Tom Novak	Architect	Project Manager
Randy Devendorf	Wildlife Biologist	Environmental analysis/NEPA doc.
Kari Layman	Hydraulic Engineer	Hydraulic analysis
Jon Hendrickson	Hydraulic Engineer	Hydraulic analysis
Joel Face	Geotechnical Engineer	Geotechnical analysis
Tim Grundhoffer	Civil Engineer/Structural	Structural/Design Layout
Aaron Dunlop	Civil/Structural Engineer	Structural Design Layout
Lori Taylor	Technician	Design Layout
Doug Crum	Geotechnical Engineering	Cost Estimating
Byron Williams	Cartographic Technician	GIS analysis

U.S. FISH AND WILDLIFE SERVICE

Sharonne Baylor	Habitat Projects Coordinator
Rick Schultz	Refuge Manager
Chris Kane	Assistant Refuge Manager
Nick Rowse	Ecological Services
John Dobrovolny	Regional Historic Preservation Officer
Pam Thiel	Refuge Fishery Resources

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

Wayne Barstad Regional Environmental Assessment Ecologist

1.3 PROJECT PURPOSE

1.3.1 RESOURCE PROBLEMS/OPPORTUNITIES

The purpose of this Definite Project Report is to document existing and predict future habitat conditions and deficiencies, define habitat goals and objectives, identify and evaluate alternative measures that would address the goals and objectives, and recommend a selected plan for habitat restoration and enhancement.

1.3.2 PROJECT BOUNDARIES

The Long Meadow Lake project is located along the lower Minnesota River (plates 1 and 2). The general project area is that portion of the Minnesota River floodplain lying between the main channel and the uplands on the left side of the river between river miles 5.0 and 10.0 (plates 3 and 4). The study area lies within the boundaries of the Minnesota Valley National Wildlife Refuge (Refuge).

General Project Selection Process

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GENERAL PROJECT SELECTION PROCESS

2.1 ELIGIBILITY CRITERIA

A design memorandum (or implementation document) did not exist at the time of the enactment of Section 1103. Therefore, the North Central Division, U.S. Army Corps of Engineers, completed a "General Plan" for implementation of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP) in January 1986. The U.S. Fish and Wildlife Service, Region 3, and the five affected States (Illinois, Iowa, Minnesota, Missouri, and Wisconsin) participated through the Upper Mississippi River Basin Association. Programmatic updates of the General Plan for budget planning and policy development are accomplished through Annual Addenda.

Coordination with the States and the USFWS during the preparation of the General Plan and Annual Addenda led to an examination of the Comprehensive Master Plan for the Management of the Upper Mississippi River System. The Master Plan, completed by the Upper Mississippi River Basin Commission in 1981, was the basis of the recommendations enacted into law in Section 1103. The Master Plan report and the General Plan identified examples of potential habitat rehabilitation and enhancement techniques. Consideration of the Federal interest and Federal policies has resulted in the conclusions below:

a. (First Annual Addendum). The Master Plan report... and the authorizing legislation do not pose explicit constraints on the kinds of projects to be implemented under the UMRS-EMP. For habitat projects, the main eligibility criterion should be that a direct relationship should exist between the project and the central problem as defined by the Master Plan; i.e., the sedimentation of backwaters and side channels of the UMRS. Other criteria include geographic proximity to the river (for erosion control), other agency missions, and whether the condition is the result of deferred maintenance....

b. (Second Annual Addendum).

(1) The types of projects that are definitely within the realm of Corps of Engineers implementation authorities include the following:

- backwater dredging
- dike and levee construction
- island construction
- bank stabilization
- side channel openings/closures
- wing and closing dam modifications
- aeration and water control systems

- waterfowl nesting cover (as a complement to one of the other project types)
- acquisition of wildlife lands

(2) A number of innovative structural and nonstructural solutions, which address human-induced impacts, particularly those related to navigation traffic and operation and maintenance of the navigation system could result in significant long-term protection of UMRS habitat. Therefore, proposed projects, which include such measures, will not be categorically excluded from consideration, but the policy and technical feasibility of each of these measures will be investigated on a case-by-case basis and the measures will be recommended only after consideration of system-wide effects.

2.2 PROJECT SELECTION

Projects are nominated for inclusion in the St. Paul District's habitat program by the respective State natural resource agency or the U.S. Fish and Wildlife Service, based on agency management objectives. To assist the District in the selection process, the States and USFWS have agreed to use the expertise of the Fish and Wildlife Work Group (FWWG) of the River Resources Forum (RRF) to consider critical habitat needs along the Mississippi River and prioritize nominated projects on a biological basis.

The FWWG consists of biologists responsible for managing the river for their respective agency. Meetings are held on a regular basis to evaluate and rank the nominated projects according to the biological benefits that they could provide in relation to the habitat needs of the river system. The ranking is forwarded to the RRF for consideration of the broader policy perspectives of the agencies involved. The RRF submits the coordinated ranking to the District, and each agency officially notifies the District of its views on the ranking. The District then formulates and submits a program that is consistent with the overall program guidance as described in the UMRS-EMP General Plan and Annual Addenda and supplemental guidance provided by the North Central Division.

Projects consequently have been screened by biologists closely acquainted with the river. Resource needs and deficiencies have been considered on a pool-by-pool basis to ensure that regional needs are being met and that the best expertise available is being used to optimize the habitat benefits created at the most suitable locations.

The U.S. Fish and Wildlife Service identified the Long Meadow Lake project for consideration. The project was evaluated in 1990 by the FWWG and ranked for inclusion in the District's FY 1993 program. In that evaluation, the project was ranked as the number 17-priority project (out of 38) for consideration in FY 1993.

In 1991, the FWWG ranked projects for inclusion in the FY 1994 St. Paul District program. In this ranking, the Long Meadow Lake project rose in priority to number 6 out of 33 projects ranked. Because of this high ranking, the Long Meadow Lake project was selected for study beginning in FY 1994. However, before planning could begin, the Minnesota Valley

Refuge had to acquire a large portion of the Long Meadow Lake area that was in private ownership. Due to funding constraints and other priorities, the property was not acquired until the summer of 1999. Planning for the project commenced in August 1999.

Assessment of Existing Resources

3

ASSESSMENT OF EXISTING RESOURCES

3.1 PHYSICAL SETTING

The Minnesota River drains much of west central, southwestern and south central Minnesota, and flows northeastward into the Twin Cities metropolitan area towards its confluence with the Mississippi River. The Minnesota River valley in the metropolitan area is 1 to 2 miles wide and is bordered by bluffs, which, in some locations, extend a few hundred feet in elevation above the river.

Most of the river floodplain is a mosaic of bottomland forest and marsh habitats. In limited areas, portions of the floodplain are farmed. Development in the form of grain terminals, quarries, and landfills are present in the floodplain, and a number of highways and railroads bisect the area. As this reach of the river is within the Twin Cities metropolitan area, much of the upland area bordering the river valley is developed or rapidly becoming so. The 9-foot navigation channel extends to river mile 14.7, while a Federally authorized 4-foot channel extends to river mile 25.6 at Shakopee, Minnesota.

The Minnesota Valley National Wildlife Refuge (Refuge) covers about 5,260 hectares (13,000 acres) of the river valley, extending from river mile 4 to river mile 35 on the Minnesota River. The Refuge was established in 1976, and is one of the few national wildlife refuges located within a major metropolitan area.

3.2 WATER RESOURCES

MINNESOTA RIVER

The Minnesota River is a major tributary of the Mississippi River that drains more than 16,000 square miles of west central, southwestern and south central Minnesota. The Minnesota River watershed is primarily agricultural. This, along with urban development along the river, results in water quality degradation. The most visible water quality problem is turbidity caused by high levels of suspended sediments. Due to the nature of the watershed, other water quality problems include agricultural chemicals and coliform bacteria. In recent years several agencies have been working to reduce or eliminate these problems.

LONG MEADOW LAKE

Long Meadow Lake is a floodplain lake located on the left bank of the Minnesota River between river miles 5.0 and 10.0. The lake is separated from the river by a natural levee generally a few hundred feet wide. The lake is divided into two basins separated by an

abandoned roadway and bridge (Old Cedar Avenue). The two basins are called Upper Long Meadow Lake and Lower Long Meadow Lake, respectively. At low river stages, shallow channels passing under the Old Cedar Avenue Bridge connect the basins. At high river stages, the two basins become one.

Upper Long Meadow Lake is connected to the Minnesota River via a natural cut at about river mile 9.9 (plate 3). Depending on river stages, water can flow in either direction through this cut. Lower Long Meadow Lake outlets to the Minnesota River via an unnamed creek at about river mile 4.6 (plate 4). The Minnesota River can back up into Long Meadow Lake via this creek during high river stages.

During a "normal" hydrologic season, Long Meadow Lake will rise in elevation during the spring runoff period. This rise will usually be caused by snowmelt and precipitation runoff and/or high water on the Minnesota River backing up into the lake via the inlets/outlets noted above.

Once the spring high water recedes, the water surface elevation of Long Meadow Lake declines during the summer due to outlet discharges and evapotranspiration. Groundwater inflows and runoff from the lakes drainage basin maintain the lake during the summer period.

A minimal amount of water quality data is available for Long Meadow Lake. Due to its shallow, fertile nature, the lake likely goes anoxic during the winter. Diel dissolved oxygen depletion also probably occurs during the summer months. Minnesota River flooding would introduce suspended sediments and produce turbid conditions during the spring and other high water periods. During the summer suspended material would settle out and the water in Long Meadow Lake becomes clearer. No water quality problems have been identified that adversely affect the quality of Long Meadow Lake as habitat for migratory birds and aquatic mammals.

3.3 GEOLOGY AND SOIL/SUBSTRATE

The region surrounding the Long Meadow Lake area was glaciated extensively during the Pleistocene Epoch. Advancing and retreating glaciers laid down thick deposits of unsorted till and outwash sand that today form a hummocky, poorly-drained plain dotted with numerous marshes and small lakes. The glacial drift can reach a thickness of between 200 and 250 feet, and it overlies dolomitic limestone and sandstone of the Prairie du Chien and Jordan Formations.

The wide valley of the present Minnesota River was carved by Glacial River Warren, which carried large volumes of water discharging from the now-extinct Glacial Lake Agassiz located in western Minnesota and eastern North Dakota. Glacial River Warren cut deeply into bedrock, scouring and reworking an earlier valley filled with outwash, stratified drift, and till. Episodic increases in flow caused Glacial River Warren to cut lower into the older valley, leaving remnants of higher channel bottoms as terraces. When Lake Agassiz eventually ceased

to drain to the south, the Minnesota River was formed by local drainage and established its present floodplain in the valley.

Three alluvial and bedrock terraces rise above the Minnesota River floodplain and form regionally prominent benches paralleling the river valley. The lower terrace is 30 to 50 feet above the floodplain, the middle terrace is 75 to 115 feet above the floodplain, and the upper terrace is between 120 and 180 feet above the floodplain. The walls of the river valley form a bluff that grades into a hummocky, poorly drained regional highland.

3.4 FISH AND WILDLIFE

The wildlife present in the Minnesota Valley National Wildlife Refuge occurs there because of the interspersion of the habitat types. Predominant species in the area include waterfowl, wading birds (herons, egrets, and rails), pheasant, white-tailed deer, muskrat, raptors, and songbirds. There have been 275 species of birds recorded within the river valley during migration, 100 of which nest within the refuge. The diverse habitats within the floodplain support a large number of birds during migration. The river valley provides wildlife with food, shelter, and breeding pair habitat during migration. Even though migratory use of the refuge is the most visible and intensive, wildlife production is good due to the diversity of habitats and the isolation within an urban area.

There is a bald eagle (*haliaeetus leucoceplaus)* nest located on the northwest end of Long Meadow Lake. The bald eagle is a federally listed threatened species. The nest has been active for the last several years. No state listed threatened or endangered species are present with the immediate project area.

Forty-nine species of fish were collected within the Minnesota Valley National Wildlife Refuge in a recent survey (Yess 1993). Many of the lakes adjacent to the Minnesota River have a maximum water depth of 5 feet and are prone to winterkill situations limiting their fishery potential. The Minnesota River contains a diverse fish assemblage, but due to water quality conditions fish consumption advisories are in place.

Long Meadow Lake serves as a spawning and nursery area when water conditions provide access and egress for adult fish and egress for the young-of-the-year fish. Most high water conditions occur in the spring during the spawning season. Fish egress is a problem when the lake is at or below normal water level conditions. When spring water conditions do not overtop the banks to flood Long Meadow Lake, it is unlikely any significant spawning activity occurs due to the absence of fish because of winterkill conditions.

3.5 HABITAT TYPES AND DISTRIBUTION

A northern floodplain forest plant community located in the prairie-forest transition zone dominates the lower Minnesota River valley. As the steep bluffs and wetlands of the Refuge made it unsuitable for development and agriculture, it provides some of the largest acreage of natural vegetation in the metropolitan area.

Original survey data indicates the lower Minnesota River valley was about 30% bottomland forest, 30% marsh, and 40% wet meadow. Currently the marsh and aquatic habitat type comprises the largest portion of the Refuge at approximately 32%. The vegetation composition of this habitat type is mainly river bulrush, softstem bulrush, cattail, bur-reed, water lily, smartweed, arrowhead, wild rice, and lotus.

Bottomland hardwoods make up 26% of the Refuge. Elm, silver maple, cottonwood, willow, and basswood dominate this habitat type. Understory vegetation is willow shrubs, red-osier dogwood, alder, sumac, little bluestem, and field thistle. Wet meadow habitat occurs on 12% of the refuge and is dominated by common reed, reed canary grass, and prairie cordgrass.

Uplands occur over approximately 10% of the Refuge area. The dominant tree species are elm, oak, boxelder, aspen, and cottonwood. Shrubs include roundleaf and grey dogwoods, sumac, hazel, chokecherry, sage, rose, prickly ash, and prickly ribes. The dominant forb and grasses are prairie bush clover, field thistle, yellow sweet clover, yarrow, common milkweed, little and big bluestem, Indian grass, Canada wild rye, and switchgrass. Habitat types dominated by human intervention (orchards, agriculture, etc.) occur on about 20% of the Refuge lands.

The Long Meadow Lake wetland complex is approximately 607 hectares (1,500 acres) in size. During normal water conditions, the water supply is from natural springs, seepage, and runoff. The lake outlets to the Minnesota River. It is a palustrine system and in certain years is dominated by emergent vegetation in nearly 100% of the lake basin. In other years, vegetation is less dense or absent in coverage. The surface substrate contains a large portion of loose organic fragments over mud.

3.6 CULTURAL RESOURCES

The Minnesota River has been a focus of human use and occupation for thousands of years as evidenced by the many archaeological sites associated with the diverse landscape settings of the river valley. More specifically, archaeological sites, mostly burial sites, have been identified within and adjacent to Long Meadow Lake.

Archaeological survey work was conducted at the location of the proposed control structure. The survey results indicate that this area is blanketed with a meter or more of flood deposited sediment that has most likely accumulated over the last 150 years. Historic artifacts

such as broken glass, slag, and metal fragments were observed within this flood deposited sediment. The deposits underlying this historic alluvium appear to be lacustrine sediment, suggesting a depositional environment with a very low potential for past human occupation.

Soil borings were taken at farm field sites 1 and 3 to determine their potential to harbor archaeological resources. Field site one exhibited 2.7 meters of combined fill and historic-age alluvium over a buried soil that represents a former stable land surface. While the buried soil does have the potential for significant archaeological deposits, it lies well below the area of potential effect for any project related activity. The fill and historic-age alluvium has no archaeological potential. Soil borings at Field Site 3 suggest that the surface soils at this site do have the potential to contain archaeological deposits.

The Corps has also sought information from appropriate American Indian tribes pertaining to any properties of cultural or religious importance that may exist within the area of potential effects for the project. The tribes contacted have identified no properties.

A no historic properties affected determination has been coordinated with the Minnesota State Historic Preservation Office for the construction of the control structure and the use of Field Site one for placement of dredged material. If additional sites are needed for the disposal of dredged material or if they will be subject to mechanical site preparation for planting, additional surveys and coordination may be necessary. As the planting and site preparation methods for the other seven field sites are further defined, additional archaeological fieldwork and/or design change may be required. Any activities at those locations, which the Corps and/or the Fish and Wildlife Service determines will have the potential to affect historic properties, will need to be coordinated with the SHPO and interested Indian Tribes before those activities may proceed.

3.7 SOCIOECONOMIC/RECREATION

The Minneapolis-St. Paul Metropolitan Statistical Area includes Ramsey, Hennepin, Anoka, Scott, Carver, Dakota, Washington, Wright, Sherburne, Isanti and Chisago counties in Minnesota, St. Croix and Pierce counties in Wisconsin, and has a population of approximately 2.97 million. The Long Meadow Lake Management Unit of the Minnesota Valley National Wildlife Refuge is located in the southern tier of the Twin Cities metropolitan area in Hennepin County, with the refuge visitor center overlooking the Minnesota River Valley located on the bluffs adjacent to the management unit. Existing trails in the Long Meadow Lake unit provide recreational and environmental education opportunities in the midst of a heavily urbanized area.

Problem Identification

4

PROBLEM IDENTIFICATION

4.1 LONG MEADOW LAKE

4.1.1 Existing Habitat Conditions

Long Meadow Lake is a 600-hectare (1,500-acre) wetland complex within the larger 970-hectare (2,400-acre) Long Meadow Lake management unit of the Refuge. The lake is influenced by the extensive urban development surrounding it and the commercial development on the Minnesota River. Storm water discharge from the heavily urbanized western boundary of the lake, and the increasing periods of high water on the Minnesota River (due to land use changes in the watershed) have all contributed to a gradual and long lasting change in hydrological cycles in the lake. There are often extended periods of high water several times a year, and the frequency with which this occurs from year to year has increased. The end result is a system that fluctuates from years with almost 90% coverage of emergent aquatic vegetation to some years with almost 100% open water.

The dominant emergent vegetation species in Long Meadow Lake are broad-leaved arrowhead, softstem bulrush, water lily, lotus and cattail. However, composition and distribution of emergent aquatic vegetation varies, dependent on the predominant water conditions in a given year. In many years large portions of the lake are composed primarily of large monotypic stands of vegetation.

The area provides important migration habitat for many species of birds, especially neotropical migrants and waterfowl. However, quality year-round habitat for many species of birds in Long Meadow Lake is limited by the extremes of habitat conditions that occur. For many wetland species, an open water to emergent vegetation ratio of 1:1 is an important component in contributing to high habitat quality. These conditions occur only sporadically in Long Meadow Lake.

Habitat types around Long Meadow Lake are primarily woodlands and wetlands. Approximately 92% of the 970-hectares (2,400-acre) Long Meadow Lake Management Unit is classified as either wetlands or wooded. Until recently the remaining 8% was primarily in agricultural use. There has been limited nesting habitat in this unit for waterfowl except for the wood duck.

4.1.2 Historically Documented Changes in Habitat

Although general habitat changes can be inferred from the conditions described above, specific habitat changes have not been thoroughly documented. Land use and hydrological changes are responsible for extensive habitat changes within the Minnesota River Valley and this is reflected in the limited habitat quality of many riparian areas throughout the region. The

urbanized nature of the surrounding landscape and the increased flooding that occurs on the Minnesota River are indicators that hydrologic conditions in Long Meadow Lake have been dramatically changed. It is reasonable to assume that the "natural" hydrologic cycle for this extensive marsh complex has been extensively altered, which has led to a decline in habitat diversity and quality in Long Meadow Lake.

4.1.3 Estimated Future Habitat Conditions

Without any modifications to Long Meadow Lake, habitat conditions for fish and wildlife in the marsh will likely not appreciably improve. Water levels within Long Meadow Lake will continue to be affected by both storm water discharges from the city of Bloomington and high water events from the Minnesota River. Aquatic vegetation composition and distribution will continue to be cyclic, with optimum conditions occurring only occasionally.

4.2 FARM FIELDS

4.2.1 Existing Habitat Conditions

With the various forms of development that have take place in the Long Meadow Lake floodplain, the forest has been fragmented to some degree, and the diversity of tree species has decreased. Since the phase-out of farming on the refuge, many of the areas have reverted to old-field dominated by reed canary grass. These areas have little or no regeneration of tree species because of the high-density reed canary grass, and possible over browsing by deer. In those areas where tree seedlings area becoming established, they are primarily monotypical stands of box elder, eastern cottonwood and willow. The areas being considered for reforestation are currently old fields with no trees becoming established at this time. The areas are dominated by reed canary grass and provide limited habitat for a few species of birds and small mammals.

4.2.2 Estimated Future Habitat Conditions

It is assumed that over time, succession would result in the farm field areas eventually becoming re-established with some woodland. In the absence of any mangement activities or reforestation efforts, species most likely to become established on these areas would be green ash, cottonwood and willow.

Project Goals And Objectives

5

PROJECT GOALS AND OBJECTIVES

5.1 INSTITUTIONAL FISH AND WILDLIFE MANAGEMENT GOALS

Fish and wildlife management goals and objectives for the Long Meadow Lake area fall under those defined more broadly the Minnesota Valley National Wildlife Refuge, and those designated specifically in the Refuge Master Plan. The management objectives of the Refuge, which apply most directly to the study area, are discussed below.

5.1.1 GENERAL

The general Refuge objective is to manage the natural resources in order to perpetuate wildlife species and ecological community's natural diversity and abundance, as well as provide opportunities for wildlife-oriented recreation and an educational center for the study of natural systems. The intent is to restore and/or maintain the naturally occurring plant communities with the idea that if the habitats are present and healthy, the wildlife will be there.

5.1.2 LONG MEADOW LAKE UNIT OBJECTIVES

Long Meadow Lake is part of the 970-hectares (2,460-acre) Long Meadow Lake Unit. The following is the Unit Objective as stated in the Refuge Master Plan.

"Long Meadow Lake's location in proximity to the metropolitan area and its special and diverse resources combine to provide outstanding opportunities for environmental education and wildlife management interpretation for a wide range of visitors.

Public use in the unit will emphasize environmental education and wildlife management interpretation with special consideration given to programs and facilities for short term visits, the handicapped, the elderly, and youth.

UPPER LONG MEADOW LAKE

The unit has been subdivided into west and east. Areas southwest of the new Cedar Bridge (Upper Long Meadow Lake) will emphasize wildlife with reduced public use. These areas will be managed primarily for wildlife abundance and diversity.

LOWER LONG MEADOW LAKE

Lands northeast of the new Cedar Bridge (Lower Long Meadow Lake) will emphasize public use with facility development for education, management demonstration, and wildlife viewing. These lands will be managed for both public use and wildlife values. Wildlife facilities will be constructed to demonstrate modern wildlife management

techniques and their related benefits."

The Refuge Comprehensive Conservation Plan (CCP), currently in development, may result in some modification of these objectives. However, these changes are not expected to appreciably affect the specific project goals and objectives.

5.2 PROJECT GOALS AND OBJECTIVES

Defining project goals and objectives by habitat type(s) or habitat parameter(s) was considered for Long Meadow Lake. For example, a habitat objective at Long Meadow Lake could be to maintain a given number of acres of floodplain marsh habitat with a certain mix of emergent and floating leaved/submergent vegetation and unvegetated open water. However, there can be substantial year-to-year variation in the vegetative cover in shallow floodplain marshes as a result of the variability in annual hydrology and other factors. Therefore, it would be impossible to design a project to produce a defined mixture of marsh habitats or vegetation types in any given year. It also would be difficult to measure the success or failure of the project using habitat types or vegetation mixtures because of the natural annual variation that can occur within these floodplain marsh systems.

The plant species present in lower Minnesota River floodplain marshes (and the wildlife that depend upon them) are adapted to a hydrologic regime that has been altered due to man's activities, both in the watershed of the Minnesota River and in the local watershed of Long Meadow Lake. The key to restoring and protecting habitat values at Long Meadow Lake is to restore the natural hydrology of the system, or to provide the capability to mimic as much as possible the natural hydrology.

Refuge staff has indicated the desirability of trying to restore/maintain natural processes and native species in Long Meadow Lake. Current emergent vegetation in and around Long Meadow Lake is dominated by cattails and reed canary grass, adaptable species that can survive wider ranges of water level fluctuation.

It is not possible to reverse the land use changes that have occurred in the Minnesota River and the Long Meadow Lake watersheds over the last 150 years. Therefore, the focus at Long Meadow Lake has to be on providing the capability to the Refuge to mimic the natural hydrology within Long Meadow Lake as much as possible.

It would be impossible, without extensive diking systems, to provide the Refuge with any capability to deal with increased overbank flooding caused by land use changes in the Minnesota River watershed. The only practical approach would be to provide the Refuge with the capability to manage less than bank-full high water events, i.e., when the Minnesota River can back up into Long Meadow Lake.

With regards to the local watershed of Long Meadow Lake, it is not considered feasible

to divert runoff from upland areas around the lake as there are numerous storm water outlets discharging into Long Meadow Lake. This would require extensive construction that would be costly and would disturb a substantial amount of habitat around Long Meadow Lake. A more practical approach would be to provide the Refuge the capability to discharge excessive runoff from Long Meadow Lake to the Minnesota River.

In light of the conditions and constraints at Long Meadow Lake, the following project goals were developed. (It should be noted that goal A provides the Refuge with the physical capability to mimic natural hydrology as much as practical. It does not and is not intended to include a management plan defining to what extent this capability will be applied. That is the management responsibility of the Refuge.)

GOAL A: Maintain the lake as a shallow floodplain lake/marsh to provide high quality habitat for migratory birds and aquatic wildlife.

Water levels in Long Meadow Lake are influenced to a large degree by Minnesota River levels, groundwater seepage, springs and storm water drainage. Minnesota River levels in the study area no longer follow a natural pattern because of the drainage development that has taken place in the watershed. In addition, water levels are also influenced by the increased urbanization.

OBJECTIVE A1: Provide the Refuge with the capability to prevent the Minnesota River from backing into Long Meadow Lake during less than bank-full high water events.

Due to land use changes within the Minnesota River watershed, i.e., agriculture and development, there has been an increase in the frequency of high water events on the lower Minnesota River. As noted earlier, it is not practical to manage those events that overflow the natural riverbanks and inundate Long Meadow Lake. However, for those events that are less than bank-full, it would be possible to provide the capability to keep Minnesota River waters from backing into Long Meadow Lake.

It is desirable to prevent inundation of Long Meadow Lake by an unnaturally high Minnesota River for two reasons. First, the Minnesota River, especially its flood waters, are heavily laden with suspended solids. This material settles out in Long Meadow Lake, increasing the aging rate of Long Meadow Lake. Secondly, floodplain marsh vegetation has evolved under the natural condition of generally low water during the late summer. Flooding by increasingly frequent summer high water events can reduce the vigor and successful regeneration of marsh vegetation.

OBJECTIVE A2: Provide the Refuge with the capability to discharge excessive water from Long Meadow Lake.

Urbanization of the Long Meadow Lake watershed results in faster and more runoff into Long Meadow Lake. The natural outlets of the lake do not have the capacity to discharge the excess water in a timely manner. This can result in higher water levels in Long Meadow Lake during the summer, which in turn can be detrimental to the vegetation and use of the lake by wildlife. An added advantage is that the capability would also be provided to discharge excess water should the lake be inundated by a bank-topping Minnesota River high water event.

GOAL B: Restore the site to mature bottomland forest habitat with species variety typically found under natural conditions.

The Long Meadow Lake unit contains a number of old farm fields that will eventually, through the process of succession, return to floodplain forest. However, many of these fields now support a dense growth of reed canary grass, making it difficult for trees to establish themselves by seed. In addition, many of these areas will initially regenerate with pioneer species such as box elder not normally found in the typical floodplain forest along the Minnesota River. Tree plantings could "jump start" the succession process to floodplain forest with the desired mix of native species.

OBJECTIVE B1: Revegetate 18 hectares (45 acres) on several farm fields in a manner that will accelerate the natural succession process as much as practicable, and promote succession to a diversity of native species that provide high quality wildlife habitat.

This objective was developed to meet the goal of establishing bottomland forest habitat in these fields in a manner faster than the estimated 100-120 years it would take to accomplish this under natural succession. This objective would also meet the goal of reestablishing the diversity of vegetation that would be expected under natural conditions, and to take advantage of the opportunity available to revegetate with species of value to wildlife. Because of past agricultural use, the topography of the field is flat. Under natural succession, the field would be more likely to revegetate in a monotypic stand of a species such as cottonwoods.

Alternatives

6

ALTERNATIVES

6.1 PLANNING OPPORTUNITIES

The natural levee separating the Minnesota River from Long Meadow Lake, aside from a few openings, provides a contiguous barrier separating the river from the lake.

6.2 PLANNING CONSTRAINTS

6.2.1 INSTITUTIONAL

The project area lies within the boundaries of the Minnesota Valley National Wildlife Refuge. As such, Refuge management goals and objectives must be complied with, as well as the laws and regulations governing Refuge management.

6.2.2 ENGINEERING

Construction of structures on Upper Long Meadow Lake may require road construction because access to this area is very limited.

6.2.3 ENVIRONMENTAL

Long Meadow Lake is a spawning area for fish in the Minnesota River. Spawning runs occur up the lower lake outlets. In the absence of over-the-bank flooding, control structures without facilities for spawning fish to enter the lake could negatively affect the fisheries resource. The Minnesota DNR recommends that a control structure at the outlet of Long Meadow Lake be designed to allow upstream fish passage from March 1st through May 31st.

An eagle nest is located along the Minnesota River in the area of lower Long Meadow Lake. This nest may influence allowable construction times.

6.2.4 CULTURAL RESOURCES

No specific cultural resource constraints have been identified to date. Depending upon the location of proposed work, cultural resource surveys may be required. If cultural resources are found, it could affect the design of project features and/or their location.

6.2.5 SOCIOECONOMIC/RECREATIONAL

The Minnesota Valley National Wildlife Refuge is located within an urban area. Any habitat restoration measures considered must take into consideration the high level of public use that takes place on the Refuge and the visibility to the public.

6.3 ALTERNATIVES IDENTIFIED

6.3.1 NO ACTION

The no action alternative is defined as no implementation of a project under the UMRS-EMP to modify habitat conditions in the Long Meadow Lake area of the Minnesota Valley National wildlife Refuge.

6.3.2 LONG MEADOW LAKE

Several options for addressing the increased inflow into Long Meadow Lake and for providing effective water level management were initially investigated. Features initially evaluated included; modifying the inlet/outlet to Upper Long Meadow Lake, either with a control structure or rock berm, construction of a new outlet from Upper Long Meadow Lake, modifying the secondary outlet on Lower Long Meadow Lake and modifying the existing outlet on Lower Long Meadow lake.

6.3.3 FARM FIELDS

There are a number of former agricultural fields located on the Refuge that are being allowed to succeed back to floodplain forest vegetation. Many of these areas have limited tree establishment due to extensive presence of reed canarygrass or dominated by monotypic stands of cottonwood or green ash. Tree plantings on these fields to accelerate the reforestation process towards a desired mix of species were evaluated.

6.4 ALTERNATIVES ELIMINATED FROM DETAILED ANALYSIS

Preliminary hydraulic analysis was completed for a variety of combinations of inlets, outlets and plugs and the results are presented in Appendix 5. The analysis, coupled with inter-agency site visits, indicated that the modification of the existing outlet on Lower Long Meadow Lake would be the most effective approach to the meeting the goals of the project. Modifying the inlet/outlet to Upper Long Meadow Lake, constructing a new outlet for Upper Long Meadow Lake or modifying the secondary outlet on Lower Long Meadow Lake were either potentially very expensive, provided limited drawdown capacity or were considered environmentally unacceptable. As a result, these features were dropped from detailed analysis and no detailed cost estimate or habitat benefit analysis was done for these features.

6.5 ALTERNATIVES CONSIDERED IN DETAIL

6.5.1 No Action

Under the no action alternative, no project would be implemented under the UMRS-EMP to modify habitat conditions in the Long Meadow Lake area of the Minnesota Valley National Wildlife Refuge. It is assumed that the USFWS would complete some type of rehabilitation of the existing 1.5m ungated culvert within 15 years. The timing and type of structure would be dependent on funding and management priorities for the refuge.

6.5.2 Alternative LL-1 (Modify Outlet of Lower Long Meadow Lake)

Alternative LL-1 is the modification of the existing outlet to Lower Long Meadow Lake to provide the capability to raise, lower and/or maintain water levels in both Upper and Lower Long Meadow Lake. The feature consists of replacing the existing 1.5m diameter ungated culvert with a two-bay stop log structure.

The outlet channel would be excavated to elevation 210.7m, would have a bottom width of 3m, and side slopes of 1V:3H (Plate 7). It is estimated that 2,050 cubic meters would be excavated to create the channel.

All excess material from the channel excavations would be placed on the farm fields 1 and 3.

The estimated implementation cost of alternative LL-1 is $359,900 (table 6-1). The average annual cost at the current discount rate of 5 5/8 percent would be $21,647.

Table 6-1
Cost for Alternative LL-1

Feature	Cost
Construction	
Demolition of Existing Culvert	$ 11,400
Upstream Channel Dredging	$191,200
Clearing	$ 1,600
Stop log Control Structure	$ 95,000
Planning, Engineering and Design	$ 35,700
Construction Management	$ 25,000
Total	$ 359,900

July 2002 price levels

6.5.3 Farm Field – Tree planting

The U.S. Fish and Wildlife Service developed the planting plan for the farm fields. The projected composition of the trees to be planted would include, Silver maple, Green ash and Burr oak. The exact number and specific species will be finalized during the Plans and Specification phase. The trees would be planted using a mechanical planter. The trees would also receive site preparation and other treatments to enhance growth and survival. These measures would include mechanical site preparation, chemical site preparation, wood chip mulch, tree mats, and tree tubes. These measures would be employed in various combinations to evaluate their effectiveness in this type of setting.

The estimated cost of the farm field reforestation plan is $132,600 (Table 6-2). The average annual cost would be $7,976.

Table 6-2
Estimated Cost for Farm Field Reforestation

Feature		Cost
Construction		
Materials		$ 117,000
Plantings & Decorating		$ 15,600
	Total	$ 132,600

July 2002 price levels

Development & Evaluation of Alternatives

7

EVALUATION OF ALTERNATIVES

7.1 NO ACTION

By definition, no action would entail no expenditure of Federal funds under the UMRS-EMP HREP program to address habitat concerns in the Long Meadow Lake area. Coordination with refuge personnel indicates that if the control feature were not constructed at this time, it would be replaced within 15 years. Therefore, if the habitat concerns are not addressed under the UMRS-EMP HREP program, it is unlikely that the U.S. Fish and Wildlife Service would undertake any substantive measures in the foreseeable future due to fiscal constraints.

The no-action alternative would not satisfy any of the project objectives. Habitat conditions would change as described under earlier sections entitled "Estimated Future Habitat Conditions".

7.2 LONG MEADOW LAKE

7.2.1 ALTERNATIVE LL-1 (MODIFY OUTLET OF LOWER LONG MEADOW LAKE)

Alternative LL-1 would provide the capability to draw down both Upper and Lower Long Meadow Lake on an as needed basis to consolidate sediments and manage aquatic vegetation growth within the lake for the benefit of migratory waterfowl and other migratory birds. The new control structure would also reduce the frequency of high water events entering Long Meadow Lake during the growing season by providing the capability to close the structure during summer bankfull events on the Minnesota River.

Habitat evaluation procedures were used to quantify the habitat benefits associated with providing the capability to draw down Long Meadow Lake on a periodic basis (see appendix 4, HEP appendix, for details). It is estimated that the LL-1 alternative would provide 76 annual habitat units (AAHU) of benefit.

The estimated implementation cost of the LL-1 alternative is $359,900. The average annual cost would be $21,647 at the current discount rate of 5 5/8 percent.

The cost/quantifiable benefits of the LL-1 alternative would be approximately $285/AAHU.

7.2.2 FARM FIELD – (TREE PLANTINGS)

Tree plantings at the farm fields would accelerate the reforestation of these fields by years versus natural succession. In addition, a species composition consistent with the composition of naturally occurring bottomland forest communities in the Minnesota River

floodplain would be achieved. Habitat evaluation procedures were used to quantify the habitat benefits of this plan (see Appendix 4, HEP Appendix, for details). It is estimated that the reforestation plan would provide 10 AAHU of benefits.

The estimated implementation cost of the reforestation alternative is $132,600, with an average annual cost of $7,976. The cost/quantifiable benefits of the reforestation alternative would be approximately $798/AAHU.

7.3 INCREMENTAL ANALYSIS

Due to the limited number of alternatives considered, a detailed incremental analysis is not warranted. While several alternatives to the single control structure on Lower Long Meadow Lake were initially developed, they were eliminated from further consideration early in the planning process either because of the potentially high cost or ineffectiveness in meeting project objectives. The limited scope and cost for the proposed tree planting precludes meaningful incremental analysis for this feature as well. As such, cost estimates and a quantification of habitat benefits were completed for only the two features. A comparison of the cost effectiveness of the proposed features is presented below.

Table 7-1 . Average Annual Cost/Habitat Unit for Proposed Features

PROJECT FEATURE	TOTAL COST	AVERAGE ANNUAL COST	AVERAGE ANNUAL HU	AA COST/HU
Control Structure	$359,900	$21,647	76	$285
Tree Planting	$132,600	$7,976	10	$798

7.4 PLAN SELECTION AND JUSTIFICATION

The selected plan is the LL-1 alternative and the planting plan for the farm field restoration. Both features appear justified based on the reasonableness of the costs and the importance of the resource being benefited. Long Meadow Lake is an outstanding wetland complex in the midst of a heavily urbanized area. As such, it not only provides important year round bottomland habitat for wildlife, it receives remarkable use by waterfowl and neotropical migrant bird species during migration. The proposed features would provide timely capability to maintain and restore this important habitat in the Minnesota River corridor.

7.4.1 LOWER LONG MEADOW LAKE

The LL-1 alternative will provide the Refuge with the capability to both draw down and impound Upper and Lower Long Meadow Lake waters for the management of aquatic vegetation. This will provide improved habitat conditions for migratory waterfowl and other

migratory birds. This 607-hectare (1500-acre) shallow lake is an important habitat component of the Minnesota Valley National Wildlife Refuge. The ability to manage water levels in Long Meadow Lake to improve habitat conditions for migratory waterfowl and other migratory birds will contribute substantially to goals and objectives of the refuge.

The LL-1 alternative meets both project goals for Long Meadow Lake. The LL-1 alternative would provide quantifiable habitat benefits ($285/AAHU) well within the range considered reasonable and prudent for habitat projects of this nature. Therefore, the LL-1 alternative was selected as the recommended plan.

7.4.2 FARM FIELD

The planting plan for the farm field will accelerate the reforestation of this field to a bottomland forest community natural to this area of the Minnesota River floodplain. This will provide habitat for a wide variety of species that use bottomland forest habitat. The cost of the quantifiable habitat benefits that will result from this plan ($798/AAHU) are considered reasonable for the benefits to be obtained. For this reason, the planting plan for the farm field was selected as the recommended plan versus the no action alternative.

Selected Plan with Detailed Description/Design/Construction Considerations

8

SELECTED PLAN WITH DETAILED DESCRIPTION/DESIGN AND CONSTRUCTION CONSIDERATIONS

8.1 LONG MEADOW LAKE

The selected plan LL-1 for Long Meadow Lake involves the demolition of the existing culvert and concrete appendage, excavation of an upstream/downstream channel and the installation of a 2-bay concrete stop log control structure to manage lake water levels. Appropriate erosion control measures as required by the Minnesota Pollution Control Agency's waiver of water quality certification would be incorporated into the final project design.

8.1.1 LOWER LONG MEADOW LAKE TWO BAY STOP LOG STRUCTURE

CONTROL STRUCTURE

To provide the ability to raise, lower and/or maintain Long Meadow Lake water levels, a control structure located at the current outlet/inlet culvert location under the access/maintenance road (Plates 7 and 8) would be constructed. Analysis indicated that it would be more practical to replace the existing 1.5 m round ungated culvert with a 2-bay concrete stop log structure.

Hydraulic analysis indicated that 2-bays would suffice to meet requirements to allow floodwaters out of Long Meadow Lake in a timely manner. A 2-bay (1.5 m wide) would be selected to provide for margin of error and to provide additional management capability.

Setting the control structure invert elevation 210.7m would allow for opportunities to better manage water levels in Lower Long Meadow Lake.

UPSTREAM CHANNEL

To permit the drawdown of Long Meadow Lake the upstream channel would extend from the control structure to approximately 750m (2,500 feet) to the west to an area in the lake (Plate 7).

The channel would have a 3m bottom width, with 1V: 3V side slopes (Plate 7). The channel would be excavated to a depth of 210.7m. A minor amount of overdepth excavation is proposed to account for sloughing.

To construct the upstream channel it is assumed that the contractor would truck in a mechanical dredge plant, which would be launched near the new proposed control structure. A backhoe operating on a deck barge would unload material onto small 30 m^3 barges that would unload near the control structure where trucks would haul the excavated material to the fields.

Approximately 2,050 m^3 of material would have to be excavated from the upstream

channel.

8.2 FARM FIELDS

The 18-hectares (45-acres) located on eight separate areas would be planted/reforested according to the following plan. Trees purchased from a local nursery would be planted at a rate of about 400 trees per acre. Spacing of the trees would be 3.6m (12 feet) on center.

The majority of the areas would be planted using a mechanical planter. Existing agricultural fields 2 thru 8 would not require any pre-treatment. In some selected areas such as Field 1, various pre-treatments would be employed to enhance tree survival and growth.

Some of the trees would be given protection, either in the form of tree mats, wood chip mulch, tree tubes, or some combination of all three.

Environmental Assessment

9

ENVIRONMENTAL EVALUATION

An environmental assessment has been conducted for the proposed action and a discussion of the impacts follows. As specified by Section 122 of the 1970 Rivers and Harbors act, the categories of impacts listed in the impact assessment matrix (table 9-1) were reviewed and considered in arriving at the final determination. In accordance with Corps of Engineers regulations (33 CFR 323.4(a)(2)), a Section 404(b)(1) evaluation was prepared (attachment 2). Application has been made to the State of Minnesota regarding water quality certification under Section 401 of the Clean Water Act. The Finding of No Significant Impact (attachment 10) may be signed after the public review period has elapsed, any issues have been resolved, and the water quality certification has been obtained. If the public review uncovers significant impacts, a revised NEPA document may be prepared.

TABLE 9-1

IMPACT ASSESSMENT MATRIX

NAME OF PARAMETER	NO ACTION — MAGNITUDE OF PROBABLE IMPACT							SELECTED PLAN — MAGNITUDE OF PROBABLE IMPACT						
	<----- INCREASING BENEFICIAL				INCREASING ADVERSE ----->			<----- INCREASING BENEFICIAL				INCREASING ADVERSE ----->		
	SIGNIFICANT	SUBSTANTIAL	MINOR	NO APPRECIABLE EFFECT	MINOR	SUBSTANTIAL	SIGNIFICANT	SIGNIFICANT	SUBSTANTIAL	MINOR	NO APPRECIABLE EFFECT	MINOR	SUBSTANTIAL	SIGNIFICANT
A. SOCIAL EFFECTS														
1. Noise Levels				X								X		
2. Aesthetic Values				X							X			
3. Recreational Opportunities				X							X			
4. Transportation				X							X			
5. Public Health and Safety				X							X			
6. Community Cohesion (Sense of Unity)				X							X			
7. Community Growth & Development				X							X			
8. Business and Home Relocations				X							X			
9. Existing/Potential Land Use				X							X			
10. Controversy				X							X			
B. ECONOMIC EFFECTS														
1. Property Values				X							X			
2. Tax Revenues				X							X			
3. Public Facilities and Services				X							X			
4. Regional Growth				X							X			
5. Employment				X							X			
6. Business Activity				X							X			
7. Farmland/Food Supply				X							X			
8. Commercial Navigation				X							X			
9. Flooding Effects				X							X			
10. Energy Needs and Resources				X							X			
C. NATURAL RESOURCE EFFECTS														
1. Air Quality				X							X			
2. Terrestrial Habitat										X				
3. Wetlands					X				X					
4. Aquatic Habitat					X				X					
5. Habitat Diversity and Interspersion					X				X					
6. Biological Productivity				X					X					
7. Surface Water Quality				X								X		
8. Water Supply				X							X			
9. Groundwater				X							X			
10. Soils				X							X			
11. Threatened or Endangered Species				X							X			
D. CULTURAL EFFECTS														
1. Historic Architectural Values				X							X			
2. Pre-Hist & Historic Archeological Values				X							X			

9.1 RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS

The proposed action would comply with all applicable Federal environmental laws, executive orders, and policies, and State and local laws and policies including the Clean Air Act, as amended; the Clean Water Act of 1977, as amended; the Endangered Species Act of 1973, as amended; the Land and Water Conservation Fund Act of 1965, as amended; the National Environmental Policy Act of 1969, as amended; the Fish and Wildlife Conservation Act of 1958, as amended; the National Wildlife Refuge System Administration Act; Executive Order 11988 - Floodplain Management; and Executive Order 11990 - Protection of Wetlands. The proposed action would not result in the conversion of farmland to non-agricultural uses. Therefore, the Farmland Protection Policy Act of 1981 does not apply to this project.

9.2 NATURAL RESOURCE EFFECTS

9.2.1 FISH AND WILDLIFE RESOURCES

In order to quantify habitat benefits of the proposed actions, The U.S. Fish and Wildlife Services' Habitat Evaluation Procedure (HEP) was used. The HEP methodology utilizes a Habitat Suitability Index to rate habitat quality on a scale of 0 to 1 (1 being optimum). The HSI is multiplied by the number of acres of available habitat to obtain Habitat Units (HU's). One HU is defined as one acre of optimum habitat. By comparing existing HU's to HU's expected to be gained with the proposed action, the benefits can be quantified. Based on the management objectives of the U.S. Fish and Wildlife Service for this management unit of the Minnesota Valley National Wildlife Refuge, a general wildlife diversity/productivity model and the black-capped chickadee model was used to quantify habitat benefits and evaluate the effectiveness of the proposed project features. A detailed discussion of the habitat evaluation procedures conducted for this project is presented in Appendix 4.

The proposed control structure would improve general habitat conditions in the 1500-acre Long Meadow Lake. Improved water control capabilities would result in increased vegetation diversity and extent improving habitat conditions for a wide variety of wetland dependent wildlife such as ducks, grebes, double crested cormorants, bitterns, herons, egrets, terns, shorebirds, muskrat, mink, and many species of reptiles and amphibians. Increased vegetation diversity and stabilized water levels would improve seasonal habitat for fish as well as habitat for many other aquatic species. The structure would be operated so as to not adversely affect fish passage into Long Meadow Lake during the spring. Improved water control capabilities would allow this high quality wetland to be managed to provide near optimum conditions. The model used for this evaluation indicates that habitat unit values would increase by 6 percent.

With the various forms of development that has taken place in the Long Meadow Lake floodplain, woodland habitat has become fragmented to some degree and diversity of tree species has decreased. Re-establishment of woodlands on selected areas, totaling 18 hectares (45 acres), would help to reduce habitat fragmentation between some of the larger tracts of woods on Lower Long Meadow Lake and provide a diversity of desired tree species. This would increase general habitat conditions for a variety of woodland wildlife species. Habitat unit values on the 18 hectares would be increased by about 50 percent.

9.2.2 WETLANDS

The construction of the control structure would require the dredging of the outlet channel to facilitate effective water control, and raising the access road approaching the control structure, and the replacement of a culvert to maintain connectivity to wetlands immediately below Long Meadow Lake. This could require the temporary placement of fill in up to 2.5 hectares (5 acres) of wetland habitat for the construction of a cofferdam while the control structure is built along the access road. Approximately 31 lineal meters of road would be raised to tie the control structure into high ground, requiring that a minor amount fill be placed in less than .2 hactares of wetlands along the toe of the road. Wetlands along the road are primarily seasonally flooded in nature and dominated by reed canary grass. In addition some bank stabilization would be required immediately downstream of the control structure to remedy erosion that is currently taking place immediately downstream of the existing outlet. The expected increase in habitat quality in Long Meadow Lake would more than offset aquatic habitat losses associated with construction.

9.2.3 WATER QUALITY

The proposed action would result in short-term decreases in water quality because of localized increases in turbidity during construction or dredging.

9.2.4 ENDANGERED SPECIES

No state listed or federally listed threatened or endangered species would be affected by the proposed project. The federally threatened prairie bush-clover (*Lespedeza leptostachya*) is located on the Minnesota Valley National Wildlife Refuge. While it is present on several prairie tracts on the refuge, it is not present in the area affected by the proposed construction of the control structure or in any of the areas being considered for tree plantings. Coordination with FWS Refuge personal would be conducted prior to initiating construction to determine if eagles are nesting within the project area. If active eagle nests are present, construction activities within ¼ mile of the nest would be timed to avoid disturbing nesting eagles.

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9.3 CULTURAL RESOURCES EFFECTS

The Corps in consultation with the Minnesota State Historic Preservation Office (SHPO) has determined the there will be no historic properties affected by construction of the proposed water control structure or the use of Field Site 1 as a dredge placement site or a planting site requiring mechanical site preparation. As the planting and site preparation methods for the other seven field sites are further defined, additional archaeological fieldwork and/or design change may be required. Any activities at those locations, which the Corps and/or the Fish and Wildlife Service determines will have the potential to affect historic properties, will need to be coordinated with the SHPO and interested Indian Tribes before those activities may proceed. The Corps of Engineers will be the lead Federal agency for the Section 106 (National Historic Preservation Act) process for this project,

9.4 SOCIOECONOMIC EFFECTS

The proposed action would have minimal or no impacts on the following socioeconomic categories: transportation, public health and safety, aesthetics, recreation opportunities, community cohesion, community growth and development, business or home relocations, land use, property values, tax revenues, regional growth, employment, business activity, food supply, navigation, flooding effects or energy resources.

9.4.1 NOISE

The immediate vicinity around the project area may be temporarily disrupted by construction activities. Some disturbance may occur from noise and human activity. These effects would be temporary and adverse effects to the general public would be short-term and insignificant.

9.5 CUMULATIVE EFFECTS

Long Meadow Lake management unit is considered to be a key component of the refuge for environmental education and wildlife interpretation programs. The proposed actions would facilitate the refuge's capabilities to meet these objectives. This may result in the earlier development of a more extensive trail system within this unit and the implementation of additional habitat management activities within the unit to provide additional opportunities for public education. The proposed features would likely serve to enhance the value of future refuge operations on the Long Meadow Lake unit.

Summary of Plan Accomplishments

10

SUMMARY OF PLAN ACCOMPLISHMENTS

The habitat benefits of the selected plan have been discussed in earlier sections of this report. In capsulated form they are as follows.

The 2-bay control structure on Long Meadow Lake would provide water level management capability on this 607-hectares (1500-acre) shallow lake. This would provide the refuge with the capability to manage water levels to optimize the growth of aquatic vegetation for the benefit of migratory waterfowl. Habitat evaluation analysis projects that this portion of the project will provide an estimated 851 AAHU of waterfowl habitat benefits.

The tree planting plan will accelerate the reforestation of approximately 18 hectares (45 acres) of farm fields. In addition, the planting plan is designed to promote reforestation with diversity of species found in the natural bottomland forest community in the Minnesota River floodplain. Habitat evaluation analysis projects that this portion of the project will provide an estimated 800 AAHU of woodland habitat benefits.

Table 10-1
Meeting Project Goals and Objectives

Goal	Project Objective	Met/Not Met	Discussion
Goal A - Maintain the Long Meadow Lake as a shallow floodplain lake/marsh to provide high quality habitat for migratory birds and aquatic wildlife.	A-1: Provide the Refuge with the capability to prevent the Minnesota River from backing into Long Meadow Lake during less than bank-full high water events.	Met	2-bay control structure.
	A-2: Provide the Refuge with the capability to discharge excessive water from Long Meadow Lake.	Met	2-bay control structure.
Goal B - Restore the site to mature bottomland forest habitat with species variety typically found under natural conditions.	B-1: Reforest 18 hectares (45 acres) on several farm fields in a manner that would accelerate the vegetation succession process as much as practicable, and promote succession to a diversity of native species that provide high quality wildlife habitat.	Met	18 hectares (45 acres) of tree planting.

Operations and Maintenance

11

OPERATION AND MAINTENANCE

11.1 GENERAL

Upon completion of construction, the U.S. Fish and Wildlife Service would accept responsibility for operation and maintenance of the Long meadow Lake project in accordance with Section 107(b) of the Water Resources Development Act of 1992. The operation and maintenance responsibilities of the U.S. Fish and Wildlife Service are addressed in the Memorandum of Agreement for the project **(Attachment 7).**

Specific operation and maintenance requirements would be defined in project operation and maintenance (O&M) manuals, which would be prepared by the Corps of Engineers, and coordinated with the U.S. Fish and Wildlife Service.

11.2 OPERATION

The feature of the project that would require operation by the U.S. Fish and Wildlife Service is the stop log control structure on the outlet culvert. It is estimated that the stop logs in this structure would have to be changed an average of twice a year. The frequency in any given year could range from 0 to 4 times. The estimated operation costs are included in table 11-1.

11.3 MAINTENANCE

Maintenance requirements would primarily center on cleaning the outlet channel of debris and woody vegetation, maintenance and repair of the control structure, and replacement of rock upstream and downstream of the structure. A breakdown of projected operation and maintenance costs is contained in **Attachment 2** and summarized in **Table 11-1**

Table 11-1
Average Annual Operation and Maintenance Costs - U.S. Fish and Wildlife Service

Feature	O&M Cycle	Average Annual Cost
a. Upstream channel dredging	20-yr	$ 2,552
b. Control Structure/concrete	20-yr	$ 357
c. Control Structure/metals	20-yr	$ 465
d. Control Structure/riprap	20-yr	$ 117
e. Control Structure/aggregate surface	20-yr	$ 21
f. Total inspections/reporting	1-yr	$ 4,575
Average annual amount		$ 8,087

Not all project features will require maintenance. **Table 11-2** categorizes project features as to the expected level of maintenance. Critical features are those that must be maintained for structural integrity or for the feature to provide the majority of the habitat benefits for which it was designed. Non-critical features are those where minor change is acceptable and the need for maintenance will be considered on a case-by-case basis. Dynamic features are those where river/lake forces will be allowed to shape the features with no future maintenance anticipated.

Table 11-2
Maintenance Categorization of Project Features

Critical – Must Be Maintained or Repaired

Major damage to rock protection

Non-Critical – Maintained or Repaired if Determined Necessary

Minor damage to rock protection

Dynamic – No Maintenance

Channels

Project Performance Evaluation

12

PROJECT PERFORMANCE EVALUATION

Project performance evaluation was designed to directly measure the degree of attainment of the project objectives. **Table 12-1** summarizes the overall monitoring approach used for UMRS-EMP habitat projects. **Table 12-2** summarizes the specific monitoring that would be conducted for the recommended features of the Long Meadow Lake project.

TABLE 12-1
UMRS-EMP Monitoring and Performance Evaluation Matrix

Type of Activity	Purpose	Responsible Agency	Implementing Agency	Funding Source	Remarks
Problem Analysis	System-wide problem definition Evaluate planning assumptions.	USGS	USGS (UMESC)	LTRM	Lead into pre-project monitoring; define desired conditions for plan formulation.
Pre-project Monitoring	Identify and define problems at specific sites.	Sponsor	Sponsor	Sponsor	Should attempt to begin defining baseline.
Baseline Monitoring	Establish baselines for performance evaluation.	Corps	Field stations or sponsors thru Cooperative Agreements, or Corps.*	HREP	Should be over several years to reconcile perturbations.
Data Collection for Design	1. Identify project objectives. 2. Design of project. 3. Develop Performance Evaluation Plan.	Corps	Corps	HREP	After fact sheet. Data may aid in defining baseline.
Construction Monitoring	Assure permit conditions met.	Corps	Corps	HREP	
Performance Evaluation Monitoring	Determine success of projects.	Corps	Field stations or sponsors thru Cooperative Agreements, sponsor thru O&M**, or Corps.*	HREP	After construction.
Analysis of Biological Responses to Projects	1. Determine critical impact levels, cause-effect relationships, and long-term losses of significant habitat.	USGS	USGS (UMESC)	LTRM	Biological Response Study tasks beyond scope of Performance Evaluation, Problem Analysis, and Trend Analysis.
	2. Demonstrate success or response of biota.	Corps	Corps/USGS (UMESC)/Others	HREP	

*Choice depends on logistics. When done by the States under a Cooperative Agreement, the role of the UMESC will be to: (1) advise and assist in assuring QA/QC consistency, (2) review and comment on reasonableness of cost estimates, and (3) be the financial manager. If a private firm or State is funded by contract, coordination with the UMESC is required to assure QA/QC consistency.

**Some limited reporting of information for some projects (e.g., waterfowl management areas) could be furnished by on-site personnel as part of O&M.

TABLE 12-2
POST-CONSTRUCTION MONITORING- LONG MEADOW LAKE

Goal	Project Objective	Enhancement Feature	Unit of Measure	Measurement Plan	Monitoring Interval	Projected Cost/Effort
Goal A - Enhance the value of Long Meadow Lake for migratory waterfowl.	A-1: Provide drawdown capability	Control Structure	Years	Monitor number of years drawdown is successfully used to manage vegetation	Annual	$
	A-2: Provide capability to raise/maintain lake levels	Control Structure	Years	Monitor number of years impoundment is successfully used to manage vegetation	Annual	$
Goal B - Restore agricultural fields to bottomland forest	B-1: Revegetate 45 acres of agricultural fields to accelerate natural succession to desired species.	Tree Plantings	Trees/acre of desired species	Count number of trees of desired species within 20 permanaent circular plots	Annually for five years, every five years thereafter	$

Cost Estimate

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COST ESTIMATE

The total project cost for the selected plan is estimated to be $492,500 as summarized in **Table 13-1.** This cost does not include prior allocations of $260,000 for general design (planning). A detailed cost estimate is contained in **Attachment 2**. The fully funded cost of the project for budgeting purposes is estimated to be $526,000.

Table 13-1
Summary of the Selected Plan and Costs*

Feature	Cost
Construction	
Demolition	$ 11,400
Clearing	$ 1,600
Upstream Channel Dredging	$ 191,200
Stop log control structure	$ 95,000
Reforestation	$ 132,600
Construction Subtotal	$ 431,800
Planning, Engineering, and Design	$ 35,700
Construction Management	$ 25,000
Total Cost	**$ 492,500**

*July 2002 price levels

Real Estate Requirements

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REAL ESTATE REQUIREMENTS

This Environmental Management Program project is located in the Minnesota Valley National Wildlife Refuge, Bloomington, Minnesota. This direct Federal project will be constructed entirely on lands owned by the United States of America. Additionally, the navigational servitude applies to any work performed within the river. The project is located on lands that are administered by the U.S. Fish and Wildlife Service and are managed by the Service as part of the Minnesota Valley National Wildlife Refuge. No additional interest in any lands will be necessary to complete this project.

Schedule for Design and Construction

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SCHEDULE FOR DESIGN AND CONSTRUCTION

A schedule for review and approval, major work tasks, and project construction is shown below. This schedule assumes the availability of funds to prepare plans and specifications and undertake construction will not be limiting.

Requirement	Scheduled Date
Submit final Definite Project Report to District Engineer	Jun 2004
DE approves project for construction	July 2004
Complete plans and specifications	Sep 2004
Advertise for bids	Oct 2004
Award initial construction contract	Nov 2004
Complete construction	Nov 2005

Implementation Responsibilities

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IMPLEMENTATION RESPONSIBILITIES

The responsibility of plan implementation and construction fall to the Corps of Engineers as the lead Federal agency. After construction of the project, project operation and maintenance would be required for features of the project as outlined in the **OPERATION AND MAINTENANCE** section of this report. The U.S. Fish and Wildlife Service would be responsible for operation and maintenance of the project upon completion.

Should rehabilitation of those portions of the Long Meadow Lake project located on the Refuge be needed, which exceeds the annual maintenance requirements (as a result of a specific storm or flood), a mutual decision between the participating agencies will be made whether or not to rehabilitate those portions of the project. If rehabilitated, the Federal share of rehabilitation would be the responsibility of the Corps of Engineers.

Performance evaluation, which includes monitoring of physical/chemical conditions and some limited biological parameters, would be a Corps of Engineers responsibility.

Attachment 7 contains a draft of the formal agreement that would be entered into by the Corps of Engineers and the U.S. Fish and Wildlife Service. The Memorandum of Agreement formally establishes the relationships between the Department of the Army, represented by the Corps of Engineers, and the U.S. Fish and Wildlife Service in constructing, operating, and maintaining the project.

Coordination, Public Views, And Comments

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COORDINATION, PUBLIC VIEWS, AND COMMENTS

The planning for the Long Meadow Lake project has been an interagency effort involving the St. Paul District, the U.S. Fish and Wildlife Service, and the Minnesota Department of Natural Resources. Interagency coordination meetings and site visits were held on a periodic basis throughout the study phase. In addition to the meetings, informal coordination took place on an as-needed basis to address specific problems, issues, and ideas.

The initial public meeting was held at the refuge Bloomington, Minnesota on 12 September 2001, to inform the public of the study and solicit input concerning fish and wildlife habitat conditions and problems within the project area. No private citizens attended the meeting **(note: the meeting was scheduled 30 days in advance. The meeting was held the day after the September 11, 2001 attacks on the World Trade Center and the Pentagon).**

A Problem Appraisal Report was completed for the project in June 2000, which addressed the existing conditions and habitat problems in the project area, identified habitat goals and objectives, and identified alternatives to be studied in detail that would address the habitat goals and objectives.

The draft Definite Project Report/Environmental Assessment was sent to Congressional interests; Federal, State and local agencies; special interest groups; interested citizens; and other as listed in attachment 8.

Conclusions

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CONCLUSIONS

The Long Meadow Lake habitat rehabilitation and enhancement project provides the opportunity to restore and improve habitat for fish, migratory birds, and other forms of fish and wildlife indigenous to the lower Minnesota River valley. Lack of water control facilities limits the ability to manage water levels in Long Meadow for the benefit of migratory birds and aquatic mammals.

A number of measures are aimed at correcting existing habitat problems and providing improved wildlife management capabilities in the Long Meadow Lake area. Providing the capability to draw down Long Meadow Lake and impound water in the lake would increase the number of years Refuge Managers will be able to optimize water levels for habitat purposes.

Planting trees on the agricultural land will provide wildlife habitat benefits both by accelerating the rate of reforestation and by promoting reforestation with the diversity of species found naturally occurring bottomland forests in this area.

Recommendation

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RECOMMENDATION

I have weighed the accomplishments to be obtained from the Long Meadow Lake project against its cost and have considered the alternatives, impacts, and scope of the proposed project. The total estimated cost of the project at current price levels is $492,500. As the project is located on national wildlife refuge lands, project costs would be 100-percent Federal in accordance with Section 906 (e) of Public Law. In my judgement, the cost of the project is a justified expenditure of Federal funds. Therefore, I recommend that the Long Meadow Lake project for habitat restoration and enhancement be approved for construction.

Robert L. Ball
Colonel, Corps of Engineers
District Engineer

BIBLIOGRAPHY

Yess, Scott. 1993. U.S. Fish and Wildlife Service. Unpublished report.

U.S. Fish and Wildlife Service. 1984. Comprehensive Plan, Minnesota Valley National Wildlife Refuge, Recreation Area and State Trail.

U.S. Fish and Wildlife Service 1982. Master Plan for the Minnesota Valley National Wildlife Refuge, Environmental Impact Statement.