Appendix D – Section 404 Certification

Appendix D

Section 404(b)(1) Evaluation

Marsh Lake Ecosystem Restoration Project
Minnesota River

Big Stone, Lac qui Parle, and Swift Counties, Minnesota

June 2011

I. PROJECT DESCRIPTION

A. Location - The proposed fill activity would take place in Marsh Lake on the Minnesota River and in the Lower Pomme de Terre River located in western Minnesota (Figures 1 and 2). Lac qui Parle and Marsh Lake Reservoirs form boundaries for Lac qui Parle, Chippewa, Swift, and Big Stone Counties.

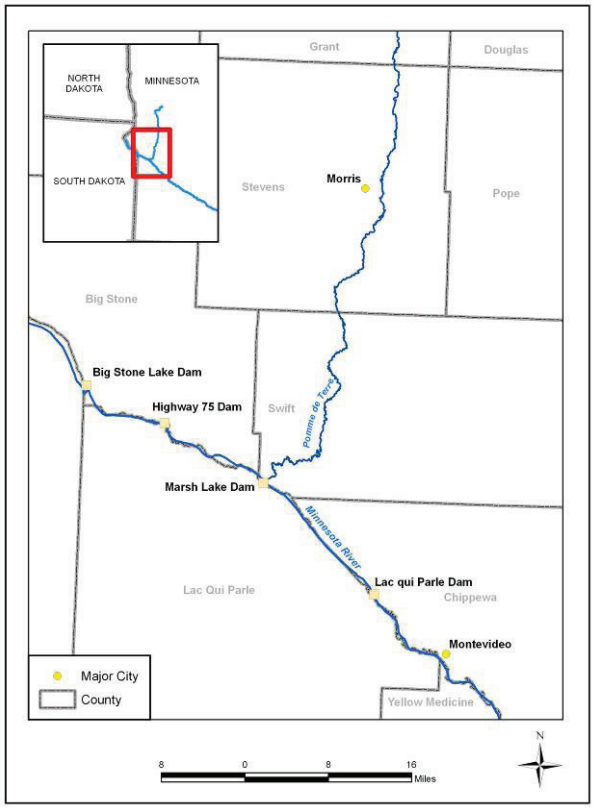

Figure 1. Marsh Lake Dam location on the Minnesota River in western Minnesota.

B. General Description - The proposed fill activities would consist of modifications to the Marsh Lake Dam to enable passive and active water level management and provide for fish passage between Lac qui Parle Lake and Marsh Lake and the Pomme de Terre River. This would include construction of a fishway in the overflow spillway and a stoplog water control structure in the embankment adjacent to the spillway (Figures 3 and 4).

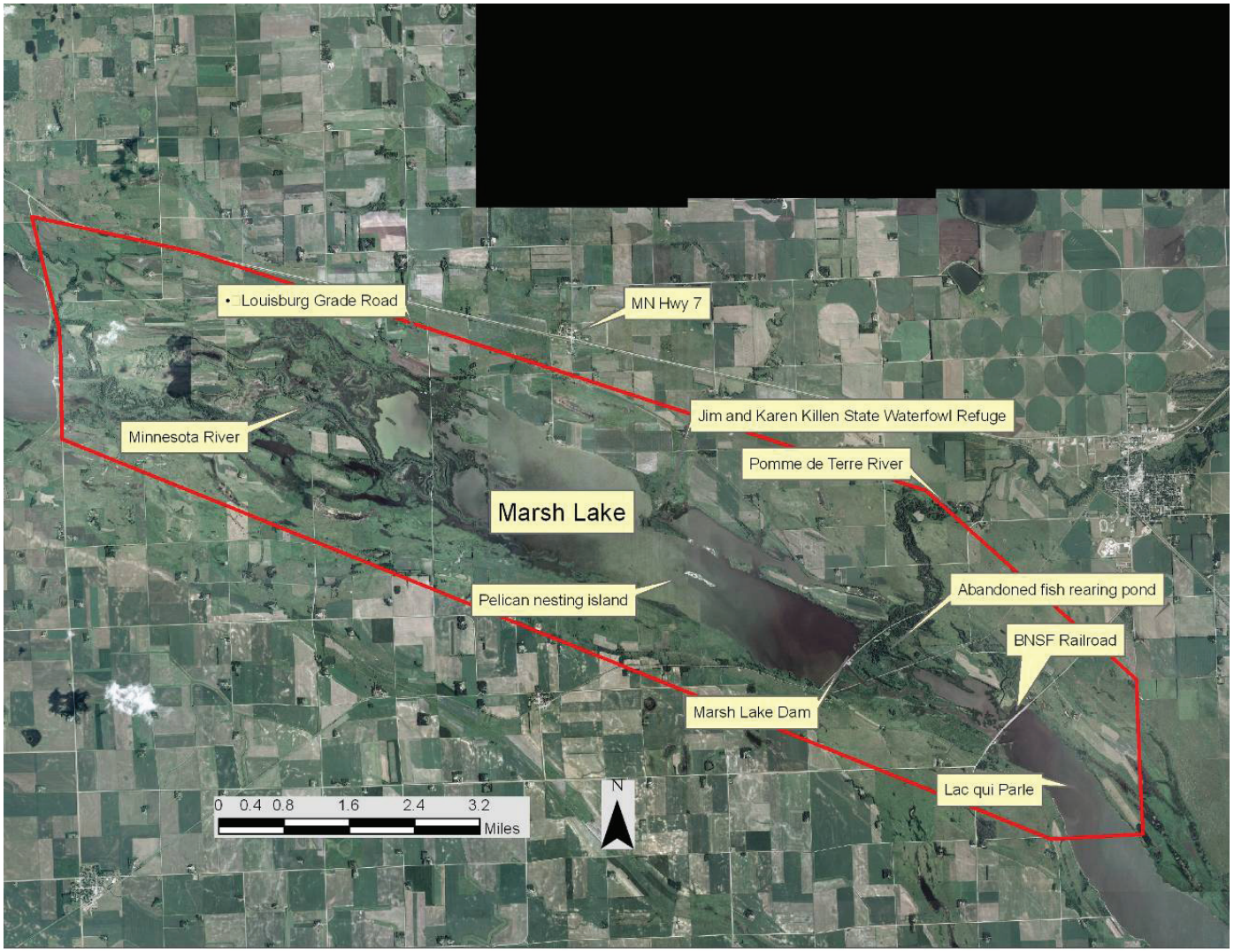

Figure 2. Marsh Lake project area boundary. Minnesota River flowing left to right. Marsh Lake Dam at right center. Pomme de Terre River entering from upper right. Farm Service Agency 2003 photo.

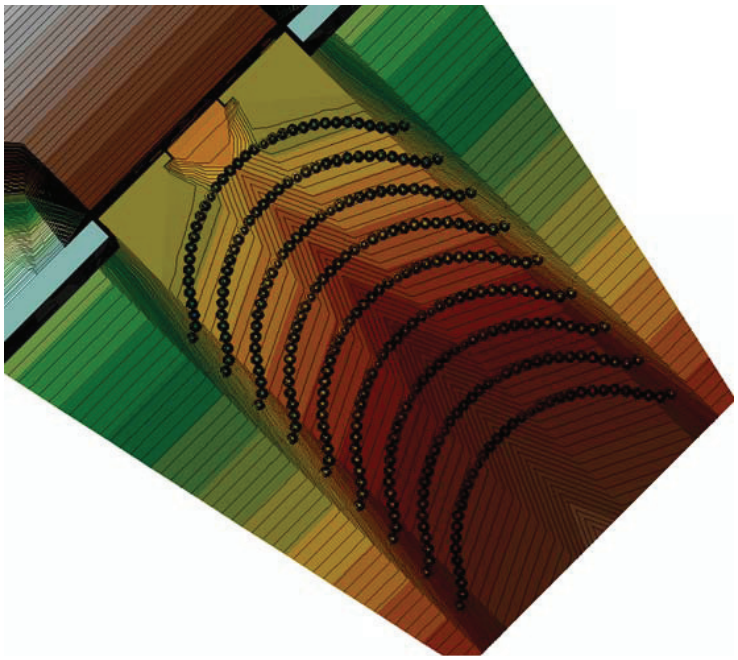

Figure 3. Conceptual design of a Marsh Lake fishway. Flow from upper left to lower right.

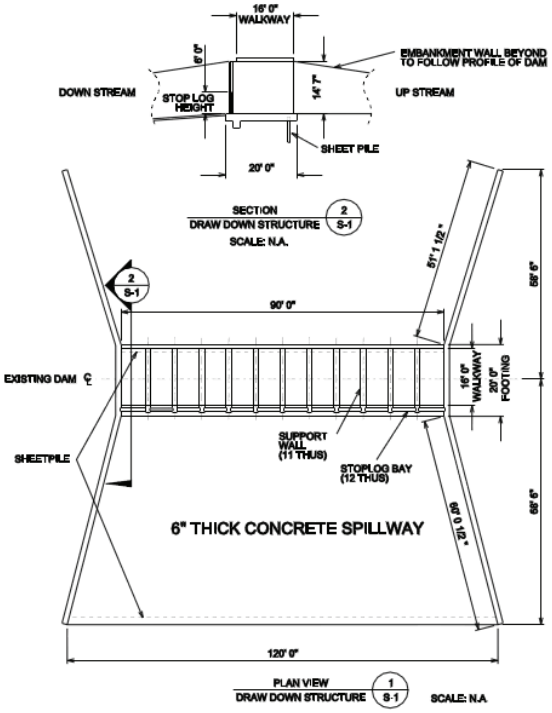

Figure 4. Conceptual design of a stop log water control structure for the Marsh Lake Dam.

Restoring the Pomme de Terre River to its former channel near its confluence with the Minnesota River would include construction of three cut-off berms and a bridge over the Pomme de Terre River to maintain access to the Marsh Lake Dam (Figure 5).

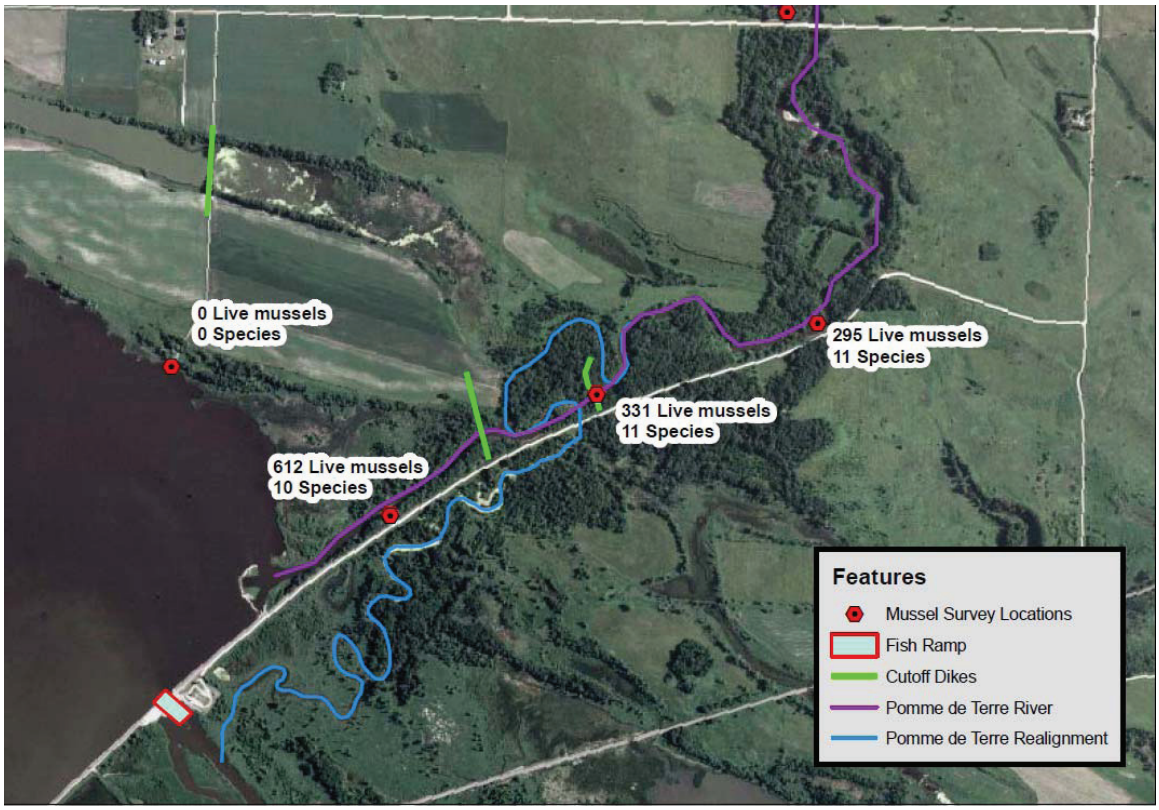

Figure 5. Pomme de Terre River existing channel (purple), realignment into former channel (blue), earthen cut-off dikes (green)

The abandoned fish rearing pond next to the Marsh Lake Dam would be reconnected with the upper end of Lac qui Parle. Breaching the fish pond dike on the downstream side of the Marsh Lake Dam would provide connectivity between the fish pond area and the upper end of Lac qui Parle, allowing native floodplain vegetation to become established and providing seasonally variable habitat for fish and shorebirds.

Installing gated culverts in the Louisburg Grade Road would enable water level management in upper Marsh Lake (Figures 6 and 7) during years when Marsh Lake is intentionally drawn down to restore aquatic vegetation.

Figure 6. Existing culverts under the Louisburg Grade Road at the upper end of Marsh Lake.

Figure 7. Location of culverts under the Louisburg Grade Road at the upper end of Marsh Lake.

Recreational and educational features would be constructed, including a trail bridge over Marsh Lake Dam to connect with the Minnesota State Trail, shore fishing access sites at six locations on Marsh Lake, canoe access on the Pomme de Terre River, and an improved recreation area at Marsh Lake Dam.

Figure 8. Example of an accessible shore fishing platform.

C. Authority and Purpose - The Marsh Lake feasibility study was authorized by a Resolution of the Committee on Public Works of the U.S. House of Representatives, May 10, 1962. The resolution reads as follows:

> "Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the report of the Chief of Engineers on the Minnesota River, Minnesota, published as House Document 230, 74th Congress, First Session and other pertinent reports, with a view to determining the advisability of further improvements in the Minnesota River Basin for navigation, flood control, recreation, low flow augmentation, and other related water and land resources."

The purpose of this document is to comply with Section 404(b)(1) of the Clean Water Act pertaining to guidelines for placement of dredged or fill material into the waters of the United States. This evaluation also provides information and data to the Minnesota Pollution Control Agency demonstrating compliance with State water quality standards for the decision-making process about State 401 water quality certification.

D. Description of Dredged or Fill Material

Project Features Including Dredged or Fill Material

Modifications to the Marsh Lake Dam would include modifying the fixed crest spillway by constructing a fishway and construction of a gated stoplog structure. 1900 tons of large (1.6 ft diameter and larger boulders for weirs) rock would be used in the fishway channel. Riprap and bedding (10,000 tons) would be used to armor the fishway channel tying in to the existing

embankment and in the downstream scour hole. The gated stoplog structure would also be armored with riprap and bedding (16,144 tons) tying in to the existing embankment and in the tailwater connecting to the Minnesota River. The embankments on the sides and downstream of the fishway and stoplog structure would be constructed with 23,350 cy of impervious fill. Material excavated from the work area for the fishway and stoplog structure would be transported to an upland placement site.

Restoring the Pomme de Terre River to its former channel would involve constructing two new sections of embankment to separate the Marsh Lake pool from the re-routed section of the Pomme de Terre River (left two green lines in Figure 5 above). The new embankments would be constructed to an elevation equal to spillway design flow elevation plus 5 feet of freeboard, or an elevation of 952.1 ft. Rock riprap against wave action would be necessary for the lake side of the new embankments. Rock riprap would be placed to a top elevation equal to rock riprap on the existing embankment (942.0 ft). A diversion plug is needed to divert the Pomme de Terre River into its historic channel in the area upstream of Marsh Lake Dam (right green line in Figure 5 above). Impervious clay fill material for the new embankments and diversion plug (31,596 cy) would be borrowed from a nearby upland site (Figure 9).

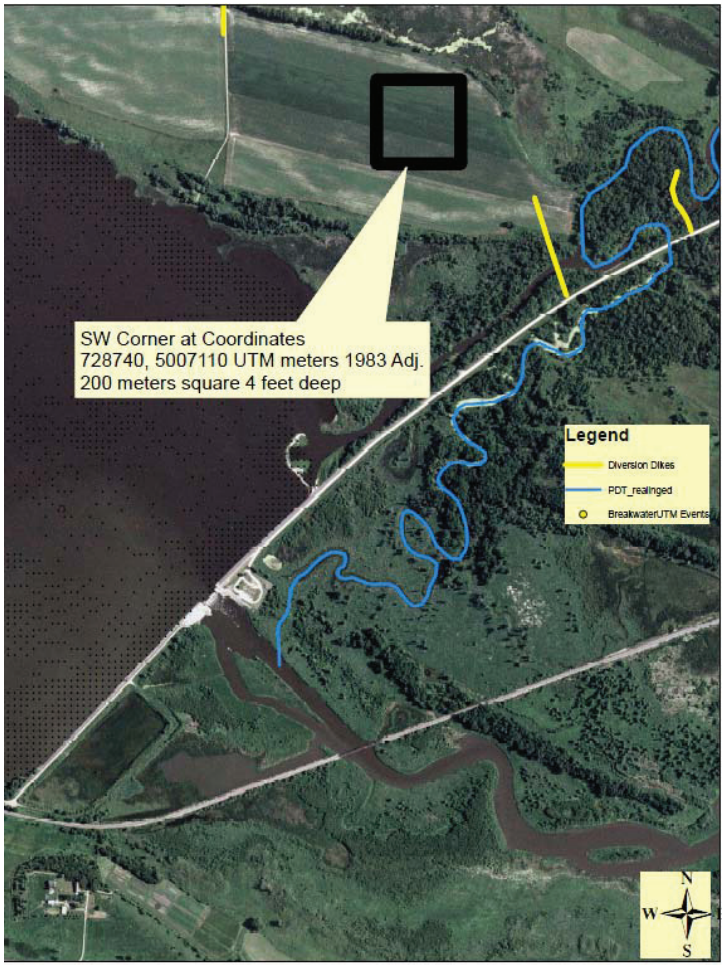

Figure 10. Borrow location for material to construct new embankments and diversion plug for re-routing the Pomme de Terre River to its former channel.

A five-span concrete bridge 450 ft long would be constructed over the Pomme de Terre River where it is re-routed through the Marsh Lake Dam embankment. The bridge piers would contain 90 cubic yards (cy) of concrete and footings, of which approximately one half would be in the water.

In-channel erosion control structures would be necessary to prevent head-cutting in the Pomme de Terre River channel that could threaten the Marsh Lake embankment and new bridge. Four erosion control structures (Figure 11) would be constructed near the mouth of the Pomme de Terre River and the highest located slightly upstream of the re-routed reach. Fill for these structures would be approximately 2000 cy of granite rock from local quarries. The rock would not be obtained by mining native prairie areas.

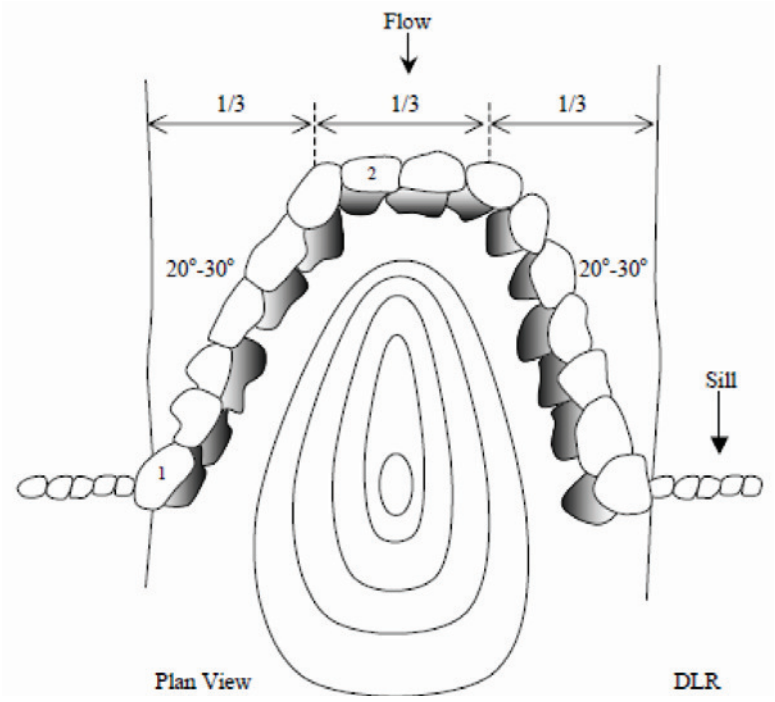

Figure 11. Rock erosion control structures to be constructed in the re-routed Pomme de Terre River Channel.

The abandoned fish rearing pond dike would be breached by removing 650 cy of fill and transporting it to an upland site.

The seven existing culverts under the Louisburg Grade Road would be removed and replaced with gated culverts. Approximately 210 cy of granite rock approximately 1 ft in diameter would be obtained from local quarries to armor the upstream and downstream ends of the culverts.

Shore fishing sites at six locations around Marsh Lake would be constructed. Two of the sites would be handicapped-accessible and constructed with pre-cast 8 ft x 8 ft concrete box culverts (Figure 9 above). The other recreational fishing shoreline accesses would be constructed with 4 ft x 8 ft slabs of locally quarried granite rock.

E. Description of the Proposed Discharge Sites

The fishway and stoplog control structure would be constructed in the Marsh Lake Dam at the existing fixed crest spillway. This construction activity would affect a 5.0 acre area of the existing dam and Minnesota River tailwater. Modifications to the Marsh Lake Dam would also alter 1.1 acres of Marsh Lake with excavation to deepen the approach to the fishway, scour of the lake bed in the approach to the stop log structure, and placement of new riprap to protect the structures. The existing aquatic habitat near the Marsh Lake Dam was altered by construction and operation of the dam. The lake bed material is sandy with scattered boulders and riprap along the lake side of the dam.

Based on the construction drawings, the new east embankment for restoring the Pomme de Terre River to its former channel would cover 1.3 acres of floodplain and river channel area. The Pomme de Terre River floodplain has scattered green ash, black willow and cottonwood trees with reed canary grass in the lower areas. The Pomme de Terre River channel is sandy with patches of gravel.

The cut-off dike for re-routing the Pomme de Terre River would cross the Pomme de Terre River floodplain and channel. Based on the construction drawings, the cut-off dike would have a footprint of 0.96 acres.

Replacing the existing culverts under the Louisburg Grade Road with new gated culverts would not change the footprint of the structures. New 1 ft diameter rock riprap would be placed to armor the upstream and downstream ends of the culverts. The area of this fill would total approximately 2800 square feet, or 0.06 acres.

Breaching the dike on the abandoned fish pond would not involve placing fill. Material excavated from the breach area would be removed and placed on an upland site.

Installation of shoreline fishing access structures would affect small areas approximately 20 x 20 ft in the immediate vicinity of the six new structures. The shoreline fishing structures would be located on the shoreline of Marsh Lake adjacent to deeper water suitable for fishing. Most of these structures would be along the already riprapped Marsh Lake Dam.

F. Timing and Duration

Subject to approval and funding, construction could begin in the year 2013. Construction for this project would take 1 to 2 years, depending on when construction is initiated. The culverts on Louisburg Grade Road, the fishway, the fish pond notch, the recreation features and the road raise can be constructed any time during the open water season when water levels allow. The order of construction the diversion dikes and bridge over the Pomme de Terre River along Marsh Lake Dam is important. The bridge should be done first. Then either of the diversion dikes can be constructed next. The cutoff dike that forces the water of the Pomme de Terre River to flow through the bridge needs to be constructed out of impervious fill and needs to be compacted to be stable.

G. Description of the Proposed Borrow Site

The 9.88 acre borrow site is in an agricultural field on the Lac qui Parle Wildlife Management area near the north end of the Marsh Lake Dam (figure 10). Rock would be obtained from local quarries.

H. Description of Material Placement Method

The material would be moved and placed mechanically.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations

Substrate Elevation and Slope - The average annual water level on Marsh Lake is 938.3 ft. The bed of Marsh Lake in the vicinity of the proposed modifications to Marsh Lake Dam is fairly flat and approximately 935.2 ft . The sill elevation of the stop log water control structure would be set at 935.0 ft to enable drawdown of most of the lake. At this sill elevation, no approach channel dredging would be required. Some scour of the lake bed would be expected near the dam when the stop logs are removed.

As the historic Pomme de Terre River channel was originally formed by the geomorphic conditions of the river and its watershed, it is expected that the channel plan form dimensions would result in a stable natural channel once the fine sediments that have accumulated in the former channel are washed out. The reconnection of the Pomme de Terre to its historic channel would require some excavation of material that now blocks this flow path, particularly through the existing embankment and near the mouth where it would meet the Minnesota River. It would also require that fill be placed in two channelized reaches of the current flow path. Some erosion control structures would also be necessary to prevent head cutting. However, the general philosophy would be to connect the river to its original flow path and allow natural processes to form to channel.

Cross section surveys of the Pomme de Terre below Appleton, MN indicate that the average bank full width of channel is approximately 90-110 feet. This width was verified with aerial photos. Steady flow modeling of the Pomme de Terre River with a bankfull discharge (850 cfs) shows that hydraulic depth varies from 3-5 feet in the reach between Appleton and the mouth. An average depth of 4 feet is therefore considered the typical depth for the Pomme de Terre River at bank full flow in the project reach. Based on the stream slope upstream of the project area, a typical slope of 0.0005 ft/ft is considered representative of the reach to be restored.

Sediment Type - Sediment in Marsh Lake is sandy silt. Sediment in the Pomme de Terre River is sandy gravel. Sediment in the former channel of the Pomme de Terre River is approximately six inches of silt and organic matter overlying the former sand and gravel of the river bed.

Dredged/Fill Material Movement – The embankments and cut-off dike to re-route the Pomme de Terre River are designed with riprap armoring to limit erosion by wave action and river current.

B. Water Circulation, Fluctuation, and Salinity Determinations

Water Salinity – Water in the project area has naturally high total dissolved solids, influenced by calcium sulfate in the soils. The fill activities would not affect salinity.

Water Chemistry - The use of clean fill material and mechanical placement would preclude any significant impacts on water chemistry.

Water Clarity - Minor, short-term reductions in water clarity are expected from sediment resuspension associated with the proposed fill activities. Long term, the project is expected to increase water clarity in Marsh Lake.

Water Color - The proposed fill activities should have no impact on water color.

Water Odor – Dense summer blue green algae blooms and windrows of scenescent algae on Marsh Lake produce foul odors and toxicity. The project should reduce foul odors in the summer due to algae blooms.

Water Taste – Marsh Lake and the Pomme de Terre River are not used for water supply.

Dissolved Gas Levels – Modification of the Marsh Lake Dam would allow winter drawdown, intentionally inducing hypoxia (low dissolved oxygen concentration) to kill carp. The project would not otherwise have any effect on dissolved oxygen concentrations.

Nutrients - The proposed fill activities should have no impact on nutrient (nitrogen and phosphorus) concentrations in the water.

Eutrophication - The proposed modifications to Marsh Lake Dam and rerouting the Pomme de Terre River would reduce nutrient loading to Marsh Lake, encourage the growth of aquatic vegetation and reduce the density and duration of blue-green algae blooms.

Temperature - The proposed fill activities would have no impact on water temperature.

Current Patterns and Water Circulation - Re-routing the Pomme de Terre River to its former channel would change the pattern of Pomme de Terre River flow. The river was channelized to enter Marsh Lake above the Marsh Lake Dam when the project was first constructed.

Current Velocity – Modifying the Marsh Lake Dam fixed crest spillway with a fishway would provide a variety of current velocities that would enable upstream fish passage and eliminate the public safety hazard of the hydraulic backroller below the existing spillway.

Restoring the Pomme de Terre River to its former channel would restore a more natural pattern of current velocity in the river.

Stratification – Because Marsh Lake is shallow and thoroughly wind-mixed, the lake does not stratify.

Hydrologic Regime - The proposed fill activities would have no impact on the hydrologic regime of inflows to the project area.

Water Level Fluctuations - Re-routing the Pomme de Terre River to its former channel would change the pattern of Pomme de Terre River flow. The river was channelized to enter Marsh Lake above the Marsh Lake Dam when the project was first constructed. The combined project features would alter the water level regime in Marsh Lake. The overall effect would be increased water level variability, minimal changes during flood events, and occasional managed water level drawdowns.

Salinity Gradient – The project area is not in a coastal estuary.

Actions Taken to Minimize Impact - Standard construction procedures in compliance with Federal and State requirements would be used. The material would be placed mechanically. Silt barriers would be deployed during construction to limit mobilization and transport of sediment in the Pomme de Terre River. Mussels in the Pomme de Terre River have been quantitatively surveyed and recolonization of mussels in the restored channel would be monitored (see Section 4.1.4 in the Feasibility Report).

C. Suspended Particulate/Turbidity Determination - Some temporary and localized increases in suspended sediment would result from construction of the project features.

Restoring the Pomme de Terre River to its former channel would reduce sediment loading to Marsh Lake by about half and improve conditions for growth of submersed aquatic plants. Pomme de Terre River flow at higher levels of river discharge would spread overbank into the vegetated floodplain before reaching the Minnesota River, removing sediment and nutrients before flowing into Lac qui Parle.

Modification of Marsh Lake Dam and restoring a more natural stage hydrograph would allow emergent and submersed aquatic vegetation to expand in Marsh Lake. The vegetation would reduce sediment resuspension and trap suspended sediment resulting in increased water clarity. Winter drawdowns would limit the abundance of common carp that resuspend bottom sediment.

D. Flood Profiles - The changes to large flood levels on Marsh Lake from the proposed project were evaluated with two methods (see Appendix H Hydraulics and Hydrology):

1) For water level simulations over 20 years (1983 – 2003), results for the two largest flood events (1997 & 2001) with & without project features were compared and,

2) Estimated 100 year flood hydrographs for with and without project conditions were routed through the reservoir.

Simulated with project water levels were on the order of 1.5 foot lower than modeled existing conditions for the 1997 & 2001 flood events. This is primarily attributed to reduced inflows to Marsh Lake due to the altered Pomme De Terre flow path.

Marsh Lake is expected to experience lower peak flood elevations due to the project as designed in this feasibility study. Note that the current 100-year Pool Elevation on Marsh Lake

of 947.4 feet is above the maximum pool elevation and is not relied upon for flood control downstream.

E. Effects on Chemical and Physical Properties of the Water Column - No effects are expected on light penetration, dissolved oxygen, toxic metals and organisms, pathogens, or the aesthetics of the water column after the project is in place.

F. Aquatic Ecosystem and Organism Determinations:

Effects on Plankton and Fish

Construction of the project features would result in temporary and localized increases in suspended solids that are not expected to adversely affect plankton or fish. Silt curtains will be used where practicable to limit sediment resuspension during construction.

The project is expected to increase water clarity in Marsh Lake, resulting in increased extent and abundance of submersed aquatic plants. Increased water clarity and aquatic plants would improve habitat conditions for native fish, zooplankton and macroinvertebrates.

Modifying the Marsh Lake Dam with a stop log water control structure would allow drawdowns that would reduce the abundance of common carp and favor native fish species.

Restoring the Pomme de Terre River to its former channel would provide fish from Lac qui Parle access to the river for spawning. Construction of a fishway in Marsh Lake Dam would allow northern pike access to high quality spawning habitat in upper Marsh Lake.

Effects on Benthos

Construction of the new embankment to re-route the Pomme de Terre River would bury macroinvertebrates including native mussels and fingernail clams in the Pomme de Terre River (see Section 4.1.4 in the Feasibility Report/EA) where the new embankment crosses the channel. This would affect a 0.18- acre area of river bed. In addition, mussels in the lower reach of the channelized Pomme de Terre River below the new embankment would no longer be in a flowing river and would probably die.

Benthos, primarily chironomid and ceratopogonid midge larvae living in the silt substrate in the former Pomme de Terre River would washed away when the river is diverted back into its former channel. The former channel area would scour down to the historic sand/gravel substrate and would rapidly recolonize with benthic macroinvertebrates from upstream. Native mussels are expected to recolonize the restored river channel.

Effects on Wildlife

The proposed project is expected to increase water clarity in Marsh Lake, resulting in increased extent and abundance of submersed aquatic plants. Increased water clarity and aquatic plants would improve habitat conditions for native fish, muskrats, mink, fish-eating birds like

pelicans, herons and egrets, and breeding waterfowl. One of the primary benefits of the project would be increased food (sago pondweed tubers) for fall-migrating waterfowl.

Effects on Aquatic Food Web

The project features in combination and associated management of Marsh Lake water levels are intended to change the ecosystem state of Marsh Lake from a turbid shallow lake with sparse vegetation to a clearer water vegetated condition.

Effects on Special Aquatic Sites

Sanctuaries and Refuges

The project area is within the Lac qui Parle Wildlife Management Area owned and managed by the Minnesota DNR. Parts of Marsh Lake serve as a refuge for migrating waterflowl in the fall. The DNR is the project cost-share partner for this project.

Wetlands, Mud Flats and Vegetated Shallows

Marsh Lake is a shallow lake with an extensive littoral zone. All of Marsh Lake is a wetland area. The project would allow for water level management on Marsh Lake to restore emergent and submersed aquatic vegetation, consolidate sediment, reduce sediment resuspension and reduce abundance of carp. There would be extensive mud flat areas in Marsh Lake in years when it would be drawn down to restore emergent aquatic vegetation. The mud flats would provide excellent habitat for shorebirds.

The Pomme de Terre River floodplain that would be affected by the new embankment and cut-off berm to restore the river to its former channel is also a wetland area.

Natural Floodplain Areas

Restoring the Pomme de Terre River to its former channel would restore floodplain processes in the floodplain at the confluence with the Minnesota River.

Effects on Threatened and Endangered Species

As discussed in the Feasibility Report and EA, no federally-listed threatened or endangered species occur in the project area. The USFWS concurred with this conclusion during the coordination process (Appendix C).

Re-routing the Pomme de Terre River would result in temporary adverse impacts on state-listed mussel species. Native mussels in the Pomme de Terre River are expected to re-colonize the restored river channel and result in a net gain in the abundance and spatial extent of native mussels in the river over time.

G. Contaminant Determinations - The fill material would be clean impervious fill from an upland site and rock and that would not introduce contaminants. Neither the material nor its placement would cause relocation or increases of contaminants in the water.

H. Proposed Disposal Sites Determinations

Mixing Zone Determination - The proposed fill activities would have minimal mixing zones for resuspended sediment. The mixing zones would be small and would not constitute a significant problem because of the nature of the fill material and its placement by mechanical means.

Determination of Compliance with Applicable Water Quality Standards - The nature of the fill material and the type of construction should avoid violation of State water quality standards. The long-term effects of the project would be to increase compliance with state water quality standards in Marsh Lake.

I. Potential Effects on Human Use Characteristics - Because of the present and projected human use characteristics, the existing physical conditions, the proposed construction methods, and the nature of the fill material, this proposed action would have no adverse effects on human use characteristics. The project would improve conditions in the Marsh Lake ecosystem for human uses like hunting, fishing, and wildlife viewing.

J. Determination of Cumulative Effects on the Aquatic Ecosystem - Implementation of the proposed actions would have positive effects of restoring the Marsh Lake and lower Pomme de Terre River aquatic ecosystems.

K. Determination of Secondary Effects on the Aquatic Ecosystem – Secondary effects of the project on the aquatic ecosystem would include increased abundance of emergent and submersed aquatic plants, reduced abundance of common carp, clearer water in Marsh Lake, increased populations of native fish, increased use by breeding waterfowl and migrating waterfowl, and increased recreational use of the area.

III. FINDING OF COMPLIANCE WITH RESTRICTIONS ON DISCHARGE

1. The proposed fill activity would comply with Section 404(b)(1) guidelines of the Clean Water Act of 1972, as amended. No significant adaptations of the guidelines were made for this evaluation. As discussed in the Feasibility Report and Environmental Assessment, the placement of fill for the proposed project is required to achieve the project purpose, which is to benefit the aquatic ecosystem. Therefore, none of the alternatives is environmentally damaging to the aquatic ecosystem.

2. The proposed fill activities would comply with all State water quality standards, Section 307 of the Clean Water Act of 1972, as amended, and the Endangered Species Act of 1973, as amended. The proposed fill activity would not have significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity, and stability and on recreational, aesthetic, and economic values would not occur.

3. Certification under Section 401 of the Clean Water Act would be obtained from Minnesota prior to implementation.

4. The project would not introduce hazardous or toxic substances into the waters of the United States or result in appreciable increases in existing levels of toxic materials.

5. The project would have no impact on federally listed threatened or endangered species. Re-routing the Pomme de Terre River would result in temporary adverse impacts on state-listed mussel species. Native mussels in the Pomme de Terre River are expected to re-colonize the restored river channel and result in a net gain in the abundance and spatial extent of native mussels in the river over time.

6. No municipal or private water supplies would be affected. The project would have no significant adverse impacts on recreational or commercial fishing. The effect of this project on human uses of the Marsh Lake ecosystem would be positive.

7. No contamination of the Minnesota or Pomme de Terre Rivers is anticipated. The proposed actions would cause only minimal adverse environmental effects during construction and would have positive cumulative effects on the environment.

8. On the basis of this evaluation, I conclude that the proposed discharges would comply with the Section 404(b)(1) Guidelines for the discharge of dredged or fill material.

15 July 2011
Date

Michael J. Price
Colonel, Corps of Engineers
District Engineer