WATERSHED PLAN
AND
ENVIRONMENTAL ASSESSMENT

UPPER PELICAN RIVER WATERSHED

BECKER COUNTY, MINNESOTA
March 2007

United States Department of Agriculture
Natural Resources Conservation Service

ABSTRACT

WATERSHED PLAN – ENVIRONMENTAL ASSESSMENT (EA)
UPPER PELICAN RIVER WATERSHED, MINNESOTA
BECKER COUNTY
MARCH 2007

This document describes a plan that includes the restoration of the Rice Lake Wetland complex and land treatment along Campbell Creek. Implementation of the plan would reduce the amount of sedimentation in the lakes. The restoration of Rice Lake Wetland complex would restore the hydrology to the drained areas and is expected to reduce the amount of phosphorus loading to the lakes downstream.

Alternative measures considered during planning included various systems of structural and nonstructural measures. Total installation, operation, maintenance, and replacement costs for this project are estimated at$2,326,670, or an average annual cost of $114,470. The total project benefits are estimated to be $2,650,000, or an average annual benefit of $136,700[1].

Prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566 as amended (16 USC 1001-1008) and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 est seq).

Prepared by:
Pelican River Watershed District (Sponsor)
City of Detroit Lakes (Sponsor)
Becker County Soil and Water District (Sponsor)
U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)

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[1] Project benefits and costs are presented as the present value of all costs and benefits over the life of the project, which was designed for 100 years. Values are in 2006 dollars and calculated using a discount rate of 5.125%.

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Upper Pelican River Watershed, Minnesota

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WATERSHED PLAN SUMMARY

Sponsors: Pelican River Watershed District, City of Detroit Lakes, and Becker County Soil and Water Conservation District.

Description of Recommended Plan: The plan includes the restoration of Rice Lake Wetland complex, installation of a sediment basin(s) and accelerated application of conservation land treatment measures to reduce sedimentation, to improve water quality and to improve wetland wildlife and waterfowl habitat.

Resource Information:

Size of watershed (acres)	46,110

Land Cover:

Wetlands (acres)	13,250
Water - ditch, stream and river channels and lakes (acres)	1, 834
Cropland (acres)	14,042
Deciduous Forest (acres)	9,658
Developed (acres)	4,080
Miscellaneous (acres)	3,245

Landownership:

Private (percent)	80
State-Local (percent)	20
Federal (percent)	<1

Farm Statistics:	**County (2002)**	**Watershed**
Number of Farms	1,254	75
Average farm size (acres)	332	200
Number of minority farmers	32	3

Project Beneficiary Profile: Becker County is home to 30,000 people, 7,000 of which reside in the City of Detroit Lakes (Table 3). From 1990 to 2000 the population of Detroit Lakes increased by 11%, outpacing Becker County by 3%. Approximately one quarter of Detroit Lake's residents 25 years and older has a Bachelors degree or higher, compared to 17% for Becker County. The median household income for Detroit Lakes is $35,200, sixteen percent lower than Becker County, $41,900.

Wetlands: The U.S. Fish and Wildlife, National Wetlands Inventory (NWI), identifies approximately 13,250 acres of Types 1 –7 wetlands within the entire watershed, *Wetland*

Codes and Definitions[2], (Figure 1). However, the predominant wetlands occurring within the watershed project boundaries are as follow:

> Type 2 – Wet Meadow (PEMB) with soil saturated within at least a few inches of the surface during most of the growing season with vegetation consisting of grasses, sedges, rushes, and various broad-leaved plants.
>
> Type 3 – Shallow Marsh (PEMC) with soil often covered with 6 inches or more of water during the growing season with wetland vegetation comprised of reed canarygrass, bulrush, spikerush, cattail, arrowhead, pickerelweed, and smartweed.
>
> Type 4 – Deep Marsh (PEMG & PUBFd) with soil inundated with 6 inches to 3 feet or more of water during the growing season with wetland vegetation comprised of cattail, reed, bulrush, spikerush, and wild rice.
>
> Type 5 – Shallow Open Water (PUBG) with soil inundated and usually covered with less that 10-foot-deep water. Fringe of emergent vegetation similar to open areas of Type 4 above.

Two MN DNR Wildlife Management Areas (WMA) occur within the proposed project area: the Frank WMA (339 ac), and the Stenseth WMA (27 ac). The Frank WMA is entirely within the proposed project area and is predominantly a Type 4 and Type 5 – Deep Marsh (PEMFd) /Shallow Open Water (PUBG) semi-permanently flooded wetland called the "Rice Creek Bottoms", a mostly closed marsh dominated by sedges, cattails, and reed canarygrass. The Stenseth WMA is a Type 2 – (PEMB) Wet Meadow which is primarily a sedge meadow wetland consisting of reed canarygrass, sedges and broad-leaved plants.

Highly Erodible Soils: Determinations for highly erodible soil are based on an erodibility index as defined in the National Food Security Act Manual. There are 730 acres of highly erodible soils on cropland within the watershed boundary.

Threatened and Endangered Species: There are no federally listed *endangered* species occurring in Becker County. The Gray Wolf and the Bald Eagle are federally listed *threatened* species occurring in Becker County. Within the UPRW boundaries proper, the Bald Eagle is a state listed *Species of Special Concern* (*spc*), and the Trumpeter Swan is a state listed *threatened* species. Within the rest of Becker County, there are one *endangered* and six *threatened* state listed plant species, as well as 13 animal and 13 plant state listed *spc* species occurring within Becker County. The Pugnose Shiner a state *spc* is listed as occurring within the UPRW boundaries. Appendix C, table 12C gives a complete federal and state listing of all plant and animal species by common and scientific names which currently occur in Becker County.

[2] http://www.fws.gov/nwi/mapcodes.htm

Cultural Resources: Based on a file search at the Minnesota State Historic Preservation Office there are no previously recorded archaeological sites or sites eligible for listing on the National Register of Historic Places in the project area. There are several properties listed on the National Register located in the city of Detroit Lakes, 1-2 miles south of the project area. There are no historic structures or buildings on any state registers that are in the project area. The Woods trail, the easternmost Red River ox cart trail purportedly runs through the city of Detroit Lakes and then cuts northward to within 1 mile west of the project area. This collection of trails used primarily from 1820-1870, opened up and carried an international trade in furs and merchandise between the burgeoning commercial center of St. Paul in the south and the colony that grew into modern Winnipeg in Canada to the north (Gilman et al., 1979). Any archaeological residues that may be related to the trails and the fur trade would hopefully be identified during field investigations.

The lack of cultural resources, at least prehistoric sites, is more than likely due to the fact that the area has not been formally surveyed. Archaeological sites would be expected on upland formations adjacent to wetland areas or overlooking streams and lakes.

Federally recognized tribes in Minnesota that will be consulted regarding this project include:

Fond du Lac Lake Superior Band of Chippewa Indians
Bois Forte (Nett Lake) Lake Superior Band of Chippewa Indians
Grand Portage Band of Lake Superior Chippewa
Leech Lake Band of Ojibwe
Mille Lacs Band of Ojibwe Indians
Red Lake Band of Minnesota Chippewa
Lower Sioux (Mdewakanton Sioux) Indian Community of Minnesota
Upper Sioux Indian Community of Minnesota
Prairie Island Indian Community
Shakopee Mdewakanton Sioux

According to the Native American Consultation Database (NACD) there are no federally recognized Indian tribes, residing out-of-state, who have land claims in Becker County, Minnesota.

Problem Identification: The problems in the watershed involve degraded water quality due to excess nutrient and sediment loadings to Floyd Lakes (North Floyd, Big Floyd, Little Floyd), and Detroit Lakes (Little Detroit, Big Detroit and Curfman).

Alternative Plans Considered: The formulation process concluded with the development of four alternative plans:

Plan 1 – No Action;
Plan 2 – Chemical Treatment;

Plan 3 – Rice Lake Wetland Restoration;
Plan 4 – Rice Lake Wetland Restoration and land treatment along Campbell Creek. (Recommended Plan)

Project Purpose: Water Quality Management**.** To improve water quality in Floyd Lakes and Detroit Lakes with overall water quality benefits to the other downstream lakes while improving the wetland wildlife and waterfowl habitat especially within the Rice Lake Wetland complex.

Project Cost:

Table 1 – Installation Cost (Price Base 2006)[3]

	Installation Costs				
Item	Construction	Engineering	Land Rights	Project Admin	Total
Rice Lake Wetland Complex	$ 567,300	$ 113,500	$ 562,800	$ 169,500	$ 1,413,100
Campbell Creek	$ 583,900	$ 116,800	$ 4,000	$ 88,200	$ 792,900
Totals	$ 1,151,200	$ 230,300	$ 566,800	$ 257,700	$ 2,206,000

Project Benefits: Implementation of the project would reduce the phosphorus loading to the lakes while improving the wetland wildlife and waterfowl habitat within the Upper Pelican River Watershed. The water quality within the lakes would meet or exceed the Minnesota Pollution Control Agency's (MPCA) goals for the watershed. The improved wetland wildlife and waterfowl habitat and water quality would maintain and possibly improve future recreational opportunities for local residents and visitors.

To estimate project benefits, conditions with and without the project are established and compared. Future without project conditions are increased in-lake phosphorus levels leading to reduced water quality and recreation opportunities. The value of these lost days is part of the total project benefits. Under the most likely future conditions without project, the average annual recreational benefits of the project are $126,200

In addition to the recreational benefits resulting from the project, there are also benefits that would be realized by the waterfront property owners. If water quality were to decline without the project, the value of these houses would also decline. The project impact of maintaining water quality will thus maintain property values. Using information obtained from the Becker County tax assessors office, data on predicted phosphorus levels, and estimated values of changes in water quality on housing values, these benefits were estimated. Comparing the value of waterfront homes under the

[3] Does not include $6,546/year operation, maintenance, and replacement costs (O&M&R).

current conditions with those predicted under the future without project degraded conditions, the estimated value of maintaining water quality to these homeowners totaled $2,600,000, or an average annual value of $11,100.

Combining the recreational and housing values, the present value of total project benefits is $2.66 million, or an average annual value of $137,300. Details on how the recreation and housing benefits were calculated can be found in appendix C. Also, due to risk and uncertainty associated with the future without project conditions, a sensitivity analysis of these benefits was completed and can be found in the risk and uncertainty section of the plan.

Environmental Values Changed or Lost: Approximately 6.48 acres of wetlands would be permanently impacted by project construction involving earthen excavation and fill activities to build the Rice Lake Wetland structures and to improve anchor road (Table 2). All wetlands impacted by the project construction activities listed in Table 2 would be mitigated in compliance with NEPA and the Minnesota Wetland Conservation Act (WCA). Mitigation of all impacted wetlands would comply with all federal state and local permit guidelines issued for the project[4].

Field determinations of all wetlands within the effected project area will need to be conducted at a later date prior to construction.

Table 2 - Wetland Loss by Measure

Measure	NWI WetlandSymbol/Types	Size (ac)
Campbell Creek Sediment Basin(s)	PFO1C - Type 7	1.0
Anchor Road Parking Lot	PSSI/PEMCd - Type 6	0.04
Improved Anchor Road	PSSI/PEMCd - Type 6	0.52
Rice Lake Wetland Structure	No Wetlands Impacted	N/A
Lower Rice Structure	PEMCd/PFO1Cd1Cd - Type 3/7	1.62
Access Road Rice Lake Wetland Structure	PEMCd/PEM1A/PSS1Cd - Types 3/6	0.30
Access Road Lower Rice Lake Structure	PFO1Cd - Type 7	0.13
Ditch Plug North	PEM/SS1Cd/PSS1Cd - Types 3/6	0.01
Ditch Plug South	PEMCd/PEMFd - Types 3/6	0.01
Spoil Bank Leveling	PEMCd/PEMFd/PF01Cd/PSS1Cd -Types 3/6	2.85
	Total Impacted Wetlands	**6.48**

Within the Rice Lake Wetland Complex, the project would increase wetland depths by an average of 2 feet establishing a new wetted perimeter, fringe area of approximately 78 acres. This would create additional saturated soils within this expanded fringe area, and as a result, more favorable Type I wetland vegetation could be restored to replace the existing rank growth of stinging nettle and reed canarygrass occurring without the project. In addition, approximately 462 acres of Type 2 through 7 wetlands would be created or enhanced. This enhancement includes approximately 178 acres of Type 3 wetland acres in which the project would enhance needed primary nesting and brooding

[4] All wetland acreage for the Rice Lake Wetland Complex were estimated using the HEC-RAS hydrologic computer model. The results of the model were not field checked.

habitat for several species of migratory waterfowl. The proposed project would increase depth and duration of flooding on all of the partially drained Rice Lake Wetlands restoring the wetlands to pre-ditched water levels and creating more natural wetland hydrology conditions.

Table 10C displays the NWI type in acres, added at each depth. At 'present' conditions, the fringe area includes the area 7 inches (0.59') above the baseflow surface water elevation around the outside of the wetland. Rice Lake Wetland Complex is approximately 434 acres without project.

To estimate the 'with project' conditions, the U.S. Army Corps of Engineers definitions were used as guidelines to determine shallow and deep marshes. Those definitions are below.

> **Shallow Marshes:** Hydrology shall consist of saturation to the surface, to inundation by up to 6 inches of water, for a minimum of 60 consecutive days or two periods of 30 consecutive days or four periods of 15 consecutive days, during the growing season under normal to wetter than conditions (70 percent of years based on most recent 30-year record of precipitation). During the growing season, inundation by up to 18 inches of water following the 2-year or greater storm/flood event is permissible provided that the duration does not exceed 30 days (e.g., water depth drops from 18 inches to 6 inches within the 30 days).
>
> **Deep Marshes:** Hydrology shall consist of inundation by 6 to 36 inches of water throughout the growing season, except in drought years (driest 10 percent of most recent 30-year period of precipitation record).

Accounting for the acres of wetlands restored, the project would result in a net gain of approximately 461.8 acres for a total of 896 acres of wetland functions and values protected, enhanced, or restored with the project which should not require additional compensation or mitigation (Table 11C in appendix C).

INTRODUCTION[5]

This document contains the Watershed Plan – Environmental Assessment (EA) for the Upper Pelican River Watershed. It describes the water and related land resource problems, plan formulation, and expected impacts. The project purpose is to improve water quality and wetland wildlife and waterfowl habitat.

The sponsors of this project are the Pelican River Watershed District, City of Detroit Lakes, and Becker County Soil and Water Conservation District. The citizens of the watershed plus other federal, state, and local agencies assisted the NRCS during the planning process.

Specific authority for assisting in the development of the plan is Public Law 83-566, (PL-566) Watershed Protection and Flood Prevention Act, as amended (16 USC 1001-1008). The plan was prepared in accordance with Section 102(2) (C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 est seq). Responsibility for compliance with National Environmental Policy Act (NEPA) rests with the NRCS.

PROJECT SETTING

The Upper Pelican Watershed is located in the Otter Tail watershed (Unites States Geologic Survey (USGS) catalog unit #09020103) in northwestern Minnesota (Figure 1). The Pelican River Watershed, a subwatershed of the Otter Tail watershed, is located almost entirely (95%) within Becker County, US Congressional District Seven and MN Legislative District Eleven A (PRWD 1994). Becker County is approximately 50 miles East of Fargo, ND and 200 miles northwest of the Twin Cities Metro Region.

Region Description. The project area is located in the North-Central Hardwood Forest ecoregion. This ecoregion is characterized by rolling hills and small plains with upland areas being forested by hardwoods and conifers. The plains include pasturelands and row cropping agriculture. Beginning with early 19th century Euro American settlers, the natural environment in the region was dramatically altered and continues to change today. As a result, large portions of the dense hardwood forests and native wetlands were cleared and drained for agriculture.

Topography. Relief varies greatly in Becker County. The ground moraine in the northwestern part of the county and the Ponsford Prairie outwash plain in the eastern part of the county, have slopes that are nearly level to gently undulating. Relief is more pronounced throughout the rest of the county, especially in areas of the Alexandria and Itasca end moraines where slopes are very steep. The highest elevation in Becker County is about 1,850 feet. This elevation is in section 16 of Wolf Lake Township. The lowest elevation, about 1,150 feet, is in section 9 of Walworth Township[6].

[5] All information and data, except as where noted, were collected during the watershed planning investigation by the NRCS, DNR, PRWD, MPCA, and ARS.
[6] Soil Survey of Becker County, USDA-NRCS, 1998.

Surface Water. The primary waterway is the Pelican River, which is a tributary to the Otter Tail River and eventually the Red River of the North. There are four main lakes within the watershed of interest, Big Floyd, Little Floyd, Little Detroit, and Big Detroit. The watershed drainage area to Detroit Lakes is approximately 46,110 acres.

Watershed Urban Center. There is a major urban center within the watershed, the City of Detroit Lakes. Detroit Lakes is a resort community that provides high quality and easily accessible recreation and tourism opportunities. Although agricultural and urban pressures have increased over time, the high quality aesthetics of the watershed have remained intact. This is evidenced through the area serving as a destination for tourism and recreation and an ideal setting for second homes and lake cottages.

Transportation. The watershed is well served by federal, state, county, and township roads. Major highways include U.S. Highway 10, U.S. Highway 59, State Road 34, County Roads 21 and 25. The region is also serviced by the Burlington Northern Railroads.

Soils. The watershed's upland soils range from medium textured, sandy-loams, to sandy soils developed on the deposits of glacial moraine and outwash. The soils of the morainic areas are medium textured, sandy soils. The soils formed in the outwash area are darker, and medium to coarse in texture. Ponding and waterlogging are characteristic of the organic soils occupying low-lying areas throughout the watershed. A summary of the five most common watershed soil associations found in the watershed and their attributes are as follows:

- The Verndale-Dorset-Corliss Association - Well drained, sandy loam, soils formed on nearly level to steep slopes in outwash; subject to droughtiness, wind, and water erosion.
- Waukon-Forman-Cathro Association – Well drained to very poorly drained loam or muck soils formed on till or organic deposits on lateral moraines; slopes range from level to moderately steep; used for cropland and woodland and wetlands (Cathro); subject to water erosion and wetness, ponding.
- Cormorant-Audubon-Foxlake Association – Moderately to poorly drained silty-clay-loam soils formed on level to steep slopes on glacial till. Major use is cropland; clay content and wetness are management problems.
- Nebish-Seeleyville Association – Range from well –drained to very poorly drained with loam to muck textures on flat, to moderately flat surfaces. Used for cropland as well as woodland and wetlands.
- Snellman-Rifle-Sugarbush Association – Well drained to very poorly drained soils found in glacial till, outwash, and moraines. Found on slopes from level to steep. Rifle variant is very poorly drained and associated with wetlands. woodland and some cropped areas. Subject to water erosion, droughtiness, and ponding.

Land Cover. The land cover is comprised of approximately:

- 33 percent waterbodies & wetlands (1835 ac Waterbodies + 13,250 ac NWI identified Wetlands = 15,085 ac.);
- 30 percent cropland (14,042 acres);
- 21 percent deciduous forest (9,658 acres);
- 9 percent developed (4,080 acres);
- 7 percent other land (3,245 acres), which includes grassland, rocks, and coniferous forest.

Weather. The climate in the watershed is characterized by great extremes in temperature. The monthly normal temperature ranges from 6 to 69 degrees F in January and July respectively. Temperature extremes have been recorded that range from -46 to 107 degrees F. Average total snowfall is approximately 43 inches, with 120 days per year having at least 1 inch of snow on the ground. The first freeze typically occurs in early to mid-September, while the last freeze can be expected in late May. The average growing season is 112 days.

Evaporation from lakes in this area averages about 27 inches (United State Department of Commerce, 1959). During the growing season (May – September), approximately 17 inches of rainfall is received.

Wildlife. Terrestrial wildlife in the area is typical of an agricultural landscape in northwest Minnesota. Common terrestrial wildlife species include whitetail deer, rabbit, grouse, mink, muskrat, beaver, red fox, coyote, and striped skunk. Many major waterfowl species such as Mallards, Blue and Greenwinged Teal, Scaup, Gadwall, Pintails, Northern Shovelers, and Canvasback ducks migrate seasonally throughout the watershed. Other common migrating species include many shorebirds and Ring-Bill and Herring Gulls, and Forster's, Common, and Black Terns. Other common birds include: Yellow Warblers, Veery, Robins, Baltimore Orioles, Warbling Vireos, Red-winged Blackbird, Bobolink, and Swallows.

Lakes and streams within the watershed have varied and important sport fisheries. Nearly all the main lakes support game fishing for largemouth bass, crappie, walleye, northern pike, and muskellunge, as well as bluegill, pumpkinseed, hybrid sunfish, and brown and yellow bullhead. Walleye continue to be the most sought after sport fish, but black crappie and northern pike are also important. Sucker Creek, a direct tributary to Big Detroit Lake, is a designated trout stream.

Two federally *threatened* species, the Bald Eagle and the Gray Wolf, are listed as occurring with Becker County. Since there is no way to predict if either of these species may now occur within project construction or the Area of Potential Effects (APE), and since potential habitat does exist for both of these species, a consultation with the U.S. Fish and Wildlife Service is under way with a determination category of "may affect but are not likely to adversely affect the Bald Eagle and Gray Wolf". A similar consultation process will be initiated with the MN DNR Environmental Review Coordinator concerning the state listed *threatened* Trumpeter Swan, and the state listed *spc* Bald

Eagle and Pugnose Shiner species listed as occurring within the UPRW boundaries, but which may or may not occur within the project "action areas".

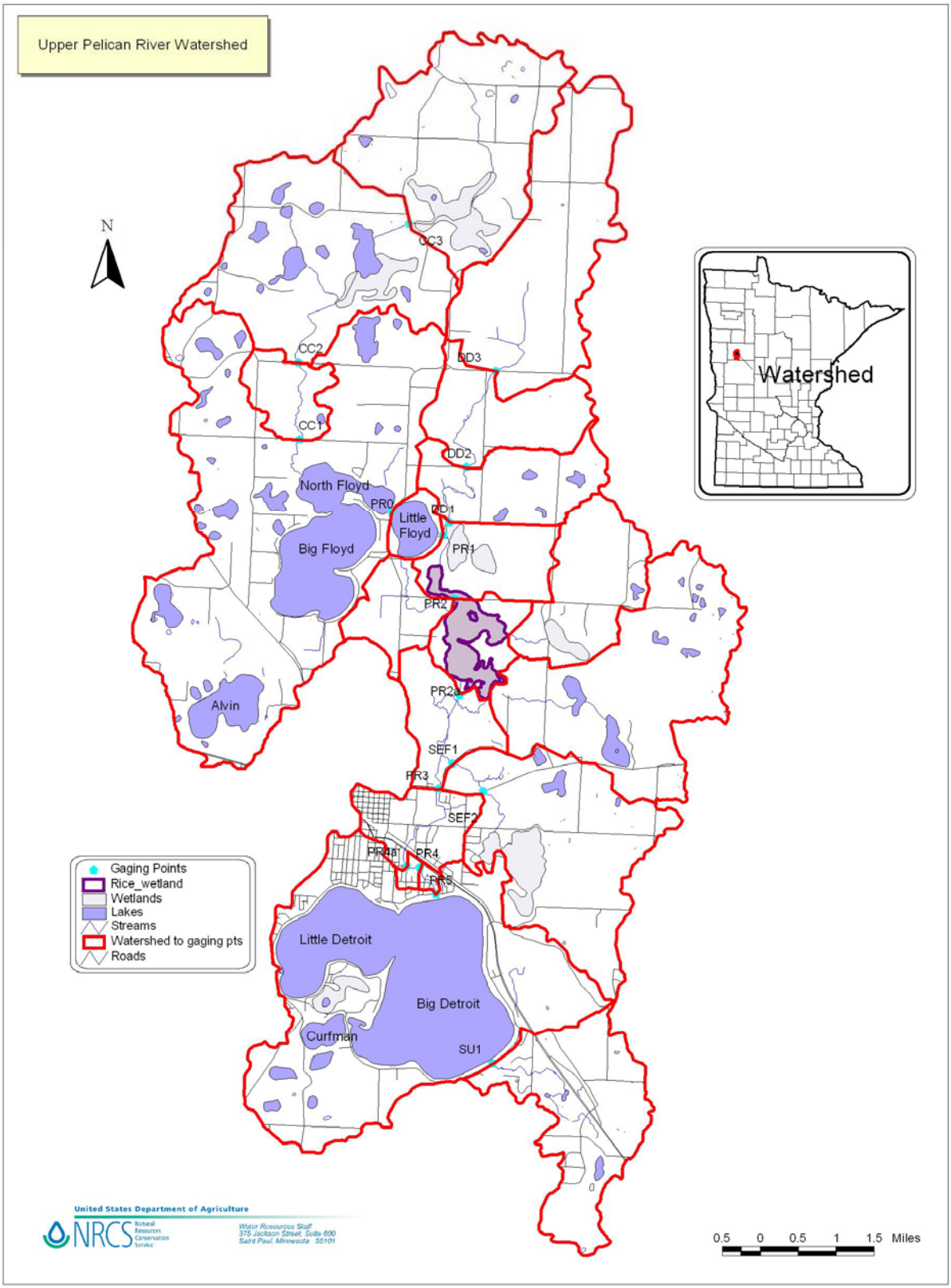
Appendix C, table 12C provides the complete listing of the current plant and animal species listed as federally threatened, and listed by the State of Minnesota as threatened, endangered, or as a species of special concern.

Population. Becker County is home to 30,000 people, 7,350 of which reside in the City of Detroit Lakes (Table 3). From 1990 to 2000 the population of Detroit Lakes increased by 11%, outpacing Becker County by 3%. Approximately one quarter of Detroit Lake's residents 25 years and older has a Bachelors degree or higher, compared to 17% for Becker County. The median household income for Detroit Lakes is $35,200, sixteen percent lower than Becker County, $41,900.

Table 3 - Socioeconomic data for the City of Detroit Lakes and Becker County from the 2000 US Census (2006 Dollars)

	City of Detroit Lakes	Becker County
Population	7,350	30,000
Median Household Income	35,200	41,900
Individuals below poverty line	1,070	3,590
Median Age	42	39
25 and over	5,100	19,830
Education (Age 25 and over)		
HS	4,270	16,450
BS or higher	1,230	3,320
Unemployment (Age 16 and over)	3 %	4%
% family households	56	69
Average Family Size	3	3.0
Median Value of Home	100,400	105,200

Figure 1 – Upper Pelican River Watershed



WATERSHED PROBLEMS AND OPPORTUNITIES

Purpose and Need for the Project

Water Quality Management: To improve water quality in Floyd Lakes and Detroit Lakes with overall water quality benefits to the other downstream lakes while improving the wetland wildlife and waterfowl habitat within the Rice Lake Wetland complex.

Water Quality

Since 1995, through the Clean Water Partnership Program (CWP), the Pelican River Watershed (PRWD) and Minnesota Pollution Control Agency (MPCA) have been collecting and analyzing water quality samples throughout the watershed. Their CWP Working Paper, "Water Quality Assessment of the Upper Pelican River Watershed" was completed in 2002 and summarizes the findings.

PRWD has identified water quality impairments to Little Floyd, North Floyd, Big Floyd, Big Detroit, and Little Detroit Lakes. The primary impairment is periodic nuisance algae blooms that occur due to excessive nutrient loadings. The primary nutrient of concern has been identified as phosphorus. Assuming a Northern Lakes and Forests ecoregion[7], MPCA Minnesota Lake Phosphorus Criteria is less than 30 ppb for fully supporting swimmable uses. With these concentrations, nuisance algal blooms would occur less than 5 % of the summer. Currently, North Floyd Lake exceeds the MPCA Lake Phosphorus Criteria (1998 - 2000 in-lake TP = 37 ppb). At this concentration, it is estimated that nuisance algal blooms could occur 25% of the time during the summer. The remaining lakes are within the upper bound of the criteria (see Table 5) however, slight increases in phosphorus loading could easily "tip" these lakes into a degraded category. The potential increases in total phosphorus loading is a legitimate concern because of 1) future phosphorus release from lake sediments, 2) temporary or permanent increased future precipitation, and 3) the effects of increased urbanization within the watershed[8].

Project sponsors identify the following adverse impacts on lakes users, if phosphorus levels exceed the above criteria:

- Local Residents
    1. Impairment of boating and swimming
    2. Damage to sport fishing
    3. Reductions in property values
    4. Declines in tourism
- Tourism
    1. Impairment of boating and swimming
    2. Damage to sport fishing

[7] From MPCA's CWP Working Paper: "Since the lakes of the Upper Pelican River Watershed share more in common with the Northern Lakes and Forests than the North Central Hardwood Forest ecoregion, more reliance has been placed upon characteristics of the former than the latter for goal setting purposes."

[8] During the period 1990-2000, the City of Detroit Lakes has increased in population by 11% while Becker County has seen an 8% increase.

The CWP Working Paper analyzes PRWD monitoring data taken over a three year period (1998 - 2000)[9]. Figure 1 displays the stream and lake monitoring locations within the watershed while Table 5 and 6 describes the data collected.

Table 4 - Average In-Stream Total and Ortho Phosphorus Levels (1998 - 2000)

Monitoring Station	Location/ Description	Total Phosphorus Conc (ppb)	Ortho Phosphorus Conc (ppb)
CC1	Campbell Creek just upstream of North Floyd Lake	89	42
PR0	Road crossing between North Floyd and Little Floyd	36	10
PR1	Outlet of Little Floyd	30	10
PR3	Upper Pelican River at Hwy 34	95	52
PR4	Pelican River just upstream of Big Detroit Lake	65	22

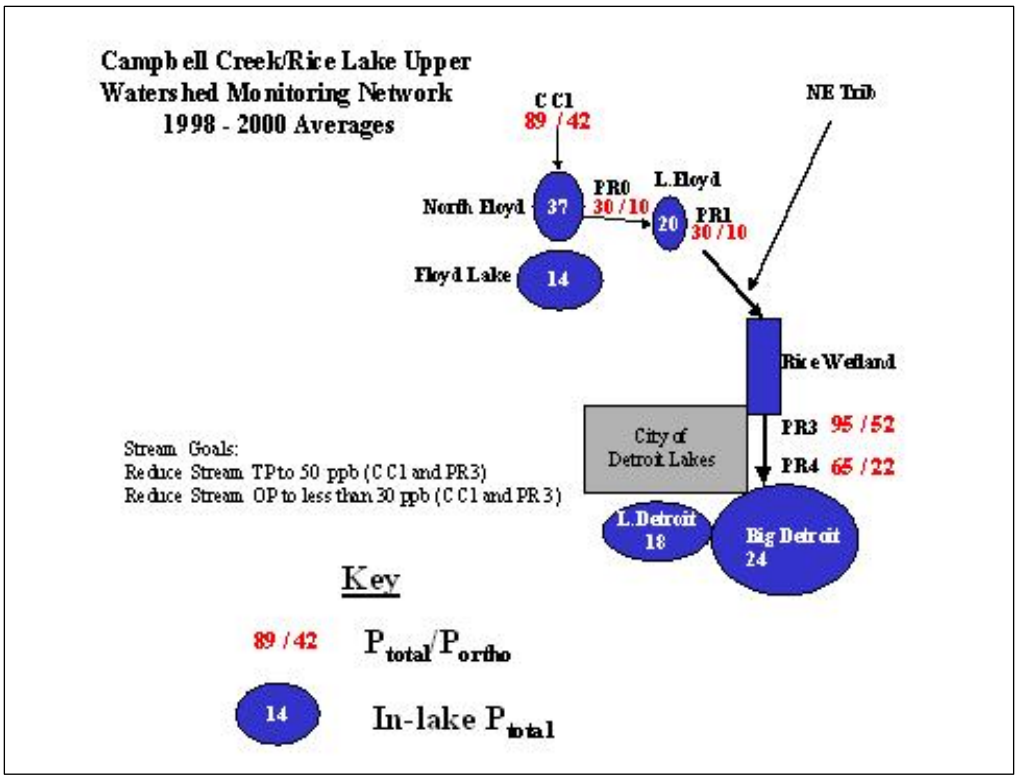
Ortho phosphorus (OP) readings are included in the stream monitoring data since it provides a relative indicator of phosphorus "availability" for potential in-lake nuisance plant growth. A schematic summarizing the results from the stream monitoring stations and the lakes is shown in Figure 2, from the CWP Working Paper

Table 5 - Average Total In-Lake Phosphorus Levels (1998 - 2000)

Lake	Average Total In-Lake Phosphorus (ppb)
North Floyd	37
Big Floyd	14
Little Floyd	20
Big Detroit	24
Little Detroit	18

[9] The MPCA analysis was updated with 2001-2004 monitoring data to ensure conclusions are still valid. See Appendix C for a summary of the updated FLUX models.

Figure 2 - Pelican River Water Quality Loading Schematic



Rice Wetland Phosphorus Source. One of the significant findings from the monitoring data was the 316% and 520% increase in total- and ortho phosphorus concentrations respectively between the outlet of Little Floyd (PR1) and just downstream of Rice Lake Wetland (PR3). Monitoring conducted during 1998-2000 showed approximately 2,000 kg (4,400 pounds) of phosphorus per year being contributed to the Pelican River as it flows through Rice Lake Wetland. Rice Lake Wetland was once a larger, deeper wetland that was drained in the 1910's. Photos during the dry 1930's (see Appendix B) show extensive pasturing within the old wetland shoreline meander. When normal precipitation patterns returned, however, much of the wetland hydrology returned and the area was abandoned. Although wetland vegetation re-established itself, a remnant ditch remains through the center, leaving Rice Lake Wetland in a semi-drained state. Soil sampling performed by NRCS in June 2004, revealed that organic soils (mucks and peats) are over 30 feet deep in some places within the wetland. Early in the planning process, it was hypothesized that the original ditching through the wetland has accelerated phosphorus release from the organic materials by enhancing the oxidation process (increased aeration and solar warming within the upper layers of organics).

To help understand the phosphorus "pulsing" from Rice Lake Wetland, PRWD contracted with the Agricultural Research Service (ARS) in 2004 to research if wetland oxidation (decomposition) was responsible for phosphorus loadings and how those loadings would be affected by fluctuating water levels. Below are the major ARS findings from two separate studies.

- The major release mechanism of phosphorus in lab core samples was determined to be the reduction of iron oxide-phosphate soil minerals in anaerobic conditions. Phosphorus mineralization may be significant in the slower organic-inorganic phosphorus transformations. (Berryman 2006)
- While elevating the water table may slow decomposition and phosphorus mineralization and thereby limit the formation of iron bound phosphorus, the magnitude of this effect over the long term cannot be assessed without further study. (Berryman 2006)
- Reflooding Rice Lake Wetland may mobilize high concentrations of phosphorus, at least in the short term. (Berryman 2006)
- There appears to be a significant spatial variation of phosphorus porewater concentrations with the highest concentrations occurring where the Pelican River enters Rice Lake Wetland just downstream of Anchor Road. (Berryman 2006)
- There is a significant lateral groundwater contribution to the Rice Lake Wetland between Anchor Road and its outlet. (Elf 2006)
- Mass balance studies showed significant phosphorus loading as the Pelican River flowed through Rice Lake Wetland during 2004 and 2005. Table 6 below summarizes those studies (Elf 2006)

Table 6 - ARS Ortho Phosphorus Mass Balance Through Rice Lake Wetland 2004, 2005

Year	Ortho Phosphorus Load at Inlet of Wetland (kg)	Ortho Phosphorus Load at Outlet of Wetland (kg)	Percent Increase in Ortho Phosphorus
2004	80	211	+ 264%
2005	36	571	+1,580 %

Campbell Creek Phosphorus Source. Analysis of water quality sampling at the outlet of Campbell Creek show significant phosphorus concentrations within streamflows (89 ppb and 42 ppb total and ortho phosphorus respectively). For a perspective of Campbell Creek phosphorus concentrations compared with other areas of the watershed see Figure 2. Combining concentration data with flow data, total phosphorus loading can be estimated. Campbell Creek inputs a approximately 585 kg (1,290 lbs) total phosphorus and 260 kg (575 lbs) ortho-phosphorus into North Floyd Lake annually. The source of this phosphorus is likely a combination of phosphorus from drained Campbell Lake (similar phosphorus release processes as Rice Lake Wetland), loading of upland/floodplain sediments laden with phosphorus, and streambank erosion/streambed scour. Total suspended sediment (TSS) load at Campbell Creek (CC1) is high relative to other monitoring locations. In 1998 for example, CC1 averaged 8.8 ppm TSS while PR1, PR3, and PR4 were 1.5 ppm, 5.0 ppm, and 6.4 ppm respectively.

Campbell Creek has a very steep grade (26 feet/mile) for 1.8 miles upstream of North Floyd Lake making it susceptible to streambank and channel bed erosion. Concurrent

water quality sampling during baseflow conditions was made on April 7, 2005, showing an increase in TSS from 5 ppm to 45 ppm in a 1.25 mile reach upstream of CC1 on Campbell Creek. In addition to the streambank/channel bed erosion, a large percent of the watershed's highly erodible soils exist adjacent to the lower 4 miles of Campbell Creek. Although the actual cropland soil loss being contributed to Campbell Creek has not been estimated, the existing topography, field sizes, and cropping practices are strong indicators that it is occurring.

Feedlot Phosphorus Sources. Feedlots and confined livestock operations have the potential to affect water quality within a watershed. Wastes from feedlots can be washed into watercourses. Also, manure that is over-applied and/or not incorporated into the soil soon after application can result in high nutrient levels in surface and groundwater. To assess this potential, a livestock operation assessment was performed within the watershed by NRCS in 2004. This assessment concluded that although livestock may have been a significant contributor to excessive nutrient loadings to the Pelican River and its tributaries in the relatively recent past, current livestock numbers and management of that manure do not pose a future threat to water quality conditions.

Non-Point Source Assessment. The magnitude of non-point sources of phosphorus was estimated using the GLEAMS Water Quality model. This model estimates per acre amounts of soil loss and nutrients (Phosphorus and Nitrogen) for all land uses. The model takes into account land use, soil type, vegetation, and land slope. For cropland, it includes rotations, tillage practices, and fertilization amounts (amount, timing, and method).

Comparing the non-point source results from GLEAMS with PRWD monitoring results, it is possible to estimate loadings due to "other sources" (i.e. lake internal loadings, mineralization of wetlands, streambank erosion, point sources, etc.). Table 7 displays these estimates, in terms of percentage, for CC1 (outlet of Campbell Creek), PR1 (outlet of Little Floyd), and PR3 (Pelican River at CSAH 34). The table gives Total Phosphorus source proportions.

Table 7 - Estimated Total Phosphorus Source by Type

Watershed	Non-Point P_{total}	Other P_{total}
CC1	38%	62%
PR1	27%	73%
PR3	8%	92%

Per acre non-point sediment and nutrient losses from cropland are disproportionately higher than non-cropland because of its higher erosion rate and soil nutrient management. For example, in Campbell Creek, cropland represents 30% of the watershed area yet contributes 97% and 96% to the annual sediment load and P_{total} load respectively.

Economic Problems Associated with Water Quality. Increased nutrient loadings, specifically phosphorus, to lakes in the watershed increase the likelihood of nuisance and severe algal blooms. If algal blooms in Big and Little Detroit Lakes increase in

frequency, intensity or both, the first sector of the public to be impacted are the individuals and groups of individuals engaging in water based recreation (e.g. swimmers, anglers and boaters). These groups are in direct contact with the water and are most likely to change behavior if the quality of their experience declines. The recreational visitors come to Detroit Lakes because they expect to have excellent water quality for recreational purposes, in addition to the amenities the town has to offer. Minor or nuisance blooms can be tolerated by the boaters and fishers however swimmers would likely choose an alternative form of recreation at the first signs of a bloom. If the quality that visitors expect begins to deteriorate, individuals would reduce the number of visits they make to the lakes.

A second sector of the public to notice problems associated with increased algal bloom activity is waterfront landowners. Although not necessarily in direct contact with the water, the landowners can experience negative impacts from increased bloom frequency and intensity through a decline in property values. If a lake that is known for its excellent water quality begins to experience a decline, the demand for waterfront property would follow.

The final sector that would experience negative impacts from a decline in water quality is the residents of Detroit Lakes. The town's economy is heavily based on tourism. If visitation to the area declines in response to the declining water quality, the economy would suffer. In addition to the reduction in new dollars coming into the economy, the city would have reduced revenues as a result of declining property taxes.

Water Quality Goals. Water quality goals for the watershed were based on loading reductions that would 1) improve water quality conditions in North Floyd and 2) maintain a non-degradation condition for the other lakes. The results summarized in the CWP Working Paper utilized the BATHTUB In-Lake Water Quality Model to model phosphorus dynamics for Floyd and Detroit Lakes. For the Floyd Lake System, the model estimates that 72% of the water and 92% of the phosphorus comes from Campbell Creek (CC1). For Big and Little Detroit Lakes, the model estimates that 82% of the water and 90% of the total phosphorus comes from the Upper Pelican River (PR4).

The goals proposed in the CWP Working Paper are to *maintain* Big Floyd, Little Floyd, Big Detroit, and Little Detroit in-lake total phosphorus levels at 20-30 ppb and to *reduce* North Floyd in-lake total phosphorus to the 30-40 ppb range. The formulation process for this watershed plan is guided by these CWP goals. To achieve the goals, the CWP Working Paper recommends:

1. **Reduce watershed total phosphorus loadings to North Floyd Lake 25% short term and 50% long term[10].** This translates into 25% and 50% reductions in total phosphorus in Campbell Creek at CC1.

[10] "Short term" is approximately the period of 5 years following installation of all plan components. "Long term" refers to the period after plan components have "settled in". Long term conditions include:

- land treatment measures reach full sediment/nutrient reduction potential
- Campbell Creek stream system bottom and bank sediments adapt to reduced sediment loading
- wetland/pond vegetation matures in the sediment basins and Lower Rice Wetland Restoration

2. **Reduce watershed total phosphorus loadings to Rice Lake Wetland 25% short term and 50% long term.** This would include reduction of total phosphorus loadings from DD1, PR2, PR2A, PR2AETRIB, FPONDTRIB subwatersheds (total drainage area = 14.21 square miles - see Appendix C under the Hydrology Section for locations of these tributaries).

3. **Reduce the total phosphorus internal loading from Rice Lake Wetland 50%.** This recommendation recognizes the significant contribution of total phosphorus from Rice Lake Wetland itself.

- initial potential phosphorus flush subsides in Rice Lake Wetland Restoration
- original ditch becomes ineffective (vegetation mat grows over) for direct conveyance of flows in Rice Lake Wetland restoration

SCOPE OF THE ENVIRONMENTAL ASSESSMENT

Project scoping was used to identify problems and needs, and to rate their significance. This list of concerns was refined through public meetings, technical meetings, input from the Citizen Advisory Committee (CAC), other federal, state and local governmental agencies. The following table lists and rates the significance of the concerns which have been addressed. Each of the high concern items are discussed below.

Table 8 - Evaluation of Identified Concerns

Economic, Social, Environmental, and Cultural Concerns	Degree of Significance to Decision Making
Cultural Resources	High
Fish Habitat	High
Human Health & Safety	High
Property Values	High
Threatened, Endangered, and Species of Special Concern	High
Recreation Development	High
Soil Erosion & Sedimentation	High
Upstream Inundation	High
Water Quality	High
Wetlands	High
Wildlife Habitat	High
Downstream Floodwater damage	Low
Drainage	Low
Forest Land	Low
Prime Farmland	Low

(**High** – may be affected significantly by alternative solutions. **Low** – considered, but not significant. **None** – need not be considered in analysis.)

Cultural Resources. Early Prehistoric period (ca. 11,000-5,000 BC) settlement patterns are poorly known in this Central Lakes region, because artifactual evidence is limited and consists mostly of projectile points from surface collections. These early fluted and stemmed forms have been concentrated near lakes and major rivers. Several Archaic-age (5,000-1,000 BC) burials have been discovered in the area. Most recently a mass burial dating to this time period was uncovered on the north side of Little Floyd Lake.

The end of the Archaic period witnessed significant shifts in technology, subsistence-settlement patterns, and even ideology. Technological innovations include the introduction of ceramics around 200 BC and the bow and arrow about AD 500. Subsistence went from intensive bison hunting, to broad based hunting and gathering, and finally to intensive wild rice gathering. Sites became larger as populations became less nomadic.

Sites of Woodland affiliation (1,000 BC-1,700 AD) are the most common prehistoric sites in the general area. These sites are identified by a variety of different pottery types, particular to different complexes spread across the central lakes region. The project area would more than likely contain Woodland sites associated with the Brainerd and Blackduck complexes (Anfinson 1988).

By the beginning of the Late Prehistoric period (1,000 AD-through contact) subsistence focused primarily on wild rice gathering and was supplemented with bison hunting (Gibbon 1982). Sandy Lake ceramics are found in the general project area and are believed to be associated with proto-Dakota peoples.

At contact, this area was controlled by Dakota groups such as the Yankton and Yanktonai. Following the French fur trade west during the 1720s, however, the Ojibwe moved beyond Lake Superior and into a war with the Dakota (Sioux). During the next century, the Ojibwe forced the Dakota out of northern Minnesota and Wisconsin. Fur traders relied principally on the Ojibwe to trap and kill the animals and prepare the pelts. It was through the "practical partnerships" forged among these groups that the fur trade began to flourish in Minnesota from around 1785 to 1815.

Shortly after, from roughly 1820-1870, a network of primitive roadways, traveled by way of ox carts, opened up and carried an international trade in furs and merchandise between the burgeoning commercial center of St. Paul in the south and the colony that grew into modern Winnipeg in Canada to the north. The Red River Trails, as they were known, were as important to commerce and development of the West as the Santa Fe and Oregon Trails. Detroit Lakes was a favorite resting place for travelers of the trails. For many years, the resting place was called "Ga-ia-wa-wan-gag - a Chippewa name meaning, "Lake in which there is a crossing in a sandy place" (Gilman et al., 1979)

Settlers, having trouble pronouncing that name, preferred a traveling French priest's description of the sandy place; he called it "Detroit," using the French word for sand bar.

According to historical records Becker County was established in March 18, 1858. The first major wave of European settlers, following the fur trader pattern of establishing posts on major lakes and rivers, came to the county about ten years later. Government surveying to establish townships boundaries started in 1870 and was completed in 1872. Today, the city of Detroit Lakes has an estimated population of 7,350 residents and is an important agricultural area; it is also the center of a thriving "412 Lake" tourism district.

Fish Habitat. Lakes and streams within the watershed have varied and important fisheries. The main lakes support game fish populations and contribute to a viable sport fishery. Species found in these lakes include bluegill, black crappie, yellow perch, walleye, northern pike, largemouth bass, and muskellunge.

The Minnesota Department of Natural Resources (DNR) is responsible for and actively manages the fisheries resources in these waters. Floyd and Detroit Lakes have fisheries management plans, and several others are used for rearing walleye fingerlings. Stocking has been part of the DNR's management activities and at present, walleye, lake sturgeon,

and muskellunge are being stocked on a regular basis. The DNR's "Red River Basin Sturgeon Recovery Plan" includes annual stocking of lake sturgeon in Detroit Lake. Muskellunge are stocked in Detroit Lake every other year to maintain that fishery. A commercial bullhead netter operates on Detroit Lake. Walleye spawning habitat exists in the Pelican River in the area between Detroit Lake and Minnesota State Highway 10, and walleyes are known to use this spawning habitat. Large areas of northern pike spawning habitat exists upstream of State Highway 34. However, this habitat is not considered critical since northern pike are chronically too abundant in Detroit Lake. The PRWD works closely with DNR's Section of Fisheries in the areas of habitat protection, shoreland regulations, and exotic species control and management. Sucker Creek, a direct tributary to Detroit Lake, is a designated trout stream.

Lake Sallie and Lake Melissa, just southwest of the watershed boundary, have diverse fish communities that support both a sport fishery and commercial bullhead netting. Several of the smaller lakes in the watershed, including St. Clair and Muskrat, are subject to winterkill.

Human Health & Safety. No adverse impacts are expected to effect public health and safety since flood prevention is not a project goal. However, implementation of the project should enhance water supply; improve and protect Anchor Road; and improve and enhance water based recreation.

Property Values. Local environmental factors often influence people's choice of housing. For instance, there is evidence from many cities that housing values are directly affected both by local air and water quality. Conversely, industrial facilities and chemical spills reduce the value of nearby homes. Alternatively, it has been demonstrated that individuals place high value on having nice views or parks nearby, or on having high water or air quality in their neighborhoods. As environmental quality declines or increases property values are likely to follow the trend.

Threatened, Endangered, and Species of Special Concern. No endangered species are federally listed as occurring in Becker County. The Gray Wolf and the Bald Eagle are federally listed threatened species occurring in Becker County. The Bald Eagle and Trumpeter Swan are listed by the State as *threatened* animal species occurring within the watershed boundaries, as well as the Pugnose Shiner, a state listed Species of Special Concern. There is one endangered and six threatened plant species listed on the State of Minnesota register as occurring in Becker County. There are 13 plant and 13 animal species listed on the State Species of Special Concern (SPC) list as occurring in Becker County. Table 12C in Appendix C gives this complete federal and state listing of all of these species by common and scientific names.

Recreation Development. Detroit Lakes is a destination for many water based recreators. If the quality of the individuals experience declines or visitation rates drop due to the degradation of water quality, a loss in social welfare (value society gains from consuming the resource) occurs. Additionally, if individuals are forced to visit another

location, their second and lesser valued choice, a loss in welfare is experienced. These losses in social welfare can be added to the loss in tourism revenues to the City of Detroit Lakes to reveal the aggregate impact a decline in water quality has on recreation.

The primary purpose of the proposed project is to address water quality in Detroit Lakes and the Floyd Lakes. These lakes, specifically Detroit Lakes, are the most developed and thus the counties dominant economic force. The projects impacts on water quality and thus recreation will provide the lion's share of all benefits. As such, only recreation dependent on water quality will be evaluated. It is likely that some components (e.g. increased wetland acres and restored wetland hydrology) of the plan would increase other forms of recreation (e.g. wildlife watching, hunting, hiking, etc.), and thus overall social benefits. However it is difficult to establish a clear link between these potential additional benefits and individual project components. Therefore, it was determined that investigating these effects is beyond the scope of this analysis.

Soil Erosion and Sedimentation. Soil loss caused by water erosion is a concern throughout the entire watershed. There are 730 acres of highly erodible soils on cropland within the watershed. GLEAMS modeling of sheet and rill erosion indicate that Campbell Creek and Dovre Ditch subwatersheds have the highest net (edge of field) sheet and rill soil loss rates (3,345 and 1,645 tons average annual for Campbell Creek and Dovre Ditch respectively). Actual delivery of eroded soil to stream channels and lakes is very much dependent on flow path conditions from field edge to the water body. Landscape features such as wetlands, surface depressions, buffers, and grassed waterways can trap sediments reducing the actual amount of sediment delivery along the way. For example, it is estimated that only 8-10 percent of the edge of field soil loss within the Campbell Creek and Dovre Ditch make it to the outlets of those subwatersheds.

Portions of Campbell Creek north of County Road 149 have potential for significant stream bank erosion due to a steep stream gradient. A one day water quality sampling performed on April 7, 2005 during base flow conditions showed an increase from 5 ppm to 45 ppm suspended sediment in the mile upstream of County Road 149. This indicates that significant stream bank/channel bed scour is occurring

Excessive wind erosion is not a serious concern within the watershed and none of the cropland is considered highly erodible land. The Becker County Soil and Water Conservation District (SWCD) is actively promoting land treatment to reduce damages from water and wind erosion. SWCD encourages landowners and operators to install and maintain land treatment measures for the protection and improvement of the watershed.

U.S. Geological Survey (USGS) report, "Suspended Sediment in Minnesota Streams, 85-4312." states that the median suspended sediments (SS) concentrations in the Pelican River near Fergus Falls ranges from an average of 15 mg/L to a maximum of 208 mg/L. Usually, the peak SS occurs during late-spring. The maximum daily yield is 0.79 ton/square mile; the estimated average annual is 1.0 ton/square mile.

Upstream Inundation. Any additional water stored on the Rice Lake Wetland Complex may impact private property and outlet flow conditions from Little Floyd Lake. This is because of the small vertical elevation difference between Little Floyd Lake (outlet invert - 1354.1) and the outlet of Rice Lake Wetland (proposed outlet invert - 1352.0). Current hydraulic analysis shows that the wetland restoration would not affect outflow conditions to Little Floyd Lake outlet. Other private property impacts (around and upstream of Rice Lake Wetland) would be mitigated.

Water Quality. Discussed earlier in report starting on page 11.

Wetlands: The U.S. Fish and Wildlife, National Wetlands Inventory (NWI), identifies approximately 13,250 acres of Cowardin Classification Wetland Types 1 – 7 within the entire watershed (Figure 1). However, the predominant wetlands occurring within the watershed project boundaries are as follow:

> Type 2 – Wet Meadow (PEMB) with soil saturated within at least a few inches of the surface during most of the growing season with vegetation consisting of grasses, sedges, rushes, and various broad-leaved plants.
>
> Type 3 – Shallow Marsh (PEMC) with soil often covered with 6 inches or more of water during the growing season with wetland vegetation comprised of reed canarygrass, bulrush, spikerush, cattail, arrowhead, pickerelweed, and smartweed.
>
> Type 4 – Deep Marsh (PEMG & PUBFd) with soil inundated with 6 inches to 3 feet or more of water during the growing season with wetland vegetation comprised of cattail, reed, bulrush, spikerush, and wild rice.
>
> Type 5 – Shallow Open Water (PUBG) with soil inundated and usually covered with less that 10-foot-deep water. Fringe of emergent vegetation similar to open areas of Type 4 above.

Two MN DNR Wildlife Management Areas (WMA) occur within the proposed project area: the Frank WMA (339 ac) and the Stenseth WMA (27 ac). The Frank WMA is entirely within the proposed project area and is predominantly a Type 4 and Type 5 – Deep Marsh (PEMFd) /Shallow Open Water (PUBG) semi-permanently flooded wetland called the “Rice Creek Bottoms”, a mostly closed marsh dominated by sedges, cattails, and reed canarygrass. The Stenseth WMA is a Type 2 – (PEMB) Wet Meadow which is primarily a sedge meadow wetland consisting of reed canarygrass, sedges and broad-leaved plants.

Efforts were made to estimate the ‘present’ and ‘with project’ wetland types within the Rice Lake Wetland Complex. A HEC-RAS computer model was created for the Rice Lake Wetland Complex area. This model was used to estimate the wetted perimeter for ‘present’ and ‘with project’ conditions. For a comparison between ‘present’ and ‘with project’ conditions, the normal pool elevation at baseflow was used.

Table 10C displays the NWI type in acres, added at each depth. At 'present' conditions, the fringe area includes the area 7 inches (0.59') above the baseflow surface water elevation around the outside of the wetland. Rice Lake Wetland Complex is approximately 434 acres without project.

Terrestrial Wildlife Habitat. Wildlife in the area is typical of an agricultural landscape in northwestern Minnesota. Common wildlife species include whitetail deer, mink, rabbit, grouse, muskrat, beaver, red fox, coyote, striped skunk, meadow vole, meadow jumping mouse, and the masked shrew. Migrating waterfowl such as Mallard, Blue-winged Teal, gulls, and a variety of shorebirds traverse this area. Other common birds include Yellow Warbler, Veery, Baltimore Oriole, Warbling Vireo, Red-winged Blackbird, Bobolink, and swallows. The Bald Eagle may be sighted in the area during migration. At present, no known Bald Eagle nests are known to be in the vicinity of the project area, and at present, no critical habitat for Gray Wolf is present in the immediate project area.

The watershed has an abundance of wildlife species with unique habitats of pine forests, deciduous woodlands, native tall grass prairie, aspen parkland, sand dunes (remnants of Glacial Lake Agassiz), calcareous fens, bogs, marshes, large and small lakes and rivers all interspersed among open cropland fields. Within these unique habitat areas of Becker County, more than 250 species of birds have been documented with unique nesting resident species such as Osprey, and Northern Harrier; Cooper's Hawk; Great Horned and Barred Owls; Three-toed and Black-backed Woodpeckers; Golden Winged, Chestnut - Sided, and Black and White Warblers; as well as, Evening Grosbeaks, and American Woodcock to name a few.

The tenth annual Festival of Birds is scheduled for May 17 -20, 2007 in Detroit Lakes. During the ninth annual festival last year in May, 2006, 174 species birds were seen. Some of these highlighted species were Henslow's Sparrow, Chesnut Collared Logspur, Blackpoll, Blackburnian, and Northern Parula Warblers, Piping Plover, Prairie Chicken, and Sandhill Cranes.

FORMULATION AND COMARISON OF ALTERNATIVES

General

Plan formulation for works of improvement administered by NRCS was according to the U.S. Water Resources Council's "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)."

Formulation Process

All reasonable methods of solving the identified water related land resource problems of the watershed were considered. Alternative plans were developed that included nonstructural measures, structural measures, and the possibility of no action. They were formulated in consideration of four criteria: (1) Completeness, (2) Effectiveness, (3) Efficiency, and (4) Acceptability.

Continuous coordination was maintained with federal, state, citizens from within the watershed and local agencies having related programs or interests in the Upper Pelican River Watershed area.

During planning, two main sources of excess nutrient loadings within the watershed were identified: (1) Rice Lake Wetland and (2) Campbell Creek.

Alternative measures considered for stabilizing and improving the water quality within these areas are listed below:

Table 9 - Project Alternatives

Campbell Creek	Rice Lake Wetland
1. No Action 2. Water Quality Improvement Measures a. Accelerated Conservation Land Treatment b. Enhancement of Development and Zoning Regulations and Enforcement c. Sediment basin(s) d. Onsite Chemical Treatment e. Streambank Stabilization	1. No Action 2. Water Quality Improvement Measures a. Off Channel Chemical Treatment b. Enhancement of Development and Zoning Regulations and Enforcement c. Onsite Chemical Treatment d. Wetland Isolation e. Wetland Excavation f. Wetland Restoration

Campbell Creek

No Action. No action plan or maintaining the status quo. Reduced water quality would cause economic loss over time in the tourism industry and would affect property values on Floyd and Little Floyd Lakes.

Accelerated conservation land treatment. A possible alternative to help improve water quality is to accelerate the conservation land treatment effort. Measures include converting erodible land to permanent cover, grassed waterways, water and sediment control basins, and crop residue management. The Soil and Water Conservation District is actively promoting land treatment with ongoing programs. This alternative would be in addition to the current ongoing efforts.

Development and Zoning Regulations and Enforcement. Land use changes (i.e. cropland conversion to urban) in the Pelican River Watershed can have significant impacts on sediment and nutrient loadings to Floyd or Detroit Lakes. Through the development of comprehensive plans, the City of Detroit Lakes and Becker County have each developed mission statements and goals related to the preservation and protection of their natural resources (City of Detroit Lakes 2000, Becker County 2003). Currently rules, ordinances, and polices are in place that help address these concerns. For example, current rules require best management practices during the construction of urban developments, limiting the amount of impervious surface within sensitive watersheds, and banning certain lawn and garden chemicals. The rules and ordinances in place can be strengthened by adding measures that focus specifically on nutrient loading sources. The potential for strengthened regulations and planning is highlighted in the City of Detroit Lakes Comprehensive Plan. In their plan the city identified the significant influence storm water from current and future development has on lake nutrient levels and the need for a management plan. The city will also need to review all zoning, shoreline, and subdivision regulations on a regular basis to ensure that the potential sources of increased nutrient loading are being addressed. Finally, the city must be vigilant and consistent in enforcing rules, ordinances, and policies that are in place to protect its valuable natural resources. Enforcing and strengthening current regulations will have beneficial impacts on the lakes within the watershed.

Sediment basin. Construct a flow through sediment basin on Campbell Creek just upstream from County Road 149. The basin would be approximately 4 acres in size and have a capacity of approximately 11 acre-feet of sediment storage. A sediment basin of this size would reduce Campbell Creek's sediment load to Floyd Lakes by approximately 45-65%. A 28-39% reduction in Total Phosphorus is expected. It would take approximately 100 years for the sediment basin to fill in. It is estimated that the sediment basin would cost approximately $635,000[11] to install, plus acquisition of real property rights.

Stream Bank Stabilization. Stabilize the stream grade and banks along Campbell Creek in the reach through Section 33, Richwood Township. In addition to protecting

[11] Price Base August 2006

stream banks with rock and/or bio-engineering techniques, small grade control structures may be needed (along this steep reach, the channel drops 26 feet per mile). Installing brush layer for 1000 feet, 1000 live stakes, and 15 stream barbs would cost around $82,000[12].

Off Channel Chemical Treatment. Based on the stream flow rate an appropriate amount of chemical (i.e. Alum) would be injected into the stream to flocculate (settle) the Aluminum-Phosphorus precipitate. The settling would occur in a detention basin, where the water would be detained for a minimum of 6 hours. The chemical reaction would remove most of the ortho phosphorus from the water. The treatment system would be operated only when phosphorus loads exceed the target of 30 ppb OP for a sustained period[13].

The treatment facility would consist of a shed to store the chemicals and equipment needed to inject the chemicals into the stream. The chemicals would be injected into the flows as water is diverted into the detention basin. The amount of chemical needed would vary with flowrate. The operation of the injection equipment and diversion structure would require monitoring of the in-stream phosphorus concentrations. The detention basin would also require access for periodic cleanout of the flocculent. The basin would be constructed off channel and provide storage for a 2 year storm event (35 cfs) with a minimum of 6 hours of detention time (17 acre feet).

The preferred location for this chemical treatment facility is just upstream of Campbell Creek's confluence with North Floyd. An access road would have to be constructed, land rights purchased, and an electricity drop installed. Actual design of any chemical treatment(s) will be performed by qualified private engineering consultants with experience in water quality chemical treatment. Final designs will require an NPDES (National Pollutant Discharge Elimination System) permit. The permitting process would require an MPCA technical review to address any potential environmental toxicity effects. Also, the NPDES permit process would require that a monitoring plan be developed to ensure compliance into the future.

Because the treatment is not located on the channel, obtaining the permits for this alternative is possible. MPCA would be the lead permitting authority.

Estimated installation cost for this chemical application method is $350,000. The annual operation, maintenance, power, precipitate removal and monitoring would cost approximately $70,000.[14]

[12] Price Base August 2006

[13] Actual design will be done by a qualified consulting engineering firm. The final operation plan/trigger conditions will be developed by the consultant in conjunction with MPCA and PRWD.

[14] Memorandum dated February 15, 2006, from Mike Panzer, Wenck Associates Inc, to Tera Guetter, Pelican River Watershed District. The dollar amounts were adjusted to better fit the local conditions.

Rice Lake Wetland

No Action. No action plan or maintaining the status quo. Reduced water quality would cause economic loss over time in the tourism industry and would affect property values along Detroit Lakes.

Development and Zoning Regulations and Enforcement Land use changes (i.e. cropland conversion to urban) in the Pelican River Watershed can have significant impacts on sediment and nutrient loadings to Floyd or Detroit Lakes. Through the development of comprehensive plans, the City of Detroit Lakes and Becker County have each developed mission statements and goals related to the preservation and protection of their natural resources (City of Detroit Lakes 2000, Becker County 2003). Currently rules, ordinances, and polices are in place that help address these concerns. For example, current rules require best management practices during the construction of urban developments, limiting the amount of impervious surface within sensitive watersheds, and banning certain lawn and garden chemicals. The rules and ordinances in place can be strengthened by adding measures that focus specifically on nutrient loading sources. The potential for strengthened regulations and planning is highlighted in the City of Detroit Lakes Comprehensive Plan. In their plan the city identified the significant influence storm water from current and future development has on lake nutrient levels and the need for a management plan. The city will also need to review all zoning, shoreline, and subdivision regulations on a regular basis to ensure that the potential sources of increased nutrient loading are being addressed. Finally, the city must be vigilant and consistent in enforcing rules, ordinances, and policies that are in place to protect its valuable natural resources. Enforcing and strengthening current regulations will have beneficial impacts on the lakes within the watershed.

Off Channel Chemical Treatment. Based on the stream flow rate an appropriate amount of chemical (i.e. Alum) would be injected into the stream to flocculate (settle) the Aluminum-Phosphorus precipitate. The settling would occur in a detention basin, where the water would be detained for a minimum of 6 hours. The chemical reaction would remove most of the ortho phosphorus from the water. The treatment system would be operated only when phosphorus loads exceed the target of 30 ppb OP for a sustained period[15].

The preferred location for the chemical treatment facility is south of CSAH 34 near the west side of the Pelican River. The proposed facility location has access to electricity and the land is currently owned by Pelican River Watershed District.

The treatment facility would consist of a shed to store the chemicals and equipment needed to inject the chemicals into the stream. The chemicals would be injected into the flows as water is diverted into the detention basin. The amount of chemical needed would vary with flowrate. The operation of the injection equipment and diversion structure would require monitoring of the in-stream phosphorus concentrations. The

[15] Actual design will be done by a qualified consulting engineering firm. The final operation plan/trigger conditions will be developed by the consultant in conjunction with MPCA and PRWD.

detention basin would also require access for periodic cleanout of the flocculent. The basin would be constructed to provide storage for a 2 year storm event (60 cfs) with a minimum of 6 hours of detention time (30 acre feet).

Because the treatment is not located on the channel, obtaining the permits for this alternative is possible. MPCA would be the lead permitting authority.

Estimated installation cost for the chemical application method is $400,000. The annual operation, maintenance, power, precipitate removal and monitoring would be approximately $80,000.[16]

Onsite Chemical Treatment. This measure involves applying chemicals directly to the Rice Lake Wetland to "tie up" and reduce the mobility of phosphorus from wetland. Application would likely be done by helicopter or when conditions are frozen so equipment could be used to broadcast the chemical. During the scoping process, the State Agencies stated that a permit for this alternative would not be granted; therefore, our efforts to develop this alternative were terminated. Below are the following reasons why the permit would be rejected:

- The flocculate would not be able to be removed without destroying the wetland.
- Unable to determine the negative effect the chemicals would have on the wetland.
- Location of affected area was not determined within the wetland**.**
- Concern that the chemicals applied would adversely affect the wildlife and plants community

Wetland Isolation. This measure would route flows around the wetland thereby reducing the transport of phosphorus generated in the wetland to the larger system. A diversion channel would be constructed along the west side of the wetland, with its inlet upstream of Anchor Road and its outlet downstream of PR2a. The structure would split the flows between the diversion channel and the Rice Lake Wetland. Some flow would be allowed into the wetland in order to maintain plant life. To improve the hydraulics of the upstream flow split, Anchor Road would be raised and new culverts would be installed. Near the outlet of Rice Lake Wetland, near PR2a, an outlet control structure would also be built. This low level weir structure would not allow water out of the wetland except during large flood events.

The features of this alternative would serve to hydrologically isolate the surface water from the wetland therefore reducing the amount of phosphorus that reached Detroit Lake.

Upon farther investigation, it was determined that the soils around the west side of the wetland were not suitable for building and maintaining a diversion channel. The diversion channel would also cause lateral drainage effects on the wetland. Because of these factors detail planning on this alternative stopped and the ability to obtain permits was never fully researched.

[16] Memorandum dated February 15, 2006, from Mike Panzer, Wenck Associates Inc, to Tera Guetter, Pelican River Watershed District. The dollar amounts were adjusted to better fit the local conditions.

Wetland Excavation. Phosphorus laden soils would be removed from the wetland. The depth and area of the excavation would be determined by soil borings that would be taken throughout the wetland. Because the exact depth of the excavation is not known, a depth of ten feet was assumed for cost calculations.

Disposal of the excavated material would best be accomplished by spreading on agricultural land as a soil conditioner. The excavated material would be disked or incorporated into the soil by some other method. Assuming 6 inches of material could be placed over each acre, an estimate of 4,100 acres of land would be needed. The exact amount of material that could be spread on each acre would be determined for each field in order to not affect the land's crop yields.

Two grade stabilization structures would also be built to control any head cutting that could happen near the limits of the excavation area.

The advantage of this alternative is that it would remove the phosphorus laden soil from the area, thereby permanently eliminating the problem. However digging the material out may release other contaminates from the soil which could negatively impact the environment.

Installation cost for this alternative is $67 million.[17] Regardless of the excavation size, the cost and environmental affects are disadvantages to this alternative. Also, this alternative is not compatible with the DNR's and other agencies management plan for this wetland. As such, obtaining the permits needed for this alternative would be difficult. Additional detailed planning on this alternative stopped.

Wetland Restoration. Restoring the wetland would:

- Decrease mineralization of organic material thereby reducing phosphorus loadings to the Pelican River.
- Reduce lateral movement of wetland phosphorus laden porewater towards the channel.
- Increase runoff residence time through the restored wetland thus enhancing filtering/adsorption of phosphorus.

To restore the hydrology of the wetland, structures would be built within the stream channel to raise water to simulate pre-ditching surface/groundwater levels. Two locations have been identified:

1. At the outlet of Rice Lake Wetland. (Rice Lake Wetland Structure).
2. North of Hwy 34, upstream of the location where Sucker Creek enters Pelican River. (Lower Rice Structure)

Rice Lake Wetland Structure and Lower Rice Structure would be constructed as fixed crested weirs with two-five foot wide stoplog bays. The stoplog slots would be

[17] Base Price August 2006. Updated cost values from E.A. Hickok and Associates Report: "Clearwater River Chain of Lakes Restoration Project, Engineering Report, Upper Watkins Wetland Project # 81-7", September 1983, page 8.

constructed to allow for locking the stoplogs in place. The total weir length of 50 feet (fixed weir plus stoplog bays) was designed for having minimal pool bounce during runoff events.

Embankments on either side of the structure would be constructed to an elevation 3 feet higher than the weir runout. The embankments would have a top width of 10' and side slope of 3H:1V.

To prevent wash out of the embankment around the structure during extreme events, an auxiliary earthen/rock spillway would be provided to the west of the channel. Additional soil borings and survey information would be needed before construction.

Between the Rice Lake Wetland Structure and the Lower Rice Structure, the existing culverts through the adjacent access trail would be upgraded (the existing culverts are either crushed and/or sediment filled). Also in this reach, three ditch plugs would be created from existing spoil piles along the west side of the channel. Any unused spoil piles would be knocked down and blended into the existing landscape to the west of the channel. Ditch plugs and removal of the spoil banks would create sheet flow (wide width/low depth). Sheet flow should enhance the filtering and adsorption of phosphorus in the floodplain between the two structures.

In addition to the water quality benefits, restoration of Rice Lake Wetland would create open water areas which in turn would improve wildlife diversity.

Additional alternative components associated with Rice Lake Wetland restoration include:

- Replace farm crossing between Little Floyd and Anchor Road
- Improve Anchor Road
- Livestock exclusion from the stream, upstream of Anchor Road.

Description of Alternatives

The formulation process next considered combining feasible measures into alternative plans.

Plan 1. The No Action Plan – consists of foregoing the project and relying on existing programs for corrective action. Water quality would decline over time with plan 1 in place.

Plan 2. Implementation of chemical treatment plants and city development and zoning enforcement strategy. The preferred method to apply chemicals into the water is via an off-channel chemical treatment basin. The benefit of this plan is the high degree of confidence that the chemicals would remove phosphorus within the water column. A drawback to this plan is the ongoing expense of chemicals and general operation and maintenance. The plan includes chemical treatment facilities on Campbell Creek upstream of North Floyd Lake and on the Pelican River just downstream of CSAH 34. Existing programs available through the county, watershed district, SWCD, NRCS and

FSA would still continue. Water quality would be maintained in Floyd and Detroit Lakes with plan 2 in place.

Plan 3. An alternative plan consisting of restoring the Rice Lake Wetland and wetlands north of the Pelican River's confluence with Sucker Creek via the following components:

- Farm Crossing improvement
- Anchor Road improvement
- Rice Lake Wetland Structure
- Channel modifications
- Lower Rice Structure
- Chemical treatment or equivalent phosphorus reduction technology downstream of Rice Lake Wetland.[18]

This plan would also implement the city zoning/enforcement strategy. However, it does not include any measures on Campbell Creek. Water quality would be maintained in Detroit Lakes, but decline over time in Floyd Lakes with plan 3 in place. Existing programs available through the county, watershed district, SWCD, NRCS and FSA would still continue.

Plan 4. An alternative plan consisting of the components of Plan 3 plus accelerated conservation land treatment, streambank stabilization, and an off-channel sediment basin on Campbell Creek upstream of County Road 149. Existing programs available through the county, watershed district, SWCD, NRCS and FSA would still continue.
Water quality would be maintained in Detroit Lakes, Big and Little Floyd Lakes, and improved in North Floyd Lake with plan 4 in place.

Effect of Alternative Plans
The effects of alternative plans on the identified concerns are described below.

1. Cultural Resources

Future with plan 1 (no action). Plan 1 would have no effect on sites that would potentially be present in the project area since no earthmoving or ground disturbing activities would take place.

Future with plan 2. The Detroit Lakes location for the proposed chemical treatment area is within the city limits and any prehistoric or historic site more than likely would have been disturbed by previous improvements. Therefore, the installation of the chemical treatment system has a low probability of affecting anything that has not already been disturbed. The Floyd Lakes location for the proposed chemical treatment area would need to be studied once a specific location is identified.

[18] This corrective treatment is only for Rice Lake Wetland and it may not be needed. If required, the effects are the same as Plan 2. The installation costs of this system are borne by sponsors.

Future with plan 3. There is a moderate probability for encountering archaeological sites on the uplands adjacent to the proposed location of the Rice Lake Wetland structure, especially west of the channel. If structure installation would have subsurface impacts to the adjacent upland west of the channel, a cultural resources field assessment would be warranted. The proposed access road would also need to at least undergo pedestrian survey. The small upland formation east of and adjacent to the proposed Sucker Creek structure also has a moderate to high probability for containing archaeological sites. The locations of the three proposed culverts and ditch plugs are considered to have a low probability for containing archaeological sites. They are within the wetland basin and this area has been considerably disturbed by ditching or channelization of the Pelican River.

The proposed borrow area, southeast of the Rice Lake Wetland structure, is in a moderate to high probability setting for finding archaeological sites. This location would need to undergo a formal archaeological survey before any earth moving took place.

Future with plan 4. There is a moderate probability for encountering archaeological sites on the uplands adjacent to the proposed location of the Rice Lake Wetland structure, especially west of the channel. If structure installation would have subsurface impacts to the adjacent upland west of the channel, a cultural resources field assessment would be warranted. The proposed access road would also need to at least undergo pedestrian survey. The small upland formation east of and adjacent to the proposed Sucker Creek structure also has a moderate to high probability for containing archaeological sites. The locations of the three proposed culverts and ditch plugs are considered to have a low probability for containing archaeological sites. They are within the wetland basin and this area has been considerably disturbed by ditching or channelization of the Pelican River.

The proposed borrow area, southeast of the Rice Lake Wetland structure, is in a moderate to high probability setting for finding archaeological sites. This location would need to undergo a formal archaeological survey before any earth moving took place.

The additional proposals of conservation land treatment, streambank stabilization, and off-channel sediment basins on Campbell Creek could potentially have significant effects on cultural resources. The topography of the Campbell Creek area, upland knolls and hills adjacent to and overlooking the creek and surrounding environs, is a major factor in considering this area as a high probability setting for containing archaeological sites. Locations where tree plantings and the installation of tile and/or sediment basins is proposed would need to undergo formal archaeological survey. In addition, any proposed streambank modifications would also need to be investigated in the field,

2. Fish Habitat

Future with plan 1 (no action). Fish habitat within the watershed is rich and varied. Trophy Walleye, Northern Pike, and Muskellunge fishing is a major recreational activity

on Big Detroit Lake, and one trout stream flows into the lake. Little Detroit, Curfman, Floyd, and North Floyd also offer a varied fishery of bluegill, crappie, walleye and northern pike. However, if the current documented runoff of phosphorous continues to increase in Detroit Lakes, nutrient enrichment would continue to accumulate causing blue green algae blooms with associated oxygen depletion within the lake's water column. In particular, the sport fishery in Big Detroit Lake comprised of the cool water species of walleye, northern pike, and Muskellunge, would be expected to decline as a result of increased phosphorous causing lake eutrophication, decreased dissolved oxygen levels, and warmer water temperatures.

Future with plan 2. The existing sport fishery in Detroit Lakes would be expected to be maintained as it is, while the fishery in Floyd lakes would be expected to decline over time due to increased sedimentation.

Future with plan 3. The fish habitat would be expected to be maintained within Detroit Lakes. Fish habitat would degrade in Floyd Lakes due to continued upstream sedimentation. The trophy fishery of Big Detroit Lake and the walleye spawning areas in the channel below Sucker Creek would be protected from increased nutrient build up of phosphorous. The young of the year Northern Pike population could be better managed to prevent overpopulation into Big Detroit Lake. Based upon discussions with DNR Fisheries, no fish passage structures would be needed at the Rice Lake Wetland Structure. This is because the predominant fishery is an overpopulated, stunted population of northern pike that MN DNR wants to keep confined to the Rice Lake Wetland.

Future with plan 4. In addition to the fish habitat protected downstream of Rice Lake Wetland, the fishery habitat upstream of the wetland should be enhanced by reducing sedimentation and excluding livestock. The fisheries of North Floyd would see an improvement in fish habitat over time while Big and Little Floyd would maintain current fish habitat conditions. The trophy fishery of Big Detroit Lake and the walleye spawning areas in the channel below Sucker Creek would be protected from increased nutrient build up of phosphorous. The young of the year Northern Pike population could be better managed to prevent overpopulation into Big Detroit Lake. Based upon discussions with DNR Fisheries, no fish passage structures would be needed at the Rice Lake Wetland Structure. This is because the predominant fishery is an overpopulated, stunted population of northern pike that MN DNR wants to keep confined to the Rice Lake Wetland.

3. Human Health & Safety

Future with plan 1 (no action). The conditions for human health and safety would decline over time.

Future with plan 2. The chemical treatment system would be designed by a qualified engineering firm and reviewed by MPCA through the permitting process. The chemical treatment system would control the phosphorus levels entering Detroit and Floyd Lakes, maintaining public safety.

Future with plan 3. Improving Anchor Road would increase public safety by allowing local residents to use the road during high frequency storm events. Human health and safety would be maintained at current levels for the immediate Detroit Lakes area, however water quality may decline due to increased sedimentation into the Floyd Lakes.

Future with plan 4. Improving Anchor Road would increase public safety by allowing local residents to use the road during high frequency storm events. The land treatment improvements along Campbell Creek and the sediment basin(s) would reduce the amount of sediment entering North Floyd Lake. Human health and safety would be improved for the immediate area surrounding North Floyd, and maintained for areas surrounding Detroit Lakes and for the areas surrounding Big and Little Floyd Lakes.

4. Property Values

Future with plan 1 (no action). - Under the no action alternative, waterfront property values would decline as phosphorus loadings increase. Though local market conditions may take time to adjust, and property values may continue to rise, they would do so at a decreased rate. This would be directly related to the negative value assigned with poor water quality.

Future with plan 2. If water quality remains at its current level for Detroit and Floyd Lakes, the waterfront property values would remain constant or increase. Property values in the future would be based on markets conditions, though no negative impacts from poor water quality would be realized. The expected impacts of the zoning restrictions on property values are uncertain.

Future with plan 3. If water quality remains at its current level for Detroit Lakes, the waterfront property values would remain constant or increase. Property values in the future would be based on markets conditions, though no negative impacts from poor water quality would be realized. Conversely, the waterfront properties of the Floyd Lakes would likely decline with water quality. The expected impacts of the zoning restrictions on property values are uncertain.

Future with plan 4. Waterfront property values would likely increase on North Floyd Lake and remain at their current level for Detroit Lakes, Big and Little Floyd. Overall property values in the future would be based on markets conditions, though marginal impacts related to water quality would be realized. The expected impacts of the zoning restrictions on property values are uncertain.

5. Federally Listed Threatened Species and State Threatened, Endangered, and Species of Special Concern

Future with plan 1 (no action). Currently, the Bald Eagle and Trumpeter Swan are listed by the State as *threatened* animal species occurring within the watershed boundaries, as well as the Pugnose Shiner, a state listed Species of Special Concern.

There is one endangered and six threatened plant species listed by the State of Minnesota as occurring in Becker County. There are 13 plant and 13 animal species listed on the State Species of Special Concern (SPC) list as occurring in Becker County (Table 12C in Appendix C). In the near future, both the federally threatened Bald Eagle and the Gray Wolf may be de-listed as a result of targeted population re-establishment numbers of both species exceeding the original listed goal. The State has also established a Wolf Management plan to begin phasing in after de-listing. In the future, it would be expected that the State will continue to evaluate plant and animal species and their habitats for protection and recovery efforts.

Future with plan 2. Two federally *threatened* species, the Bald Eagle and the Gray Wolf, are listed as occurring with Becker County. Since there is no way to predict if either of these species may now occur within project construction or the Area of Potential Effects (APE), and since potential habitat does exist for both of these species, a consultation with the U.S. Fish and Wildlife Service is under way with a determination category of "may affect but are not likely to adversely affect the Bald Eagle and Gray Wolf". A similar consultation process will be initiated with the MN DNR Environmental Review Coordinator concerning the state listed *threatened* Trumpeter Swan, and the state listed *spc* Bald Eagle and Pugnose Shiner species listed as occurring within the UPRW boundaries, but which may or may not occur within the project "action areas".

Future with plan 3. Two federally *threatened* species, the Bald Eagle and the Gray Wolf, are listed as occurring with Becker County. Since there is no way to predict if either of these species may now occur within project construction or the Area of Potential Effects (APE), and since potential habitat does exist for both of these species, a consultation with the U.S. Fish and Wildlife Service is under way with a determination category of "may affect but are not likely to adversely affect the Bald Eagle and Gray Wolf". A similar consultation process will be initiated with the MN DNR Environmental Review Coordinator concerning the state listed *threatened* Trumpeter Swan, and the state listed *spc* Bald Eagle and Pugnose Shiner species listed as occurring within the UPRW boundaries, but which may or may not occur within the project "action areas". However, declining water quality in Floyd Lakes may adversely affect some of these species and their habitat.

Future with plan 4. Two federally *threatened* species, the Bald Eagle and the Gray Wolf, are listed as occurring with Becker County. Since there is no way to predict if either of these species may now occur within project construction or the Area of Potential Effects (APE), and since potential habitat does exist for both of these species, a consultation with the U.S. Fish and Wildlife Service is under way with a determination category of "may affect but are not likely to adversely affect the Bald Eagle and Gray Wolf". A similar consultation process will be initiated with the MN DNR Environmental Review Coordinator concerning the state listed *threatened* Trumpeter Swan, and the state listed *spc* Bald Eagle and Pugnose Shiner species listed as occurring within the UPRW boundaries, but which may or may not occur within the project "action areas". However, habitats may improve in North Floyd Lakes due to reduced sedimentation, and improved water quality.

6. Recreation Development

Future with plan 1 (no action). Under the no action alternative, recreation in the lakes would decline with water quality. The decrease in visitation would begin with swimmers, then impacting the fishers and boaters.

Future with plan 2. Detroit and Floyd Lake's recreation would remain at its current level.

Future with plan 3. Detroit Lake's recreation would remain at its current level. Water quality would decline in Floyd Lakes reducing swimming, fishing and boating activities.

Future with plan 4. Recreation on Detroit and Big and Little Floyd Lake's would be maintained at current levels. Recreation on North Floyd would improve.

7. Soil Erosion & Sedimentation

Future with plan 1 (no action). Ongoing local, state, and federal soil conservation programs would continue to promote land treatment to reduce soil erosion. Trends in overall soil loss and resulting sedimentation are a function of conservation funding. For example, if current CRP or CREP land is converted back to cropland, sedimentation would increase as soil erosion on these areas increase. Also, land use changes (i.e. cropland conversion to urban) can have an impact on sediment reaching Floyd or Detroit Lakes. With best management practices in place during construction of urban developments, upland erosion would be reduced. However, increased runoff volumes and rates from urban land use have the potential to increase streambank erosion and sediment transport.

The vast majority of current soil erosion and sedimentation issues within the project area are in the lower reaches of Campbell Creek. Some of the watershed's most severe cropland soil erosion occurs here. Also, the steep grade of lower Campbell Creek makes it susceptible to streambank erosion. For this plan, it is assumed that current soil conservation funding would continue into the future. Sediment loading to streams and lakes would remain unchanged.

Future with plan 2. Current erosion and sedimentation rates would remain unchanged. The chemical treatment would not reduce the amount of erosion within the watershed. A very minimal reduction in sedimentation to Detroit and Floyd Lakes would occur due to small amounts of sediment[19] that would settle out in the chemical treatment settling basins. The expected impacts of the zoning restrictions on water quality would be positive but the magnitude is unknown.

[19] The amount of sediment within the Pelican River at Highway 34 is very small due to the current filtering effect of Rice Lake Wetland.

Future with plan 3. Upland soil erosion would remain the same. Sedimentation from the Upper Pelican River would decrease with the installation of the wetland restoration practices due to the improved trapping efficiency of Rice Lake Wetland and Lower Rice Lake Wetland restorations. The expected impacts of the zoning restrictions on water quality would be positive but the magnitude is unknown.

Future with plan 4. Land treatment on highly erodible cropland soils adjacent to Campbell Creek would reduce the amount of upland erosion that occurs. Streambank stabilization along Campbell Creek would reduce streambank erosion and sediment transport. In addition to the improved sediment reductions from Rice Lake Wetland and Lower Rice Wetland restorations stated in plan 3, sediment yields from Campbell Creek to Floyd Lakes would be reduced due to the sediment basin. The expected impacts of the zoning restrictions on water quality would be positive but the magnitude is unknown.

8. Upstream Inundation

Future with plan 1 (no action). The current conditions and existing programs would continue. No effect on upstream properties would occur.

Future with plan 2. The chemical treatment plan would not affect upstream properties.

Future with plan 3. The Rice Lake Wetland and Lower Rice Wetland restorations would increase the current inundation area. Given the same discharge, the increased pool areas, in acres, are shown in Table 10 below.

Table 10 - Increased Pool Area

	Present Conditions			With Project		
Flow	Lower (ac)	Upper (ac)	Total	Lower (ac)	Upper (ac)	Total
Base	1	273	274	54	629	683
2 yr	8	616	624	107	738	845
10 yr	87	866	953	150	904	1054
100 yr	195	1025	1220	206	1022	1228

Purchase or easements of approximately 560 acres of private land would be required to complete the project. The majority of inundations effects to private property occurs upstream of Anchor Road. Inundation effects between present conditions and with project would not extend upstream of the farm crossing (center of section 11 T139N R41W) due to the upgrade of the existing crossing. Based on surveys of houses in the area upstream of Anchor Road, the first house west of the Pelican River would likely have increased groundwater impacts in the basement from the proposed restoration.

In addition to increased inundation areas during passage of peak flows, duration of inundation would be increased. For the Rice Lake Wetland restoration, duration of inundation for all elevations below 1353.0 water surface would be greater with the project in place. For Lower Rice Lake Wetland, this elevation of increased duration would be below elevation 1350.8. Table 12 below summarizes inundation duration

effects. An example interpretation for this table would be: Upstream of Anchor Road, elevation 1352.6 is inundated an average of 36 more days per year with project as compared with present condition. See Appendix C - Inundation Area/Duration Effects for details.

Future with plan 4. In addition to the effects listed in *Future with plan 3* above, the sediment basin(s) upstream of North Floyd Lake would result in an increased pool area and duration effects upstream along Campbell Creek. The inundation/duration area impacted by the sediment basin(s) would be purchased as part of this project.

Table 11 - Main Rice Lake Wetland Restoration - Additional Number of Inundation Days

Elevation of Increased Inundation	# of Days Increase (Upstream of Anchor Road)	# of Days Increase (North Pool of Main Rice Lake Wetland Inundation)	# of Days Increase (South Pool of Main Rice Wetland Inundation)
1352.0	333	351	363
1352.2	343	355	364
1352.4	92	92	87
1352.6	36	36	23
1352.8	13	15	6
1353.0	5	7	1
1353.2	4	3	< 1
1353.4	1	1	< 1
1353.6	< 1	< 1	0
1353.8	< 1	< 1	
1354.0	< 1	0	
1354.2	0		
1354.4			

9. Water Quality[20]

Future with plan 1 (no action). The degradation of lakes within the Upper Pelican River Watershed would continue. Current, future with-project, and future without-project in-lake phosphorus estimates are based on data analysis found in MPCA's "Water Quality Assessment of the Upper Pelican River Watershed" - 2002. Data from this report were used to estimate Future Without-Project Condition. Table 12 below summarizes that data. The estimated level for an impaired condition is 30 ppb.

[20] Due to the highly variable (spatially and temporally) and complex nature of wetland nutrient cycling, accurate estimations of water quality impacts of Rice Wetland restoration are impractical. The impacts assumed for plan formulation are based on the best available information and technical consensus/discussions among project technical partners (PRWD, MPCA, ARS, and NRCS). See Risk and Uncertainty section for details.

Table 12 - Current and Future Without-Project Total Phosphorus Concentrations

Lake Name	Current In-Lake Total Phosphorus Concentrations	Future Without-Project Total Phosphorus Concentrations
Little and Big Detroit Lake	18-24 ppb respectively	40 ppb
North Floyd Lake	37 ppb	52 ppb
Big and Little Floyd Lakes	14-20 ppb respectively	20 -28 ppb

The Future Without-Project Condition assumes no reduction in loadings/concentrations from PR3 and internal phosphorus recycling within the lakes becomes significant. See Appendix C Determining Lake's Future With- and Without-Project Conditions for details.

Future with plan 2. The chemical treatment system would reduce the amount of phosphorus that enters Detroit and Floyd Lakes. The water quality would stabilize in these lakes. The expected impacts of the zoning restrictions on water quality would be positive but the magnitude is unknown.

Future with plan 3. Assumes P_{total} concentrations at PR3 (Upper Pelican River at Hwy 34) are reduced by at least 50% (95 ppb to 40-50 ppb). With nutrient loading reductions of this magnitude, frequency of algae blooms would remain the same in Detroit Lakes. Conditions in Floyd Lakes would continue to decline as shown in Table 12. The expected impacts of the zoning restrictions on water quality would be positive but the magnitude is unknown.

Future with plan 4. In addition to *Future with plan 3* above, streambank stabilization, land treatment, and the sediment basin(s) along Campbell Creek would reduce the sedimentation and total phosphorus loading by at least 50% entering North Floyd Lake. From MPCA water quality modeling of this condition, frequency of algae blooms would decrease and lead to overall improved water quality in North Floyd Lake. Conditions in Detroit, Big and Little Floyd Lakes would maintain their current water quality conditions. The expected impacts of the zoning restrictions on water quality would be positive but the magnitude is unknown.

10. Wetlands

Future with plan 1 (no action). The decline of Type 3 and Type 4 Wetlands would continue with the proliferation of cattails in Rice Lake Wetland. Eutrophication of Rice Lake Wetland would be further accelerated. The shoreline wetland habitat of Big Detroit Lake would be altered by continued nutrient enrichment with the proliferation of undesirable summer algal blooms. The existing wetlands would be expected to continue losing their intrinsic value and function over time. Plant and animal species composition and related biodiversity would be expected to be permanently altered in the Frank WMA.

Future with plan 2. The decline of Type 3 and Type 4 Wetlands would continue with the proliferation of cattails in Rice Lake Wetland. Eutrophication of Rice Lake Wetland would be further accelerated. The shoreline wetland habitat of Big Detroit Lake would be altered by continued nutrient enrichment with the proliferation of undesirable summer algal blooms. The existing wetlands would be expected to continue losing their intrinsic value and function over time. Plant and animal species composition and related biodiversity would be expected to be permanently altered in the Frank WMA. Existing wetland function and value would be expected to be maintained in Detroit Lakes, but would be expected to decline over time in Floyd Lakes due to increased sedimentation.

Construction may impact existing wetlands. Any wetlands impacted by construction activities would be mitigated in compliance with NEPA and the Minnesota Wetland Conservation Act (WCA). Mitigation of all impacted wetlands would comply with all federal state and local permit guidelines issued for the project.

Future with plan 3. Within the Rice Lake Wetland Complex, the project would increase wetland depths by an average of 2 feet establishing a new wetted perimeter, fringe area of approximately 78 acres. This would create additional saturated soils within this expanded fringe area, and as a result, more favorable Type I wetland vegetation could be restored to replace the existing rank growth of stinging nettle and reed canarygrass occurring without the project. In addition, approximately 462 acres of Type 2 through 7 wetlands would be created or enhanced. This enhancement includes approximately 178 acres of Type 3 wetland acres in which the project would enhance needed primary nesting and brooding habitat for several species of migratory waterfowl occurring within the Frank WMA. The proposed project would increase depth and duration of flooding on all of the partially drained Rice Lake Wetlands**.** Degraded Type 2 through Type 4 Wetlands would be restored and enhanced in the Rice Creek Wetland from present conditions of 434.2 acres to 896 acres with the project. The amount of the prolific cattail growth may be reduced based upon increased water levels, thereby increasing species composition and related biodiversity of the Frank WMA. The function and value of existing wetlands in Detroit Lakes would be maintained, but may decline over time in Floyd Lakes due to expected annual increases in sedimentation from upstream sources.

Construction may impact existing wetlands. Any wetlands impacted by construction activities would be mitigated in compliance with NEPA and the Minnesota Wetland Conservation Act (WCA). Mitigation of all impacted wetlands would comply with all federal state and local permit guidelines issued for the project.

Future with plan 4. Within the Rice Lake Wetland Complex, the project would increase wetland depths by an average of 2 feet. This would establish a new wetted perimeter fringe area of approximately 78 acres. This would create additional saturated soils within this expanded fringe area, and as a result, more favorable Type I wetland vegetation could be restored to replace the existing rank growth of stinging nettle and reed canarygrass occurring without the project. In addition, approximately 462 acres of Type 2 through 7 wetlands would be created or enhanced. This enhancement includes approximately 178 acres of Type 3 wetland acres in which the project would enhance needed primary nesting and brooding habitat for several species of migratory waterfowl

occurring within the Frank WMA. The proposed project would increase depth and duration of flooding on all of the partially drained Rice Lake Wetlands. Degraded Type 2 through Type 4 Wetlands would be restored and enhanced in the Rice Creek Wetland. The amount of the prolific cattail growth may be reduced based upon increased water levels, thereby increasing species composition and related biodiversity of the Frank WMA. The wetland function and value in Detroit Lakes would be maintained in Detroit Lakes, and Big and Floyd Lakes, but would be expected to improve in North Floyd Lakes due to reduced sedimentation and improved water quality with the implementation of the planned sediment basins.

Construction may impact existing wetlands. Any wetlands impacted by construction activities would be mitigated in compliance with NEPA and the Minnesota Wetland Conservation Act (WCA). Mitigation of all impacted wetlands would comply with all federal state and local permit guidelines issued for the project.

11. Wildlife Habitat

Future with plan 1 (no action). Upland Wildlife habitat is already rich and diverse within the watershed. However, the wetland habitat of the Rice Lake Wetland would continue to be overgrown with cattails and reed canary grass. As a result, the already declining waterfowl habitat would be further reduced.

Future with plan 2. Upland Wildlife habitat is already rich and diverse within the watershed. However, the wetland habitat of the Rice Lake Wetland would continue to be overgrown with cattails and reed canary grass. As a result, the already declining waterfowl habitat would be further reduced.

Future with plan 3. Waterfowl nesting and food habitat within the Rice Lake Wetland would be enhanced. With the eventual decline of cattails in the deeper pool areas created by the structure, more diving ducks such as Canvasbacks and Redheads would be attracted during the spring and fall migrations. This alternative provides opportunity to manage more desirable wetland vegetation. The Frank WMA would be enhanced for waterfowl hunting, and wildlife watching. The wetland restoration upstream of the Lower Rice Structure would also restore wetland habitat for waterfowl and shorebirds

Future with plan 4. In addition to the improved waterfowl habitat in Plan 3 above the Rice Lake Wetland, the reduction of sedimentation and improved water quality would attract more puddle and diving ducks both to the Upper Pelican River Watershed area. An entire new wetland restoration upstream of the Lower Rice Structure would create new wetland habitat for waterfowl and shorebirds. The Frank WMA would be enhanced for waterfowl hunting, and wildlife watching.

Comparison of Alternative Plans

For plans 1 through 4 the major items used in the decision making process are summarized in the Table 13:

Table 13 - Comparison of Alternative Plans

Effects	Plan #1 (No Action)	Plan #2	Plan #3	Plan #4 (Recommended)
Measures	None	Chemical Treatment System	2 Structures (Rice Lake Wetland & Lower Rice), raise Anchor Road, and channel work	Along Campbell Creek: streambank stabilization, land treatment, and sediment basin(s) upstream of North Floyd Lake. Rice Lake Wetland: 2 Structures (Rice Lake Wetland & Lower Rice), improve Anchor Road, and channel work.
PROJECT COSTS				
Installation	$0	$750,000	$1,448,900	$2,206,000
O&M&R		$2,765,350	$80,120	$120,670
Total		$3,515,350	$1,529,020	$2,326,670
Average Annual		$179,440	$75,220	$114,470
PROJECT ENVIRONMENTAL EFFECTS				
Water Quality	Water quality in Detroit and Floyd Lakes declines	Water quality in Detroit and Floyd Lakes is maintained at current levels.	Water quality in Detroit Lakes is maintained at current levels. Water quality in Floyd Lakes declines	Water quality in Big Floyd, Little Floyd and Detroit Lakes is maintained at current levels. Water quality improvements in North Floyd Lake
Soil Erosion & Sedimentation	No change	Minimal reduction in sediment to Detroit and Floyd Lakes	Reduces sedimentation to Detroit Lakes	Reduces upland/streambank erosion, and sedimentation to Floyd and Detroit Lakes
Fish Habitat	No change	Detroit lakes fishery would be maintained, while Floyd Lakes habitat would decline	Detroit lakes fishery would be maintained, while Floyd Lakes habitat would decline. The northern pike, muskellunge, and walleye trophy fishery of Big Detroit Lakes would be protected from nutrient buildup by phosphorous.	Detroit lakes fishery would be maintained, while Floyd Lakes habitat would decline. The northern pike, muskellunge, and walleye trophy fishery of Big Detroit Lakes would be protected from nutrient buildup by phosphorous. The fishery in Floyd Lakes would be protected from increased sedimentation.
Wildlife Habitat	No change	No change	Waterfowl Habitat would improve in the Rice Lake Wetland Complex.	Waterfowl Habitat would improve in the Rice Lake Wetland Complex.
Wetland Impacted	No change	No change	6.48 acres filled/drained	6.48 acres filled/drained
Wetland Restored	No change	No change	461.8 acres of wetland functions and values would be maintained, created, or enhanced.	461.8 acres of wetland functions and values would be maintained, created, or enhanced.

Risk and Uncertainty

Rice Lake Wetland Loadings

Nutrient cycling and sedimentation processes within a wetland landscape are very complex. Several years of research and data analysis by different groups has not lead to a singular, predictable cause and effect relationship of the phosphorus loading through Rice Lake Wetland. After evaluation of all data, including reports and research on projects with similar conditions, and consultation with PWRD, ARS, MPCA technical staff, the most practical approach for Rice Lake Wetland phosphorus reduction would be restoration of the wetland's pre-ditched hydrology. Significant effects of this plan would be:

- Wetting and drying effects on the organic soils would be reduced which in turn would reduce phosphorus mineralization (soil phosphorus fractionation tests showed that over 50% of the wetland's soil phosphorus is in organic form).

- Restoration of the wetland will produce a level pool which turn should eliminate lateral hydraulic gradients from the wetland to the drainage ditch. This would reduce movement of phosphorus laden porewater to the drainage ditch.

- Retention time of runoff within the wetland will be extended. This would increase settlement of phosphorus associated with solids (dislodged organic material, sediment, etc.) and increase the potential for phosphorus uptake by vegetation.

There are certain outcomes from a wetland restoration plan that could potentially have a negative impact. These are outlined below along with possible mitigation measures.

1. The organic "mat", or layer in which the wetting and drying are occurring, may simply float when the water level is raised, thereby having only minimal effect on wetting/drying cycle.

    - From the soil logging performed by NRCS in June, 2004 the floating mat area was estimated to be approximately 25% of wetland (see Appendix B for a map of the estimated floating mat area). The remaining 75% should remain at the same elevation and therefore saturate if the water level is raised gradually as planned. In addition, although 25% would still be subject to the current wetting/drying and therefore release phosphorus, the efficiency of the wetland to flush the phosphorus out would be greatly reduced due to the elimination of lateral hydraulic gradients.

    - Monitoring of the floating mat should occur. The monitoring plan should include taking photos of the Rice Lake Wetland Complex. The photos should be taken to document the movement of the mat over

time. The photos and any notes taken should have a date recorded on them so in the future a pictorial history of the mat can be reviewed.

2. When the wetland is restored and water levels increase, phosphorus currently tied up as iron oxide complexes could be released. This possibility was pointed out in ARS research conducted during 2004-2005. Phosphorus, when mineralized out of the organic pool, is either flushed out of the mat by rainfall/groundwater flows to the ditch in a dissolved state or, if the mat remains aerated, complexes with iron oxides. Upon flooding, iron is reduced by microorganisms utilizing the iron as an alternative electron acceptor to oxygen. As iron is reduced, it releases the complexed phosphorus into the porewater. An initial flush of phosphorus may occur during the initial inundation period as iron is reduced.

    - It is likely that only a portion of Rice Lake Wetland has the potential to release phosphorus from iron oxides in quantities suggested by ARS soil column experiments. This is due to the widely varying soil/hydrologic conditions across the wetland. Evidence of spatially variability across the wetland include:

        A. ARS research showing significant release of iron bound phosphorus under reducing (anaerobic) conditions applies to soil cores taken from the north part of the wetland. The south soil core experiments did not show this same level of release. Regarding the south core experiment, Erin Berryman's thesis states: "ANOVA showed no significant effects of water table treatments or sample position (upper (U) or lower (L)) on either DRP concentrations or cumulative mass of phosphorus removed from the columns." Berryman's thesis continues on to say: "The magnitude of mean dissolved reactive phosphate (DRP) release was 7 to 200 times higher for the North columns than the South."
        B. Soil fractionation analysis show 30 percent more phosphorus in the north cores than in the south cores.
        C. In 2004, in-situ peeper sampling shows porewater phosphorus concentrations to be 7 times higher in the north than the south (2.03 ppm and 0.29 ppm respectively).
        D. In 2005, two more in-situ peeper sample sites (East and West) were added. North peeper porewater phosphorus concentrations averaged 2.5 to 4.5 times higher readings than the East/West/South peepers.

    - Any initial phosphorus flush from the restored wetland will flow downstream through the lower Rice Wetland Structure which will reduce phosphorus loadings via particle settling and vegetation uptake.

    - The Saint Paul Regional Water Services has implemented a very similar project on Lambert Creek in Ramsey County, Minnesota. Lambert Creek exhibited cyclic phosphorus loadings from drained

wetlands. Concentrations and loadings were higher during wet periods that followed dry periods. Two outlet structures were installed on at the outlets of Rice Lake and Grass Lake to restore water levels to pre-drained conditions. The following summarizes the results of this project (from Bruce Wilson - MPCA):

A. Substantial stabilization of phosphorus loading over dry to wet years - smoothing the peaks for wetlands that were previously subject to drying and oxidation and then inundation causing phosphorus mobilization. The water level stabilization resulted in substantial reductions of phosphorus loss going from the dry 1996 time period to the wetter subsequent years versus very large measured pulses following the dry 1987 and 1990 time periods.
B. 15-25% reductions in impoundment total phosphorus concentrations for pre- and post-impoundment time periods were recorded.

- The Pelican River Watershed District will continue water quality monitoring throughout the watershed over the life of the project. If TP conditions at PR3 monitoring station do not improve, or begin to show unacceptable/sustained elevated phosphorus loadings then the PRWD would have the following options:

A. Remove stoplogs in the restored Rice Lake Wetland structure returning the wetland to its original drained state
B. Install a chemical treatment system downstream of CSAH 34.

3. Because of the uncertainty and assumptions in hydraulic routing through wetlands (effective flow areas, roughness estimations, beaver dam activity, variable groundwater flow contributions, etc.), achieving an exact pool average elevation and predicting upstream inundation areas is extremely difficult.

- The models were calibrated to actual storm events - some fit well, others do not. To accommodate the many variables that effect pool elevations and the resulting inundation areas, both structures would be designed with adjustable (i.e. stoplogs) runout elevations. After a few years of operation and monitoring, the actual outlet configuration/pool elevation/upstream inundation relationship would become predictable. During these initial few years, a “conservative” operation plan would be used (keep the pools lower than final, long term pool elevation).

- Operating plans for the structures will be developed by the sponsors and state agencies.

Other Project Risk & Uncertainty

- Impacts of Sucker Creek land use/livestock changes. Sucker Creek enters the Pelican River downstream of the proposed Lower Rice Wetland Structure. The recommended plan measures are located such that they won't have any effect on that tributary's water quality should it degrade in the future.

- Impacts of increased urbanization. The development and zoning enforcement and restrictions are provisions to address significant land use conversion from non-urban to urban land uses. Increased runoff volumes/rates can have an adverse effect on stream stability. Also, lake shore residential developments, if installed without BMP's (i.e. lake side buffers, certified septic systems, minimizing impervious areas, etc.) can have an adverse effect on lake water quality. Until the exact zoning restrictions and methods of enforcement are determined, it is not possible to estimate their impacts. It can be expected that these provisions will have a positive impact on water quality.

- Benefits Estimation Sensitivity Analysis. Currently, future in-lake phosphorus concentrations absent the project could not be predicted with certainty. Without having a projection of future phosphorus increases, the following scenarios were used in the benefit analysis and were based on best available information and consultation with MPCA: 1) a 10 year linear increase of in-lake phosphorus concentrations from the baseline, 24 ppb, to a future in-lake concentration of 40 ppb, 2) a 25 year linear increase from the baseline to future, and 3) a 50 year linear increase from baseline to future. Scenario one can be viewed as a worst case scenario, while scenario four may be viewed as the most likely scenario. Under these scenarios water quality would decline and recreation days and housing values would be lost. These lost values are the project benefits. Based on the third scenario, the projected average annual benefits of the project are $137,300. However because of the uncertainty in the future conditions without project, the annual project benefits estimated using scenario one could be $383,100.

Rationale for Plan Selection

The selected plan has the best potential to achieve the phosphorus reductions recommended by MPCA in addition to providing for significant improvement to wildlife habitat. Also, the selected plan has the formal support of Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Pelican River Watershed District, U.S. Army Corps of Engineers, City of Detroit Lakes, Becker County Soil and Water Conservation District. Because of its broad, interagency support, this plan is the least likely to encounter permit issues.

Plan 4 is the recommended plan. This plan addresses the sponsor's environmental concerns for the Upper Pelican River Watershed, the goals outlined in the CWP Working Paper, and results in positive net benefits. By reducing the sediment erosion within

Campbell Creek Watershed, the Floyd chain of lakes and all areas downstream would benefit. The restoration of Rice Lake Wetland in the Frank WMA would help restore common cattail around the edge of the shallow open water shoreline edge, and reduce or eliminate narrow leaf and hybrid cattail which now dominate the open water area. The restoration would allow opportunities for wetland vegetation management within the wetland.

Plan 1 is the no-action plan. It is not an acceptable solution for the sponsors to address the watershed problems.

Plan 2 would reduce the phosphorus levels in the stream before the water entered Detroit Lakes, but the ongoing costs for chemicals and maintenance is not acceptable to the sponsors at this time. If the recommend plan doesn't reach the water quality established, this plan would be considered for implementation in the future.

Plan 3 would provide wetland restoration to Rice Lake Wetland and wetlands north of Sucker Creek, but would not help the Floyd Chain/Campbell Creek reach. Although this plan results in positive net benefits, it does not meet the objectives of the sponsors for the Upper Pelican River Watershed.

CONSULTATION AND PUBLIC PARTICIPATION

On November 6 & 7, 2001, the Water Resources Staff (WRS) met with the Pelican River Watershed District (PRWD) in Detroit Lakes to learn from local leaders about the water quality problems in the watershed primarily in the Campbell/Rice Lakes area. The meeting also allowed NRCS to discuss the nature of a pre-application study for the benefit of the local people.

WRS reviewed all the gathered information and reports. On April 11, 2002, the WRS team met and concluded the analysis by PRWD and MPCA satisfies the PL-566 pre-application process. WRS also concurred that this proposed project meets the requirements for a PL-566 project; therefore, WRS encouraged PRWD to submit a formal application request.

The formal request was submitted to the State Appointing Authority on October 30, 2002. The State Appointing Authority accepted the application and assigned it a high priority ranking on December 4, 2002. NRCS received a valid application for PL-566 assistance on December 13, 2002.

Detailed planning was authorized on December 13, 2002. A watershed citizen advisory committee (CAC) and technical committee was formed to assist the sponsors and NRCS in the formulating a watershed plan. Several alternatives were studied over the next several years. Informational public meetings were held on September 26, 2002 and January 8, 2004.

The CAC held meetings on July 1, 2003 and January 11, 2005.

Several meetings were held with the project technical partners throughout the development of the watershed plan. These meetings were held on the following dates:

2002	**2003**	**2004**	**2005**	**2006**
April 9	January 10	January 9	January 11	April 18
June 27	July 1	February 24	July 27	July 12
August 5		April 26	November 22	December 20
		October 28		

A presentation of the recommended plan was made to the Pelican River Watershed District Board on July 20, 2006.

Informal consultation with the Minnesota State Historic Preservation Office (MN SHPO) has been conducted regarding the project. Until a plan is selected, formal consultation with the SHPO and the commencement of field investigations, in accord with the State Level Agreement between NRCS and the MN SHPO and in accord with NRCS responsibilities under Section 106 of the National Historic Preservation Act, will be in abeyance.

Consultation will be initiated with all eleven federally recognized Minnesota Indian tribes and any tribes outside of Minnesota, that have been identified, that may attach religious or cultural significance to the project area (all tribes listed on page 2-3).

MN NRCS will follow 36 CFR 800.13 for all post-review discoveries. This includes when cultural resources are discovered or unanticipated effects on cultural resources are found before or after MN NRCS has completed the section 106 process.

All undertakings involving human remains on private property are subject to the Private Cemeteries Act (Minnesota Stat. Ann. 307.08) and possibly the Native American Graves Protection and Repatriation Act (NAGPRA). If human remains are discovered during and NRCS undertaking, all work shall cease and any human remains should be protected in place. The MN NRCS Cultural Resources Specialist (CRS) and the appropriate MN NRCS Assistant State Conservationist for Field Operations should be notified immediately. The Minnesota CRS will notify the Minnesota State Archaeologist in accord with MN Statute 307.08.

RECOMMENDED PLAN

Purpose and Summary

Plan 4 is the recommended plan for the Upper Pelican River Watershed. The purpose of the project is to improve water quality, as well as, to enhance wetland values and functions with associated enhanced wetland fish, wildlife, and waterfowl habitat. The plan consists of the following components with their general locations identified in Figure 3 and 6 below:

Campbell Creek (Figure 3)

- Cropland on the west side of stream (Section 33 - T140N/R41W)
  - Installation of three water/sediment control basins
  - Installation of 1,500 feet of underground outlet.
  - Tree plantings along the channel.
- Cropland on the east side of stream (Section 33 - T140N/R41W)
  - Installation of 4,500 feet of tile
  - Installation of ten water/sediment basins
  - Installation of 2,000 feet of waterways
  - Installation of one block chute
  - Tree planting along the channel.
- Streambank Stabilization between cropland described above and CC1
- Sediment basin on Campbell Creek north of County Road 149.
- Installation of a fence to exclude livestock from the stream.
- Installation of a livestock watering system

Rice Lake Wetland Complex (Figure 6)

- Replace farm crossing between Little Floyd outlet and Anchor Road
- Installation of a fence to exclude livestock from the stream
- Installation of a livestock watering system
- Raise Anchor Road and install new culverts
- Installation of a structure at the outlet of Rice Lake Wetland
- Installation of 2 ditch plugs between the Rice Lake Wetland Structure and Lower Rice Structure
- Installation of a structure on Pelican River, north of Sucker Creek (Lower Rice Structure)
- Replace historic outlet's culvert

Figure 3 - Campbell Creek Area

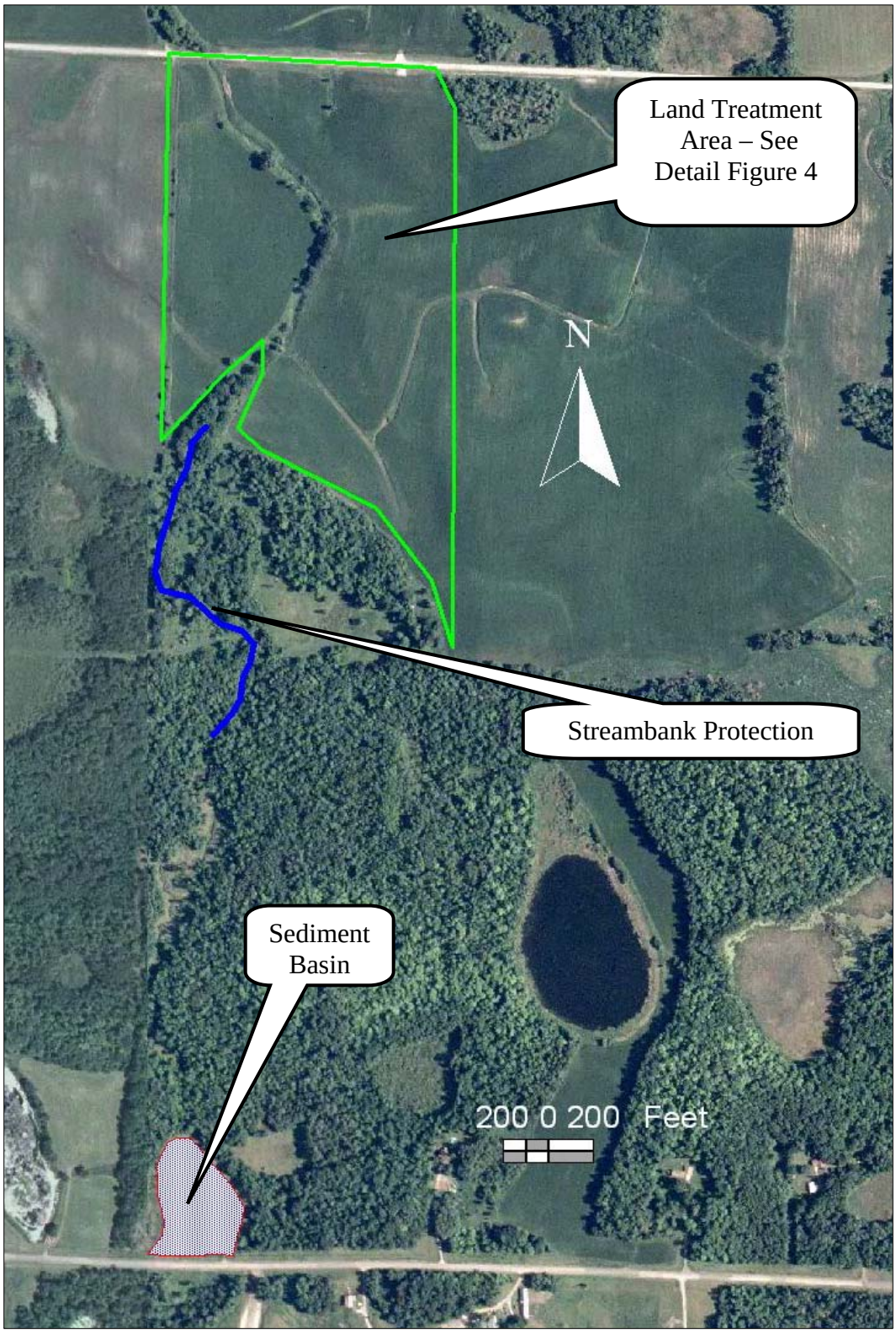
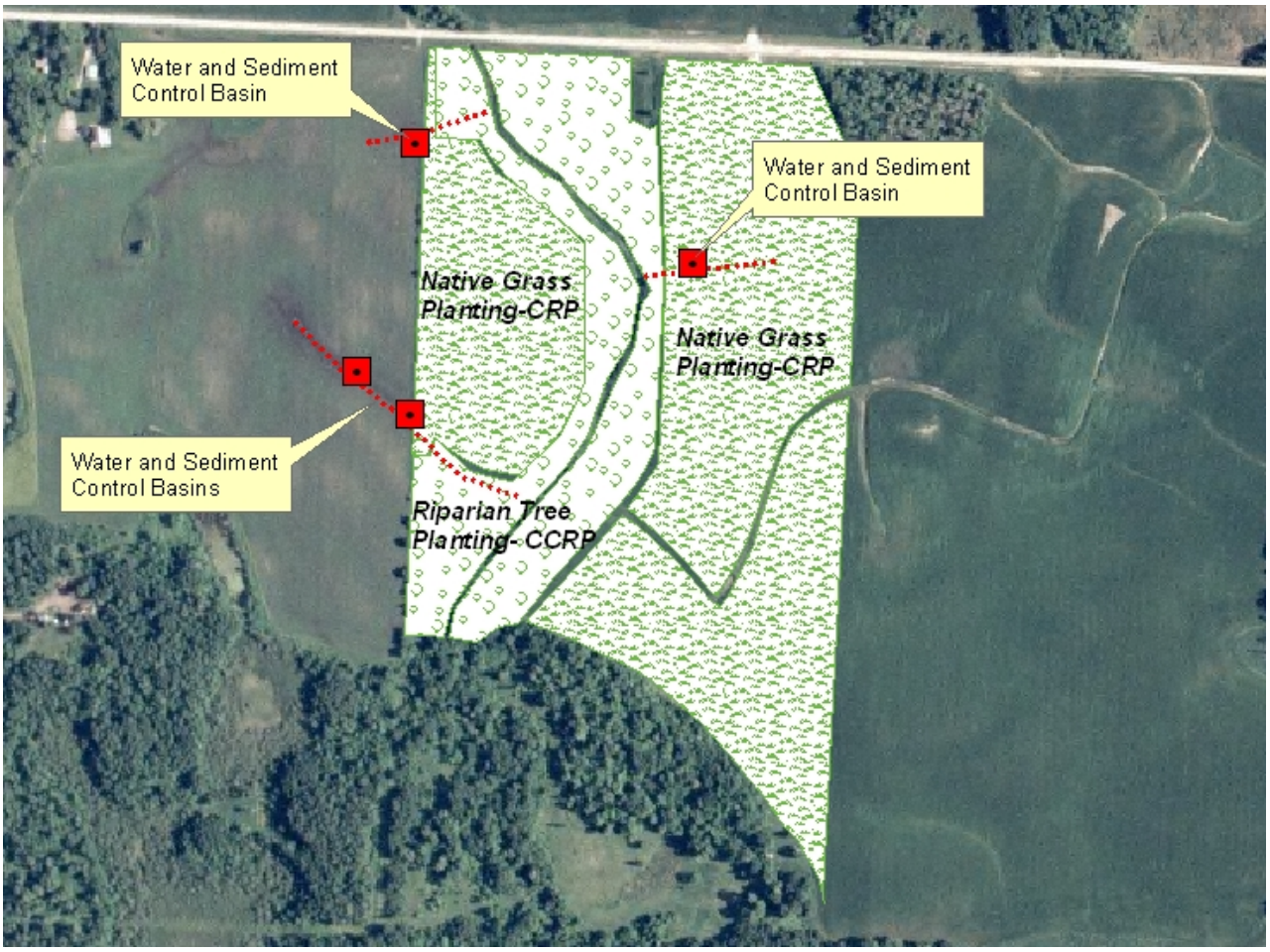


Figure 4 – Campbell Creek Land Treatment Detail



Campbell Creek

Land Treatment

The number of water and sediment control basins and grassed waterways were based upon NRCS guidelines. The exact locations for the measures are not yet identified.

Livestock Exclusion and Watering System

Fencing would be installed along Campbell Creek to keep livestock out of the stream. A livestock watering station would also be installed.

Stream Bank Stabilization

Stabilize the stream grade and banks along Campbell Creek in the reach through Section 33, Richwood Township. Rock and/or bio-engineering techniques would be used to protect the stream bank. The exact locations will be determined in the field.

Sediment Basin

A proposed sediment basin near CC1 was determined to be the best spot for a sediment basin. The Lower Campbell Creek Sediment Basin (LCCSB) flow through detention structure has an estimated 45-65% sediment trapping efficiency. This will result in a 28-39% reduction in total phosphorus loading. Figure 5 shows the proposed boundary of the preliminary sediment basin design.

Inflow Structure. A 20 feet wide, sill elevation of 1383.5', lateral stoplog structure parallel to the Campbell Creek would divert flows into the sediment basin. Each stoplog bay would have the ability to add 3.5 feet in each bay.

In-stream Structure. A 10 feet wide stoplog structure would be built directly in Campbell Creek approximately 50 feet downstream of the lateral weir. The in-stream structure weir bays would have stoplogs in place during the diversion season (snowmelt through July 1st) forcing all water through the sediment basin.

Sediment Pool. A sediment storage pool would be created by excavating and reshaping existing topography down to an elevation of 1379.0. Stormwater storage/sediment settling would be within the excavated permanent pool area in addition to above ground storage created by a 1,700 foot long containment dike. The dike would have a top elevation of approximately 1388.0 (maximum routed pool elevation + 3 feet) making it approximately 8 feet high at its maximum height. The 3.25 acre permanent pool would be 3.5 feet deep creating 11 acre-feet of storage for sediment.

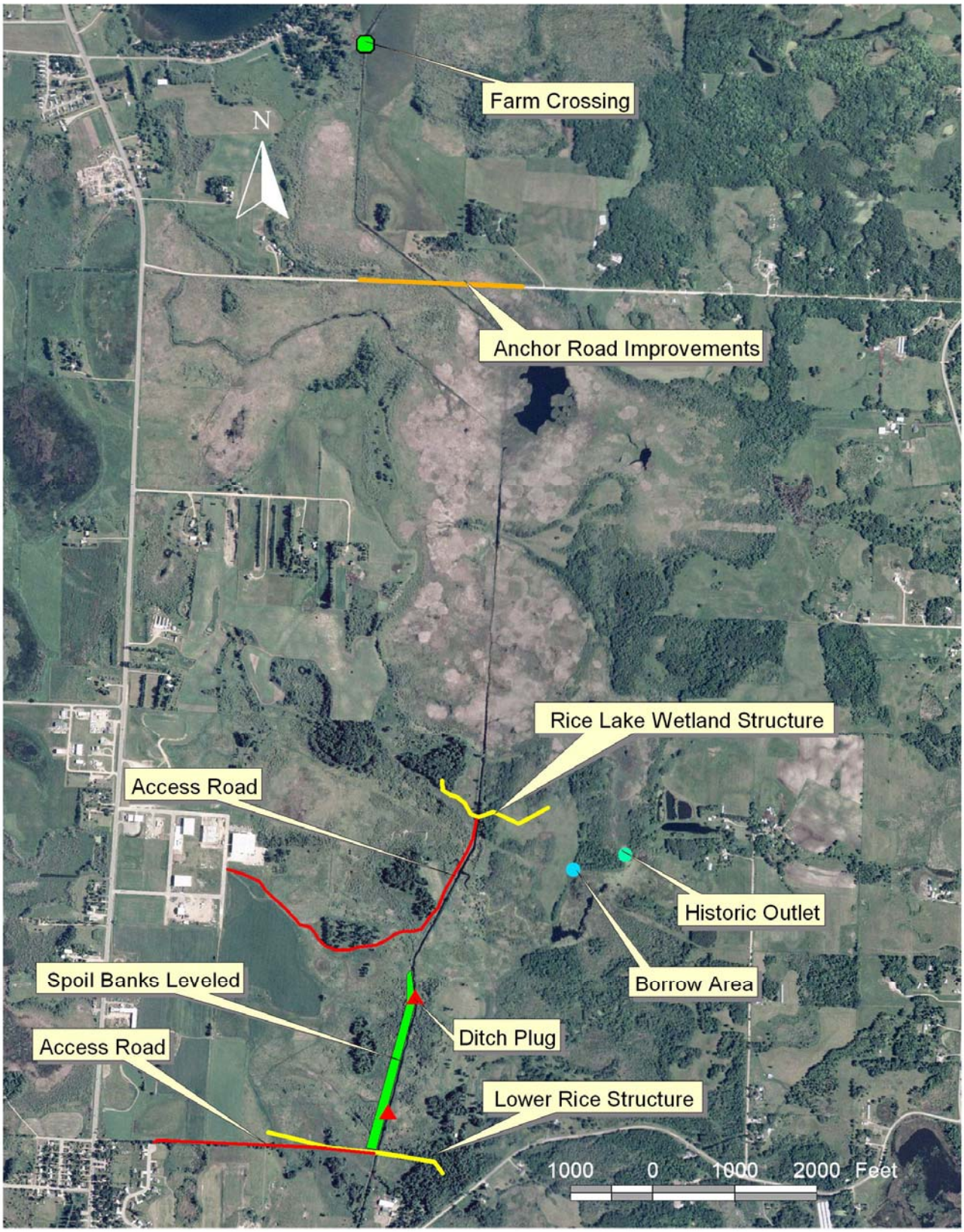
Approximately 100 feet downstream of the lateral weir, within the sediment basin, a 250 foot long rock "leveler" would be constructed. The purpose of the rock leveler is to spread out the flow evenly across the sediment basin, enhancing sediment settling characteristics. The rock would have a top elevation of 1383.0 and be about 4 feet high. The area between the lateral inlet weir and rock leveler is referred to as the sediment basin forebay.

Figure 5 - Lower Campbell Creek Sediment Basin Plan View

Outlet Structure. The outlet structure(s) are assumed to have a pipe barrel/riser configuration. The riser and pipe have 4 foot and 3 foot diameters respectively. The outlet would be set at 1383.0 feet. The structure(s) would outlet into the road ditch north of County Road 149. The LCCSB-Flow Through configuration would require two structures. One advantage in having two outlet structures is the flows spread out more across the sediment pool, enhancing sedimentation and reducing potential re-suspension of sediments.

Bypass Flows. The LCCSB-Flow Through configuration would not be manipulated to control bypass flows. All stream flows would flow through the sediment basin. The lateral weir structure, however, could be shut off with stoplogs to allow for cleanout, maintenance, etc. of the sediment basin/outlet structures.

Figure 6 - Rice Lake Wetland Complex



Rice Lake Wetland Complex

Farm Crossing

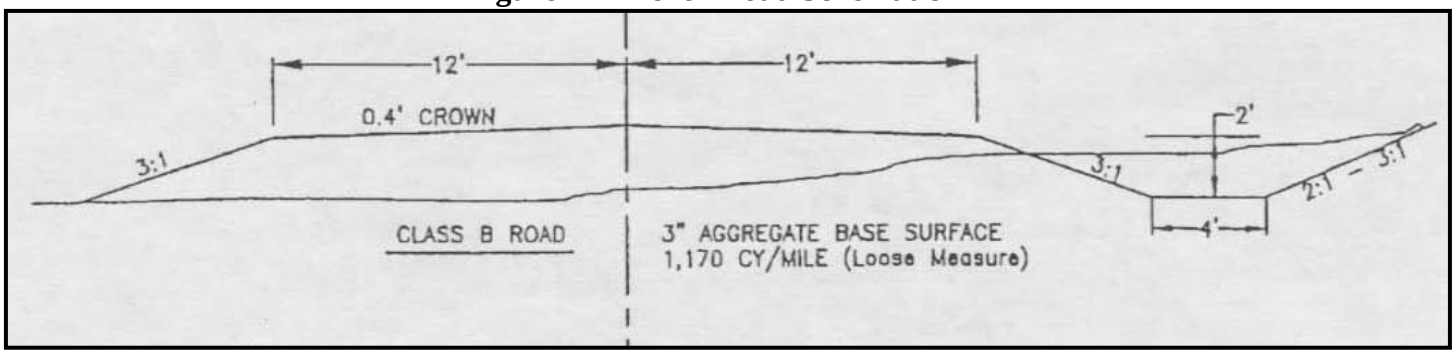
The existing farm crossing would be replaced with a Texas crossing. A Texas crossing consists of over excavating a 12' wide slot perpendicular to the stream and then backfilling the void with gravel and larger rocks to the same elevation as the stream bed on either side of the slot.

A livestock watering station would be installed. Fencing would be installed along the river to keep the livestock out of the stream.

Anchor Road

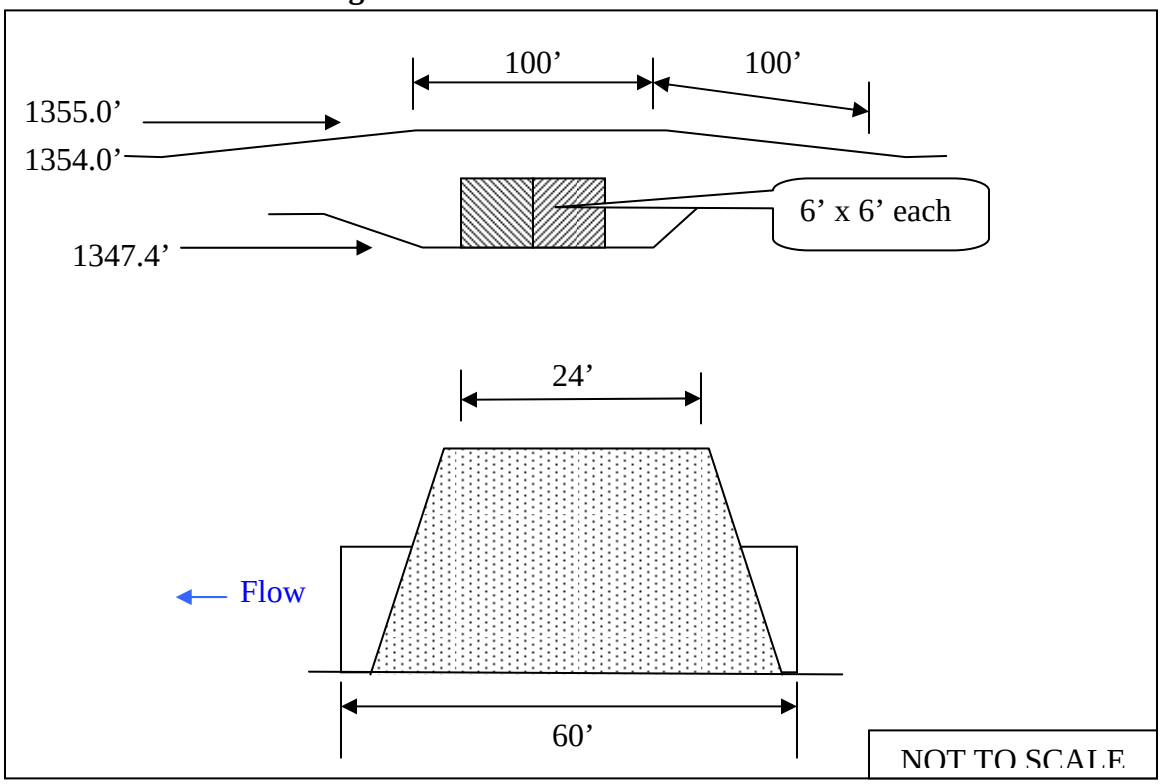
The improved Anchor Road would meet the county's 'class B road' guidelines (24 foot graded to width, 3:1 in slopes, 2 feet ditch separation, 4 feet ditch bottom, 3:1 back slopes, 3 inch aggregate surface @ 1,170 cubic yards per mile).

Figure 7 - Anchor Road Schematic



The existing 48" CMP's would be removed and two 60 foot long, 6' x 6' concrete box culvert would be installed. Road gravel would be added to raise Anchor Road to 1355.0' over the culverts and to 1354.0' for the rest of the road. 0.5 acres of wetland along the road would be impacted. Detroit Township will assume O&M on the road once construction is completed.

Figure 8 - Anchor Road Profile



A public access parking area would be constructed along the south side of Anchor Road and east of the channel. The parking area would be 12 feet wide, 3:1 inslopes, and 80 feet long. The parking area would allow public access to the Rice Lake Wetland. The parking area would impact 0.04 acres of wetland.

Rice Lake Wetland Structure

Access. The access trail to the Rice Lake Structure would also be improved. The two existing culverts under the access trail are either crushed and/or sediment filled and would be replaced with new 36” CMP. To improve access surface, approximately 800 cubic yards of road gravel would be placed over the existing trail.

Structure. This structure would be a two-bay stoplog dam. Each stoplog bay would be 5’ wide. The stoplogs slot would be constructed to allow for locking the stoplogs in place.

The fixed crested weir would have a runout of 1352.0’. The stoplog sill would have an elevation of 1349.0’ Total width of weir plus stoplog bays = 50’. Native vegetation will be established on all earthen embankments. MN DNR will help determine the type of native vegetation used and may provide the seed that is to be planted.

Additional soil borings and survey information may be needed before construction starts. An operational plan would be required before construction would be permitted.

Construction. A temporary sheet pile structure would be installed upstream of the permanent stoplog dam to allow the construction site to be dewatered. The Rice Lake Wetland would provide water storage during the stoplog dam construction process. A ditch plug, downstream of the dam, would be created to provide construction equipment access to the east side of the channel. The plug would be removed once access is no longer needed.

Lower Rice Structure

Access. The access trail to the structure would also be created. In the low areas approximately 260 square yards of geo-fabric would installed. The entire access trail would require approximately 800 cubic yards of road gravel.

Structure. The structure would be a two-bay stoplog dam. Each stoplog bay would be 5' wide. The stoplogs slot would be constructed to allow for locking the stoplogs in place. The fixed crested weir would have a runout of 1350.0'. The stoplog sill would have an elevation of 1347'. Total width of weir plus stoplog bays = 50'. Native vegetation will be established on all earthen embankments. MN DNR will help determine the type of native vegetation used and may provide the seed that is to be planted.

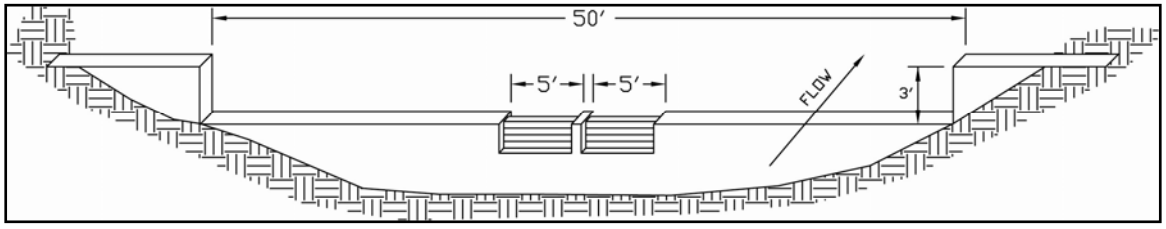
Additional soil borings and survey information may be needed before construction starts. An operational plan would be required before construction would be permitted.

Construction. An access road to the structure would be constructed. (3) – 36" CMP would be installed where the bypass channel and access road cross.

The constructed bypass channel would be approximately 330' long. The channel would have side slopes of 3:1 and a bottom width of 8'. The upstream and downstream end would be tied into the existing stream bed invert elevation. A coconut erosion blanket would be installed the entire length of the bypass channel to produce a stable channel. Once construction is completed the blanket would be removed before the bypass channel is backfilled

A temporary stream crossing, downstream of the stoplog dam, would provide construction access to the east side of the channel.

Figure 9 - Structure Schematic



Rice Lake Wetland and Lower Rice Structure

Channel Enhancements
Between Rice Lake Wetland Structure and the Lower Rice Structure, two ditch plugs would be created from the existing spoil banks along the west side of the channel. Each plug would be approximately 10 feet wide and 30 feet long. The ditch plugs would impact 0.013 acres.

Any material from the spoil banks not used, on the west side of the channel, would be blended into the existing landscape within 50 feet west of the channel. The blending of the spoil bank would impact approximately 2.85 acres.

Embankment - Borrow Area
Rice Lake Wetland Structure - Embankments would be constructed to an elevation of 1355' on either side of the structure. The embankments would have a top width of 10' and side slope of 3H:1V. An estimated 1,500 cubic yards of material would be needed to construct a 1,450 feet embankment with an average fill depth of 2 feet. Native vegetation would be established on the embankment. MN DNR will help determine the type of native vegetation used and may provide the seed that is to be planted.

Lower Rice Structure - Embankments would be constructed to an elevation of 1353' on either side of the structure. The embankments would have a top width of 10' and side slope of 3H:1V. An estimated 6,200 cubic yards of material would be needed to construct a 2,100 feet embankment with an average fill depth of 3.6 feet. Native vegetation would be established on the embankment. MN DNR will help determine the type of native vegetation used and may provide the seed that is to be planted.

Borrow Area – Once excavation is completed, the site will be graded and native vegetation would be established within the borrow area. MN DNR will help determine the type of native vegetation used and may provide the seed that is to be planted.

Historic Outlet
The existing culvert would be removed and a new 30" CMP would be installed. The invert would be set at 1352.5', which is 0.5' higher than the weir elevation on Rice Lake Wetland Structure. The construction equipment would come from the west side of the historic outlet along the existing trail. Some minor clearing of the trail would be needed to allow the equipment access to the historic outlet.

Mitigation

Table 14 - Wetland Loss by Measure

Measure	NWI WetlandSymbol/Types	Size (ac)
Campbell Creek Sediment Basin(s)	PFO1C/U / Type 7	1.0
Anchor Road Parking Lot	PSSI/PEMCd Type 6	0.04
Improved Anchor Road	PSSI/PEMCd Type 6	0.52
Rice Lake Wetland Structure	No Wetlands Impacted	N/A
Lower Rice Structure	PEMCd/PFO1Cd1Cd Type 3/7	1.62
Access Road Rice Lake Wetland Structure	PEMCd/PEM1A/PSS1Cd Types 3/6	0.30
Access Road Lower Rice Lake Structure	PFO1Cd Type 7	0.13
Ditch Plug North	PEM/SS1Cd/PSS1Cd Types 3/6	0.01
Ditch Plug South	PEMCd/PEMFd Types 3/6	0.01
Spoil Bank Leveling	PEMCd/PEMFd/PF01Cd/PSS1Cd Types 3/6	2.85
	Total wetlands impacted	**6.48**

Table 14 above lists the types of wetlands and their respective acres impacted for all of the proposed construction sites in the project. Mitigation of these wetlands would comply with all federal and state permit guidelines issued for the project. The acres of mitigated wetlands would comply with the Minnesota Wetland Conservation Act (WCA) defined by the Becker County SWCD. Mitigation of all impacted wetlands would comply with all federal state and local permit guidelines issued for the project.

Within the Rice Lake Wetland Complex, the project would increase wetland depths by an average of 2 feet. This would establish a new wetted perimeter, fringe area of approximately 78 acres. This would create additional saturated soils within this expanded fringe area, and as a result, more favorable Type I wetland vegetation could be restored to replace the existing rank growth of stinging nettle and reed canarygrass occurring without the project.

In addition, approximately 384 acres of Type 2 through 7 wetlands would be created or enhanced. This enhancement includes approximately 178 acres of Type 3 wetland acres in which the project would enhance needed primary nesting and brooding habitat for several species of migratory waterfowl. The proposed project would increase depth and duration of flooding on all of the partially drained Rice Lake Wetlands restoring the wetlands to pre-ditched water levels and creating more natural wetland hydrology conditions.

Accounting for the acres of wetlands restored, the project would result in a net gain of approximately 461.8 acres for a total of 896 acres of wetland functions and values restored with the project which should not require additional compensation or mitigation. (Table 11C in Appendix C).

A review of the NWI maps appears to be incomplete in the identification of wetlands within the Campbell Creek component of the plan. Therefore, field determinations of this area will need to be conducted at a later date prior to construction of any proposed sediment basin either off channel or across the channel upstream of County Road 149.

Inundation Impacts

Restoration of both the Rice Lake Wetland and Lower Rice Wetland would result in elevated and extended duration of water surfaces compared with current conditions. The extent and magnitude of these impacts are discussed in the scoping section of the environmental assessment. The related discussion can be found under the "Upstream Inundation" heading. Inundation impacts on private property (563 acres) would be compensated for by either permanent easements or outright purchase, whichever can be negotiated by the sponsors.

Based on surveys of first floor levels of houses in the area upstream of Anchor Road, one house would likely have impacts from the proposed restoration. Water tables near the home's basement floor level would be 0.1 to 0.2 foot higher than present conditions. The most cost effective measure identified to mitigate this impact was a 200 foot long cutoff or "curtain" drain installed along the northeast side of the home. The drain would intercept any groundwater, which in turn would flow to a sump. From sump collection area, the water would be pumped back out into the wetland. The cost of this system is estimated to be about $15,000. The sump pump would also have a battery backup system installed in the event of main electrical power failures.

Cultural Resources

Preliminary informal field investigations have been conducted and the project alternatives have been explored. A formal archaeological survey of sensitive or high probability locations will be conducted once a plan has been selected.

Consultation with the MN SHPO has been initiated in accord with the State Level Agreement between MN NRCS and the Minnesota SHPO.

Tribal consultation has not been initiated with the eleven federally recognized tribes residing in Minnesota. According the Native American Consultation database there are no tribes currently residing out-of-state that have land claims in Becker County, Minnesota.

If cultural resources are discovered during construction, the area(s) around the cultural resources would be avoided until a cultural resources specialist has been consulted and the best way to proceed has been determined. If human remains are discovered during construction, all activities would cease and the State Archaeologists Office would be notified in accordance with Minnesota State Statute 307.08 and the Native American Graves and Repatriation Act.

Permits

The following permits would be required:

404. Any work in water or wetlands would require authorization from the U.S. Corps of Engineers under Section 404 of the Clean Water Act.

401. Certification required from MPCA if 404 permit is required.

Public Waters. Any measures involving excavation or filling of earth located in public waters or protected wetlands require a permit from MN DNR Waters. The Rice Lake Wetland Structure is the only component of the recommended plan that this permit would be required for.

MN Wetland Conservation Act. Any work impacting wetlands needs to be in accordance with the act. It is administered by the MN BWSR through local governments. Contact with Becker County SWCD has been made.

Construction Stormwater Permit. Any job that disturbs more than an acre of ground may require this permit. Permit is issued by MPCA.

NPDES/SDS Permit. Required for the installation of a chemical dosing station. Permit issued by MPCA.

Ditch Permit. Any work within the legal drainage ditch system needs a permit. These permits are issued by Pelican River Watershed District.

State Environmental Review. The project may trigger a mandatory Environmental Assessment Worksheet (EAW) pursuant to Minnesota Rules 4410.4300.

Local, city, or county zoning permits may also be required for certain measures.

Cost

The total project installation cost is estimated to be $ 2,206,000. The major cost elements for the watershed plan are shown in Table 15.

Table 15 – Estimated Installation Cost by Project Component
Upper Pelican River Watershed, Minnesota

Installation Cost Item	Estimated Cost (2006 Dollars)	
	Funds	**Total**
Rice Lake Wetland Structure		
Access Road	$16,400	
Concrete Structure	$220,200	
Embankments	$8,000	
Dewatering	$40,700	$285,300
Channel Improvements	$8,300	
Ditch Plugs		
Removal of spoil banks		$8,300
Lower Rice Structure		
Access Road	$14,400	
Concrete Structure	$220,400	
Embankments	$32,800	
Dewatering	$43,500	$311,100
Seeding	$5,000	
Embankments		
Borrow Area		$5,000
Anchor Road Improvements	$109,900	$109,900
Anchor Road House	$14,900	$14,900
Access Parking	$9,500	$9,500
Farm Crossing		
Culverts & Fill	$7,200	
Fencing & Water System	$10,200	$17,400
Historic Outlet		
Culvert Replacement	$4,500	$4,500
Land rights		
Easements on private land	$651,800	
Easements on City land	$0	
Easements on State land	$0	$651,800
Campbell Creek		
Land Treatment	$59,000	
Fencing & Water System	$12,400	
Sediment basin	$635,300	
Streambank Protection	$81,600	$788,300
Total Project		**$2,206,000**

Contributing to the estimated cost of installing the project measures are construction, engineering services, geological investigation, real property rights and project administration costs. These costs are shown in Table 16. All costs are allocated to the water quality purpose.

Table 16 - Estimated Installation Cost - Summary
Upper Pelican River Watershed, Minnesota (2006 Dollars)[21]

	Installation Costs				
Item	Construction	Engineering	Land Rights	Project Admin	Total
Rice Lake Wetland Complex	$ 567,300	$ 113,500	$ 562,800	$ 169,500	$ 1,413,100
Campbell Creek	$ 583,900	$ 116,800	$ 4,000	$ 88,200	$ 792,900
Totals	$ 1,151,200	$ 230,300	$ 566,800	$ 257,700	$ 2,206,000

The estimated construction cost is $1,151,200. This is the cost furnishing materials, labor, and performing all work needed to prepare and install the components of the plan. Work elements include removal and replacement of culverts, road gravel, construction of two structures, blending spoil banks, ditch plugs, water management, erosion control during construction, and establishment of vegetation. Construction cost estimates are based upon current cost for similar work in Minnesota. A 20 percent general contingency allowance is included. Table 17 shows the construction costs per project component.

Engineering service costs are estimated to be $230,300. These include the costs of field surveys, additional engineering and geologic investigations, and the design and preparation of construction plans and specifications for the plan components and construction inspection. Similar services related to obtaining land rights and for project administration are not included in this cost. Table 17 shows the engineering service costs per project component.

Estimated project administration costs are $257,700. These are administrative costs associated with installation of the components of the plan. Table 17 shows the administration costs per project component.

Real property rights costs with administration fees included is estimated at $651,800 for the following:

- Permanent easement on 4 acres of private land within the Campbell Creek for the sediment basin(s). It is assumed easements would cost $1,000 per acre plus administration fees.

[21] Does not include $6,546/year operation, maintenance, and replacement costs (O&M&R).

- Permanent easement on 563 acres of private land within the Rice Lake Wetland Complex. It is assumed easements would cost $1,000 per acre plus administration fees.
- This estimate does not include obtaining rights to land owned by the State (436 acres), City of Detroit Lakes (145 acres), or the unidentified piece within Rice Lake Wetland (77 acres).

Table 17 - Estimated Cost of Construction, Engineering, and Project Administration by Project Component (2006 Dollars)[22]

Item	Construction[23]	Landrights[24]	Engineer[25]	Project Admin.[26]	Installation Cost
Rice Lake Wetland Structure	$211,400	--------	$42,200	$31,700	$285,300
Channel Improvements	$6,200	--------	$1,200	$900	$8,300
Lower Rice Structure	$230,500	--------	$46,000	$34,600	$311,100
Seeding	$3,700	--------	$700	$600	$5,000
Anchor Road Improvements	$81,400	--------	$16,300	$12,200	$109,900
Anchor Road House	$11,000	--------	$2,200	$1,700	$14,900
Access Parking	$7,000	--------	$1,400	$1,100	$9,500
Farm Crossing	$12,900	--------	$2,600	$1,900	$17,400
Historic Outlet	$3,400	--------	$600	$500	$4,500
Land rights – private	--------	$566,800	--------	$85,000	$651,800
Campbell Creek	$583,900	--------	$116,800	$87,600	$788,300
Totals	**$1,151,400**	**$566,800**	**$230,000**	**$257,800**	**$2,206,000**

[22] Does not include $6,546/year operation, maintenance, and replacement costs (O&M&R).

[23] Construction – materials the cost furnishing materials, labor, and performing all work needed to prepare and install the components of the plan. Work elements include removal and replacement of culverts, road gravel, construction of two structures, blending spoil banks, ditch plugs, water management, erosion control during construction, and establishment of vegetation. Construction cost estimates are based upon current cost for similar work in Minnesota. A 20 percent general contingency allowance is included.

[24] Landrights – Obtain permanent easements on private property for approximately 583 acres within the Campbell Creek and Rice Lake Wetland Complex at a rate of $1,000 per acre plus administration fees. This estimate does not include obtaining rights to land owned by the State (436 acres), City of Detroit Lakes (145 acres), or the unidentified piece within Rice Lake Wetland (77 acres).

[25] Engineering – This includes costs of field surveys, additional engineering and geologic investigations, and the design and preparation of construction plans and specifications for the plan components and construction inspection. Similar services related to obtaining land rights and for project administration are not included in this cost. It is estimated that this service would cost approximately 20% of construction costs.

[26] Project Administration - These are administrative costs associated with installation of the components of the plan. It is estimated that this service would cost approximately 15% of construction costs.

Benefits

Under current conditions, water based recreation in the city of Detroit Lakes continues to be the major component of its economy. For the purposes of this plan it was estimated that close to 300,000 individuals visit Detroit Lakes annually for swimming, boating and fishing.[27] As long as lake water quality does not deteriorate, it is assumed that this level of visitation would continue into the future. However if algal blooms become more frequent or severe, which is predicted in the future absent any form of action, visitation would decline. The value of lost visitation days, absent the project, is the recreational benefits resulting from project establishment. The recommended plan would work to stabilize water quality, with the potential for improvement from current conditions.

The housing value component of project benefits is calculated as the marginal impact degraded water quality has on waterfront property values. To estimate these benefits the baseline housing values were compared to projected reductions due to the decline in water quality. The future conditions without project would be some reduction in property values based on society's response to varying levels of increased algal bloom activity. The difference between the two scenarios is the project's housing benefit.

As discussed in the risk and uncertainty section of this plan, future in-lake phosphorus concentrations, without the project in place, could not be predicted to reasonable levels of accuracy. Without having a projection of future phosphorus increases, the following scenarios were used in the benefit analysis and were based on best available information and consultation with MPCA: 1) a 10 year linear increase of in-lake phosphorus concentrations from the baseline, 24 ppb, to a future in-lake concentration of 40 ppb, 2) a 25 year linear increase from the baseline to future, and 3) a 50 year linear increase from baseline to future. As the in-lake concentrations increase, the probability of algal blooms reducing recreational opportunities and home values also increases. The losses in recreation and waterfront property values were tracked over time, discounted to present value, and are presented on an average annual benefit for a 100 year timeframe in Table 18.

Table 18 - Benefits of Recommended Plan under 3 Future Scenarios

	10 Year Degradation Period	25 Year Degradation Period	50 Year Degradation Period
Present Value of Benefits	$7,427,100	$4,757,200	$2,661,200
Average Annual of Benefits	$ 383,100	$ 245,400	$ 137,300
Average Annual of Cost	$ 114,470	$ 114,470	$ 114,470

In each future scenario, the plan results in positive net benefits. It should be noted here that the project benefits reported here can be used as a lower bound estimate, as only recreational benefits for tourist visitation on two of the lakes in the project area are quantified. There are likely additional benefits such as local recreation benefits, wildlife enhancements and the potential for increased recreation at North Floyd Lake.

[27] Big and Little Detroit Lakes were the only lakes considered in the benefits analysis. Although recreation activities occur on the other lakes in the PRWD, it is assumed that these activities are dominated by local recreators. Details on the benefits estimation can be found in the appendix.

Installation and Financing

This section will explain the framework for carrying out the plan. It will include the planned sequence of installation, along with the responsibilities of the sponsors, NRCS, and other cooperating agencies for installing and financing the project.

Responsibilities

The Sponsors would be responsible for implementing the plan. They would be responsible for securing real property rights for the structural measures. They have the power of eminent domain and taxation by law. They would obtain and are responsible for obtaining all the necessary federal, state, and local permits required by law, ordinance, or regulation. The construction of all structural measures in the plan would comply with federal, state, and local regulations concerning air and water pollution.

Contracting

The sponsors would administer the contracts for the installation of works of improvement unless formally request the NRCS to do all or part of the contracting. They shall decide which sponsor would be responsible for dealing with the NRCS during the installation period. They would also enter into a project agreement with NRCS before either party initiates work involving funds of the other party. The project agreement would set forth in detail the financial and working arrangements and other conditions that apply to the works of improvement. Construction contracts can be awarded for a measure after the needed land rights has been secured.

Real Property

Approximately 4 acres of real property rights would need to be secured for the sediment basin along Campbell Creek.

Minimum real property rights, consisting of permanent easements of approximately 563 acres of private land within the Rice Lake Wetland Complex, would need to be obtained. Additionally, it is assumed that flowage easements would be obtained on the land owned by the State of Minnesota (436 ac) and the City (145 ac).

The sponsors would comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act.

Other Agencies

The ongoing programs of the SWCD would be utilized to promote best management practices within the watershed.

Operation, Maintenance, and Replacement

The Sponsor assumes the ownership and maintenance responsibilities of Rice Lake Wetland Structure and Lower Rice Structure, access road to the structures, and the Campbell Creek sediment basin(s) once the final inspection of the construction project is completed. Maintenance would include periodic cleanouts, control of weeds, and inspection of the abutment dikes. Cleanouts includes removal of sediment deposits and debris. The removed material would be disposed of properly, not placed in a wetland or waterbody unless legally permitted.

Detroit Township assumes ownership and maintenance responsibilities for Anchor Road once the final inspection for that construction item is completed.

The Minnesota Department of Natural Resources assumes the ownership and maintenance responsibilities for public access along Anchor Road once the final inspection for that construction item is completed.

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