Lake Ashtabula
Baldhill Dam

Sheyenne River at Baldhill Dam

Western St. Paul District Flood Control Project

Master Plan

February 2006

CEMVP-OP 21 February 2006

MEMORANDUM FOR Commander, St. Paul District

SUBJECT: Request for Approval of the Revised Lake Ashtabula Baldhill Dam Master Plan

1. References:

a. ER 1130-2-550, Recreation Operations and Maintenance Policies, Chapter 3. Project Master Plans and Operational Management Plans.

b. EP 1130-2-550, Recreation Operations and Maintenance Guidance and Procedures, Chapter 3. Project Master Plans and Operational Management Plans.

2. Attached is a copy of the subject revised master plan for your approval. The plan updates and revises the existing approved master plan for this project. It was developed over several years with extensive consultation and coordination with the public and the various Federal and state recreation and natural resource agencies in the region. Copies of the interim drafts and the final draft have been available for public and agency review. No significant changes that would impact the public's use and enjoyment of the project's resources are proposed. The changes that are recommended would result in improved operational efficiencies and resource protection.

3. An environmental review of the draft revised master plan was conducted and those proposed actions that would require additional environmental review and coordination were noted.

4. The POC for this request is Franklin Star.

Bruce A Boldon
BRUCE A. BOLDON, PE
Chief, Operations Division

Approved: MJP

Michael F Pfenning
MICHAEL F. PFENNING
COL, EN
Commander

EXECUTIVE SUMMARY

Lake Ashtabula, Baldhill Dam Master Plan

AUTHORIZATION: This Master Plan is submitted under the authority of ER 1130-2-550, 15 November 1996. It fulfills the requirements of the ER for this project, located in eastern North Dakota, U.S. Army Corps of Engineers St. Paul District.

LOCATION: The study area is in east-central North Dakota, the region known as the Northern Great Plains. This is an area of gently undulating hills, very nearly flat. It was once part of a grassland ecosystem that covered hundreds of thousands of square miles—the entire center of the North American Continent. This area is the prairie pothole region, where thousands of small "pothole" wetlands once dotted the area. It is considered to be one of the premier waterfowl breeding areas on the continent. Like the rest of the great prairie, the area has been converted to farmland. The economy of the study area is almost exclusively agriculture based. The region is experiencing a slow, steady decrease in population.

Lake Ashtabula is formed behind Baldhill Dam; it is located on the Sheyenne River which originates in central North Dakota and eventually flows into the Red River of the North, which forms the Minnesota-North Dakota border. In this semi-arid region there are few large bodies of water, especially to the west and south. This gives Lake Ashtabula significance as a rare recreation resource for the region.

PROJECT DESCRIPTION: Lake Ashtabula is a multipurpose project, operated to provide flood control, water supply, and recreational opportunities. The project is set amidst the low, rolling hills that are typical of the Great Plains. Baldhill Dam is a compacted earth embankment with a top width of 20 feet and an average height of 41 feet; the maximum height is 61 feet above the old stream bed, and the length from the east abutment to the spillway structure is approximately 1,650 feet. The lake lies in a narrow river valley, less than ½ mile wide; it is about 27 miles long and could easily be mistaken for a large river except for the lack of water movement and riparian vegetation. With a maximum depth of 46 feet and width of 3,200 feet, its storage capacity is: 18,000 acre-feet at spillway elevation; 70,600 acre feet at normal pool; and 137,500 acre-feet at maximum pool. The total Sheyenne River drainage area at Baldhill Dam, as determined by the Corps of Engineers, is 7,385 square miles.

Scattered along the length of the lake are seven recreation areas; each is surrounded by active agricultural land. The project also supports 13 wildlife management areas, managed primarily for waterfowl. The lake is eutrophic and experiences severe algae blooms throughout the summer. This affects water quality and associated recreation activities.

DOCUMENT DESCRIPTION: The planning document includes six chapters. Chapter 1 includes planning authorization, project purpose and authorization, and the process used in compiling the document. It also contains a project description, description and chronology of the study area, and discussion of regional influences. Chapter 2 is an analysis of the project

resources, both natural and built. Chapter 3 contains an analysis of the recreation programs and a projection of future recreation requirements. Chapter 4 lists the resource objectives of the plan; there are project resource objectives and resource objectives specific to each management unit. The resource objectives are the concepts that shape the direction of project development. Chapter 5 is the resource plan. This contains the specifics of how the resource objectives are to be achieved. Chapter 6 explains the public involvement strategy used to present the plan to the public and other agencies. The technical appendices contain maps, listings of regional and project specific data and document support data. The plate section contains a map showing the area of influence for the plan and plan-view depiction of current and proposed development of the recreation areas. This document is entirely in digital format for ease of implementing comments, corrections, and future updates.

ENVIRONMENTAL EVALUATION: In accordance with ER 200-2-2, Environmental Quality Procedures for Implementing NEPA, an Environmental Assessment was done for the work proposed for Eggerts Landing. Other considerations of environmental matters for the Lake Ashtabula Flood Control Project Master Plan have been limited to identifying those proposed actions that will require an Environmental Assessment and additional coordination before construction or implementation, also see attached MOR 18 April 2005.

CONCLUSIONS: Lake Ashtabula is the primary attraction for the project. Even though large water features are rare in this landscape, the irritations and annoyances associated with the poor water quality of the lake nullify the potential associated with this phenomenon. Although an analysis of the carrying capacity of the lake has not been done, observation of the recreation activity on the lake reveals that the lake's resources are underused and there is tremendous potential for expansion. It could be assumed that, if water quality were improved, visitation would also improve.

This master plan does not advise changes in project resources. It proposes to shuffle those resources so that they better fit the use patterns that are evident. One primary recommendation of the document is to institute physical modifications that will result in increased personal safety and universal accessibility for each public use area. It also does not rule out further development. If a qualified sponsor could be found to fulfill the cost sharing requirements set forth by law, further recreational development is possible.

This planning effort has found that, within the constraints of operating the projects for their primary authorized project purpose, the Federally administered land and water areas of the lake are also being managed to help fill other regional needs. These needs have been identified as including: recreation, wildlife management, habitat restoration and enhancement, fisheries augmentation, cultural resource preservation, and reinforcement of aesthetic qualities. An examination of Corps administration policies at the project indicates that the current allocation of these lands is providing protection of the resource and accommodating the recreational needs of the public. With some slight modification, the existing recreational development will support the current and projected use.

CEMVP-PM-E
MEMORANDUM FOR RECORD

18 April 2005

JBJECT: Baldhill Dam/Lake Ashtabula Master Plan Update, Statement of Consideration of Environmental Documentation.

1. In accordance with ER 200-2-2 Environmental Quality Procedures for Implementing the National Environmental Policy Act (NEPA), an Environmental Assessment has not been prepared for this planning document. Some actions of this Master Plan will require an environmental Assessment and additional coordination before construction or implementation.

2. Be advised that all projects need to be coordinated under Section 106 of the National Historic Preservation Act (Section 106), Section 7 of the Endangered Species Act (Section 7) and, when applicable, the Native American Grave Protection and Repatriation Act (NAGPRA). Before you perform work outlined in the Operational Management Plan, please provide information to the Environmental Resources Section so we can review the proposal under these regulations.

3. To facilitate coordination, I recommend that the Baldhill Dam/Lake Ashtabula staff annually provide at the beginning of the Fiscal year the Environmental and Economic Analysis Branch a copy of the updated 5-year plan. We can then begin coordination under the applicable laws and regulations for those projects that need it, and quickly discern which projects can be done without additional coordination. This should facilitate your planning for each year.

4. The Wildlife Management and Recreation units are listed below with a short description of the types of review that may be required.

5. Resource-Specific Development – Work to create wetlands by impounding tributaries of the Sheyenne River would likely require an Environmental Assessment and a Section 404(b)(1) evaluation.

6. Wildlife Management Areas
   a. Old Highway 26 – Fencing work would likely require a Section 106 review.
   b. Martin – The installation of Christmas tree reefs would require an Environmental Assessment and Section 404(b)(1) evaluation.

7. Recreation Areas
   a. Mel Rieman – Expansion of the beach area and the installation of a sprinkler system may require an Environmental Assessment, Section 404(b)(1) evaluation, and/or a Section 106 review.
   b. Sundstrom's Landing – Any earthwork, especially in unexcavated areas, needs to be coordinated with the Environmental Resources Section for Section 106 review. "Returning the ground to its prior state" may require Section 106 review.
   c. Katie Olson's Landing – The extension of the boat ramp would likely require an Environmental Assessment and a Section 404(b)(1) evaluation.
   d. West Ashtabula Crossing – The addition of a playground at this site may require a Section 106 review.
   e. Sibley Crossing - The extension of the boat ramp would likely require an Environmental Assessment and a Section 404(b)(1) evaluation.

TERRY J. BIRKENSTOCK
Chief, Environmental and Economic

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CHAPTER 1
INTRODUCTION

PURPOSE AND SCOPE OF THE MASTER PLAN

AUTHORIZATION

Master plans are authorized by Engineering Regulation (ER) 1130-2-550, Recreation, Operations, and Maintenance Policies. Chapter 3, Project Master Plans and Operational Management Plans, 15 November, 1996. This ER also provides policy and guidance for the preparation of master plans. It is the policy of the Corps of Engineers that master plans be developed and kept current for all Civil Works projects for which the Corps of Engineers has administrative responsibility. The master plan is the basic document guiding Corps of Engineers obligations. A current, approved master plan is necessary before any action can be taken which may restrict the range of future operations. Furthermore, all actions by the Corps of Engineers and outgrantees must be consistent with the master plan.

PURPOSE

The planning process is a system of concepts shaped by three basic elements: 1). Regional needs; 2). Project resource capabilities and suitability; 3). Expressed public interests. The purpose of planning is to quantify and evaluate project resources, then commit them toward the needs and interests of the region – providing the best possible combination of responses while keeping within the bounds of the authorized project purposes. The primary goal in the master planning process is to prescribe a concept of land and water management, resource objectives, and design and management programs that respond effectively and economically to regional needs, resource capabilities, and public interests. These responses must be consistent with authorized project purposes.

This master plan is intended to serve as a working document for planning, design, management, and real estate actions

affecting the lands and resources of these projects. Subsequent decisions pertaining to these projects shall be consonant with the land use plans and objectives presented in this document with respect to outgrants, leases, and licenses.

This master plan presents a concept of best use practices and development. Implementation of the objectives established by this document is beyond the scope of the plan; this is a conceptual document. The Operational Management Plan (OMP) describes in detail how the concepts and objectives prescribed in the master plan will be implemented and achieved. Operation and maintenance of the project is also outside the scope of this master plan. The operations manuals for the dams and related structures present the project operational requirements in detail.

SCOPE

This master plan serves as a guide for the use, development, and management of the natural and constructed resources at the Lake Ashtabula, Baldhill Dam Project in North Dakota, administered by the U.S. Army Corps of Engineers, St. Paul District (Corps). The master plan addresses the use and conservation of all project resources including but not limited to: fish and wildlife, vegetation, cultural, aesthetic, recreational, commercial, and outgranted lands, easements, and water. The objectives identified in this study are compatible with the authorized operation of this project.

PROJECT AUTHORIZATION

Baldhill Dam was authorized by the Flood Control Act of 1944 (Public Law 78-534). The portion of the act that pertains to this project reads: *The project for the Bald Hill Reservoir on the Sheyenne River for flood control and other purposes in the Sheyenne River Basin, North Dakota, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 193, Seventy-eighth Congress, second session, at an estimated cost of $810,000.*

The Flood Control Act, of 1944 authorized the Corps to consider recreation, water supply, and irrigation in their projects. The Federal Water Project Recreation Act of 1965 required consideration of recreation and fish and wildlife enhancement in

FIGURE 1-1. Baldhill Dam Benefit Distribution

planning water resource projects and establishing cost-sharing principles for development of recreational facilities.

PROJECT PURPOSES

Lake Ashtabula is a multipurpose project, operated to provide flood control, water supply, and recreational opportunities. The distribution of benefits in the authorizing documents is illustrated in Figure 1-1. The project's primary purpose is downstream water supply. Winter drawdown of the pool provides storage for control of heavy spring runoff from snowmelt which reduces damages from flooding in the areas downstream from Baldhill Dam. Dam operation was programmed under the concept of multiple-use storage to provide these benefits. During the summer, the threat of flooding is low and the pool is maintained as close to full as possible. During the winter, with reduced flows in the Sheyenne River, water is released to meet downstream needs and to prepare for spring runoff.

LAND ALLOCATIONS

In accordance with ER 1130-2-550, all lands will be allocated in accordance with the authorized purposes for which they were acquired. Acquired lands will be allocated into one of the following categories: Operations, Recreation, Mitigation, and Fish and Wildlife. All project lands at the Lake Ashtabula Project were acquired for project operations. A map delineating project lands is available in Appendix A.

PROJECT LAND STATUS

1. Fee Acquired Lands

Fee lands for the Lake Ashtabula project total 8,116 acres. At normal pool, 5,340 acres are inundated.

2. Flowage Easements

Easements were acquired in those areas where only periodic or sporadic inundation occurs. The Corps has acquired flowage easements on 666.2 acres. The only interest or privilege the Corps has in these lands is the right to

TABLE 1-1. Outgrants

Grantee	Acreage	Purpose
U.S. Fish and Wildlife Service	37.1	Fish Hatchery
Grace Free Lutheran Church	6.0	Recreation–South of Eggerts Landing
Freadhoff, George	1.5	Commercial Concession–Eggerts Landing
Lee, Richard	0.6	Commercial Concession–Mel Rieman Area
North Dakota National Guard	69.0	Recreation–South of Eggerts Landing
Kelly, Bob	1.4	Commercial Concession–Ashtabula Crossing
Village of Sibley	1.8	Recreation–Village of Sibley

periodically inundate them during flood events and to restrict the building of permanent structures on them.

3. Outgrants, Leases and Licenses

The existing outgrants at the project are for rights-of-way and encroachments (see Table 1-1). Structural encroachments from private parties (steps, porches, utility buildings, etc.) are covered by Department of the Army licenses. There are Special Use Licenses for sheds, decks, wells, and pump houses.

4. Excess Project Lands

No land is excess to project needs; all acreage is needed for project structures and maintenance or to accommodate an above normal pool.

5. Mitigation Land

Due to occasional flowage easements lands acquired for the 5-foot raise project around the reservoir and other lands being periodically flooded a 300-acre mitigation area was acquired to alleviate mitigation requirements. The Corps of Engineers was conveyed the land from The Sheyenne River Joint Water Resource District in 2003.

LAND CLASSIFICATION

Allocated project lands are further classified to provide for development and resource management consistent with authorized project purposes and the provisions of the National Environmental Policy Act (NEPA) and other Federal laws (see Table 1-2). The

TABLE 1-2. Land Classification

Classification	Operating Agency	Acreage	Totals
1. Project Operations	Corps of Engineers		42.0
2. Recreation	Corps of Engineers	222.2	
	Commercial Concessions	4.0	
	Village of Sibley	1.8	
	Recreation Subtotal		228.0
3. Mitigation		300.0	300.0
4. Environmental Sensitive Areas			0.0
5. Multiple Resource Management:			
Recreation – Low Density:	North Dakota National Guard	69.3	
	Griggs County Wildlife Association	1.0	
	Grace Free Lutheran Church	6.0	
	Corps of Engineers`	1,081.7	
Wildlife Management:	U.S. Fish and Wildlife Service	37.1	
	Corps of Engineers	1,105.9	
Vegetative Management			0.0
Inactive			0.0
	Multiple Resource Management Subtotal		2,301.0
	Total Fee Land Area		2,871.0
Inundated (normal Pool)			5,245.51
	Total Project Area		8,116.51
6. Easements			666.2

classification process further refines Federal land allocations to maximize use of project lands. The process must also consider public desires, legislative authority, regional and project specific resource requirements and suitability.

Lake Ashtabula and Baldhill Dam are located entirely on federally owned lands; however, the band of fee title land around the lake is narrow and in certain areas is reduced to only a few feet. At points along the lakeshore, the federally owned parcels are large enough for recreational facilities and wildlife management areas. It is within these larger tracts that existing recreational development has taken place and that opportunities exist to manage significant areas of wildlife habitat. Maps delineating project lands according to classification categories are available in Appendix A.

Much of the federally owned land acquired for the project is operated for wildlife management. The lands immediately below the dam are used by the U.S. Fish and Wildlife Service for fish hatchery ponds. The Federal lands along Baldhill Creek as well as the marshy areas upstream of the lake were leased to the North Dakota State Game and Fish Department as refuge and wildlife management areas from 1950 to 1980. When the lease expired, the Game and Fish Department did not renew it and the land reverted to Corps management.

The problems of private encroachments, alterations of shoreline and removal of natural vegetation were addressed in a Shoreline Management Plan in 1991. The plan, which was updated and approved April 2005, designates areas of the lakeshore that are to remain natural and untouched and those areas where limited development is allowed under a permit and/or license program. This management plan was developed through a combined effort of Federal, State and local government agencies and local interest groups.

PROJECT DESCRIPTION

ADMINISTRATION

Corps of Engineers responsibilities include developing regulations and restrictions for the overall management of Lake Ashtabula. Also taken into account are regulations, programs, and goals of other public agencies or private groups whose responsibilities overlap with those of the Corps. Key administrative and policy factors in planning for resource use at Lake Ashtabula include the status of project lands, Corps land stewardship responsibilities, and local sponsorship requirements for fish and wildlife enhancement or recreation development.

1. Project Personnel

The Resource Manager is responsible for all aspects of the management and administration of the Lake Ashtabula project resources. These responsibilities include dam operation and maintenance, range management, fish and wildlife management, soil erosion control, educational and interpretive programs, law enforcement, pest control, visitor and employee safety programs, and administration and inspection of public use areas and other project lands. Other duties include, but are not limited to, supervision of project employees, public relations, and inspection of outgrants, as required. There are

four other permanent full-time employees–two maintenance workers and two rangers.

Other personnel are permanent seasonal employees and include a clerk, a ranger, and maintenance workers. During the summer recreation season, these employees are supplemented by students. College students are hired under the co-op program primarily for ranger duties but are occasionally asked to assist with maintenance tasks.

LOCATION AND SETTING

1. Location

The project is located in the eastern half of North Dakota, the northern Great Plains of the North American continent (Figure 1-2). Lake Ashtabula is located on the Sheyenne River which originates in central North Dakota and flows approximately 500 miles southeasterly to join the Red River of the North. The dam is 271 miles upstream of this confluence. By highway, the dam is about 75 miles west of Fargo and about 10 miles northwest of Valley City, the Barnes County seat.

Lake Ashtabula is formed behind Baldhill Dam in the east-central portion of the state. It is located primarily in Barnes County, with small sections in Griggs and Steele Counties. The Sheyenne River flows from near the center of the state in a (generally) southeasterly direction, then curves in Ransom County to flow northeasterly. It enters the Red River of the North about 10 miles north of Fargo, North Dakota.

2. Setting

The project is set amidst the rolling hills

FIGURE 1-2. Lake Ashtabula Locator Map

that are typical of the Great Plains. The lake, lying in a narrow river valley, is 27 miles long but less than ½-mile wide. It could easily be mistaken for a large river except there is no water movement and little riparian vegetation. As with most rivers of this region, it is not visible in the landscape until the gentle hills that surround it are crested.

PROJECT ACCESS

Vehicular access to Lake Ashtabula is not difficult for persons familiar with the area (see Figure 1-4). Most of the lake is accessible by a network of pre-existing section line or township roads that were cut when the reservoir was filled. Visitors can follow paved roads and signs to the dam and main recreation area (Mel Rieman) quite easily from Valley City. From other directions, access to recreation areas is more difficult; many of the roads are gravel and signage for the project is limited. It is difficult for visitors unfamiliar with the area to find some of the recreation areas.

1. Major Access Routes

Interstate Highway 94 passes through Valley City approximately 10 miles south of the dam. State Highway 1 is located to the west and State Highway 32 to the east of the lake, as illustrated on Figure 1-3. None of these Federal or State highways provide direct access to the area. State Highway 26 crosses the lake at Sibley and provides access to Sibley (Keyes) Crossing.

2. Local Arterials

A network of surfaced and graveled county

FIGURE 1-3. Major Access Routes

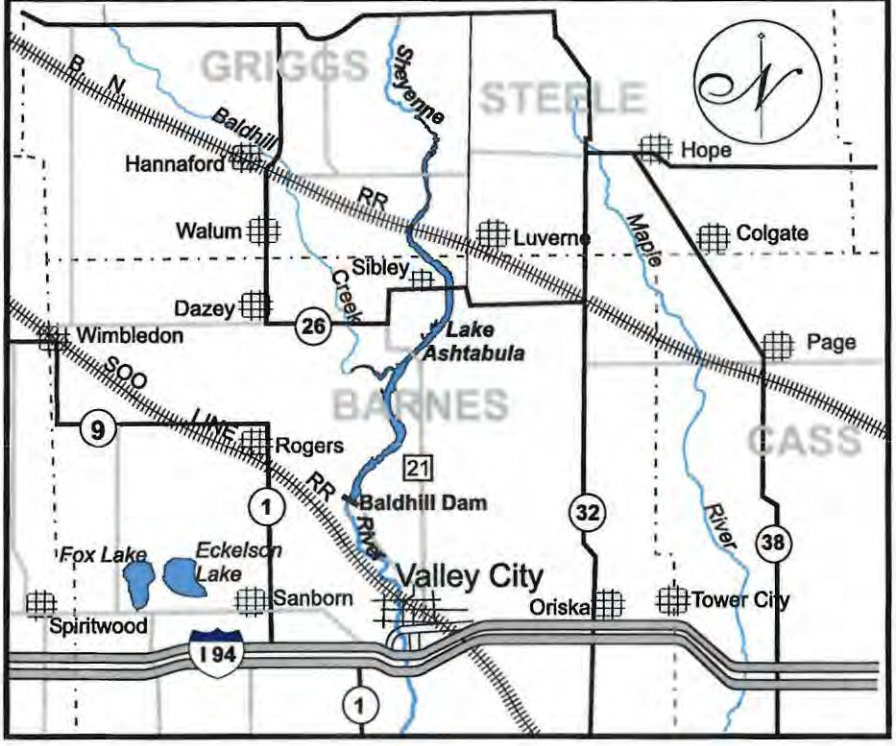


FIGURE 1-4. Lake Ashtabula Project Map

and township roads provides access all along the 27 miles of the reservoir (see Figure 1-4). Three highway-bridges cross Lake Ashtabula: State Highway 26 at Sibley Crossing; County Road 21 at East Ashtabula Crossing; and the Hannaford bridge at the north end of the lake.

3. Project Roads

All recreation areas along Lake Ashtabula can be accessed by project roads along the lake, but many of the project roads are gravel. Access between recreation sites is limited because many of the project roads do not directly connect. The size and shape of Lake Ashtabula makes travel between recreation sites time consuming.

4. Seaplane

Regulations governing seaplanes at Lake Ashtabula have not been established. While airborne, all civilian aircraft are subject to the general aviation rules and operating regulations established by the Federal Aviation Administration and the applicable state agency; e.g., the North Dakota Department of Transportation. When on the water, seaplanes are subject to the marine "rules of the road" as established by the North Dakota Parks and Recreation Department. They may operate on any Corps lake, except those where powerboats are prohibited, and are subject to the specific boating prohibitions and restrictions for each project or lake. In addition, seaplanes may only be operated on the lakes between sunrise and sunset.

ADJACENT LAND USE

The project is located in the midst of rolling farmland. Adjacent land is used for grazing and/or agriculture.

A BRIEF PROJECT HISTORY

In 1892, 1897, 1916, and 1919, the Sheyenne River flooded, causing significant damage to large areas. During the 1930's, the basin experienced severe drought with many river towns losing their water supply. Plagued by these extremes in water levels, the residents of the river basin asked for assistance. The Corps of Engineers was directed to study the problems associated with the watershed. From this study, a water supply and flood control project was proposed. Authorization of this proposal resulted in the construction of the Lake Ashtabula Flood Control Project.

Construction on Baldhill Dam began in July 1947. In the spring of 1950, even though the dam was not entirely completed, it was placed in emergency operation because of severe flooding conditions. Baldhill Dam was substantially completed in June 1950 and formally dedicated on September 21, 1952.

Construction work to correct a seepage problem at Baldhill Dam was completed in the mid-1970's. A dam safety project began in the summer of 1994, and was completed in the fall of 1999. In its pre-project condition, Baldhill Dam had a spillway capacity of only 43,100 cubic feet per second (cfs). The capacity needed to pass the probable maximum flood is 126,000 cfs. The dam safety project constructed an auxiliary spillway that provides the additional discharge capacity required to pass the probable maximum flood.

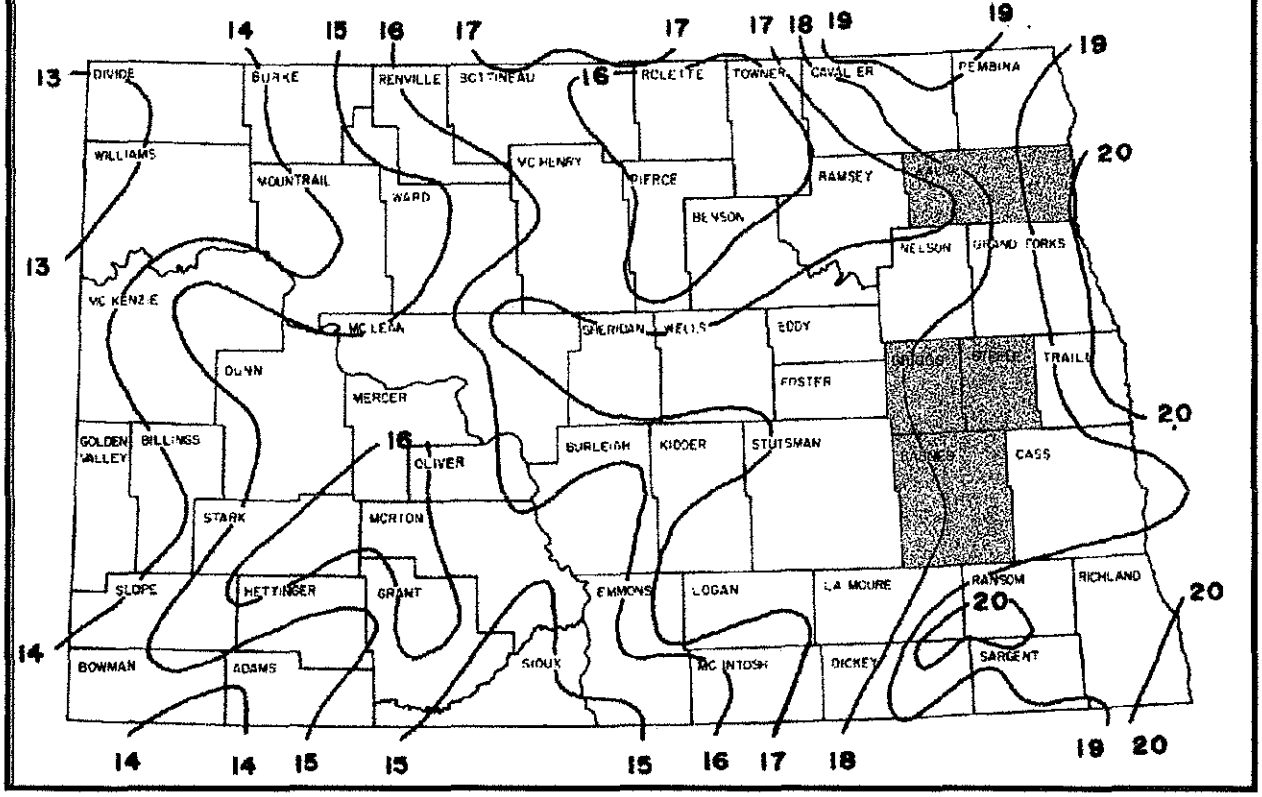
In the wake of flooding in the summer of 1993, interest was renewed in the proposed increased flood control pool capacity of Lake Ashtabula which was authorized as a part of the Sheyenne River Flood Control Project in

the 1986 Water Resources Development Act. To implement the raise of the flood control pool, the existing gated spillway was modified to accommodate the installation of new higher gates, and additional property rights, to temporarily store floodwaters around the shores of Lake Ashtabula, were acquired.

CLIMATE

As in all of the northern latitudes, weather plays an important role in even the mundane events of everyday living in North Dakota. Across the Upper Midwest, during the summer, thunderstorms with high winds, drenching rain, and large, damaging hail can arise suddenly; during the winter, savage blizzards, with white-out conditions and windchills far below freezing have been known to kill scores of people. The following description of North Dakota's climate is taken from the 1990 North Dakota State Comprehensive Outdoor Recreation Plan (SCORP). *"Latitude, movement of air masses and land formations combine to give North Dakota a continental climate typified by rapid temperature changes, frequent wind, moderate precipitation and four distinct seasons. As such, North Dakota is a state ruled by extremes. While the mean average temperature hovers near 40 degrees Fahrenheit, the highest temperature recorded in the state was 121 degrees in 1936. Later that same year, the lowest temperature for the state was documented*

FIGURE 1-5. North Dakota Average Precipitation



at -60 degrees. "The state is classified as semi-arid..... While a majority of the state's precipitation occurs in the form of rain, snow is very much a part of the North Dakota image and adds to the state's recreational diversity. The northeast corner of the state experiences the heaviest snowfalls based on mean seasonal snow depth, varying from 13 to 15 inches per year. It is within this area that the state's most popular year-round recreation resources are located. Conversely, the southwestern portion of the state receives an average of 9 to 11 inches per year."

Average annual precipitation over the Lake Ashtabula basin is less than 19-inches but radical departures from the mean are not unusual. The months with the highest average precipitation are June, July, and August. Winter precipitation is light with heavy snowfalls being the exception rather than the rule. National Weather Service records indicate that this region receives about 35 inches of snowfall annually. It is the combination of spring snowmelt and the additional runoff from spring rains that has caused the majority of the damaging floods on the Sheyenne River.

The summers at Lake Ashtabula are generally comfortable, averaging in the low 70's with very few days of hot and humid weather. Nights, with a few exceptions, are comfortably cool, in the upper 50's. The winters are cold and dry, with maximum temperatures rising above freezing only on an average of 6 days each month, and nighttime lows dropping below zero approximately half of the time. No presentation of project resources at Lake Ashtabula would be complete without a discussion of the influence that the wind exerts on recreational pastimes in this region.

The terrain of this region is flat and extremely open; over 90 percent of it is used for agricultural purposes. The lack of significant areas of tree cover combined with the absence of vertical relief in the landscape can result in the wind becoming a major factor in outdoor activities of any kind. Wind speeds in this area are high compared with other areas of the Midwest, averaging 15 miles per hour (mph); winds with speeds of 30 to 40 mph are common. Summer winds are generally out of the southeast, blowing up the river valley; winter winds are from the northwest. Wind speed has a significant effect on human comfort.

In consideration of this, the drying and cooling effects of wind are an important consideration in the planning and design of recreational facilities for summer and winter activities. If winter recreational activities are to be programmed for Lake Ashtabula, it is important that wind protection be provided; winter windchills in the -40° to -50° range are not uncommon.

DRAINAGE AREA

The total Sheyenne River drainage area at Baldhill Dam, as determined by the Corps of Engineers, is 7,385 square miles. This total includes 3,573 square miles of closed basins as classified by the U.S. Geological Survey (USGS); this is in the Devils Lake basin. The remaining area is divided by the USGS into the following categories: 1,690

square miles of primary drainage (by direct watercourse to the main stem); 1,660 square miles of secondary drainage (starts to contribute during the 50 year flood); and 462 square miles of noncontributing drainage (low areas more than 10 feet deep [prairie potholes, etc.] without an outlet).

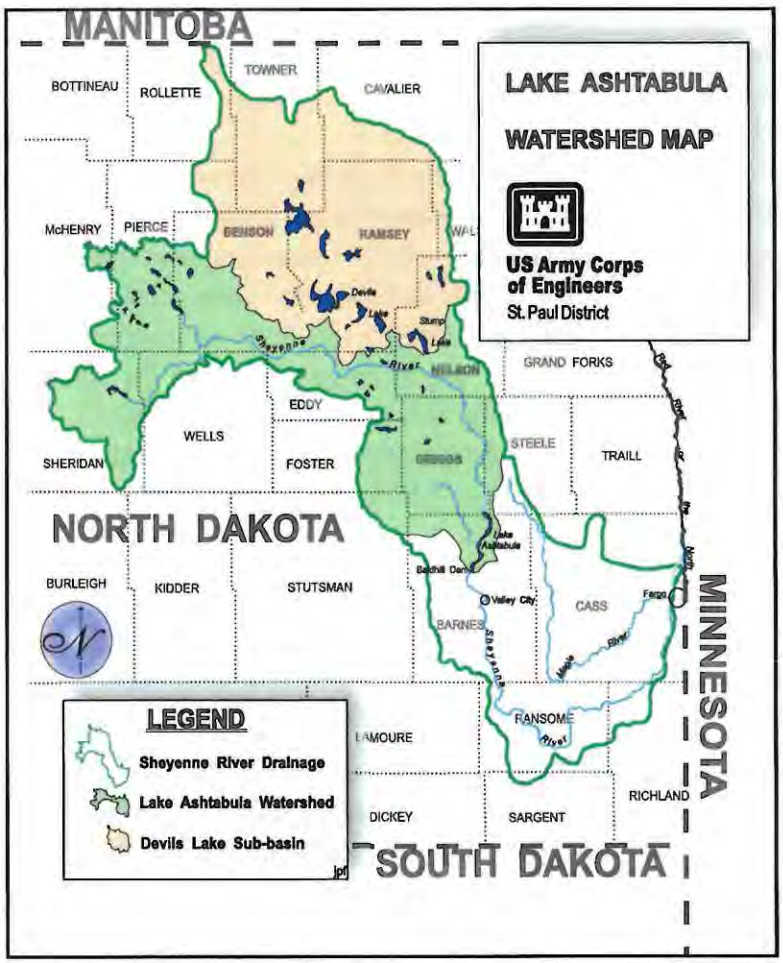
TRIBUTARIES

The Sheyenne River and Baldhill Creek are the principal tributaries to the reservoir; both have extreme seasonal fluctuations in flow. The Sheyenne River average flow, upstream of the project, is 105 cfs with extremes ranging from no-flow at times to 9,100 cfs (April 1950). Baldhill Creek average discharge is 15 cfs. Both streams contribute about 80 percent of their total discharge during snowmelt and spring runoff; late summer, fall, and winter flows are usually minimal to no-flow.

POOL

A tabular listing of project specifications is available in Appendix E.

Lake Ashtabula lies in the valley of the Sheyenne River, 271 miles above its confluence with the Red River of the North (Figure 3-1). The river valley is an aggraded meltwater trench formed when the Wisconsin Glacier thawed about 12,000 years ago. The lake is a long, very narrow body of water stretching for about 27 miles across the northern plains of North Dakota (Figure 1-4). With a maximum depth of 46 feet and a width of 3,200 feet, the lake looks like a large river, winding across the plain (see the Title Page). Its storage capacity is: 18,000 acre-feet at spillway elevation, elevation 1252; 70,600 acre-feet at normal pool, elevation 1266; and 115,300 acre-feet at maximum pool, elevation 1271. Maximum pool depth decreases at a rate of about one foot-per-mile upstream from the dam. The pool water quality suffers from excess nutrient loading from agricultural activities in the watershed and is plagued by algae blooms during the summer.



DAM

Baldhill Dam is a compacted earth embankment with a crest elevation of 1278.5 feet above mean sea level, 1929 datum (msl). Dam safety modifications raised the top of the dam to elevation 1283.5 to prevent overtopping in the event of the (revised) project design flood. The top is 20 feet wide; the average height is 41 feet (see Figure 1-6); the maximum height is 61 feet above the old stream bed; and the length from the east abutment to the spillway structure is approximately 1,650 feet. Slope protection is provided over the entire upstream face and below elevation 1253 on the downstream slope. Construction drawings indicate that the original embankment material consisted of lean clay and more pervious materials downstream of the embankment centerline; upstream of the centerline, the material is fat clay and shale.

Baldhill Dam was authorized by the Flood Control Act of December 1944, and constructed during the period 1947-1950; it was formally dedicated in 1952. Initial construction costs were estimated at $810,000. Additional information on the project is presented in *A Brief Project History and Post Construction Modifications,* this chapter.

1. Spillways

The spillway crest section, spillway abutments, and tainter gate piers are monolithic concrete gravity structures. The upstream and downstream wing walls and the walls of the chute and stilling basin are cantilever walls that use a sloping base on a shale foundation to resist sliding. Maximum height of the walls is 35 feet. The concrete floor monoliths are continuously reinforced two-way concrete slabs, anchored to bedrock. Reservoir stages are controlled by three 20-foot high by 40-foot wide tainter gates of welded structural carbon steel (see Figures 1-7 and 1-8). At maximum surcharge pool (elevation 1278.5, top of dam), spillway capacity is 60,000 cfs. Probable maximum flood (PMF) estimated inflow is 123,000 cfs (see this chapter, Post Construction Modifications).

FIGURE 1-9. Summary of Project Visitation

Investigations of Baldhill Dam under the Dam Safety Assurance Program determined that the existing spillway was inadequate for passing the revised probable maximum flood flows. A plan to repair and rehabilitate the spillway, and to construct an auxiliary ungated concrete overflow spillway on the embankment to supplement the PMF flows, was developed and presented in the October 1990 Feature Design Memorandum. Construction of this plan was completed in 1999.

2. Outlet

Low flow discharges are regulated by two 3-foot-diameter conduits in the base of the spillway tier sections, invert intake elevations 1238.0 (see Figure 1-8).

3. Other Project Structures

Four major buildings are located on the west end of the dam near the spillway structure:

- Shop building to house government vehicles and provide work space for the maintenance employees. The building measures approximately 40-120 feet.
- Shop and storage shed located near the spillway structure.
- Project offices.
- A metal storage building for winter storage of boats, vehicles, and other equipment.

A visitor center is located near the east end of the dam in the Mel Rieman Recreation Area. This building measures approximately 50-feet square and has two stories. The lower level houses restrooms and changing facilities for the nearby swimming beach. The upper level is divided into a ranger station and a display area for interpretive exhibits. The display area also functions as a public meeting hall.

LAKE REGULATION

Each year, flood control storage is made available in the lake by releasing the stored water after October 1, to ensure a drawdown to at least elevation 1262.5 by March 1. Drawdown below that elevation is accomplished when warranted by forecasts of larger than normal spring runoff, heavier than normal snow, downstream water supply conditions, or other pertinent factors. During the spring and summer, the lake is then filled to elevation 1266.0 by the spring runoff and snowmelt. The outflow during this high water period is regulated to prevent or reduce flooding at Valley City and other communities downstream. Following the spring runoff period, the discharge from the lake will never be less than 13 cfs. To supplement natural flows for water supply, releases from the dam will be increased as required if sufficient storage is available.

PROJECT VISITATION

Project visitation for fiscal year 2003 was 2,227,330 visitor hours. Visitation records indicate that overall visitation is increasing; this is shown on Figure 1-9. Additional information on project visitation is available in Chapter 3, *Recreation*

Program Analysis and in Appendix B, *Recreation Program Tabular Statistics.*

SUMMARY OF RECREATION DEVELOPMENT

The original Baldhill Dam Project, completed in 1952, did not include recreation facilities. A master plan for administration and development of the Lake Ashtabula Project land and water areas was approved in May 1953; recreation facility development was initiated in spring of 1954, in accordance with the master plan. The Barnes County Park Board developed eight public use areas at Lake Ashtabula on sites leased from the Corps of Engineers (see Figure 1-4):

Sundstrom's Landing,
Mel Rieman (main public use area),
Old Highway 26,
Sibley (aka Keyes) Crossing,
Katie Olsons Landing,
Eggerts Landing,
East and West Ashtabula Crossings.

The Park Board developed camping and day use facilities at these sites and engaged in an extensive tree planting program with state assistance (the Corps developed most of the facilities and did extensive tree planting at Old Highway 26). Low-density recreation development was also planned for the Sheyenne Campsite, The Island and Baldhill Creek areas. No development took place at these sites; they have subsequently been designated as wildlife management areas

In the mid-1960's, citing increased maintenance costs and a declining economy, Barnes County returned all but three sites to the Corps: East Ashtabula Crossing, West Ashtabula Crossing and Eggert's Landing. Eggert's Landing was returned to the Corps in 1977; East and West Ashtabula Crossings were returned for Corps management beginning April, 1, 1979.

In 1998, the Corps deactivated Old Highway 26 Recreation Area, citing difficult access and low visitation rate as the basis for this decision. All campsites were relocated to Eggerts Landing Recreation Area to facilitate the steadily increasing visitation there (see Figure 2-6). Old Highway 26 Recreation Area was reclassified as Multiple Resource Management: Wildlife Management.

The National Park Service (NPS) is in the development and certification phase for the national the North Country Trail. It is a low density hiking trail that presently runs through seven states. There is a 35-mile segment on project lands bordering the reservoir. Site personnel maintain the trail with 68 barb-wire fence crossings and four small boardwalks. There are three trailhead information kiosks located at Baldhill Dam, West Ashtabula Crossing, and Sibley Crossing and two remote camping sites. The Ashtabula segment has been certified by the National Park Service.

LISTING OF PRIOR AND PROPOSED DESIGN MEMORANDUMS

*i...*General Design Memorandum,

Baldhill Dam and Reservoir, Lake Ashtabula, Sheyenne River ND, revised December 1982, approved July 1985: evaluating six alternatives for increasing spillway capacity.

ii...General Design Memorandum and Final Environmental Impact Statement, Dam Safety Assurance Program, Baldhill Dam and Reservoir, Lake Ashtabula, Sheyenne River ND, January 1987, approved July 1987.

iii...Supplement to General Design Memorandum and Environmental Assessment, Dam Safety Assurance Program, Baldhill Dam and Reservoir, Lake Ashtabula, Sheyenne River ND, December 1988, approved May 1989.

iv...Design Memorandum No. 1. Rehabilitation of Baldhill Dam and Reservoir, Embankment and Spillway, October 1990

v....Design Memorandum No. 2. Construction Materials, Rehabilitation of Baldhill Dam and Reservoir, Embankment and Spillway, May 1992.

vi...Value Engineering Study Report, Baldhill Dam Rehabilitation, Sheyenne River ND, August 10, 1993.

vii...Design Memorandum No. 2, Rehabilitation of Baldhill Dam and Reservoir, Operating Facilities, December 1997.

viii..Design Memorandum, Pool Raise for Flood Control, Baldhill Dam and Reservoir, November 1998, revised June 1999.

POST CONSTRUCTION MODIFICATIONS

Modifications since construction include:

- Upstream riprap repair of the embankment.
- Control of surface runoff and foundation seepage in the downstream toe of the dam.
- Stabilization of a slide above the discharge channel.
- Extension of slope protection on the discharge channel and approach channel.
- Construction of a tailwater control structure in the discharge channel.
- Construction of an auxiliary ungated concrete overflow spillway.

The upstream riprap repair was required because high waves eroded the original slope protection. The repair consisted of flattening the upstream slope and placing new riprap. The upstream slope is now 1 vertical (V) on 2½ horizontal (H) from the crest of the embankment to the surface of a small granular-fill berm. The berm was constructed before the new riprap was placed.

Immediately downstream of the dam, wet conditions existed for several years as a result of the ponding of surface runoff and

a significant amount of foundation seepage. The seepage occurs through a 2-foot to 5-foot thick zone of sand, gravel, and cobbles that lie 3 to 8 feet below the original ground line between station 14+00 and the spillway. This pervious zone is probably exposed to the spillway approach channel and may also be connected to the pool through the sand backfill placed behind the upstream left wing wall of the spillway. Because no core (or inspection) trench was required, the pervious zone was not cut off when the embankment was constructed. To control the foundation seepage, and prevent its emergence at the ground surface near the downstream toe, an 8 inch subdrain was installed in the pervious zone to collect the seepage and convey it to the discharge channel downstream of the spillway. To improve surface drainage in the downstream toe area, a ditch was excavated about 110 feet downstream of the embankment toe to drain runoff to the old river channel. Between the ditch and the embankment toe, up to three-feet of berm fill has been placed to provide surface drainage to the ditch.

Excavation for the construction of the spillway and associated approach and discharge channels triggered overburden slides in the right abutment. The abutment consists of glacial till overlying shale bedrock. The shale surface has a slight downward slope toward the valley. The slide occurred along the saturated, sloping glacial till-shale contact. Intermittent movements of the overburden slides above the stilling basin and discharge channel and above the approach channel continued after construction. A 450-foot-long shear wall was finally installed about 95 feet upslope from the stilling basin and discharge channel to stabilize the downstream slide area. Since its installation, the shear wall has prevented overburden movement above the stilling basin and the discharge channel. Additional stabilization of this abutment is part of the dam safety project. Sixty 6-foot-diameter reinforced concrete caissons, about 45 feet long, extend 30 feet into the shale bedrock over a distance of 700 feet along the abutment.

Since the construction of Baldhill Dam, the National Weather Service has updated the generalized estimates of the probable maximum precipitation (PMP) for areas east of the 105th meridian. The PMP estimates were published in Hydrometeorological Report No. 51 and are the basis for the probable maximum flood (PMF). Revised unit hydrographs based on more complete flow records in conjunction with the updated PMP estimates resulted in the current PMF with a peak discharge of 126,000 cfs.

Investigations of Baldhill Dam under the Dam Safety Assurance Program determined that the existing spillway was inadequate for passing the revised probable maximum flood flows. A plan to repair and rehabilitate the spillway, and to construct an auxiliary ungated concrete overflow spillway on the embankment to supplement the PMF flows, was completed in 1997. Other parts of this project included placement of caissons to anchor the hillside on the west

end of the dam and reconstruction of the existing gated spillway. In 1999 a fifty year major rehabilitaion project was started at Baldhill Dam. This project consisted of replacing the aging operation equipment on the dam and the construction of a new office building. This work was completed in the spring of 2001.

A raise of the flood control pool of Lake Ashtabula was authorized for construction as a part of the Sheyenne River Flood Control Project in the Water Resource Development Act of 1986. The design studies for this flood control pool raise were started in 1993 and were completed in 1998. Modifications to the gates of the existing gated spillway and the acquisition of additional rights-of-way around the shoreline of Lake Ashtabula are the principal components of the flood pool raise. Construction of levees at some cabin areas would also occur. This project started in 2001. The flood pool raise increased the design flood pool level to elevation 1271, up to 5 feet above the design flood pool level of 1266. This provides an additional 30,000 acre-feet of storage that would be available exclusively for flood control. Currently, in anticipation of flood events, the pool has to be lowered for floodwater storage. The proposed flood pool raise adds a measure of safety for unanticipated, unforeseeable occurrences such as the extremely wet summer of 1993.

REGIONAL INFLUENCES

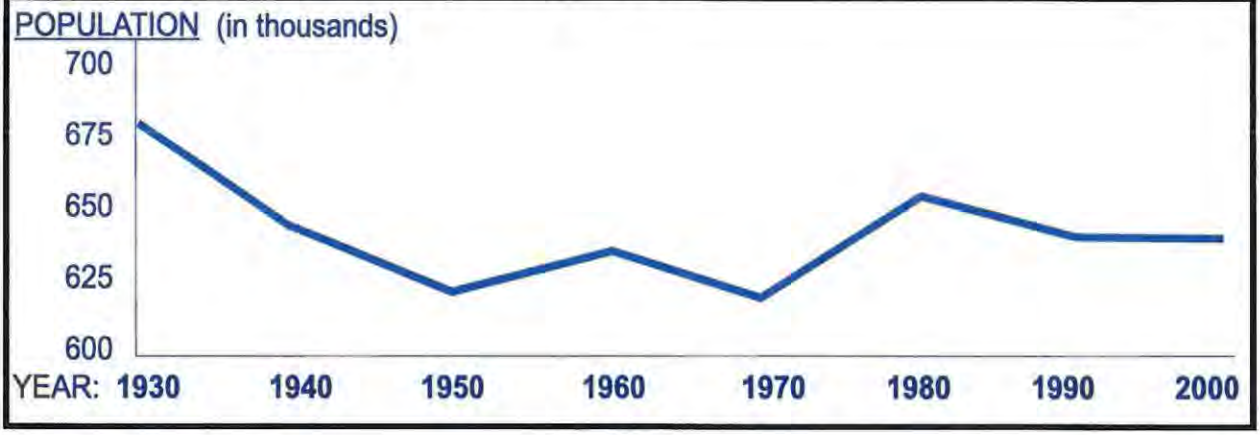
POPULATION

North Dakota is a sparsely populated state; the 2000 census counted a total state population of 642,200. Three major demographical trends are affecting the state: an overall decline in rural populations; the urbanization of North Dakota; and the general aging of the population.

North Dakota has experienced a loss of population since 1930, reaching a low point in 1970 (see Figure 1-10). During this time, urban populations continue to grow while rural populations decline.

The study area surrounding Lake Ashtabula includes the counties of Barnes, Griggs, Steele, and Cass in North Dakota. This area extends west to Jamestown, North Dakota, north through Cooperstown, east to Fargo, and south to Enderlin. The population of the area was

FIGURE 1-10. North Dakota Population, 1930-2000



estimated at 121,142 in 1990 within a 12,207 square kilometer area. The majority of the population resides in urban areas near Valley City and Fargo. The urban population of the region was estimated at 93,576 and the rural population 27,566 in 1990.

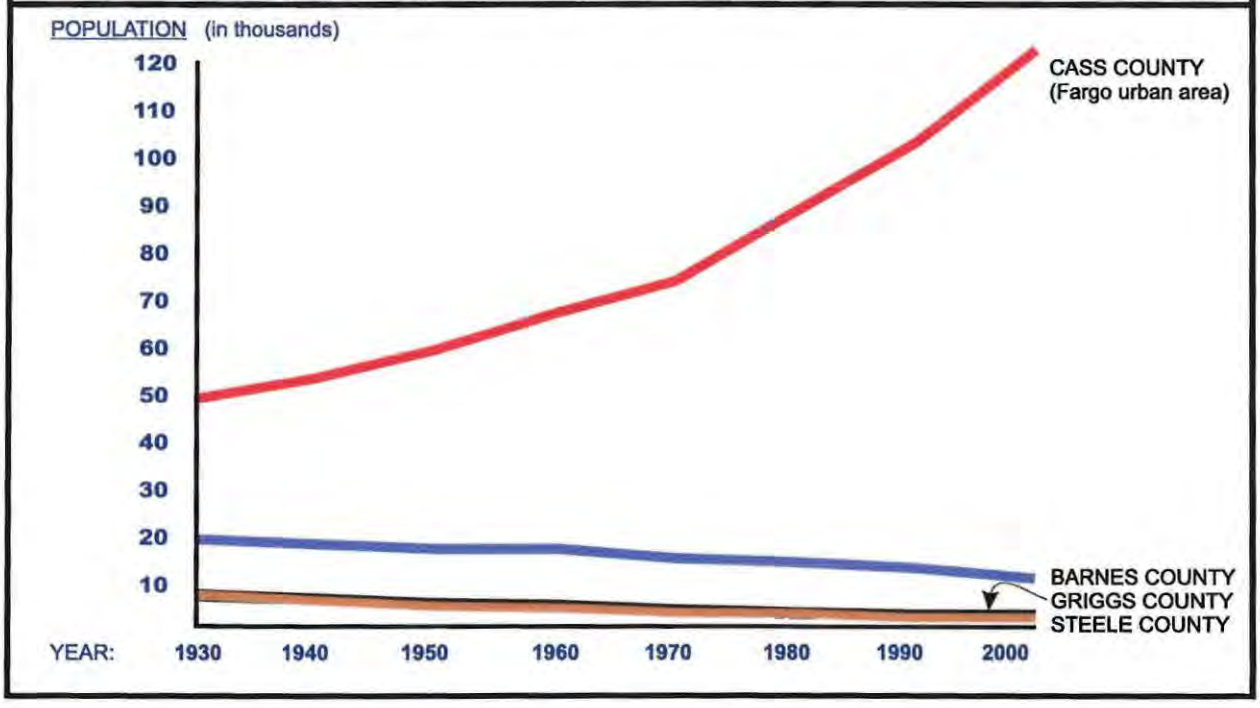
Barnes, Griggs, and Steele Counties experienced a loss of population from 1980 to 1990. In general, as rural areas decline, urban areas continue to grow as shown by the population growth in Cass County (see Figure 1-11) where Fargo is the state's largest city. Over 16 percent of the state's population reside in Cass County. Estimates for the year 2000 indicate similar trends: counties with large urban centers will continue to grow while rural counties will experience population loss (Table 1-3). If these trends continue, recreational patterns and usage may shift from local to out-of-state visitation.

As with the rest of the United States, North Dakota's largest population increase is projected to be in the 45 to 54 (years old) age group, "the Baby Boomers." This group is expected to increase 58 percent above its current level. The percent of the population above age 55 is projected to increase 21 percent (1990 ND SCORP). Other age groups show modest increases, with some younger groups actually decreasing. Figure 1-12 depicts that a large segment of the population is approaching middle age. It is expected that as this large and influential segment of the population ages they will have, as consumers and voters, a significant and wide-ranging socioeconomic effect. This impact is already apparent in widely diverse areas of our society such as advertising, health care, politics and the stock market.

1. Median Age

The median age of residents of Barnes,

FIGURE 1-11. Study Area Population Trends and Projections



Cass, Griggs, and Steele Counties and the State of North Dakota rose significantly between 1980 and 2000 (see Table 1-4). As the generation of baby-boomers grows older and the out-migration of the youth continues, the median age of residents will continue to increase. These trends will influence future recreation patterns. Generally, younger people tend to participate in recreational activities more than older people. As young people leave small towns and family farms for urban areas, it is possible that recreation at Lake Ashtabula will decline in the years to come. Modern facilities and a wide range of recreation amenities will be required to attract young people to the lake.

2. Education

University, college, and vocational training is available throughout the four-county study area. Two of the largest universities in the state are located in the region: North Dakota State University, Fargo and the University of North Dakota in Grand Forks.

A comparison of the level of education for residents of Barnes, Cass, Griggs, and Steele Counties shows that most persons 25-years or older have a high school diploma. The percentage of persons with a high-school diploma and a Bachelor's Degree is greater in Cass County than in Barnes, Griggs, and Steele counties; residents of Cass County have a significantly higher level of education, on the average. This is as expected in that industries tend to locate near metropolitan areas (a larger labor pool), and generally have greater education requirements, especially in management-level employment and high-tech design and manufacturing (see Table 1-5).

ECONOMY

The economic base in North Dakota has traditionally been agricultural with a large share of the land devoted to farming a variety of crops that include wheat, barley, sunflowers, oats, flax, soybeans, sugar beets, potatoes, rye, and livestock. Agriculture is still the primary base but the structure of agriculture has changed over the last 20 years. Agriculture has become characteristic of big business with large corporate farms replacing small privately-owned family farms. This is due, in part,

TABLE 1-4. Median Age by County — SOURCE: 1980, 1990, 2000 U.S. CENSUS

COUNTY	MEDIAN AGE		
	1980	1990	2000
Barnes	31.3	36.6	40.6
Griggs	37.9	41.0	45.8
Cass	27.2	30.0	31.3
Steele	35.1	39.8	41.4
Study Area Average	32.9	36.9	39.8
North Dakota State Average	28.1	32.4	36.2

TABLE 1-5. Educational Attainment — SOURCE: 2000 U.S. CENSUS

North Dakota County	High School Diploma	Bachelor Degree
Barnes	85.0	22.1
Cass	90.9	31.3
Griggs	78.7	15.7
Steele	86.1	19.8
State of North Dakota	76.1	22.0

to tremendous economic change but also to the increase in the use of modern chemicals and technology.

Many rural communities in North Dakota areas such as Steele, Barnes, and Griggs counties have experienced a decline in agricultural opportunities. Farming/rural residents in these counties have been forced to seek employment in non-agricultural industries while others have moved to larger cities in search of employment.

As the structure of agriculture has changed, the economy has become more diversified; it has changed from a goods producing to a service producing based system. Health services is one of the largest components of the services industry and it is likely to increase throughout the state as the population grows older and the out-migration of youth continues.

FIGURE 1-12. North Dakota Population Age Curve — SOURCE: 1990 ND SCORP

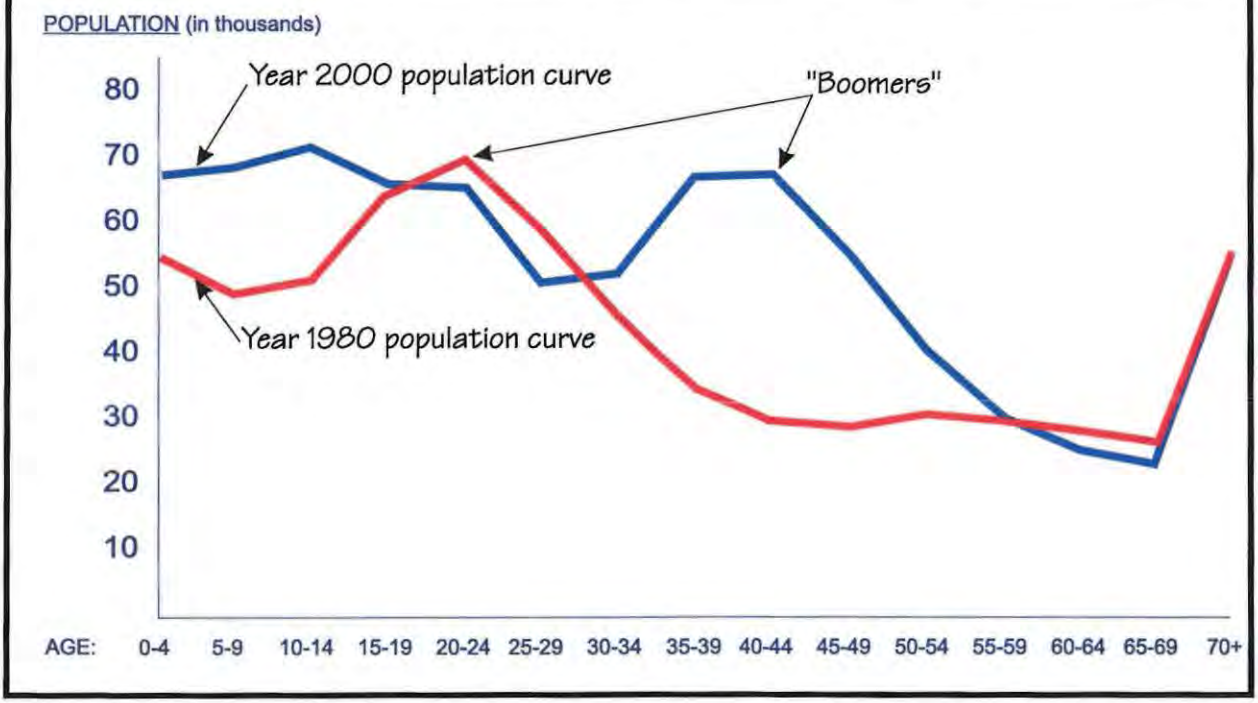


TABLE 1-6. Area Employment by Industry — SOURCE: 1990 US CENSUS

INDUSTRY	COUNTY							
	Barnes		Cass		Griggs		Steele	
	1980	1990	1980	1990	1980	1990	1980	1990
Agriculture	19%	18%	–	–	38%	30%	49%	30%
Trade	23%	22%	27%	26%	20%	18%	16%	15%
Manufacturing	13%	6%	12%	8%	7%	6%	–	–
Health Services	8%	9%	11%	12%	7%	6%	6%	7%
Education Services	12%	13%	11%	10%	8%	8%	7%	9%
Finance	–	–	7%	8%	–	–	–	–
Transportation, Education, and Utility	–	–	–	–	–	–	16%	15%
TOTAL	75%	68%	70%	64%	80%	68%	94%	76%

– information not available

1. Employment

The trade industry is an important employer in both urban and rural regional counties. Agriculture is a primary employer in rural counties particularly in Griggs and Steele Counties where it accounted for 30 percent of the work force (see Table 1-6). As the structure of agriculture has changed, employment opportunities in North Dakota and the four-county region have become more diversified, shifting from manufacturing to service in urban counties, and from agriculture to service in rural counties. This shift is predominant in agriculture based counties such as Griggs and Steele.

The percentage of persons 16 years and older employed in the labor force was 65.3 percent while the percentage of unemployed persons was 5.3 percent in the state according to the 1990 Census. The percentage of persons employed in the labor force was 72.2 percent in Cass County, 57.6 percent in Griggs County, 58.3 percent in Barnes County, and 56.5 percent in Steele County as of 1990.

The comparable unemployment rates for the four-county region during this time were 4.1 percent in Cass, 4.6 percent in Griggs, 6.0 percent in Barnes, and 6.3 percent in Steele Counties. As of 2000, unemployment rates in the four-county

TABLE 1-7. 1992-1998 Study Area Unemployment Rates — SOURCE: State of North Dakota

COUNTY	1995	1996	1997	1998	1999	2000
Barnes	2.5%	2.7%	2.2%	2.8%	3.1%	3.2%
Cass	2.0%	1.7%	1.4%	1.6%	1.8%	1.6%
Griggs	1.8%	2.0%	1.5%	2.3%	2.3%	2.0%
Steele	1.8%	1.9%	1.5%	1.7%	1.2%	1.4%
*State of North Dakota	3.3%	3.1%	2.5%	3.2%	3.4%	3.0%
*United States	5.6%	5.4%	4.9%	4.5%	4.2%	4.0%

* seasonally adjusted

TABLE 1-8. 1990 Median Family Income SOURCE: 2000 U.S. Census

Barnes County	$42,149
Cass County	$51,469
Griggs County	$38,611
Steele County	$43,914
State of North Dakota	$34,604

region were quite low, down considerably from 1990. The rate of unemployment for all counties remains below the average in the state and the nation (see Table 1-7).

2. Family Income

The median family incomes of the counties and the State of North Dakota are listed in Table 1-8. The median family income for all of the study area is higher than the median family income in the state as a whole. The median family income in Cass County is higher due to its large urban areas, especially Fargo, the largest city in the state, and West Fargo.

RELATIONSHIP TO OTHER PROJECTS

The only other Corps of Engineers project within the Lake Ashtabula Project zone of influence is the Pipestem Lake Project on the James River, about 30-miles west of Valley City. As this in a different drainage basin (the Missouri River), it is administered by the Omaha District of the Corps of Engineers. Pipestem Lake provides camping, restrooms, picnic facilities, and a boat ramp.

The Homme Dam Project, about 100-miles north of the lake, near Park River, North Dakota, is the next nearest Corps project. Homme Dam facilities include a boat ramp and parking; Walsh County Park Board provides restrooms, showers, camping, and picnic facilities. The project is administered by the Lake Ashtabula Project personnel. The Corps also has a flood control project and structures on the Souris River that do not support dedicated recreation facilities. The Grand Forks/East Grand Forks flood reduction project has a considerable recreation component with almost 20-miles of multipurpose trails, parking, restrooms, picnic and play areas, and other facilities situated along the Red and Red Lake Rivers within the cities. The project lies just outside of the 50-mile Ashtabula Zone of Influence (see Figure 3-1).

PROGRAMS OF OTHER AGENCIES

1. U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) maintains a warmwater fish hatchery and the Wetlands Management District Office at the Valley City hatchery. This office has provided assistance and recommendations towards management of Corps lands for wildlife habitat restoration and enhancement such as controlled burning and prairie restoration. The USFWS also maintains fish rearing ponds immediately below the dam.

2. North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP) is an international agreement between the United States, Mexico, and Canada for the restoration of lost waterfowl habitat. Federal, State, private, and Provincial agencies are cooperating under this plan for the conservation, development, and management of habitat for waterfowl and associated wetland species. The Corps of Engineers and the USFWS have signed a cooperative agreement that defines the goals, responsibilities, and procedures by which these agencies will work together to further the efforts of the NAWMP. The Corps agrees to identify opportunities at operating projects and to coordinate management efforts with the USFWS.

3. North Dakota Game and Fish Department

The North Dakota Game and Fish Department (NDGFD) is responsible for managing the fishery of the lake. These duties include fish stocking activities, creel surveys, and enforcement of state hunting and fishing laws. Fish stocking of the reservoir is the result of an agreement between the U.S. Fish and Wildlife Service and the North Dakota Game and Fish Department. Sport and commercial harvest of fish is controlled through management actions such as licensing of fishers, establishment of seasons, and catch limits. The NDGFD, in conjunction with the Corps, has designated two areas of approximately 1,920 acres (land and water) as waterfowl refuge areas. The primary purpose of these rest areas is for waterfowl protection during the period 1 October to 1 December, every year; they also serve as refuge areas for other game species during this time.

4. Colleges and Universities

Three universities within the region have been directly involved with the Lake Ashtabula project resources. The University of North Dakota in Grand Forks and North Dakota State University (NDSU) in Fargo have conducted various studies pertaining to environmental assessments and the ecology of project resources under contract to the St. Paul District, and for academic research purposes. NDSU is conducting research on control of leafy spurge, *Euphorbia esula* (a noxious weed) on project lands. Valley City State University has used the project for a recreation area and as an outdoor classroom.

This project also works with universities providing internships and working environments for their students. Mankato State University, the University of Wisconsin at River Falls, the University of Minnesota, and North Dakota State University provide students to work as co-ops for the summer.

CHAPTER 2

RESOURCE ANALYSIS

REVIEW AND INVENTORY OF RECREATION RESOURCES

This chapter presents the factors that most influence the use, development, and management of the land and water resources at the Lake Ashtabula, Baldhill Dam Flood Control Project. This includes factors that are conducive to development and factors that act as constraints. The elements presented here fall into three broad and loosely interrelated classifications: natural resources, social and cultural resources, and administrative and policy considerations. Using the needs and desires of the region as the final determinant, these factors are used to decide the most appropriate development of the project resources.

BALDHILL DAM OPERATIONS AREA

1. Unit Description

a. Size: This site is 11 acres (see Figure 2-1).

b. Location and Access: The site is located on the west shore, adjacent to the dam and control structure, about 10-miles north of Valley City; there is good access via County Road 19.

c. Existing Site Use (Plate 2): The site contains the offices, vehicle park, and maintenance facilities of the Lake Ashtabula Project. Public use facilities at this site consist of an observation deck for viewing the dam and spillway and parking.

d. Adjacent Land Use: Non-Federal land is agricultural; adjacent Federal land is part of the project, including the dam, control structure, and tailwater area.

e. Soils and Topography: Soils are of the Buse-Barnes series: deep, well drained, moderately slowly permeable soils on till plains and moraines and in stream valleys. Slopes range from 0 to 35 percent [1]. Baldhill Dam Operations Area is sited on the east facing terrace of the Sheyenne River Valley (Figure 2-1). Slopes are from flat to moderately steep on this site.

[1] Soil descriptions are from the United States Department of the Interior, Natural Resources Conservation Service (USDA NRCS).

f. Vegetation: The actively used portion of the site is almost exclusively mown turf with rows of trees planted around the edges. The turf extends completely down the slope to the armored banks of the tailwaters.

g. Habitat Availability: Off-site habitat is agricultural property and riverine floodplain.

h. Cultural Resources: Baldhill Dam Operations Area has been evaluated for cultural resources. The North Dakota State Historic Preservation Office (SHPO) has determined that there are no sites in this area eligible for the National Historic Register.

i. Limitations and Hazards: During periods of high flow, there is a fast water hazard associated with the tail waters of the dam and the river.

2. Land Use Classification
This site is classified, in accordance with ER 1130-2-550, as Project Operations.

3. Visitation
As there are no public facilities at the dam, visitation records are not kept for the operations area.

4. Visual Resources
The view from the project office area is of the dam and control structure on the left, with the reservoir behind extending toward the north, and the river valley to the right, winding toward the south.

Views from the site are varied and interesting. The dam and control structure are industrial in nature, with geometric shapes and massive concrete constructs dominating the view while the river with its greenery-clad-banks and quiet water is the focus of the view to the right. The fish hatchery is situated below, to the front. Although the views are of an entirely different nature, either viewshed has interesting and varied contributors.

FIGURE 2-1. Baldhill Dam Operations Area, Plates 2 and 10.

5. Summation

This site is used by the public as access to the tailwater area of the dam and to the Sheyenne River. Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose of water supply, the federally administered land and water areas of this site are being managed to help fill regional resource needs. An examination of Corps administration policies at the project indicates that the current classification of this area is providing protection of the resource and accommodating the recreational needs of the public.

MEL RIEMAN RECREATION AREA

1. Unit Description

a. Size: This recreation area is 70 acres, divided into three well-defined use areas: day use, overnight camping, and boat launching (see Figure 2-2).

b. Location and Access: This area is at the south end of the lake on the east bank adjacent to the dam. The site is located about 10 miles north of Valley City; there is good access from County Roads 21 and 19. It is considered the main activity area of the project by the community.

c. Existing site use (Plate 3): This site has the best water quality in the reservoir and has a very popular swimming beach (Figure 2-2). The area has a visitor-center located near the beach; the building houses an interpretive display area, flush toilets, and shower rooms. The site also has volleyball courts and a modern playground. There is a private concession and a boat ramp with a courtesy dock and a fish cleaning station. There is no sanitary disposal facility at this site.

Public use facilities at the Mel Rieman Recreation Area include:

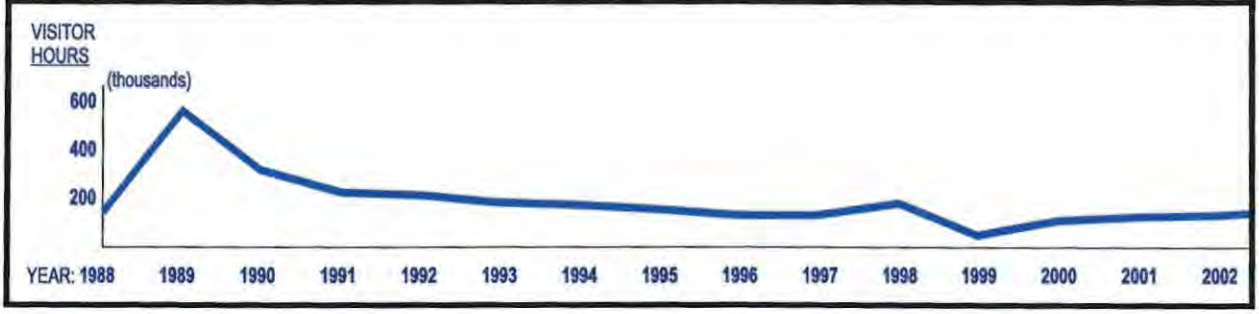
Campsites 27
Picnic Shelter 1
Picnic Tables (may vary) 56
Boat Launch 1-lane
Vault Toilets 2
Parking 128-spaces

d. Adjacent Land Use: Land around this unit is used for agriculture.

e. Soils and topography: Soils are of the Buse-Barnes series: deep, well drained, moderately slowly permeable soils on till plains and moraines and in stream valleys with slopes ranging from 0 to 35 percent[1]. Ground slopes on the site vary within the entire range.

f. Vegetation: This site is a mix of steep, native grass covered slopes, mown turf high use areas, and a small wooded coulee in the center of the site.

FIGURE 2-2. Mel Rieman Area – Visitation Summary



g. Habitat Availability: The site is mostly improved with areas of turf and trees. Off-site is agricultural land with riverine habitat below the dam.

h. Cultural Resources: Mel Rieman Recreation Area has been evaluated for cultural resources. The North Dakota SHPO has determined that there are no sites in this area eligible for the National Historic Register.

i. Limitations and Hazards: Steep erodable slopes limit uses of some areas of the site.

2. Land Use Classification

This unit is classified, in accordance with ER 1130-2-550, as Recreation.

3. Visitation

Total visitation at Mel Rieman Recreation Area in fiscal year 2003 was 144,454 visitor hours.

4. Visual Resources

Mel Rieman Recreation Area is located astride the valley terrace on the east side of the reservoir, overlooking Baldhill Dam (Figure 2-2). The day use area, with its playground, picnicking facilities, swimming area, and open space, is heavily used. There is tent camping and picnicking in two small, wooded coulees. Recreational vehicle (RV) and trailer camp-pads are located above on the valley terrace.

The site has interesting and varied views within, the topography of the site is a major contributor to this. As a result of this vertical relief there are very good views of the dam and reservoir from the site. The lack of a

FIGURE 2-3. Mel Rieman Recreation Area, Plates 3 and 11.

riparian vegetation zone along the perimeter of the reservoir detracts from the aesthetic appeal of the lake.

This site has good existing visual resources. There are varied, interesting views both within the site and from the site looking outward. This area also has excellent potential for improvement.

5. Summation

This site is used by the public as access to the lake and for intensive-use recreation. Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose of water supply, the federally administered land and water areas of this site are being managed to help fill regional resource needs. An examination of Corps administration policies at the project indicates that the current classification of this area is providing protection of the resource and accommodating the recreational needs of the public.

Visitation records show that use of this site has been consistent since 1999. As the most easily accessed recreation area from Valley City and the freeway and with a complete host of amenities, it should continue to draw for the forseeable future

SUNDSTROMS LANDING

1. Unit Description

a. Size: This site is 9 acres (see Figure 2-4).

b. Location and Access: This area is located about 2½ miles above the dam. Although it is close to the dam by boat, the site is difficult to access by the existing road system and as a result is one of the more remote areas on the lake.

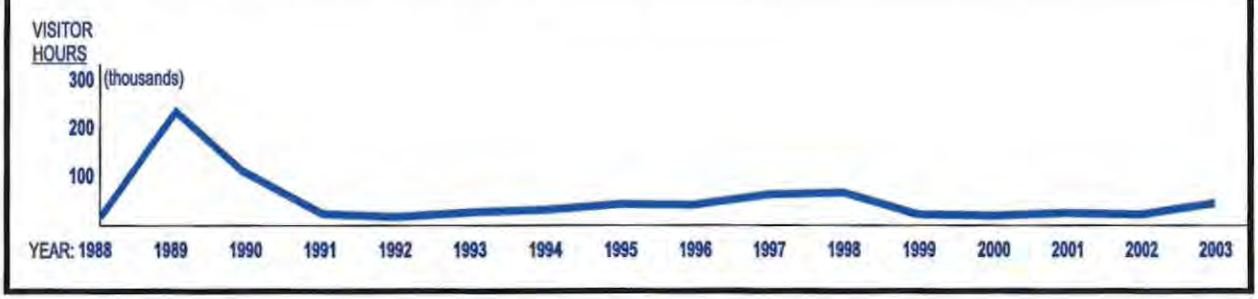
c. Existing Site Use (Plate 4): This site is primarily a lake access facility. As such, there is no beach, camping, or sanitary disposal at this site. There is a modern playground, picnic shelter, and fishing dock. The boat ramp also has a courtesy dock. Public use facilities at Sundstroms Landing Recreation Area include:

Picnic Tables (may vary) 5
Boat Launch 2-lane
Vault Toilets 1
Parking 46-spaces

d. Adjacent Land Use: Land adjacent to Sundstroms Landing is used for agriculture.

e. Soils and Topography: Soils are of the Buse-Barnes series: deep, well drained, moderately slowly permeable soils on till plains and moraines and in stream valleys

FIGURE 2-4. Sundstroms Landing – Visitation Summary



with slopes ranging from 0 to 35 percent[1]. The site is located on a narrow shelf of relatively flat land along the shore, with the steeply sloping valley terraces rising directly inland.

f. Vegetation: The steep, erodible slopes on the site are covered with native grasses, brush, or trees.

g. Habitat Availability: This is a remote site, surrounded by farm fields. The site provides savanna type upland habitat for the wildlife of the area.

h. Cultural Resources: Sundstroms Landing has been evaluated for cultural resources. The North Dakota SHPO has determined that there are no sites in this area eligible for the National Historic Register.

i. Limitations and Hazards: Steep, highly erodible slopes make much of the site unsuitable for recreation.

2. Land Use Classification

This unit is classified, in accordance with ER 1130-2-550, as Recreation.

3. Visitation

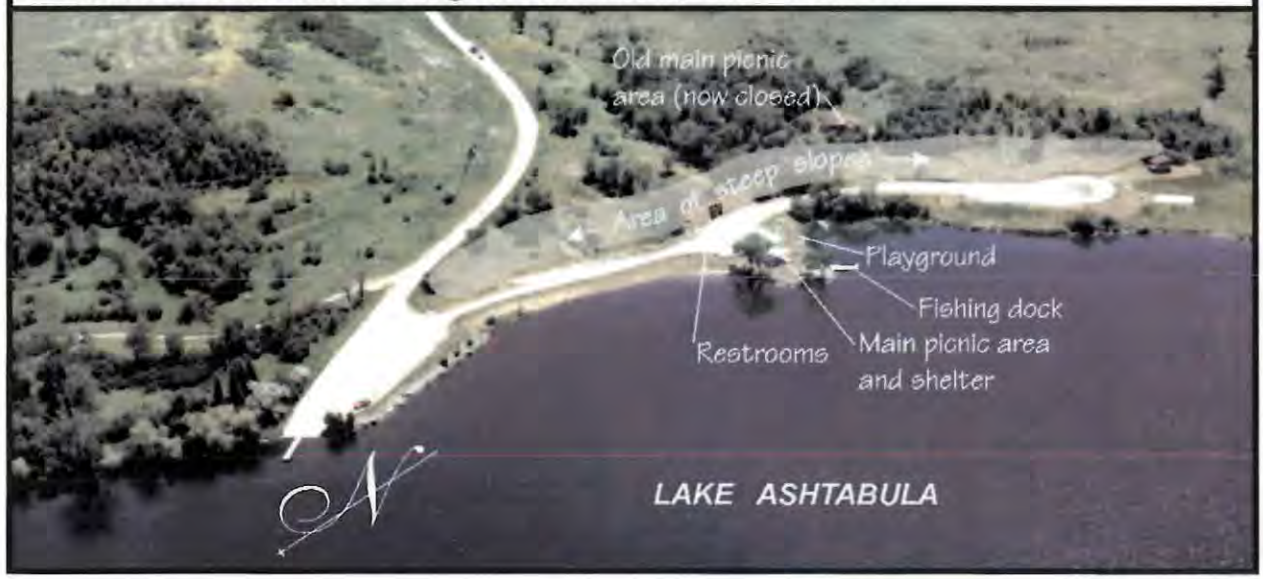
Visitation at Sundstroms Landing during fiscal year 2003 was 43,597 visitor hours (see Figure 2-5).

4. Visual Resources

Sundstroms Landing is a remote site, situated on a small, narrow shelf of land between the reservoir and the valley terrace; usable land is limited by the proximity of these steep, erodible slopes (see Figure 2-4). Roads and parking occupy most of the level terrain. As a result, there is little area suitable for recreation use, moderate to steep slopes being unsuitable for most recreation activities. An arched picnic shelter was removed because of erosion problems associated with its location and its inaccessibility to disabled persons.

The new main picnic area is well sited on a small spit of land that juts out into the lake; the playground is directly inland from it, with parking adjacent. New accessible restrooms are located close to the other recreation amenities and a fishing dock has been added to facilitate accessibility to the lake. The

FIGURE 2-4. Sundstoms Landing Recreation Area, Plates 4 and 12.



highly erodible sloping ground is planted in native prairie grasses and is not mowed.

The site has very good visual resources with its tree and grass covered hills and provides good views of the lake but, because of the highly erodible terraces and remote location, its recreation potential is small.

5. Summation

This site is used by the public as access to the lake and for intensive-use recreation. Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose of water supply, the federally administered land and water areas of this site are being managed to help fill regional resource needs. An examination of Corps administration policies at the project indicates that the current classification of this site is providing protection of the resource and accommodating the recreational needs of the public.

EGGERTS LANDING

1. Unit Description

a. Size and shape: Eggerts Landing Recreation Area is 28 acres;18 are developed (see Figure 2-7).

b. Location and Access: This site is on the east shore, about 5½ miles above the dam. It has excellent access by paved, county maintained roads.

c. Existing Site Use (Plate 5): There is a concession near the site that rents boats and cabins. The concession area is separated from the campground by a small creek. This site has a fish-cleaning station near the boat ramp and a courtesy dock. It provides an accessible campsite, a swimming beach, flush toilets, showers, and a hiking trail. The site has a modern playground and provides sanitary disposal facilities but does not have a picnic shelter. Recreation facilities at Eggerts Landing Recreation Area include:

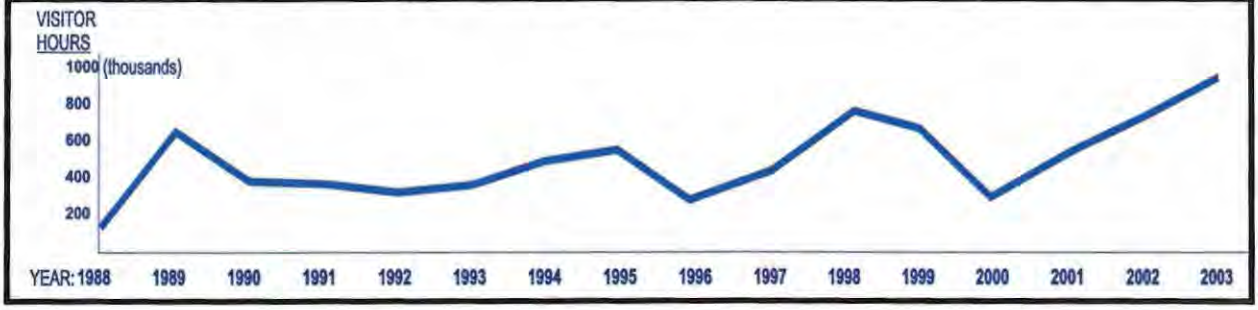
Campsites 41
Picnic Tables (may vary) 45
Boat Launch 2-lane
Vault Toilets 1
Parking 66-spaces

d. Adjacent Land Use: Land adjacent to this site is used for agriculture.

e. Soils and Topography: Soils in the area are of the Lanona-Swenoda series: deep, well drained soils on lake plains with slopes ranging from 0 to 9 percent[1]. This site is flat with the exception of the creek banks.

f. Vegetation: Part of this site is mown turf; most of it is in tree cover. The forested area resembles a shelterbelt planting.

FIGURE 2-6. Eggerts Landing – Visitation Summary



g. Habitat Availability: The surrounding area is farm field. The site, with its thick stand of trees, provides good cover for area wildlife.

h. Cultural Resources: Eggerts Landing has been evaluated for cultural resources. The North Dakota SHPO has determined that there are no sites in this area eligible for the National Historic Register.

i. Limitations and Hazards: None.

2. Land Use Classification

Eggerts Landing is classified as Recreation.

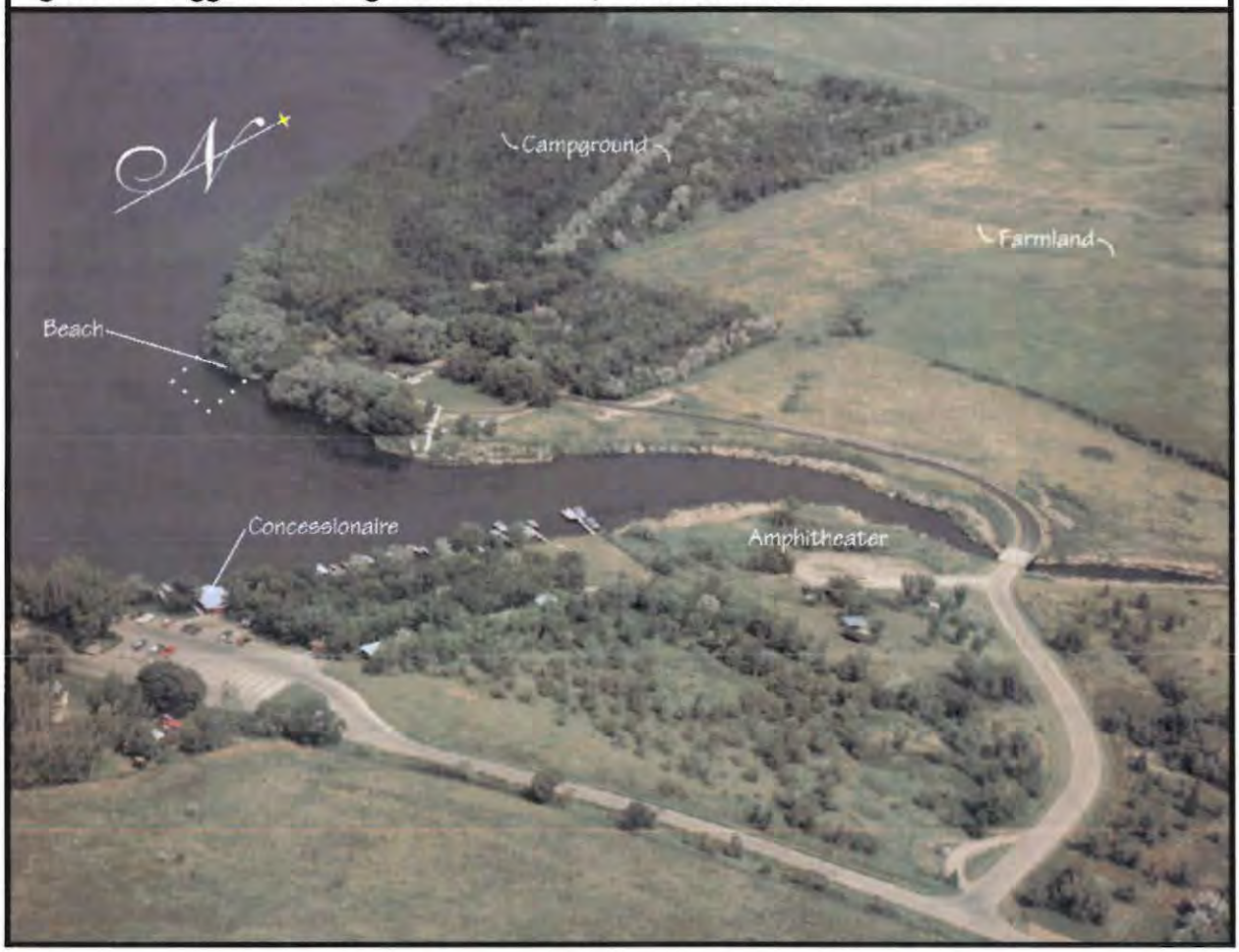
3. Visitation

Visitation at Eggerts Landing in fiscal year 2003 was 930,982 visitor hours.

4. Visual Resources

Although visual quality at this site is mediocre at this time, the site has tremendous potential. Sited at the mouth of a small, ephemeral creek, the area is without vertical relief. The mouth of the creek is a small inlet from the lake. It is a very attractive setting and provides an aesthetic center-piece for the site. The inlet is lined with cattails and is heavily used by waterfowl and muskrats.The east bank of the inlet is used as a docking facility for the concession.

Figure 2-7. Eggerts Landing Recreation Area, Plates 5 and 13.



A tree planting program at the site has resulted in acres of trees planted in a shelterbelt configuration; i.e., trees and shrubs of a single species, planted with minimal spacing, in straight rows (see Figure 2-7). This method has resulted in an overgrown woodland with an unnatural "weedy" appearance. The shoreline is not usable, or even attainable, because of the thick shrubby understory present.

Selective thinning and removal of excessive vegetation, and a selective planting of more desirable species would result in a pleasant, park-like atmosphere on the shore of Lake Ashtabula. This type of "forested" lakeside is not commonly available in this semi-arid, wide open land of treeless plain. A modification of this sort would be a positive addition to the recreation potential of the project.

5. Summation

This site is used by the public as access to the lake and for intensive-use recreation activities. Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose of water supply, the federally administered land and water areas of this site are being managed to help fill regional resource needs. An examination of Corps administration policies at the project indicates that the current classification of this area is providing protection of the resource and accommodating the recreational needs of the public.

Use patterns of the recreation facilities on the lake indicate that this area is not being used to its full potential (project personnel observation). Visitation records show a continuing increase in visitors to this site while visitation to other recreation areas within the project has been declining. A large part of this site is being underused. Use patterns should be evaluated and changes in facilities, amenities and administration accomplished to better fit these patterns and achieve better use of the resources of the Lake Ashtabula Project. These changes should include the reduction, relocation, or elimination of services, etc., when warranted.

KATIE OLSONS LANDING

1. Unit Description

a. Size: This is an 11-acre site (see Figure 2-9).

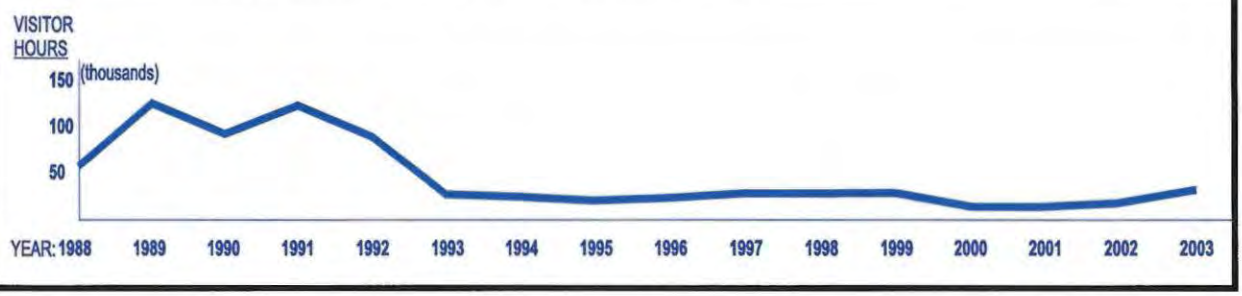
b. Location and Access: The site is a narrow strip of land on the west shore (see Figure 2-9), across the lake from Eggerts Landing. It is located about 5½ miles above the dam and is the only west bank public access to the lake south of the Ashtabula Crossings. Access to this site is mostly over paved roads. It is a difficult area to locate for the first-time user.

c. Existing Site Use (Plate 6): This site functions primarily as an access point for the lake. As such there is no beach, camping, sanitary disposal facility, or playground. A courtesy dock is provided at the boat ramp. Public use facilities at Katie Olsons Landing Recreation Area include:

Picnic Tables (may vary) 2
Boat Launch 1-lane
Vault Toilets 1
Parking 15-spaces

d. Adjacent Land Use: Lands around Katie Olsons Landing are actively farmed; there are a few private cabins on adjacent land to the south.

FIGURE 2-8. Katie Olsons Landing – Visitation Summary



e. Soils and Topography: Soils of this unit are of the Buse series: deep, well drained, moderately slowly permeable soils on till plains and moraines and in stream valleys[1]. Slope ranges from 3 to 35 percent.

f. Vegetation: This site has a few trees and some native grasses.

g. Habitat Availability: The land immediately off-site is agricultural. The site proper offers little habitat.

h. Cultural resources: Katie Olsons Landing has been evaluated for cultural resources. The North Dakota SHPO has determined that there are no sites in this area eligible for the National Historic Register.

i. Limitations and Hazards: Areas of the shore are steeply eroded. There has been a noticeable landslip into the parking area.

2. Land Use Classification

This area is classified, in accordance with ER 1130-2-550, as Recreation.

FIGURE 2-9. Katie Olsons Landing Recreation Area, Plates 6 and 14.

3. Visitation

Visitation at Katie Olsons Landing for fiscal year 2003 was 32,812 Visitor Hours.

4. Visual Resources

Katie Olsons Landing provides a point of access for project users from the west side of the lake however, the site offers few visual resources. The picnic area and playground have a few shade trees and there is a beginning of a riparian vegetative edge along the lakeshore. The shoreline has areas where wave scour has severely eroded the bank, making access to the water difficult.

5. Summation

Visitation records indicate that the site visitation has been relatively constant over the last few years. This site is used by the public as access to the lake and intensive-use recreation activities. Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose of water supply, the federally administered land and water areas of this site are being managed to help fill regional resource needs. An examination of Corps administration policies at the project indicates that the current classification of this area is providing protection of the resource and accommodating the recreational needs of the public.

EAST ASHTABULA CROSSING

1. Unit Description:

a. Size: This site is 11 acres (see Figure 2-10).

b. Location and Access: East Ashtabula Crossing is located 10½ miles above the dam on County Road 21, one of two vehicular crossings on the 27-mile-long lake.

c. Existing Site Use (Plate 7): This is the most popular public use area on the lake. It is an attractive site with a variety of mature trees and shrubs and a definite park-like atmosphere. This area has an improved campground with a picnic shelter, swimming beach with showers, and flush toilets. A fish cleaning station and courtesy dock are provided near the boat ramp. There is also a modern playground near the beach. No sanitary disposal facility is provided at this site. There are no concessions at this site; however, there is a restaurant across the county highway that can satisfy many needs. Public use facilities at East Ashtabula Crossing Recreation Area include:

Campsites 38
Picnic Tables (may vary) 52
Boat Launch 1-lane
Parking 65-spaces

d. Adjacent Land Use: Land to the north is used for private cabins; land to the south, across County Road 21, is used for commercial enterprise.

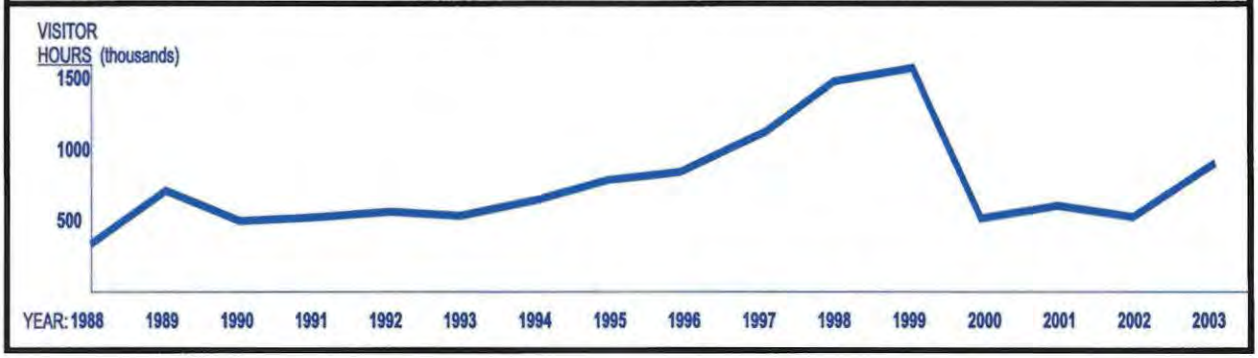
e. Soils and Topography: Soils in this area are of the Nutley series: deep well drained, slowly permeable soils in stream valleys with slope ranges from 0 to 15 percent[1]. This site slopes, on a relatively even plane, gently toward the lake.

f. Vegetation: This area is mown turf grasses with a moderate tree cover.

g. Habitat Availability: This small site is completely developed; as such, its value as habitat is small.

h. Cultural Resources: East Ashtabula Crossing has been evaluated for cultural resources. The North Dakota SHPO

FIGURE 2-11. Ashtabula Crossings – Combined Visitation Summary



has determined that there are no sites eligible for the National Historic Register.

i. Limitations and Hazards: This is a popular site, fully developed, heavily used, and small. Water quality is a particular problem here. The road causeway across the lake obstructs the natural circulation of the lake. This causes the water to stagnate and promotes the growth and entrapment of algae; as a result, the area suffers from very poor water quality during much of the summer. The lack of circulation also contributes to siltation problems close to the road. Heavy siltation has blocked the boat ramp several times over the years. Because of the small size of the site, its heavy use, and lack of room for expansion, parking for the boat ramp is limited.

2. Land Use Classification

The site is classified, in accordance with ER 1130-2-550, as Recreation.

3. Visitation

Visitation at the East and West Crossings during fiscal year 2003 was 858,903 Visitor Hours.

4. Visual Resources

East Ashtabula Crossing is a small site but one of the more visually pleasing areas on the lake. It is

FIGURE 2-10. East Ashtabula Crossing Recreation Area, Plates 7 and 15.

also the most heavily used recreation area in the project, in spite of its small size and the water quality problems discussed earlier. This site has good tree cover, and views within the area are pleasing. It is sited low along the shoreline; as a result, the road causeway obstructs the view of the lake to the south. The view of the lake to the north is good from the beach area; however, the lack of a riparian vegetation edge detracts from the aesthetic appeal of the lake.

5. Summation

See West Ashtabula Crossing, Summation.

WEST ASHTABULA CROSSING

1. Unit Description

a. Size and Shape: This 23-acre site is long and narrow.

b. Location and Access: As the name implies, this site is directly across the lake from East Ashtabula Crossing, sited along the west shore of the lake; it also offers easy access from County Road 21 (Figure 2-12).

c. Existing Site Use (Plate 8): This site features a picnic shelter and fishing pier but does not have a beach or playground. It also has a courtesy dock near the boat ramp and does provide sanitary disposal facilties. Public use facilities at West Ashtabula Crossing Recreation Area include:

Campsites 40
Picnic Tables (may vary) 45
Boat Launch 2-lane
Vault Toilets 2
Parking 101-spaces

d. Adjacent Land Use: Land around West Ashtabula is actively farmed.

e. Soils and Topography: Soils on this site are of the Kloten-Buse series: shallow to deep, well drained, moderately permeable soils in stream valleys; slopes range from 3 to 35 percent[1]. The site is on a narrow shelf of relatively flat land, with moderately sloping land adjacent (inland).

f. Vegetation: This site has areas of mown turf grasses with large areas of native grasses and a few trees.

FIGURE 2-12. West Ashtabula Crossing Recreation Area, Plates 8 and 16

g. Habitat Availability: This site is completely developed. The area directly to the west provides some upland type habitat. At the top of the valley terraces is actively farmed cropland.

h. Cultural Resources: West Ashtabula Crossing has been evaluated for cultural resources. The North Dakota SHPO has determined that there are no sites eligible for the National Historic Register.

i. Limitations and Hazards: Easily eroded slopes limit expansion of this site.

2. Land Use Classification

This site is classified, in accordance with ER 1130-2-550, as Recreation.

3. Visitation

Visitation at the East and West Crossings during fiscal year 2003 was 858,903 Visitor Hours combined.

4. Visual Resources

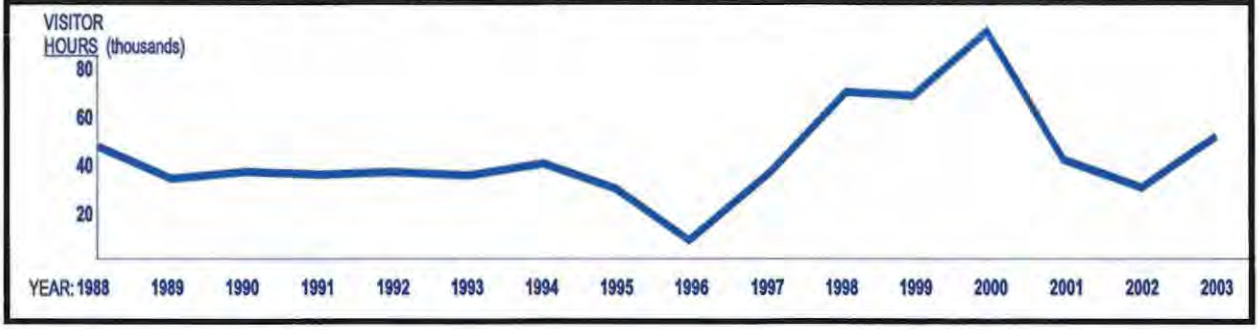
West Ashtabula Crossing visual resources are limited. The site has been expanded, with additional camping added on the north end. The site has a good layout, with excellent circulation and good separation of activities, but it has sparse tree cover and is exposed to the prevailing winds (see Chapter 1, Climate). The area has good aesthetic potential but to realize it, a focused planting plan needs to be initiated here. As at the East Crossing, there is no view of the lake to the south; views to the north are good but not exceptional.

5. Summation

Both East and West Ashtabula Crossings are used by the public for access to the lake and for intensive-use recreation activities. Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose of water supply, the federally administered land and water areas of these sites are being managed to help fill regional resource needs. An examination of Corps administration policies at the project indicates that the current classification of these areas is providing protection of the resource and accommodating the recreational needs of the public.

Use patterns of the recreation facilities on the lake indicate that these areas are being used to their full potential (project personnel observation). Visitation records show a continuing increase in visitors here while visitation to other recreation areas within the project has been declining. Use patterns should be evaluated and changes in facilities, amenities and administration accomplished to better fit these patterns and achieve better use of the resources of the Lake Ashtabula Project. These changes should include the reduction,

FIGURE 2-13. Sibley Crossing – Visitation Summary



relocation, or elimination of services, etc., when warranted.

Facilities at East Ashtabula are duplicated at West Ashtabula. Considering that the sites are less than ½ mile apart, and connected by a good road, possible consolidation of services should be looked at, where fuller use of the potential of each site might result in a better facility, service, etc., and reduced administration costs; i.e., more complete use of the resource.

SIBLEY (KEYES) CROSSING

1. Unit Description

a. Size and Shape: This site is 4 acres total; 2 acres are developed (see Figure 2-14).

b. Location and Access: The site is located about 15 miles above the dam; it is the northernmost Corps administered recreation area for the project. Access to the area is good; it is sited along Highway 26, one of two vehicular crossing on the lake. It is across from the village of Sibley; there additional are recreation facilities along the Sibley waterfront.

c. Existing Site Use (Plate 9): Amenities at Sibley Crossing Recreation Area include a vault toilet, a boat launching lane with a courtesy dock, and parking for 16-vehicles. Concessions are available across Highway 26.

d. Adjacent Land Use: Lands adjoining Sibley Crossing are privately owned

FIGURE 2-14. Sibley Crossing Lake Access, Plates 9 and 17.

cabins to the south and the village of Sibley to the north. Inland of the site is working farmland.

e. Soils and Topography: Soils of this unit are of the Renshaw series: deep, somewhat excessively drained soils on outwash plains and terraces with slopes from 0 to 25 percent[1].

f. Vegetation: This site is almost entirely asphalt parking with some mown turf.

g. Habitat Availability: None.

h. Cultural Resources: Sibley Crossing has been evaluated for cultural resources. The SHPO has determined that there are no sites eligible for the National Historic Register.

i. Limitations and Hazards: This site is entirely developed, serving as a lake access and parking.

2. Land Use Classification

This site is classified, in accordance with ER 1130-2-550, as Recreation.

3. Visitation

Total visitation at Sibley Crossing during fiscal year 2003 was 54,365 visitor hours (see Figure 2-14).

4. Visual Resources

This is a very small site, serving as a lake access. It consists of a parking lot with a boat ramp (Figure 2-14); visual resources are sparse. Views of the lake to the north are obstructed by the Highway 26 Bridge, views to the south are open. There are no areas of visual significance.

5. Summation

This site is used by the public as access to the northern end of the lake and for intensive-use recreation activities. Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose of water supply, the federally administered land and water areas of this site are being managed to help fill regional resource needs. An examination of Corps administration policies at the project indicates that the current classification of this area is providing protection of the resource and accommodating the recreational needs of the public.

REVIEW OF NATURAL RESOURCE DATA

GEOLOGY, TOPOGRAPHY AND SOILS

During the Pleistocene Epoch, glaciers advanced and retreated across the area several times over an eroded Cretaceous and Pre-Cretaceous bedrock surface. This resulted in a deposition of glacial drift that ranges from a few feet to more than 300 feet in thickness. As the last glacier melted and receded northward, its remaining mass blocked the natural northerly drainage channels for this region. This caused a very large lake (Glacial Lake Agassiz) to form in the area east of the project. With the eventual dissolution of the glacier, Lake Agassiz eventually receded from the area and the present drainage was established. The modern Sheyenne River is much smaller than its glacial ancestor and flows in a narrow channel that meanders across the aggraded floor of the old meltwater trench. The river valley averages ½ to ¾ mile wide along its length and varies in depth from 100 to 200 feet

The Lake Ashtabula Project lies at the eastern edge of the Williston Basin, a large sedimentary basin stretching from the Dakotas to Montana and north into Manitoba and

Saskatchewan. This basin is characterized by deposits of glacial till and outwash sands lying on top of dark colored shales of the Pierre Formation. The Sheyenne River Basin landform and drainage system were formed during the last period of glaciation, about 12,000 years ago; the Sheyenne River was a meltwater channel from Glacial Lake Souris. Large boulders transported from the Canadian Shield by the ice sheets are quite common. The till has an average thickness of about 200 feet.

The soils of the Lake Ashtabula project area have been classified into 17 soil-series described in the county Soil Surveys. Soils of the project lands have a variety of glacial till, outwash, lacustrine sediments, and shale as parent material. Calcareous loamy glacial till was the parent material for the soils that cover the largest portion of the project area (Barnes, Buse, and Svea series). Many of the glacial till-derived soil units at the Lake Ashtabula Project have an abundance of stones and boulders. This affects their suitability for agricultural uses. These soils are not very productive and, when cultivated, they become moderately to severely eroded. For more detailed soil information, refer to the 1990 Soil Survey of Barnes County, North Dakota.

The landscape of this region is part of the northern portion of the Great Plains of North America; it is extremely flat and open. The Lake Ashtabula Project lies in the Sheyenne River Valley, within the Drift Prairie physiographic region. The Drift Prairie is a poorly drained, gently undulating glacial drift plain that is nearly flat, with an average slope of 15-feet per mile. The river valley is deeply cut into the surrounding plain. At the damsite, the valley is about 200-feet deep; it ranges from ½ to ¾ mile in width. As a result, the reservoir is difficult to see from farther than a half mile from the east and west shorelines. The land immediately adjacent to the reservoir constitutes the river valley terraces and is moderate to steeply sloping, often rocky, with frequent and deep branching ravines. Project land elevations range from 1266 feet National Geodetic Vertical Datum (NGVD) at conservation pool to 1385 feet NGVD on the Baldhill Creek peninsula.

Because the area soils are easily eroded and not very fertile, overgrazing by livestock is a serious problem. Natural vegetative cover has been eliminated or destroyed, inducing erosion problems at many areas along the reservoir. Special considerations need to be taken in areas where the ground slope exceeds 5 percent (1v:20h).

VEGETATION COMMUNITIES

Lake Ashtabula is located in the northern portion of the vast region known as the Great Plains of North America. The original plant communities were mixed and tall grass prairie, and riparian communities of assorted floodplain woody plants. Grass fires are a major part of the prairie ecological cycle. They consume dead plant material, returning nutrients to the soil in the ashes. At the same time, fire destroys those plants that have not adapted to the cycle, thus providing a reproductive advantage to those that have adapted. As a result of this natural sequence, trees and shrubs were extremely sparse in the native landscape, existing only in areas that were protected from the fires. In recent years, the planting of shelterbelts and the elimination of fire and grazing on some of the project lands have allowed the expansion of forest and brush. On other areas of the project, excessive grazing has caused soil erosion and has severely limited plant diversity.

Restriction of grazing has allowed the return of some native grassland species in certain areas, but introduced species such as smooth brome and Kentucky bluegrass still dominate much of the grasslands. Plant species common to this area are listed in Appendix D–Environmental Resources.

1. Forests and Shrublands

Originally, forested areas only existed as riparian vegetation in this area. Many of the woodlands and much of the woody and herbaceous cover that was originally present have been converted to cropland or inundated. These actions have eliminated or reduced the various forest type habitats available for wildlife resources, and degraded the quality of areas that remain.

a. Northern Hardwood Floodplain Forest: The dominant tree species in this river bottom forest community are green ash, box elder and American elm, with basswood, and cottonwood being secondary species. The herbaceous layer is composed of typical deciduous forest species, prairie grasses and forbs. Shrubs found in this community include common chokecherry, juneberry, Virginia creeper, Missouri gooseberry, western snowberry, riverbank grape, and common prickly ash. The project has about 45 acres of hardwood floodplain forest and an additional 255 acres of shelterbelt/woodlot type forest.

b. Shrub Carr: This community develops on north facing slopes and in ravines which receive extra moisture from runoff. It is sometimes called a prairie thicket. Dominant species of this community are willows and red-osier dogwood. The understory vegetation is often Kentucky bluegrass or smooth brome; it may also be similar to the river bottom forest community. The project has 107 acres of this type of habitat.

2. Grasslands

Almost all of the native prairie in the basin has been converted to agricultural production or altered by heavy grazing of livestock and the introduction of many exotic (foreign) plant species.

a. Short-Grass Prairie: Short-Grass or High Prairie communities are composed of the shorter, hardier grass species and are located on steep slopes and knolls which lose most of their moisture through runoff and wind evaporation. The dominant species of Short-Grass Prairie communities are blue grama and needle-and-thread. Secondary grasses include western wheatgrass, prairie junegrass, plains reedgrass, and prairie sandreed. Common low shrubs and forbs associated with high prairie include: tall cinquefoil, lead plant, silverleaf, American vetch, yarrow, common sagewort, pasture sage, stiff sunflower, prairie ragwort, stiff goldenrod, and wild prairie rose. There are 35 acres of Short-Grass Prairie on the Lake Ashtabula Project.

b. Mixed-Grass Prairie: Mixed-Grass or Mid Prairie occupies level areas and mid slopes where the amount of moisture available approximates that received from precipitation. Because of the varying moisture content of the local prairie soils, the vegetation of this community resembles that of the open prairie of this region. The dominant species of this prairie plant community are needle-and-thread, blue grama, and western wheatgrass. Important secondary species include bearded wheatgrass, needleleaf sedge, prairie junegrass, and Kentucky bluegrass. Common forbs and shrubs characteristic of this community are prairie onion, Canada anemone, northwest cinquefoil, lead plant, slender beard tongue, yarrow, white prairie aster, fringed sagewort, hairy golden

aster, Canada goldenrod, western snowberry, common chokecherry, American plum, and fireberry hawthorn. There are 1,033 acres of this habitat type on the project.

c. Tall-Grass Prairie: Tall-Grass or Low Prairie communities are generally found on lower slopes that receive moisture from runoff but that have well-drained soils. The dominant plants of the community are big bluestem, little bluestem, porcupine needlegrass, and switchgrass. Common forbs and shrubs associated with this community include pink wild onion, bracted spiderwort, blue-eyed grass, early meadowrue, wild licorice, American vetch, yarrow, fringed sagewort, white field aster, narrow-leaf sunflower, western snowberry, and western wildrose. There are 17 acres of Tall-Grass Prairie on the project.

d. Sedge or Wet Meadow: This meadow community is found where the gravitational water remains in the upper soil horizon for at least several weeks during the spring of each year. Dominant species include woolly sedge, slough sedge, swamp knotweed, reed canarygrass, common spikerush, fowl bluegrass, prairie cordgrass, and American mannagrass. Conspicuous forbs in this community include Canada thistle, sow thistle, and narrow-leaf sunflower. Sandbar willow is a common shrub of this community. The project has 71 acres of meadow land.

3. Marshlands

The marsh community has developed where there is water in the plant rooting zone for several months or more each year. The project has 442 acres of marsh. Marshes are classified into two phases:

a. Shallow Marsh: Shallow marsh dominants include slough sedge, three-square, American mannagrass, and whitetop rivergrass. Associated forbs are waterparsnip, rough bugleweed, wild mint, swamp betony, European water plantain, and arrowhead. Common reed, alkali bulrush, and giant burreed are also common in the shallow marsh.

b. Deep Marsh: Dominants include tule bulrush, softstem bulrush, and both common and narrowleaf cattail. Submerged plants in the deep marsh community include sago pondweed, small pondweed, clasping leaf pondweed, coontail, watermilfoil, common bladderwort, and stiffleaf buttercup.

4. Disturbed Areas

Disturbed prairie results in a change in the dominant species. Following disturbance, Kentucky bluegrass and smooth brome are the dominant plant species. The project has 448 acres of disturbed prairie land.

Prior to European settlement, vegetative succession in the region was suppressed by heavy intermittent grazing and fire. Continuous grazing by cattle, the prevention of range fires, the construction and filling of the reservoir, various agricultural activities, the planting of shelterbelts, and the introduction of exotic vegetative species such as Siberian elm, Russian olive, smooth brome grass, Kentucky bluegrass, reed canary grass, and leafy spurge, *Euphorbia esula*, have all contributed to marked changes in the vegetation of the area.

The main successional trend occurring on project lands is the expansion of prairie thicket and woodland communities into grassland areas. The brushy prairie thicket communities, particularly in the ravines, are evolving into woodland. Most of the shelterbelts planted in the 1950's are deteriorating because of age and, in certain areas, heavy browsing by deer and cattle.

5. Rare and Endangered Species and Habitats

The Sheyenne River valley is a continuation of the eastern deciduous forest biome and serves as a dispersal corridor for forest wildlife into the grasslands of North Dakota. Intensive agricultural activity outside the valley has restricted available habitat for prairie species to the valley slopes in the vicinity of Lake Ashtabula. The reservoir inundated about 2,200 acres of grassland, forest, marsh, and brush habitat. These combined factors make the remaining wildlife habitat surrounding Lake Ashtabula very important to regional wildlife.

Sixty-two percent of the project land area is grassland. Woodland and shrubland areas comprise only 12.5 percent (300 acres) of project land. Woodlands around the project are especially important because of their scarcity in this area.

6. Nuisance Plants

Lake Ashtabula project land is infested with the exotic weed, leafy spurge, *Euphorbia esula*. Its aggressive nature combined with a lack of natural controls enables it to outcompete native vegetative species. This hardy perennial reduces grassland quality by reducing species diversity. Leafy spurge has been declared a noxious weed in North Dakota. As a noxious weed, its control, defined as preventing its spread by seed or other propagating parts, is warranted. The Corps has been involved since 1975 in an effort to control noxious weeds on project lands.

WILDLIFE, SPECIES AND HABITAT

1. Mammals

Since European colonization of this area, the number of species of mammals found in the vicinity has changed. Bison, pronghorn antelope, elk, mule deer, eastern timber wolves and an occasional grizzly bear were a part of presettlement prairie fauna. Cultivation, fencing, and uncontrolled hunting were responsible for the reduction in numbers, and in many cases, the complete elimination of some mammals from the vicinity. Over 40-species of mammals are known to occur in the vicinity of the project area. Red fox and coyote are commonly harvested in the project area. There are some beaver but few mink or muskrat in the reservoir. Beaver are more common along the Sheyenne River above and below the reservoir.

The white-tailed deer is the primary big game animal found on Lake Ashtabula project land. The project lands provide valuable winter cover for deer, with the Baldhill Creek area supporting up to 200 deer during the winter. Deer in the project area use the numerous shelterbelts and associated shrubland and the Baldhill Creek area more than they use the surrounding countryside. A list of species common to this area is listed in Appendix D.

2. Upland Birds

Population levels of native upland birds such as the sharp-tailed grouse are low; prairie chickens are thought to have been extirpated from project lands. The sharp-tailed grouse had been the most abundant upland game bird in the region prior to the loss of suitable habitat. Mourning doves are widely distributed over project lands and use the adjacent agricultural areas for feeding on small grains and wild seeds. Roosting and nesting requirements are met by the woody vegetation on project lands. Wild turkey are present in the area below the dam, down to Valley City.

Both the ring-necked pheasant and gray (Hungarian) partridge nest in the area.

Neither is native to the United States. The regional population level of ring-necked pheasants is presently low. Suitable pheasant habitat along Lake Ashtabula is located at the northern end of the project and on Baldhill Creek. Intensified land use has eliminated much of the winter and nesting cover in the area, thereby reducing pheasant numbers. Pheasant population levels in the northern States are strongly associated with wetland acreage, prime nesting cover. Wetlands provide the major source of winter cover also, but dependence is on more specific vegetation types and much smaller acreage than are required for nesting. Gray partridge have become the most widely distributed upland game bird on the project land. Gray partridge prefer open, active agricultural areas, and are better adapted to deep snow and subzero temperatures than are pheasants.

3. Waterfowl

Eleven species of waterfowl are regularly sighted in Barnes and Griggs Counties. Ten species of waterfowl were reported to nest on Lake Ashtabula in 1951, but only eight species of nesting ducks have been reported recently. These eight are: wood duck, American widgeon, gadwall, green-winged teal, mallard, pintail, blue-winged teal, and northern shoveler. The most common breeding ducks in the Lake Ashtabula area are: blue-winged teal, mallard, and gadwall. The Lake Ashtabula breeding duck population is limited by the availability of suitable nesting habitat. Much of the nesting habitat is located along the Sheyenne River at the upper end of the reservoir and along Baldhill Creek.

4. Nongame Birds

Many species of birds are found in the diverse habitats along the reservoir. Some of these species are residents and maintain breeding populations, while others are migrants. A list of the breeding birds of the reservoir area is in Appendix D. White pelicans are common on Lake Ashtabula, and about 200 can normally be found around the reservoir. These are a non-breeding segment of a population from Chase Lake, North Dakota. A local population of double-crested cormorants is also found on the reservoir.

5. Amphibians and Reptiles

Eight species of amphibians and eight species of reptiles live in the Lake Ashtabula area. Of the amphibians, one is a salamander, four are toads, and three are frogs. All are relatively common. The reptile species consist of two of turtles, one skink, and five species of snakes.

6. Threatened and Endangered Species/Habitats

Three species of birds on the Federal endangered and threatened species list could occur in the project area as migrants. These are: the bald eagle, *Haliaeetus leucocephalus*; Eskimo curlew, *Numenius borealis*; and whooping crane, *Grus Americana*. No mammals, reptiles, or amphibians on the Federal list are known to be in the Sheyenne River basin. The Dakota skipper butterfly is an endangered insect species occupying native prairie tracts that could occur in the project area.

7. Special Programs

a. Corps of Engineers: Management on Lake Ashtabula Project lands will be directed toward improving habitat specifically for white-tailed deer, ring-necked pheasant, gray partridge, sharptail grouse, mourning dove, and waterfowl. Management will also be directed to further enhance the fishery habitat of the reservoir. Habitat management practices for these species will improve wildlife habitat quality for other species.

b. Private Organizations: Several local sporting clubs, wildlife clubs, and the Lake Ashtabula Land Owners and Users Association (a unit of local landowners and project users) maintain interests in project operations and activities.

FISHERIES

1. Habitat Conditions

Despite physical and water quality limitations, Lake Ashtabula supports an important fishery. The following paragraphs present a review of physical, chemical, and biological characteristics of the reservoir that determine the quality of the fishery.

The substrate has changed considerably since inundation in 1950. The reservoir was cleared of trees before filling, but many stumps, boulders, and fences remain. Water level fluctuations and wave and ice action have reworked the soils in the drawdown zone. Riprap (2- to 24-inch fieldstone) has been placed to protect eroding shoreline, from elevation 1264 to 1270 feet msl. Shoreline portions extending into the reservoir have exposed glacial till material to an elevation of 1263 msl. Wave action has produced a sandy shelf along extensive portions of the reservoir shoreline, which grades into finer-grained sediment at about 1263 feet. The former Sheyenne River floodplain and the old river channel are composed primarily of silt-sized particles enriched with organic matter.

The primary sources of sediment inputs to Lake Ashtabula are the Sheyenne River and shoreline erosion. Considering the reservoir capacity, the sedimentation rate is negligible. High algae production in the reservoir contributes substantial amounts of organic matter to the sediments. Shoreline riprapping has reduced shoreline erosion and sedimentation.

Water quality in Lake Ashtabula is a matter of public, State, and Corps of Engineers concern. The reservoir is eutrophic. It supports an almost continuous bloom of nuisance blue-green algae during the summer, has a history of oxygen depletion during the winter, and is turbid. Water quality in Lake Ashtabula limits recreational uses. The reservoir is dominated by species of the pike and perch families.

Water quality in Lake Ashtabula has been studied by a number of investigators for various purposes: routine monitoring (Corps of Engineers 1981, Megard 1980); assessment of eutrophication (EPA 1976); determination of nutrient loading (EPA 1976, Peterka and Knutson 1970); measurement of primary production (Peterka and Knutson 1970, Peterka and Reid 1968, Reid 1967, Peterka 1969, Megard 1980); measurement of secondary production (Peterka and Knutson 1970); and feasibility of nutrient removal (Peterka and Knutson 1970, Owen and Duerr 1974, Ryckman 1976).

2. Species

Lake Ashtabula is known for its northern pike, perch, and walleye. Other fish present are white bass, small mouth bass, crappie, bluegill, and bullhead. Although bullhead are removed from the reservoir by commercial fisheries, the reservoir still contains a high number of this species in its waters. A list of species common to these waters is available in Appendix D.

3. U.S. Fish and Wildlife Service Management Programs

The USFWS operates a fish hatchery directly below the dam. In the spring of each year, USFWS and NDGFD personnel, with assistance from Baldhill Dam personnel, catch northern pike and walleye and strip them of their eggs and sperm. These eggs are hatched and some of the resulting fingerlings are returned to Lake Ashtabula in the fall. The majority of these fingerlings are used to stock other areas in North Dakota and the Upper Midwest. Lake Ashtabula is considered an excellent source of high quality fish eggs.

4. North Dakota Game and Fish Department Programs

The NDGFD is responsible for managing the Lake Ashtabula fishery. Their management goal is a high quality sport fishery. As of the 1988 stocking season, they are alternately stocking walleye one year and northern pike the following year.

WATER

1. Water Resources

The principal tributaries to the reservoir, the Sheyenne River and Baldhill Creek, have extreme seasonal fluctuations in discharge, reflecting the cool, semi-arid climate and intensive agricultural use in their basins. The average discharge of the Sheyenne River at Cooperstown, upstream of Lake Ashtabula, is 105 cfs, or 76,070 acre-feet per year. Discharge varies from no flow at times to 7,830 cfs in April 1950.

Baldhill Creek has an effective drainage basin of 351 square miles above the Dazey, North Dakota, gage, and has an average discharge of 15.2 cfs, or 11,700 acre-feet per year. Baldhill Creek discharges range from no flow to a maximum of about 9,000 cfs, recorded in April 1979 (USGS, 1980).

Both the Sheyenne River and Baldhill Creek contribute most of their discharge to Lake Ashtabula during spring runoff. Approximately 80 percent of the runoff to Lake Ashtabula occurs during this time. Late summer, fall, and winter discharges to the reservoir are minimal.

Groundwater levels have not been affected by Lake Ashtabula because of the impervious glacial tills and shale bedrock surrounding the reservoir.

2. Effects of Reservoir Operations

The reservoir is operated for water storage through the summer. It is drawn down for flood control only during the winter, and then only according to the snowpack within the watershed. Because of this operating schedule, the effects of the drawdown are negligible. Areas of the reservoir that experience extreme wind fetch have had some bank erosion due to waves generated by wind.

3. Water Quality

Lake Ashtabula is a eutrophic lake. Eutrophication takes place when a body of water is loaded with mineral or organic nutrients. This reduces the amount of dissolved oxygen in the water. The phenomenon produces an environment less favorable to animal life and more favorable to plant life. The dense summer algae blooms, long recognized as a nuisance at the project, are a symptom of this excessive nutrient loading to the reservoir. Although eutrophication is a natural lake aging process, humans accelerate it greatly, accomplishing in decades what it formerly took centuries to do. These nutrients do not come from a single (point) source at Lake Ashtabula, but are

washed in from farm fields, grazing lands, and feedlots within the watershed (non-point). The watershed is discussed in Chapter 1, Drainage Area.

Based on annual gross primary productivity, Lake Ashtabula is highly productive in comparison with other eutrophic lakes in North America (Peterka and Knutson 1970). Past testing indicated the reservoir rarely stratifies during open-water periods because of its shallow depth and windy location. Testing done in the fall of 1992 shows a somewhat different story based on hourly readings. Although the lake is relatively shallow (46 feet maximum) and is generally well mixed by the wind, it also frequently stratifies both chemically and thermally. Temperature differences are not great; 4 degrees variance appears to be the maximum at locations 1 meter and 6.5 meters below the surface. Daily fluctuations in dissolved oxygen were also revealed, sometimes resulting in anoxic conditions. Lake Ashtabula waters are fairly alkaline and turbid. The maximum summer temperature is about 82.4 degrees Fahrenheit (28 C). Ice cover usually lasts from November to March, reaching a maximum thickness of 3 feet.

Anabaena, Microcystis and Aphanizomenon (possibly), semi-buoyant, bloom-forming algae, reported from Lake Ashtabula, produce toxins lethal to fish and animals. Domestic animals such as sheep, cattle, and hogs can die or become seriously ill by drinking water infested with this form of algae.

During the winter, extremely low levels of dissolved oxygen occur throughout the water column in the upper reaches of the lake. This could result in a major winterkill of fish at Lake Ashtabula. Dissolved oxygen concentrations during the summer and fall are adequate to support aquatic life.

CULTURAL, HISTORIC, OR ARCHEOLOGICAL CONDITIONS

Determination of a cultural resource site's significance and its potential to provide important information on the past (and thereby its National Register eligibility) is necessary prior to any earth moving activities at that location.

Known historic tribes that used the middle Sheyenne River region where Lake Ashtabula is now located included the Yanktonai Dakota and Cheyenne in 1750 and the Yanktonai Dakota and Plains Ojibwe (Chippewa) in 1850. By 1800, the Sheyenne River valley was also part of the bison hunting area of the metis (persons of mixed Indian and French-Canadian ancestry) from the Pembina vicinity of the Red River Valley. The middle Sheyenne River area was under French control from 1671 to 1763, under British control from 1763 to 1818, under nominal American control from 1803 to 1818, and under American control after 1818. Treaties with the Dakota in 1859 and 1872 and with the Chippewa in 1863 ceded the middle and lower Sheyenne River area to the United States along with other portions of what is now eastern North Dakota.

The Sheyenne River valley was an important source of animals for both subsistence and the fur trade for the Indians, the metis, and the fur traders. An 1805 agreement gave the North West Company exclusive trading rights north of the river and similar rights to the Michilimackinac Company south of the river. The American Columbia Fur Company eventually gained control of the Sheyenne River valley, and was in turn bought out in

1827 by the American Fur Company. While no permanent fur trading posts were built on the Sheyenne River, a wintering post was located near the mouth of Baldhill Creek in 1828 and an American Fur Company trader was operating in the valley during 1839 and 1840.

In 1863, a U.S. Army campaign under the command of General Henry Hastings Sibley crossed the Sheyenne River (in Section 34, Township 143 North, Range 58 West) twice during pursuit of the Dakota who had participated in the Minnesota Uprising of 1862. A historic trail between Fort Totten at Devils Lake, Fort Ransom south of Valley City, and Fort Abercrombie at the Red River also crossed the Sheyenne River at approximately the same location as Sibley's crossing.

Construction of the railroads west of the Red River in 1871 triggered the beginning of the first wave of immigration of Euro-American homesteaders to the eastern Dakota Territory. These settlers initially located on the Sheyenne, James, and Goose rivers. Settlement along the Sheyenne River increased rapidly once the Northern Pacific Railroad reached the river where Valley City (originally Worthington) was incorporated in 1881. The railroads opened up the Minneapolis and St. Paul markets to the local farmers. By 1887, most land opened for homesteading east of the Missouri River had been taken. A drought in the late 1880s ended this first wave of immigration. A second wave of immigration began in 1900 and lasted until the start of World War I. Mostly foreign-born immigrants were involved in this second homesteading effort. After 1920, a migration out of North Dakota started as people lost their farms due to drought and the Great Depression of the 1930s.

Archeologists from the Smithsonian Institution checked part of the project area for cultural resources in the late 1940s while the Baldhill Dam was under construction. In 1978-1979, University of North Dakota archeologists surveyed the entire project area including both fee title and flowage easement lands for cultural resources. Four of the sites on fee title land (32BA2, 32BA5, 32BA6, and 32GG2) were found to have been completely inundated by Lake Ashtabula.

As of 2005, there are 42 known prehistoric and historic archeological sites and one paleontological site on Corps fee title lands of the Baldhill Dam/Lake Ashtabula Project. Prehistoric site types include nine occupation sites, two prehistoric campsites, 11 cultural material scatter sites, four lithic scatter sites, three bison processing area sites, two burial/burial mound sites, one burial and cultural materials site, and one rock cairn site. Historic site types include two homestead dugout sites and one dump site. Sites with both historic and prehistoric components include four farmstead and lithic scatter sites and two combination historic and prehistoric cultural material scatter sites. An additional 10 archeological and architectural sites are on project-related flowage easement lands. These sites consist of two bridges, one farmstead site, one homestead dugout site, two prehistoric campsites, two prehistoric occupation sites, and two lithic scatter sites.

Between 1980 and 2005, 17 sites (32BA3, 32BA7, 32BA406, 32BA413, 32BA414, 32BA415, 32BA418, 32BA421, 32BA424, 32BA425, 32BA428, and 32GG3, 32GG5, 32GG10, 32GG11, 32GG13 and 32GG14) on fee title land were tested in order to evaluate

their eligibility for placement on the National Register of Historic Places. Only sites 32BA3, 32BA7 and 32GG3 were found eligible for listing thereon. Burial mound complex site 32BA410 is also considered eligible, based solely on field survey information. Most of the remaining sites on the project still need to have their National Register eligibility evaluated. Details on the cultural resources sites on project fee title and flowage easement lands and a cultural history of the Baldhill Dam/Lake Ashtabula Project area can be found in the Historic Properties Management Plan for the project.

SUMMARY OF RESOURCE SUITABILITY

WATER-BASED RECREATION

Although the project's potential suffers because of the water quality and access problems associated with signage and gravel roads, Lake Ashtabula is a valuable contributor to the recreational resources of the region. Going beyond the initial purposes of flood control and water supply, Lake Ashtabula has become a major recreational resource, mainly because there are so few lakes in the region. Even with the scarcity of this type of resource, because of the frequency and intensity of the algae blooms, swimming and certain other water oriented recreational activities have declined in popularity; as discussed previously, other forms of recreation are also affected. The lake remains very productive for fishing. The potential of the lake for providing a recreation resource for this region is mostly unrealized. The project provides access to the lake, clean comfortable campsites, and day use facilities. All of the amenities offered by the project are supported by the North Dakota State Comprehensive Outdoor Recreation Plan or by established use patterns (supported by visitation records).

NATURAL RESOURCE PROGRAMS

Natural resource programs supported by the project are primarily targeted at waterfowl reproduction. Considering the available resources and the established patterns of the waterfowl species (flyways, migration habits and routes, historical nesting areas, etc.), this is the most beneficial use of the resource.

PROBLEMS AND CONSTRAINTS

1. Water Quality

Water quality is the single largest problem at Lake Ashtabula. As discussed earlier, the lake is overloaded with nutrients that infiltrate surface runoff from cattle lots and farm fields in the watershed and are carried into the lake. These nutrients feed the blue-green algae existing in the lake; this surplus of nutrients results in a population explosion among the algae. As with all living organisms, they eventually age and die. This mass of dead algae, decomposing in the warm summer water, produces the foul smell and unattractive water associated with the Lake Ashtabula Project during the summer. The effect on recreation at the project is severe; this problem may also have an impact on the fish population, although direct links have not been documented. The lake water during these periods is described as "skunky," an apt description of the odor.

This problem most directly affects the water-based recreation activities such as swimming, fishing and boating. Land-based recreation activities such as camping, hiking and picnicking are affected when decomposition is occurring and the wind is coming across the water. Scenic qualities of the lake are also diminished by the water quality problems.

Poor water quality has mostly negated Lake Ashtabula's main asset (scarcity). Primarily

because of this problem, what could be an exceptional regional resource with some national interest is not even highly regarded by the local community. For example, the lake is not a centerpiece of marketing materials about the area. Indeed, most of the use is by local residents who make return trips chiefly due to the lake's proximity. Many of those in the eastern portion of the market area who desire a lake experience go to the Detroit Lakes area of northern Minnesota.

At this point, the impetus for starting programs to solve Lake Ashtabula's water quality problems must come from local citizens. The Federal Government offers two programs to assist in lake cleanup efforts – the Clean Lakes Program and the Non-point Source Pollution Program. Cleaning up the lake will be a lengthy process requiring coordination among different agencies and levels of government and local participants. Biofilters at the swimming area could help to ameliorate the impacts on this form of recreation, but only in localized areas. Long-term lake-wide solutions require land use practices that will keep the nutrients on the land (where they are beneficial) and out of the water (where they are pollution).

2. Trees

Lake Ashtabula for the most part lacks a riparian edge. North Dakota's natural heritage is principally prairie grasslands, but trees were found along the rivers and drainageways. The Sheyenne River below the dam provides an example of natural river edges. Historic photos show that much has been done to reforest lands along Lake Ashtabula since its inception. Experiencing the recreation areas and looking at the overall visual character of the lake shows that much more remains to be done.

Trees are appropriate along the lake edges and in the recreation areas. A long-term forestation and reforestation program is being developed and implemented.

3. Leafy Spurge

This invasive plant is a noxious weed that has infested project lands. Attempts to control it have been costly in terms of staff time and financial resources for the project. Efforts to control the weed biologically are currently being studied while other control efforts continue.

4. Universal Accessibility

Recreation areas at Lake Ashtabula have not reached their optimum level of accessibility. Programs and facilities need to be made available for people with disabilities, including those with impairments in mobility, vision, mental acuity and hearing. The aging population of North Dakota would also benefit from accessible facilities as would those with temporary disabilities.

Universal accessibility has been mandated for Federal facilities since 1973, so many of the existing facilities are nominally accessible but most do not satisfy current accessibility requirements. The campground at Eggerts Landing has an accessible campsite but other areas do not provide this, as required by law. An inventory needs to be done to evaluate whether all the components are accessible for any given feature (e.g., does the accessible restroom have an accessible route to it?). This evaluation would also lend itself to determination of the optimum level of accessibility for a given site or activity. An action plan would be the next step.

5. Signage

Lack of signage was pointed out in the previous master plan. Most directional

signage is along county rights-of-way and very isolated. County roads are not well marked; some recreation sites are difficult to find—especially for the first-time visitor. many problems with signage have been rectified, but some remain.

6. Winter Activity

Winter activities such as cross-country skiing, sledding, ice fishing, and ice skating have been discussed in the past. Some have even been tried. Those requiring snow have been problematic due to vagaries in the amount of snowfall. Frequently when the snow falls, the wind sweeps it away in the open areas. Facilities (such as warming houses) that might encourage winter activities are lacking.

7. Funding and Staffing

This concern translates to how well facilities will be maintained and updated for the user. The current staff is barely sufficient to deal with the maintenance and upkeep of this project (the size of this lake is an important factor). Interacting with the public and overseeing improvements in facilities and habitat strain these limited resources to their limits. The sparse population of North Dakota means a small tax base and therefore limited amounts of local funding to share the cost of special programs. Dealing with the reality of government downsizing will require creative new ways of getting things done.

Current levels of staffing and funding are unlikely to change much in the near future. Given this, what can be done to maintain and create quality experiences and programs at Lake Ashtabula? One answer is to create liaisons with other public agencies, private agencies and individuals. For example, solving Lake Ashtabula's water quality problems might be approached as a partnership between concerned citizens, the Sheyenne River Joint Water Resources District, the Environmental Protection Agency and the Corps of Engineers. Each element would share costs, time and expertise at agreed upon levels.

Other programs might be handled through volunteers. Some volunteer opportunities are already in place (Arbor Day is an example), but these could be broadened and expanded. A volunteer network might be set up. A foundation might be set up to receive charitable giving for specific uses. Special programs or events (such as Adopt-A-Tree) could be used to encourage volunteer activities.

CHAPTER 3

RECREATION PROGRAM ANALYSIS

EVALUATION OF RECREATION OPPORTUNITIES

REGIONAL SETTING

The Lake Ashtabula Project is located in North Dakota, at the northeastern end of the vast expanse of the Great Plains. The region is sparsely populated and depends heavily on agricultural industry. Although water is abundant in the region, water resources large enough to provide recreational opportunities are few within this semi-arid climate; the lake provides this resource for residents of the region.

Lake Ashtabula is located in Region 6 of the 1991-95 North Dakota State Comprehensive Outdoor Recreation Plan (SCORP). The landscape of this region, formed by the action of glaciers thousands of years ago, once consisted of vast open expanses of tall grass prairies and shallow pond wetlands called "prairie potholes." Pothole wetlands formed as the last great glaciers retreated from this area about 12,000 years ago. This type of wetland is the result of great pieces of glacial ice that broke from the glacier and were buried in the glacial till that forms this landscape today. Over time, these land-bound icebergs melted, forming small, deep lakes and ponds. As the millennia passed, the decomposition and regrowth cycle of encroaching plants along with airborne soil particles filled in these depressions leaving the small, shallow "potholes" seen today. Although many have been drained to increase agricultural productivity, there are still many thousands of them scattered across this vast open landscape. The native prairie grasslands that once stretched for hundreds of miles to the west and south have almost entirely been converted to farmland. Region 6 provides ideal habitat for resident game and migrating waterfowl and contributes greatly to the wildlife in North Dakota. North Dakota's Prairie Pothole Region is recognized as a significant natural resource—the most important duck breeding habitat in the contiguous United States.

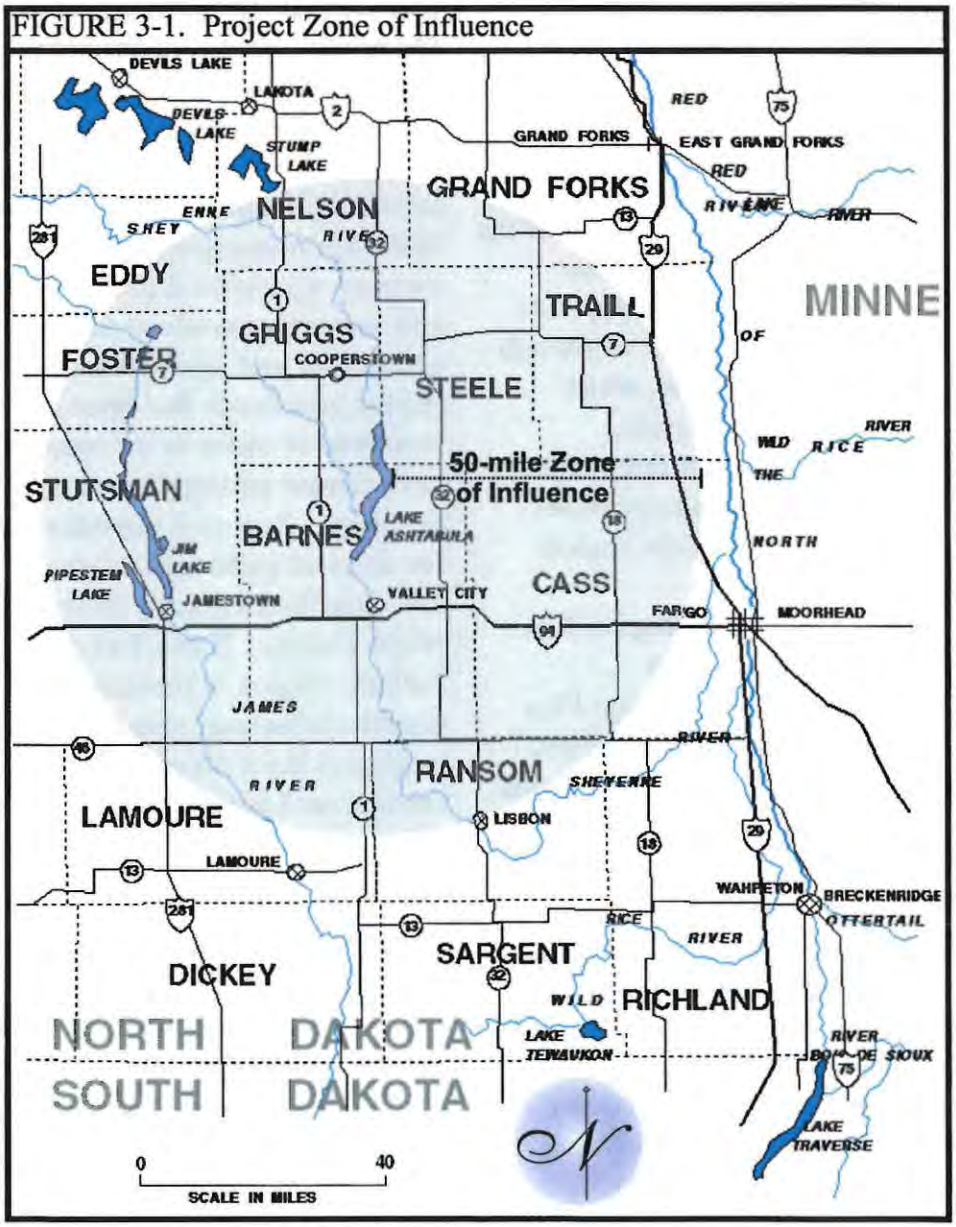
MARKET AREA

Lake Ashtabula is a popular recreation destination in North Dakota attracting visitors locally and from across the country. Of all Corps recreational areas operated by the St. Paul District, Lake Ashtabula ranked third in the amount of visitation in 1991 and fourth in 1992. Some of the most

popular and well used recreational sites at Lake Ashtabula are Mel Rieman, Eggerts Landing, and Ashtabula Crossings (East and West). These sites are frequently used because of the number of amenities available and the easy access from major highway routes.

Because of the rural nature of this region and the paucity of water-based recreation resources for this area, the market area for the Lake Ashtabula Project has been estimated as the sector within a 1-hour drive of the lake. Considering the flat, open nature of the landscape, this is an area approximately 50-miles in radius (Figure 3-1). In the area directly east of Fargo-Moorhead or Grand Forks, there is an abundance of prime recreation facilities, with (literally) thousands of clearwater

FIGURE 3-1. Project Zone of Influence



lakes, many with forested campgrounds and full service resorts. It is expected that, in general, people from the eastern portion of the market area would travel to the east for the types of recreation offered at Lake Ashtabula Project.

REGIONAL RECREATION

Lake Ashtabula is a large body of water in an area where this is a rarity. There are few other large lakes in the region. Devils Lake lies to the northwest just outside Lake Ashtabula's 50-mile radius market area and is the primary competition for water-based activities, especially fishing. Other water bodies in the general area include Jamestown Reservoir, a Bureau of Reclamation project above the Jamestown Dam, and Pipestem Lake, administered by the Omaha District of the Army Corps of Engineers (see Table 3-1). They are located approximately 35-miles west of the project. The Red River State Recreation area at East Grand Forks, MN provides access to the Red River, camping, and a connection to the Greater Grand Forks Greenway.

EVALUATION OF HISTORIC AND CURRENT USE

Visitation to Lake Ashtabula has fluctuated in the last 10-years, and this trend will continue as seasonal changes and climatic variations occur, populations shift, and other factors influence recreational use. Visitation to Lake Ashtabula remained relatively stable in the early part of the 1980's (see Figure 3-2); during the mid-1980's usage steadily increased, reaching a peak of 2½ million visitor hours in 1989 and again in 1998 and 1999. The Corps hosted the State Centennial Picnic at Lake Ashtabula in the summer of 1989. It was very well attended and significantly influenced the high visitation numbers for that year. Weather has a strong influence on visitation; extended dry spells and high

TABLE 3-1. Other Recreational Regional Resources

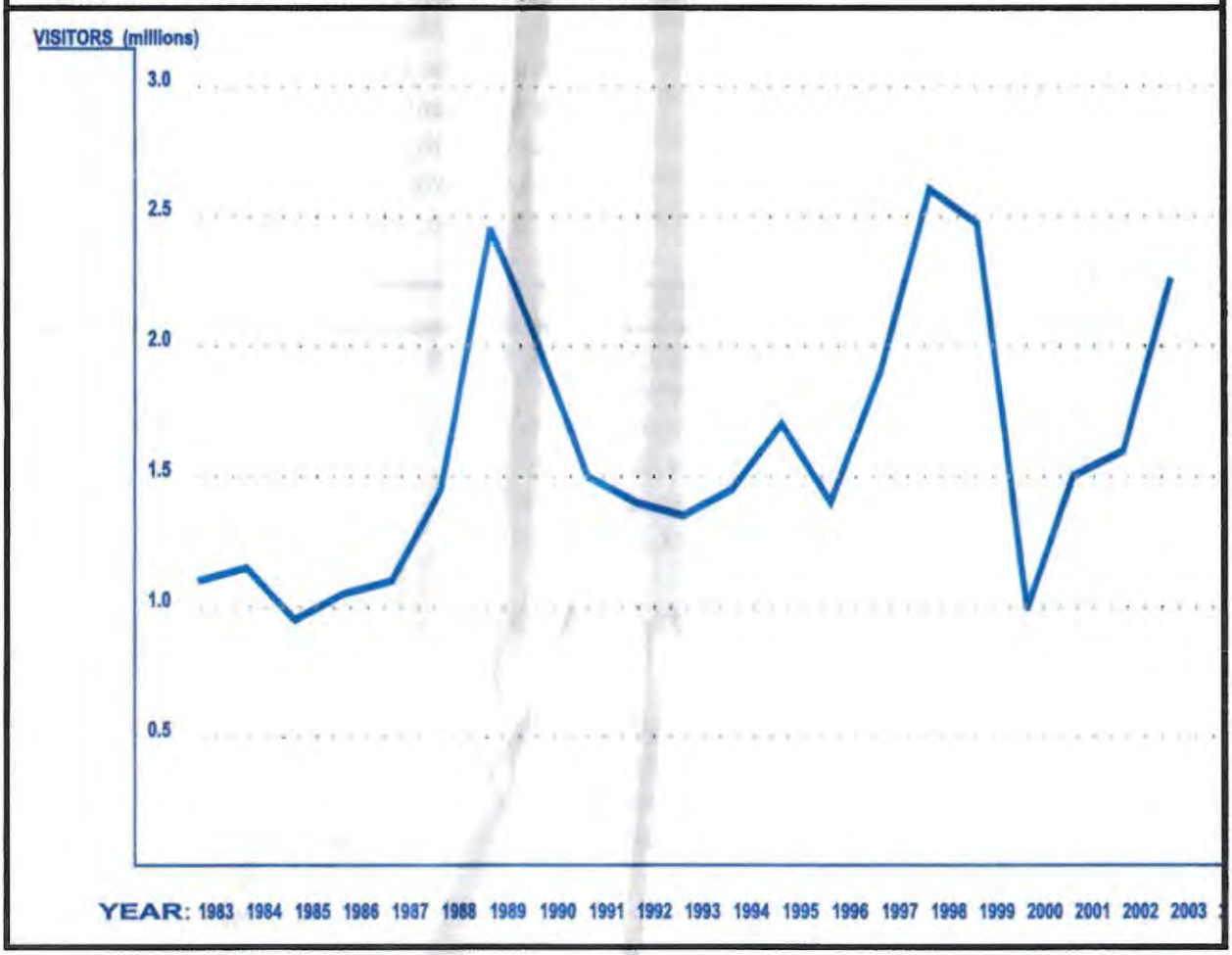
State Parks	U.S. Fish & Wildlife Service	County Parks
Turtle River	Arrowwood NWR	Little Yellowstone Park
Fort Ransom	Valley City Fish Hatchery	Clausen Springs
Devils Lake	Stump Lake NWR	Dead Colt Creek
Red River Recreation Area	Johnson Lake NWR	
	Hobart Lake NWR	
Historic Sites	**Corps of Engineers**	**Other Resources**
Carl Ben Eielson Memorial	Pipestem Lake	Lower Sheyenne River
Sibley Crossing		Devils Lake
Fort Seward	**U.S. Forest Service**	Red Willow Lake
Fort Ransom	North Country Trail	Lake LaMoure
Maple Creek	Sheyenne National Grasslands	Golden Lake
		Brewer Lake
		Jamestown Reservoir
		Grand Forks Greenway

temperatures make water activities very appealing. On the other hand, the cool, wet spring of 2000 acted to depress visitation to less than half of the previous (hot-dry) year's numbers.

In recent years, visitation to Lake Ashtabula Project has fluctuated dramatically, as shown on Figure 3-2. The dam safety project utilized the Mel Riemen site as a construction staging area and visitation suffered (locally) as a result during 1999. The increase in total visitation is a result of increases at both Ashtabula Crossings and at Eggert's Landing, sites with large visitation (see Figure 3-3). Lake Ashtabula is well used and remains a popular recreational destination in North Dakota. For additional information on visitation, see Appendix B, Lake Ashtabula Project Recreation Program Tabular Statistics. Ten years ago, costs associated with recreation amounted to about one-fourth of the total project expenditures. By 1993, over one-half of all expenditures were recreation oriented, as the recreation experience at Lake Ashtabula increases in importance.

Many visitors to Lake Ashtabula are local residents who live within a 60-mile radius of the site. The majority of the day use and camping visitors come from population

FIGURE 3-2. Lake Ashtabula Total Project Visitation



centers such as Valley City, Bismarck, Fargo, West Fargo, Jamestown, and Cooperstown. There are fewer than 15-residents who own or rent summer cabins and live at the lake year-round; they affect the visitation numbers very little.

Due to the proximity of Interstate 94, some project visitors come from out-of-State, primarily from other Midwestern States. Some come from as far away as California, Florida, Oregon, and New York. Day use and picnicking are common activities among campers and travelers. Lake Ashtabula is a good location for lunch, rest stops, or overnight stays at any of the campgrounds.

PROJECTION OF FUTURE REQUIREMENTS

1. Statewide Recreation

The State of North Dakota carried out a survey to *"identify outdoor recreation needs of the state by providing an estimation of*

TABLE 3-2. North Dakota Recreation Activity Projections

Activities	Days			Projected
	1990	1995	2000	Change
Bicycling	9,312,054	9,840,547	10,152,311	9.02%
Boating/Waterskiing	1,654,687	1,744,148	1,823,134	10.18%
Camping	2,406,820	2,554,775	2,707,011	12.47%
Canoeing	100,091	104,359	106,466	6.37%
Fishing - Open Water	3,927,245	4,161,598	4,399,737	12.03%
Gardening	7,734,711	8,211,652	8,788,131	13.62%
Hiking	1,835,926	1,973,670	2,153,237	17.28%
Hunting - Big Game	612,317	651,393	695,966	13.66%
Hunting - Non Game	226,446	238,573	248,734	9.84%
Hunting - Upland Game	578,865	611,726	643,768	11.21%
Hunting - Waterfowl	355,781	377,671	400,849	12.67%
Jogging	2,294,709	2,408,464	2,494,928	8.73%
Nature Observation	1,834,245	1,950,374	2,071,436	12.93%
Picnicking	2,045,390	2,169,823	2,292,027	12.06%
Playground Activities	1,988,225	2,095,014	2,138,648	7.57%
Sailing	24,406	45,798	67,293	175.72%
Sightseeing	1,377,404	1,462,686	1,551,222	12.62%
Skating	292,235	307,325	312,904	7.07%
Swimming - Beach	1,406,572	1,474,909	1,515,181	7.72%
Walking	13,300,784	14,202,199	15,352,246	15.42%
Winter Activities				
Cross-Country Skiing	210,089	222,358	235,904	12.29%
Fishing - Ice	542,826	584,600	640,996	18.08%
Sledding	586,795	617,640	629,100	7.21%
Snowmobiling	658,539	695,803	722,057	9.65%

present and future demand for specific outdoor recreation activities, as well as a determination of public opinion concerning areas where the state may be deficient." Present and future recreation demand was estimated for each state planning region, and the state, based on projected total number of participants and total days of participation for specific recreational activities. Survey responses also provided a basis for calculating annual per capita days of participation on statewide and regional levels. For the purposes of this study, a "day" is defined as any portion of a 24-hour period in which participation in a recreational activity occurred." The results were published in the North Dakota SCORP for 1991-1995.

Table 3-2 lists total days of participation for selected recreation activities, for the years 1990, 1995, and (projected for) 2000. Those shown were selected from the SCORP document to reflect activities that might occur at the project; the anticipated amount of change has also been calculated.

The SCORP survey indicated that the five most popular outdoor recreation activities in Region 6 (of those surveyed) based on total days of participation are:

TABLE 3-3. Region 6 Ranking of Project Recreation Activities—ND SCORP

Activity	Regional Ranking	Project Ranking
Walking	1	*
Playground Activities	4	*
Nature Observation	5	*
Sightseeing	9	5
Picnicking	13	3
Snowmobiling	15	*
Fishing	16	1
Sledding	18	*
Boating and Water Skiing	20	2
Hunting - Big Game	21	*
Camping	22	6
Swimming – Beach	23	4
Cross-Country Skiing	24	8
Hunting – Upland Game	25	*
Fishing – Ice	28	*
Hunting – Waterfowl	29	*
Hunting – Non Game	30	*
Trapping	32	*
Canoeing	34	*
Sailing	37	*
Other activities (see Table 3-4)	*	7

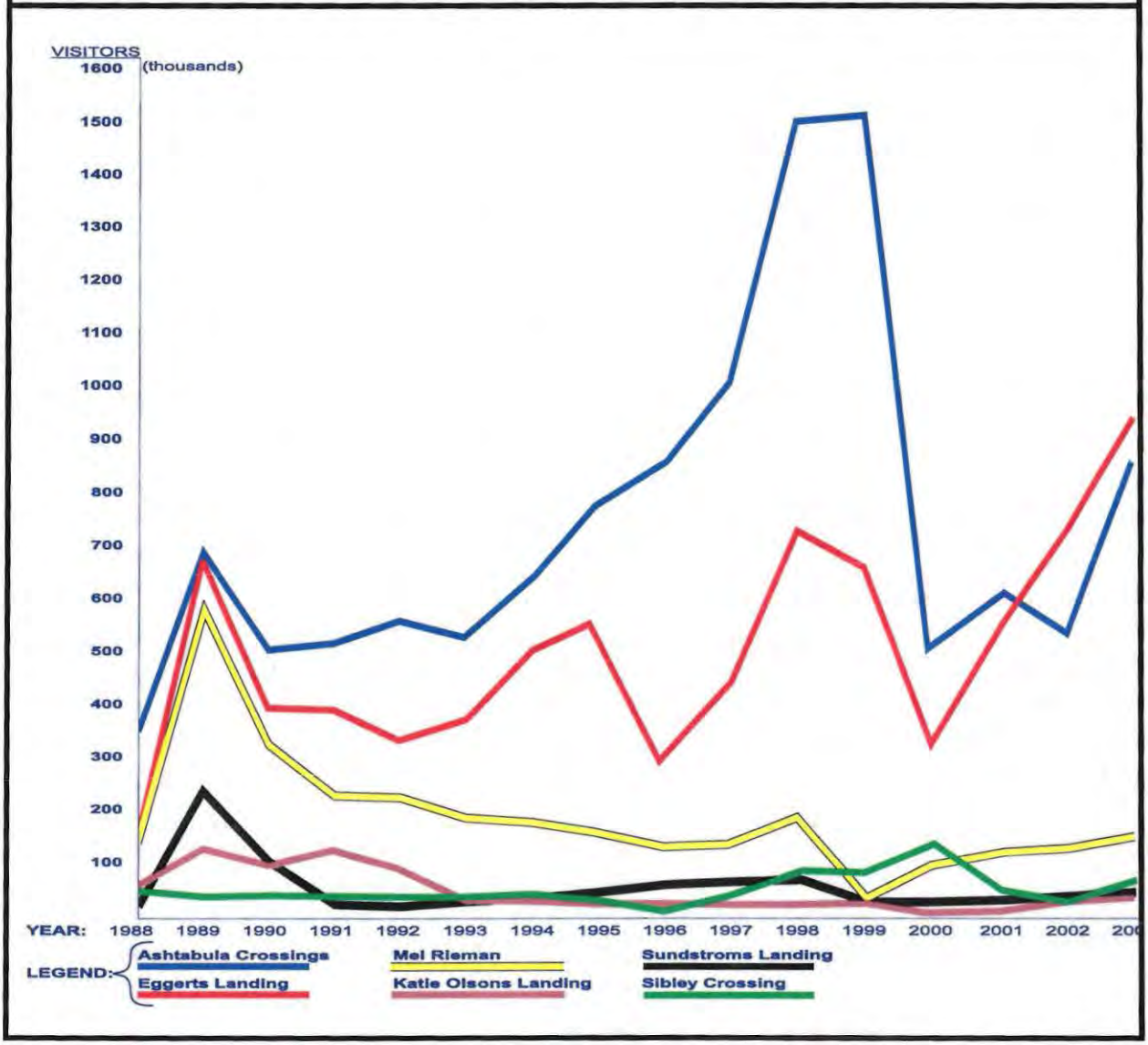
* Unknown user participation rate

1. Walking
2. Bicycling
3. Gardening
4. Playground Activities
5. Nature Observation

The least popular in-state activities are hockey, downhill skiing, canoeing, broomball and sailing. The popularity ranking in SCORP Region 6 of the recreation activities that the project currently supports is shown in Table 3-3.

The average North Dakota resident is estimated to spend 20-days per year walking for recreation, 14-days bicycling, and 12-days gardening. The average State resident is also projected to spend 6-days open water fishing. Per capita days of participation in these recreational activities are considerably higher than any other activity.

FIGURE 3-3. Lake Ashtabula Project Visitation by Site



2. Recreational Use at Lake Ashtabula

The major day use activities at Lake Ashtabula include boating, picnicking, fishing, swimming, sightseeing, and water-skiing as well as winter activities. Each of the recreational sites is unique in its own way and offers a variety of activities. Listed below is a description of the recreational activities that are most frequently engaged in and sites that are most frequently used.

Boating is a popular activity at Lake Ashtabula. It was estimated that 40 percent of project visitors participate in boating activities of some type on Lake Ashtabula each year. Because of this large percentage, all of the recreational facilities have public boat launching facilities. Mel Rieman, Eggert's Landing, Ashtabula Crossings, and Sibley Crossing are the most popular areas for boating.

Picnicking and other day use activities are quite popular at Lake Ashtabula. All of the recreational sites have picnic tables, fireplaces, and vault toilets available for public use. Nearly all of the sites have playground equipment except West Ashtabula Crossing and Sibley Crossing. Mel Rieman is the only site with volleyball and horseshoe facilities. Other day use activities enjoyed at Lake Ashtabula include walking, sunbathing, and playing Frisbee. East Ashtabula Crossing and Mel Rieman are the most frequently visited recreational areas; both facilities are easily accessed and have excellent facilities. Mel Rieman is the closest to Valley City and Interstate 94.

Of all recreational activities available, fishing is the most popular activity at Lake Ashtabula (see Table 3-4). The lake is a productive fishery. Some of the more commonly caught fish species include yellow perch, walleye, white bass, northern pike, and bullheads. Nearly 50-percent of the visitors fish at various recreational sites along the lake each year. The most popular recreation areas for fishing are Mel Rieman, Eggert's Landing, East Ashtabula Crossing

TABLE 3-4. Typical Recreational Use Patterns; Participation by Site

ACTIVITY	PERSONS								
	Camp	**Picnic**	**Boat**	**Fish**	**Wtr-Ski**	**Swim**	**Other**	**Sightsee**	**Winter**
Mel Rieman	1,695	14,537	11,017	17,026	4,775	1,414	20,299	6,382	579
Sundstroms Landing	0	5,282	3,036	6,315	690	414	2,336	1,535	427
Eggerts Landing	10,586	233	20,956	22,838	2,029	2,537	15,836	2,621	736
Sibley Crossing	0	852	12,853	13,011	804	407	12,691	875	25
Katie Olsons Landing	0	2,524	4,238	9,032	0	0	0	107	37
Ashtabula Crossings	14,659	6,383	10,508	16,790	582	5,358	19,980	3,727	36
Totals	26,940	29,811	62,608	85,012	8,880	10,130	71,142	15,247	1,840
Percentage *	14	18	36	54	6	13	43	13	1

* Persons can participate in more than one activity – thus percentages can total more than 100

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and West Ashtabula Crossing, which have fish cleaning facilities and are easily accessible from major highways. Ice fishing is also popular at Lake Ashtabula.

Swimming is a favorite activity at Lake Ashtabula. Nearly a quarter of the visitors to Ashtabula enjoy swimming as a pastime each year. Mel Rieman and East Ashtabula Crossing are the most frequently visited recreational areas for swimming and sunbathing because they have public beaches.

Lake Ashtabula and Baldhill Dam draw a number of visitors for sightseeing. Many visitors stop at the dam, located 10 miles north of Valley City, to observe its operation. Baldhill Dam is an impressive structure designed to control waters of the Sheyenne River. It is a 1,650-foot-long compacted earth structure with concrete gravity control works 140 feet in length. The reservoir at Lake Ashtabula has the capacity of 70,600 acre-feet at normal pool level.

Water skiing also occurs at Lake Ashtabula, primarily at Mel Rieman and the Ashtabula Crossings recreational facilities. Water skiing is not as popular as other summer activities, but a small percentage of visitors take part in water skiing at Lake Ashtabula each year. Recent years have also seen an increase in the use of personal watercraft.

Camping at Lake Ashtabula accounts for 20 percent of the visitors. All of the recreational facilities have drinking water available for campers. Mel Rieman, Eggerts Landing, and East Ashtabula Crossing have public showers and flushing toilets. Trailer camping pads and electric hookups are located at Mel Rieman Campground, Eggert's Landing, East and West Ashtabula Crossings. Camping pads for tents are located at Mel Rieman, Eggert's Landing, West and East Ashtabula Crossings. Sanitary disposal stations are available at Mel Rieman, Eggert's Landing, and West Ashtabula Crossing recreation areas.

Although there is less recreational use during the winter, Lake Ashtabula remains a recreation spot for a number of winter activities. Ice fishing, snowmobiling, snowshoeing, and cross-country skiing are among the most common winter attractions.

3. Visitation and Recreational Use Estimation Methods

Visitation at the project recreation sites is measured in visitor hours. A visitor hour is defined as one person engaged in one or more recreational activities for one hour. Yearly visitor hours are measured by traffic counts taken at designated locations at each recreational area. Recreation user surveys estimate the average number of people per car and the amount of recreational activity at the project sites.

Methods for estimating visitation at Lake Ashtabula have changed a great deal over the last 30 years. In the past, visitation was measured by the number of visitor days. To maintain consistency over time, visitation statistics shown are converted from visitor days to visitor hours. Survey information was collected on site by the U.S. Army Corps of Engineers resource management staff at Lake Ashtabula and by St. Paul District office staff and contractors.

4. Recreation Carrying Capacity

In the past, carrying capacity has been viewed as the maximum number of users an area could sustain without affecting the resource. The emphasis has shifted somewhat from this view. Current thinking is that the user's perception has much more to do with the carrying capacity than any set theoretical number. That is to say, a lake may be perceived as overcrowded long before any visible impact has occurred. This perception of overcrowding will also vary by location or user. One person may welcome the social opportunities present in a densely populated campground while another may prefer either implied or absolute solitude.

This information on user preferences and perceptions can be gathered with a simple survey developed at the (Corps of Engineers) Waterways Experiment Station. The survey elicits information related to the user's purpose for coming to the site, expectations, changes noticed, and how this site compares with others. In addition, there is space for additional questions or comments. In this way, both user perceptions and impacts to the resource can be documented and used to make management decisions for future use and development. Because of funding limitations and because the resource is so obviously underused, this type of survey has not been implemented at Lake Ashtabula since 1993.

5. Emerging Trends

Outdoor recreation participation patterns are changing. The current trends indicate that traditional outdoor activities are leveling off or declining and fitness activities like walking, jogging and bicycling are gaining popularity. Also, there is an increase in demand for learning and service experiences that will open up the need for more organized programs, activities and events.

The trend is toward multiple, short trips within a smaller range of travel (mini vacations) rather than the once-a-year vacation. Some of the implications include the following:

- More trips of shorter range will mean more attendance by local users and spreading out of activity over more of the entire year. The public will be more selective about crowded conditions, interpretive presentation, and specific recreational opportunities. Displays and programs will need to be rotated more often.

- More demand during the off-season will change the maintenance from an intense period of seasonal preparation toward a more distributed maintenance program throughout the year. This may aggravate the typical seasonal hiring policy and require some full-time staffing for operations and maintenance functions.

In many areas of the United States the small, diverse family farm is being replaced by larger, highly mechanized operations. The pastoral rural landscapes, composed of fencerows, woodlots, pastures, stream corridors and small fields, are becoming more difficult to find. The loss of this rural

habitat and landscape diversity is of great concern to the informed public and State conservation agencies. While there are existing State and Federal programs to maintain and increase habitat, their impact is not readily apparent on the rural landscape. Public demand demonstrates a growing need for regulatory and non-regulatory programs to protect and maintain these "green" corridors. This constitutes a broadening of traditional environmental concerns over air and water quality and hazardous wastes. Partnerships addressing these concerns between the public and private sectors, different agencies, and different levels of government have been discussed for years.

6. Looking Ahead

Identifying trends, events, factors, forces and other elements will help to define alternative futures. Based on patterns or trends in recreational activity participation to date, the demand and supply of recreational opportunities will need to consider the following:

- An aging public and increases in life expectancy.
- The population growth into the Southwest and decline in rural communities.
- A population of immigrants that is younger and growing faster than the general population.
- Families are changing (single parent, household size, etc.).
- Educational level (70-percent of people entering the job market have a college background).
- Health and fitness conscious Americans may pursue more active life style.
- Baby boomers (1946-1960) are entering mid-life, affecting future consumption of recreation. They have delayed marriage and children, thus affecting the travel market as children tie older adults to the home.
- Economic changes affect recreational choices.
- Less free time by two-income families will affect recreational use.
- Current entrepreneurial trends indicate that the home may become the future workplace of a larger percentage of the labor force. This might contribute to the shorter vacation trend discussed previously.

7. Regional Needs

Regional needs that correspond to Lake Ashtabula's ability to provide recreation opportunities include accessible camping, picnic and play areas (shelters, comfort stations), and access to the water. Regional issues include inadequate funding levels, maintenance/renovation, tourism promotion, unstable water quality and quantity.

Older adults expect and demand quality programs and activities. Baby Boomers

who have well developed leisure time habits are entering their fifties with increased longevity. Many will want all the activities they presently participate in but may need to change the level of exertion. Providing a range and variety of quality programs and activities is the key to participation. Education, such as continuing learning and self-improvement, is one of the fastest growing trends for older adults. The Fitness/Wellness trend will continue to grow with outdoor experiences such as snow and water skiing, hiking, rafting, fishing, and cycling (in demand now) expected to continue to be in demand. Also, as a result of the increase of longevity, the demand for accessible recreation facilities will grow.

8. Demand and Needs Assessment

Recreation participation is influenced by the following factors:

- Leisure time: the most critical element to the outdoor recreational pursuit in the United States is the decline in leisure time available. Recent poll reports indicate that leisure time has shrunk about eight hours per week and that the trend of decline is related to more single parent families, two-income households, and work/job security pressures. The current pattern of American adults identifies one or two vacations of one week in length plus many small weekend trips (mini-vacations) occurring more frequently throughout the year. It appears that long vacations of two or more weeks are becoming less common.

The Harris Poll (1984) found that age, gender, ethnic group and family status influenced leisure differences considerably. The elderly, whites, and men had more leisure than young adults, blacks, Hispanics, or women. Different outdoor recreation patterns occur among various social strata.

- Age: As people age their typical recreation activity tends toward less physical pursuits. Some outdoor activities such as walking for pleasure increase with age. An increase in

TABLE 3-5. Percentages of Recreation Use by Area

	SUMMER ACTIVITY							
ACTIVITY	Picnic	Boating	Fishing	Water-ski	Swim	Other *	Sightsee	Camping
Baldhill Dam	NA	NA	36.2	NA	NA	61.9	1.7	NA
Mel Rieman	38.6	29.3	45.3	12.7	27.8	54.0	17.0	4.5
Sundstrom's Landing	43.9	25.2	52.5	5.7	3.4	19.4	12.8	NA
Eggert's Landing	0.7	60.1	65.5	5.8	7.3	45.4	7.5	30.4
Katie Olson's Landing	27.3	45.9	97.9	—	—	—	1.2	NA
Ashtabula Crossings	18.5	30.5	48.8	1.7	15.6	58.0	10.8	42.6
Sibley Crossing	5.8	87.2	88.3	—	2.8	86.1	5.9	NA

— indicates no data. NA (Not Available at this area). * Other activities may include: hiking, ORV riding, visiting concessionaire, visiting beach, jet skiing, looking for camping, bicycling, walking/training dogs, nature observation, etc.

fishing could also be assumed because it takes less physical exertion. In general, outdoor activity decreases with age.

- Gender: Some activities have marked differences according to gender; hunting shows higher participation by men, while women show a preference for walking for pleasure and horseback riding.

- Income: Outdoor activity increases as a function of income. In addition, some recreational activities are limited by income.

- Education: Level of education affect recreational pursuits. People with more education, on the average, tend to recreate more than those with less education. This could be tied to the income phenomena (previous paragraph) as people with more education have, on the average, a higher income.

- Other factors such as where an individual resides (urban/rural) will also determine recreational patterns.

In evaluating the long-term trends of participation in outdoor recreation, it is important to recognize that during 22 years of survey coverage, the number of participants grew in relationship to population growth. The most dramatic increases were in more physically demanding activities such as canoeing, bicycling, water-skiing, walking, and hiking/backpacking. This relates to an observed trend toward more active recreation by Americans. This trend will probably continue in the short term, but it may not continue into a long term recreational pattern for the future.

A coalition of Federal and State agencies recently completed The Public Area Recreation Visitor Study (PARVS). The survey concluded that some activities increased in popularity while others decreased. These results confirmed that the more active recreational pursuits have become more popular. Various measures of participation were reviewed with the total number of trips taken becoming the final measure for popularity of an activity. By this measure, the ranking follows:

1 . . . .Walking
2 . . . .Pleasure Driving
3 . . . .Sightseeing
4 . . . .Pool Swimming
5 . . . .Picnicking
6 . . . .Biking
7 . . . .Open-Water Swimming
8 . . . .Open-Water Fishing
9 . . . .Wildlife Observation
10 . . .Running/Jogging.

Predicting the future recreation participation is determined by measuring relationships between current participation patterns, demographic characteristics (age), available recreation opportunities, and other indicators that influence recreational

patterns. Participation in all activities is expected to increase over the next 50-years, but some general conclusions have been suggested:

- The more simple and less specialized activities, such as walking, picnicking, sightseeing and swimming, will remain very popular. Providing the public with attractive settings, open space with trails, and unpolluted water will benefit society.

- Changes will probably occur more quickly in the future. This will require a strong national data base and projection capabilities to respond to public sector need and demand for recreational opportunities. As examples: viewing wildlife is rising, while wildlife consumption is declining; close-to-home trips are increasing while longer travel is declining.

SUMMATION

This project provides a rare recreation resource for this region where large bodies of open water and the amenities associated with this phenomenon are uncommon. While the North Dakota SCORP maintains that most of the recreation resources rank low in activity participation for SCORP Region 6, project use patterns and visitation numbers indicate that the resources of the project are in demand. For instance, fishing is ranked 16th for Region 6 activity participation, while it is ranked first at the project. This would indicate that project resources are filling the needs of people with particular recreation preferences; furthermore, this type of resource is not commonly available elsewhere in the region (possibly why it is ranked so low regionally). Comparison of Region 6 activity participation vs. project use patterns indicates that, by providing these recreation opportunities, project resources are being used in a manner that benefits the people of this region.

Analysis of site recreation patterns suggests that a reallocation of resources, especially campsites, would increase the recreation potential of the project overall and result in a better fit between use patterns (demand) and facility location (supply).

CHAPTER 4

RESOURCE OBJECTIVES

RESOURCE MANAGEMENT RESPONSIBILITIES

This chapter presents the Resource Objectives for the Lake Ashtabula Flood Control Project. Project Resource Objectives reflect the specific resources, capabilities and constraints of the Lake Ashtabula Project. They specify how those resources are to be managed in response to the current and projected public needs and desires that have been identified. These Resource Objectives must be incidental to the authorized project purposes, public laws, and other regulations, and may not conflict with them.

The Corps of Engineers is responsible for the management and protection of the cultural and natural resources of the Lake Ashtabula project. A number of general authorizing laws and regulations set forth the responsibilities of the Corps for initiating progressive resource management programs. These laws direct that natural resource management be integrated with other project resources and activities under a concept of multiple resource use.

Programs supporting state and local involvement in natural resource management have been developed by the Corps in keeping with good land stewardship responsibilities.

Under Title 36, Chapter III, Section 327, Code of Federal Regulations, to ensure the health, safety and welfare of the public, Corps employees have the authority to issue citations enforcing those regulations; however, they do not engage in actual law enforcement. Local law enforcement authorities (county and State police) retain statutory authority and the responsibility to enforce all other laws. Corps employees coordinate with local law enforcement authorities and contact them if there is a major disturbance. All the project recreation areas are located in Barnes County.

The authority to analyze environmental impacts of recreational facilities is based on the National Environmental Policy Act of 1969 (Public Law 91-190). This legislation authorizes and requires the Corps of Engineers to collect environmental data and to prepare impact assessments or statements.

The planning, preparation, and coordination of such environmental statements are guided by the Council on Environmental Quality Guidelines for Statements on Proposed Federal Actions Affecting the Environment, dated August 1973 (ER 1105-2-507) and Section 122 of the River and Harbor Act of 1970 (Public Law 91-611).

REVIEW OF RESOURCE OBJECTIVE CRITERIA

Resource Objectives are developed to guide future design, development, and management of the entire resource base. Although Federal and State laws and the Authorized Project Purposes can limit some types of development, the objective of this Master Plan is to obtain the greatest possible use of all project resources, while meeting the needs of the public and protecting and enhancing environmental quality and the resources of the project.

Seasonal water levels are governed by regulation policies established as part of the operating plan for the project and are dependent on seasonal precipitation and runoff patterns. This plan is a function of the mandated flood control and storage requirements set forth by law. Operation of the Lake Ashtabula Project according to the Operating Plan has been assumed during the formulation of the Resource Objectives presented in this Master Plan.

AUTHORIZED PROJECT PURPOSES

The Lake Ashtabula Project was originally authorized as a water storage project. Baldhill Dam was authorized by the Flood Control Act of 1944 (Public Law 78-534, which authorized the Corps to consider recreation, water supply, and irrigation in their projects). The Federal Water Project Recreation Act of 1965 required consideration of recreation and fish and wildlife enhancement in planning water resource projects and establishing cost-sharing principles for development of recreational facilities.

FEDERAL LAWS AND DIRECTIVES

A partial listing of applicable Public Laws (PL), Executive Orders (EO), Corps of Engineers' Engineer Manuals (EM), Engineer Pamphlets (EP), and Engineer Regulations (ER) for planning, development, and management of natural and cultural resources at Corps of Engineers Civil Works Projects is available in Appendix C.

REGIONAL NEEDS

As previously discussed, the purpose of a master plan is to evaluate project resources and prescribe a concept of land and water management, resource objectives, and design and management programs that respond effectively and economically to regional needs. Lake Ashtabula Project is located in an area with few comparable resources. Although the population of the region is small, this portion of the upper Great Plains has few large bodies of water. Lake Ashtabula helps to fill a need for water-based recreation facilities within the region.

RESOURCE CAPABILITIES

The Lake Ashtabula Project draws considerable numbers of visitors every year. The natural resource base is well established, and the uses made of it are adequate. Use patterns suggest that some changes in facility

distribution within the project would result in more complete use and provide additional protection of the resource base and a better fit of regional needs to project resource capabilities. Some project areas are showing signs of overuse. This can be addressed by additional (or different) management techniques, and (or) 'hardening' of the site or feature. Hardening is the process of adding built features that will reduce long-term impact, or damage, to a site, e.g., paving, striping, and fencing a parking lot will result in increased parking capacity while, at the same time, providing protection for trees, turf areas, and people in adjoining areas. Construction of a low retaining wall around a beach area will help contain the sand and also improve the areas adjoining the beach by reducing the slope – this allows better water retention by the turf grasses resulting in thicker, healthier turf which, in turn, reduces erosion and compaction of the topsoil.

PUBLIC DESIRES

Public opinion is that Lake Ashtabula facilities need to be upgraded. The information gathered from customer comment cards will be used for future budget justifications

PROJECT RESOURCE OBJECTIVES

GENERAL

1. Water Quality

OBJECTIVE: The District has defined the baseline water quality condition and will continue programs that have been established for monitoring these water quality parameters. Program goals include accurately determining trends, identifying problems and methods for remedial actions, and identifying ways to integrate water control and water quality management decisions. The District will continue to promote the policy of developing cost-sharing partnerships in the basin and recognizing the effects of basin land use practices on water quality.

RATIONALE: Water quality management programs are required at Corps civil works projects under Regulation No. 1110-2-8154, 31 May 1995. The Corps is to take a leadership role in carrying out the goals and objectives of the national policy (Clean Water Act) of managing the Nation's water resources at Corps project sites. In addition to Federal requirements, the District must ensure compliance with State water quality standards and designated use criteria.

2. Environmental Interpretation

OBJECTIVE: To enhance public awareness of the role of the Army Corps of Engineers in the administration of water resource projects and wildlife management on Corps lands; to enhance public awareness and understanding of the Baldhill Dam/Lake Ashtabula project in relation to its constructed, natural and cultural settings.

RATIONALE: Interpretation is the link between the public, the Corps, and the resources of the project. It is referred to in ER/EP 1130-2-550, Project Operations, Recreation, and Maintenance Policies: Chapter 4 - Interpretive and Outreach; Chapter 5 -Visitor Center Program; and Chapter 6 - Visitor Assistance. The Corps is authorized to manage Lake Ashtabula for flood control and regulation of downstream flows; however, it is also directed in these Environmental Regulations and in general legislation to manage other lake

resources such as water quality, fish and wildlife and recreation. These latter purposes must be incidental to, and their management cannot conflict with, the authorized project purposes. Displays, bulletin boards, tours, brochures, maps and special events are used to provide information to the public regarding the project and its environment.

PROJECT OPERATIONS

Land classified as Project Operations is the area containing the dam, control structures and maintenance and office areas. This area is small and has few level surfaces, it is suitable for low density recreation.

OBJECTIVE: To continue to operate the Lake Ashtabula Flood Control Project with safe, efficient, cost effective procedures that provide the level of flood control and downstream flow regulation authorized by Congress.

RATIONALE: The Lake Ashtabula Project is authorized by Congress for flood control and regulation of downstream flows of the Sheyenne River and the Red River of the North. In addition to operating for these mandatory purposes, the Corps is directed in general legislation to manage the other lake resources including water quality, recreation, and fish and wildlife. Achieving these secondary purposes must be incidental to the authorized project purposes and may not conflict with them. This area contains the tailwater from the spillway, a popular fishing area. Low density recreation use does not conflict with this land use classification.

RECREATION

Seven recreation sites are scattered along the 27 mile-long lake. All sites offer access to the water, and most provide recreation facilities or amenities as well (see Chapter 2, Resource Analysis).

1. Accessibility

OBJECTIVE: In general, the Lake Ashtabula Project shall provide optimum recreational opportunities for all individuals through facilities and programs designed for universal access. Wherever necessary, facilities should be modified or constructed to improve existing facilities by making them safer and more accessible to all persons.

An accessibility inventory and action plan need to be completed for each site at Lake Ashtabula.

RATIONALE: Section 504 of the Rehabilitation Act of 1973 mandated that persons with disabilities shall not "be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance...." The Americans with Disabilities Act (ADA) of 1990 made access a civil right. Although not directly applicable to Federal facilities, it made the access issue highly visible. The Design Guide for Accessible Outdoor Recreation describes accessibility this way, *"The following definition is offered to help clarify its meaning when used in a legal context: Accessible programs or facilities must offer the person with disability an opportunity to achieve experiences similar to those offered others. Consideration should include persons with mobility, visual, hearing, speech, and/or developmental impairments. Facilities must*

be designed so that they can be approached, entered, and used by persons with disabilities. An accessible facility must provide the person with a disability a place to park, accessible routes, entrance to buildings, restrooms, water, and the services offered other visitors. Newly constructed or renovated facilities must comply with 41 CFR 101-19.6, the Uniform Federal Accessibility Standards."

True accessibility means more than just physical access to a facility. Going beyond the letter of the law such as siting amenities so that they are close together with good sight lines and organization; shortening distances between areas; gentling slopes; and increasing the "comfort index" in general are all accessibility issues that will also add greatly to the usability of a site. For example, good sight lines not only allow a disabled person to find the easiest, quickest route, they also allow a parent to keep better watch over young children and contribute to personal safety in many other ways.

2. Recreation, Low Density

Most of the Lake Ashtabula Project is classified as Multiple Resource Management (see Appendix A). Low density recreation is available along most of the lake and surrounding Federal lands; most of these lands consist of a narrow band of shoreline, accessible only by boat.

OBJECTIVE: Continue to provide the public with opportunities for high quality low density types of recreation such as fishing, hunting, snowmobiling, cross-country skiing, and wildlife observation.

RATIONALE: Lake Ashtabula is one of the largest lakes in eastern North Dakota; fishing is a popular pastime at the lake and occurs year-round. The project is also renowned for its high quality waterfowl hunting. Both of these types of recreation are important to the area economy, and important providers of popular regional recreation opportunities. When considering the semi-arid climate of this area, the lake provides the people of Valley City, Jamestown and other residents of the region with scarce water-based recreational opportunities.

3. Recreation, Intensive and Day Use

OBJECTIVE: Maximize the existing project recreation resource potential to provide quality day-use opportunities that will help meet the existing and projected recreational needs of the region. Efforts to protect the ability of the resources to provide day-use recreational opportunities will continue.

RATIONALE: The project currently provides the region with hard to find opportunities for hunting, fishing, picnicking, and other day-use activities. Because land in this region is almost exclusively reserved for agriculture and there is an established pattern of use indicating a need for this type of recreational facility, the existing opportunities should continue to be provided. Changes in the existing allocation of project resources would not significantly increase the benefits derived from the project; therefore, the existing management policies should continue in effect.

4. Boating

OBJECTIVE: To continue to maintain and modernize boating facilities and to educate the public on the importance of water and boating safety.

RATIONALE: With the advent of the day use fee program it is imperative that the available facilities meet the public's expectations. If this does not occur the public will not support the fee program.

Water-based recreation continues to be more popular. With the ongoing and expected increases many new participants to this type of recreation are inexperienced and need to be informed about how to act safely and responsibly.

5. Camping

OBJECTIVE: To continue to provide high-quality camping experiences for users of Corps facilities whether in tents, trailers or motor homes.

To modernize facilities in areas where there is consistently high use.

RATIONALE: The proximity of Lake Ashtabula to Interstate 94 makes it an excellent candidate as an overnight stop for travelers en route to destinations either east or west. The definition of what constitutes a "quality" experience will therefore be based on a wide range of experiences from around the country. The facilities at the most popular sites (Mel Rieman, Eggert's and East Ashtabula Crossing) should measure up to Corps facilities in other parts of the country. Camping opportunities, particularly those in a lake setting, are not common in this region.

Many of the camping facilities at Lake Ashtabula do not meet the needs of today's campers. Campsites are too small, there are not enough electric services available, and there is a shortage of (water operated) toilets; this according to current and projected standards. Inadequate facilities make unhappy campers and increase the impact on the environment. Corps standards for recreation facilities are very high, resulting in some of the best campgrounds in the nation. This standard should be supported at Lake Ashtabula.

FISHERIES

1. Game Fish

OBJECTIVE: In cooperation with the U.S. Fish and Wildlife Service and the North Dakota Department of Game and Fish, develop and maintain a high quality fishery for warm water game fish, and continue stocking programs to provide superior recreational fishing opportunities.

RATIONALE: Fishing is the most important recreation resource for this project. A majority of total visitors participate in fishing related recreation. In addition, anglers are important contributors to the area economy.

Game fish in the lake include walleye, northern pike, crappie, bluegill, yellow perch, and white bass; walleye is the most sought-after species.

Fishing activity occurs throughout the year. Peak fishing activity occurs in the late spring and again in the fall. Winter ice fishing starts when solid ice is formed and continues through the winter. Ice houses (small structures, or shacks, positioned over a hole drilled in the ice) are commonly used for this sport, and may remain on the ice throughout the season. They are required to be removed from the lake by spring breakup.

2. Non-game Fish

OBJECTIVE: In cooperation with the US Fish and Wildlife Service and the North Dakota Department of Game and Fish, continue management methods and techniques to limit reproduction of rough fish species.

RATIONALE: Actions of rough fish contribute to turbid water conditions in the lake by disturbing bottom sediments. Large populations of rough fish can outcompete the lake game fish for available resources and space.

WILDLIFE

1. General

The Lake Ashtabula Project has several wildlife management areas scattered around the lake. All of these areas have been turned back to the Corps of Engineers by the USFWS and the State of North Dakota.

In this region, the types of habitat available to wildlife has varied in the millennia since the most recent glaciation. The last natural habitat was a combination of mixed prairie grasslands with scattered "pothole" wetlands; some forested edges existed along streams and in areas naturally sheltered from fire. Wetland habitat was also extent on river floodplain areas; seasonal wetlands formed in low areas lacking natural drainage outlets. Native wildlife populations were very high and were self-sustaining within this natural ecological system. Introduced species such as the Chinese ring-necked pheasant and Hungarian partridge are originally from regions with this general habitat type and have adapted well to this area.

OBJECTIVE: Efforts to improve habitat quality and restore animal populations should continue in cooperation with state, county, private, Federal and international agencies. The eventual goal is to reach and maintain self-sustaining populations in both game and non-game species for the recreational needs of present and future project visitors.

RATIONALE: The varied habitat at Lake Ashtabula provides the opportunity to manage for a wide variety of wildlife species, both game and non-game. A diverse wildlife population has many benefits. As a recreation source, wildlife is important to a wide cross-section of the area's economic base. In an aesthetic sense, wildlife is an extremely important contributor to the enjoyment of project recreationists. In addition to providing direct recreational experiences such as hunting and birding, opportunities to interact with wildlife in a non-controlled environment greatly enhance the recreational experience of visitors involved in other activities. Concerning the ecology in general, the full spectrum of wildlife is an important indicator of the health of the system as a whole; a highly diverse, self-sustaining wildlife population is an indication of a healthy environment. Continuance of the wildlife habitat and breeding programs now in place are of benefit to the project and the region.

2. Waterfowl

OBJECTIVE: In concurrence with regional needs and desires, and in accordance with the North American Waterfowl Management Plan, the primary objective of the wildlife management program at the Lake Ashtabula project is to restore and maintain high levels of waterfowl reproduction. Providing a

diversity in nesting and habitat environments for waterfowl on project lands is an important part of this goal.

RATIONALE: Waterfowl oriented recreation is one of the most important recreation activities at the Lake Ashtabula project. As a result, special efforts and considerations are warranted towards maximizing waterfowl populations.

3. Habitat

OBJECTIVE: Efforts to improve habitat quality and diversity should continue in cooperation with state, county, private, Federal and international agencies with the goal of reaching and maintaining a sustainable yield/level that will meet the demands realized by the achievement of the objectives set forth by Resource Objective, Wildlife.

RATIONALE: Wildlife diversity is absolutely tied to the availability and quality of specific habitat types. Because of this, the maintenance and manipulation of wildlife habitat is one of the most basic and practical activities employed in wildlife management. Vegetation control and manipulation are needed on project lands to establish and maintain the desired vegetation community types, density, and interspersion that will provide high quality wildlife habitat.

4. Threatened or Endangered Species or Habitats

OBJECTIVE: Comply with Federal, State and local laws, regulations, and ordinances to prevent adverse impacts to listed species or their habitats.

RATIONALE: The Endangered Species Act and other legislation require the Corps to assess the effect of work on endangered species. Operation and management of Baldhill Dam/Lake Ashtabula must be done in a manner consistent with these laws. Specific projects to enhance habitat for a particular listed species are not presently proposed.

VEGETATION

This region was originally tall and mixed-grass prairie, wetlands, and riverine vegetation. All of these vegetation communities have declined due to human intercession.

1. Woodland

OBJECTIVE: Establish a forested environment that will provide the quality, beauty, and privacy necessary to satisfy the desires of visitors to project lands. Properly planned plantings can, at the same time, assure the presence of habitat required by many species of wildlife.

RATIONALE: In this land of climatic extremes, a mixture of sun and shade is vital for full enjoyment of most recreation pastimes. Additional trees and other woody plants are also needed in an aesthetic sense and will serve to enhance the recreational experience for campers and day-users alike.

a. Floodplain Forest. Forested areas on the great plains are rare. Any areas of natural forested edge that existed along this reach of the Sheyenne River were lost when the reservoir was filled and the natural floodplain inundated. The riverine vegetation community (northern hardwood floodplain forest) is important habitat for many species of wildlife. The Sheyenne River downstream of Baldhill Dam is an example of this type of

vegetation. This vegetation community should be replaced, where appropriate, if the original species diversity is to be restored to pre-disturbance levels. Establishment of a riparian edge along the shoreline of the lake will also benefit the project in other ways. In addition to the aesthetic appeal of this type of vegetation, a vegetative strip along the lakeshore will act as a biological filtration system, filtering sheet-flow runoff before it reaches the lake. The wider this strip, the greater the benefit.

b. Upland Forest. The recreation areas of the project are located on lands that were originally river valley terraces, ± 40 feet above the water of the river. Project day use and camping facilities are now adjacent to the lake in most areas, but the proper vegetation community for the majority of these sites is the upland forest, or savanna; i.e., drought tolerant species. These sites are not floodplain and it is a mistake to plant water-loving trees in areas that are naturally upland sites.

c. Shelterbelts. In addition to providing protection from the fierce winter winds of the region, properly planted shelterbelts provide food and cover for many wildlife species. These long, linear strips of habitat play an extremely important role for wildlife by providing concealment and movement corridors in the farmland environs of this area.

2. Prairie

OBJECTIVE: Much of the habitat of the wildlife management areas consists of disturbed grasslands that can be improved for wildlife and aesthetics. Efforts to restore these areas to their original condition by the elimination of exotic species and the reintroduction of native grasses and forbs will be continued.

Leafy spurge, *Euphorbia esula*, a noxious weed, is especially troublesome in these areas. Efforts should continue towards its eradication.

RATIONALE: Mature prairie plant communities put down roots to a depth of several feet. Over time, these roots form a dense, almost impenetrable mass. Mature prairie is a low-maintenance, nearly erosion-proof, carpet of living plant life – a self-sustaining, self-renewing, immutable natural resource that also has great aesthetic appeal. Native tall-grass prairie, with the long, slender stems laden with a bounty of heavy seed heads, waving and tossing before the incessant onslaught of the prairie winds is quite pleasing to the eye. It is excellent habitat for upland game birds and prairie dwelling mammals, including the white-tailed deer. Restoration of this habitat type would support objectives for area wildlife populations and add to the recreational experience of project visitors.

3. Wetlands

OBJECTIVE: The emphasis in managing wetlands at Lake Ashtabula will be on restoration and enhancement of waterfowl nesting and brood rearing habitat; this will significantly increase duck and goose nesting success.

RATIONALE: Waterfowl oriented recreation is one of the most important recreation activities at the Lake Ashtabula project (personnel observation). As a result, special efforts and considerations are warranted towards maximizing waterfowl populations. Waterfowl populations are directly tied to the

availability and quality of wetland habitat. Because of this, the maintenance and manipulation of wetland is one of the most basic and practical activities employed in waterfowl management. Restoration of this type of habitat would support objectives for the North American Waterfowl Management Plan and for area wildlife populations – it will also add to the recreational experience of project visitors.

4. Threatened or Endangered Plant Species

OBJECTIVE: Comply with Federal, State and local laws, regulations and ordinances to prevent adverse impacts to listed species or their habitats.

RATIONALE: The Endangered Species Act and other legislation require the Corps to assess the effect of work on endangered species. Operation and management of Baldhill Dam/Lake Ashtabula must be done in a manner consistent with these laws however, specific projects to enhance habitat for a particular listed species are not presently proposed.

CULTURAL RESOURCES

OBJECTIVE: The primary objective is to comply with Federal, State and local laws, regulations and ordinances that pertain to the protection of cultural resources to ensure that known and undiscovered resources are not disturbed as a result of District activities at the project. To this end, the District plans to complete an evaluation of prehistoric and historic sites in order to determine their eligibility to the National Register of Historic Places. This action will insure that important sites will be protected from future disturbance and site area loss. A complete inventory of these cultural resources sites at the Lake Ashtabula Project was completed in 1978-79.

RATIONALE: In accordance with the National Historic Preservation Act of 1966, as amended, all significant cultural resources sites (i.e., National Register listed or eligible properties) must be protected from adverse impacts by Federal or Federally-funded actions. All unevaluated cultural resources sites must be protected from disturbance prior to such evaluation of their National Register status. Once a site is evaluated as being eligible for listing on the National Register of Historic Places and the North Dakota State Historic Preservation Officer concurs, that site must be treated as if it were actually listed on the National Register and any adverse impacts from construction or development must either be avoided or mitigated prior to such work. Once a site is evaluated as being not eligible to the National Register and the North Dakota State Historic Preservation Officer concurs, future developments and construction may occur at the site area with no further cultural resources work necessary. The evaluation of the National Register eligibility status of project cultural resources sites is ongoing.

MANAGEMENT UNIT RESOURCE OBJECTIVES

GENERAL – ALL SITES

OBJECTIVE: Continue to upgrade every recreation area in terms of usability (e.g., user comfort, safety, circulation, accessibility, etc.), sustainability, ease of maintenance, and aesthetics. Problem areas such as accessibility for handicapped persons and lack of shade

trees are endemic throughout the project and should receive special consideration.

Initiate accessibility surveys – work toward the goal of universal access project wide.

RATIONALE: Increasing site usability will indirectly reduce the operational costs (by a reduction in the time site personnel spend dealing with poor usability generated problems such as complaints, accidents, excessive wear, etc.) and increase user satisfaction. Increasing site aesthetics and user satisfaction will positively affect visitation (an enjoyable recreation experience will generate repeat/increased visits). Increased sustainability and ease of maintenance will also reduce operational costs.

The sites within the project are not completely accessible as required by the Uniform Federal Accessibility Standards; in addition, universal accessibility will increase the usability of the site.

RECREATION AREAS

1. Baldhill Dam Operations Area

OBJECTIVE: Eliminate accessibility deficits in this area – provide safe public access for low to moderate levels of river-based recreation use, including fishing, picnicking, and wildlife viewing.

RATIONALE: Baldhill Dam Operations Area houses the project office and maintenance areas. It is currently managed as a high density recreation area providing public access to the dam tailwater and the Sheyenne River. Since there are few easily attainable public accesses to the river, this site is an important regional recreation resource.

2. Mel Rieman Recreation Area

OBJECTIVE: Initiate plans to better use project resources – refine and concentrate resources. This site is very popular for some recreation activities, while use of other site facilities is declining. This site should concentrate on uses which best fit the recreation preferences of its users. Visitation data suggest that ongoing plans and programs aimed at upgrading the facilities of the area should continue.

RATIONALE: With the rise in visitation and the reduction in actual dollars of funding and personnel, project resources have to be used more efficiently. This means refining the resource plan to get the most out of what is available. In some cases this may mean relocation, reduction, or elimination of certain facilities, services, or programs. At this site, the beach area is well used (especially during early summer peak-days) to the point of overuse – while camp sites are not being filled. Mel Rieman is the most popular recreation area on the lake for day use activities. It is close to Valley City, has a good beach, and offers many other day use recreation opportunities.

The beach area turf receives heavy use and does not get enough water during an average summer. As a result, it is usually in poor condition; i.e., thin, dry, and prickly. A sprinkler system (irrigating with water from the lake) will increase sustainability of the resource; lush green turf will enhance the beach area aesthetically and increase its usability and the enjoyment of it by users of the resource.

The visitor center sits unused for most of the year. Winterizing and remodeling it will allow a more complete and efficient use of this resource.

3. Sundstrom's Landing

OBJECTIVE: Maintain the current level of services and amenities; reorganize site layout, siting facilities with emphasis on accessibility.

RATIONALE: Difficult site access, limited usable land area, and steep, erodible slopes are factors contributing to the policy of maintaining the current level of service, day use only. The existing facilities are not accessible, partially due to the layout of the site. If other low impact, sustainable uses can be found that will not damage the resources of the site, they could be used to expand the recreation resource base of the project.

4. Katie Olson's Landing

OBJECTIVE: Maintain the current level of services and amenities.

RATIONALE: Katie Olson's Landing offers access to the lake from the west; it is the only Federal access south of West Ashtabula Crossing. Difficult access, limited land area, and low visitation are factors contributing to the policy of maintaining the current level of service. Recent land movement above the site has made the continuation of service at KO problematic. Further slippage could engender closure of this recreation area..

5. Eggerts Landing

OBJECTIVE: Initiate a plan to modernize site facilities.

RATIONALE: Eggert's Landing has both good access and exceptional potential for expansion. The campground has been recently expanded to accomodate the increased visitation at this site. Other facilities need modernization to stay within Corps standards for recreation areas and to handle the increased traffic (in general).

6. East Ashtabula Crossing

OBJECTIVE: Initiate a plan to refine and concentrate resources. Maintain the current level of services and amenities for now, but investigate the possibility of splitting facilities between East and West Crossings. If this proves to be feasible, it should be done.

RATIONALE: Although this site has the highest visitation of any in the project, due to the lack of Federally owned land, there is no possibility of additional facilities. Due to the high visitation, additional "hardening" of the site is warranted – another possibility is to move selected site facilities to the West Crossing, across the lake.

7. West Ashtabula Crossing

OBJECTIVE: Initiate a plan to modernize existing resources and expand the level of amenities. Enlarging boat launch facility, construction of a modern playground, and paving the site road should be priorities.

RATIONALE: Currently, this site acts as an overflow area for the East Crossing. Management strategy here is to encourage more project recreationists to use this site; this will act to relieve pressure from East Crossing. With the large parking area available, adding a boat launch lane is a recommended approach. Demand for playground day use recreation is high for this (ND SCORP) region. Paving will cut down

on airborne dust, dirt and noise. These modifications act together to make the site more attractive to family campers/users and they will also reduce high-use impact on the site. additional visitation will require some hardening of high use areas, such as paving the road and parking area.

8. Sibley (Keyes) Crossing

OBJECTIVE: Maintain the current level of services and amenities.

RATIONALE: Although this site has easy access, it is very small and quite remote. Its low rate of use does not justify additional facilities at this time. Because of the size of Lake Ashtabula, access points need to be spaced along its 28 mile length. As this access is existing and serves a specific clientele, i. e.; persons that do not need additional facilities or do not wish to travel the distance involved to reach other recreation units. This access should be maintained; it will help to reduce pressure on the other areas. Additional recreation facilities are available in Sibley Village.

WILDLIFE MANAGEMENT AREAS

1. General

OBJECTIVE: Continue to improve habitat available in each of the wildlife management units through habitat manipulation and management of land use.

A variety of wildlife management goals were established for the Baldhill Dam/Lake Ashtabula project. These goals include:

- Restore habitat quality and animal populations to historic levels.
- Provide for the maintenance of self-sustaining populations in both game and non-game species for the recreational needs of present and future project visitors.
- Support and implement the goals and objectives of the North American Waterfowl Management Plan.
- Other goals for public use include: providing high quality hunting and non-consumptive recreation; providing safe and adequate access for passive recreation activities; providing education and research opportunities; improving aesthetics; preventing land-damaging activities; and maintaining high quality sport fishing opportunities.

RATIONALE: About 2,560 acres of fee-owned land is allocated for fish and wildlife management. These lands should be managed to increase the overall recreation potential of the project by providing, or enhancing, opportunities for wildlife related recreation such as fishing, hunting, birding, and photography.

2. Katie Olson

OBJECTIVE: Rehabilitate existing woodland and maintain existing diverse rangeland acreage; implement erosion control measures; continue wildlife feeding program; continue efforts to erradicate leafy spurge.

RATIONALE: The plantings, earthwork, and control of leafy spurge will secure habitat for wildlife, ensure compliance with nuisance plant regulations and ensure adequate resources for public use. Agricultural development and limited forested and open

areas around Lake Ashtabula warrant supplemental feeding of deer and other wildlife in the winter.

3. Baldhill Creek

OBJECTIVE: Maintain native rangeland; improve shoreline vegetation; rehabilitate existing woodland; implement erosion control measures; continue wildlife feeding program; implement waterfowl nesting habitat enhancement program; continue efforts to erradicate leafy spurge.

RATIONALE: The proposed earthwork, plantings, and control of leafy spurge will secure habitat for wildlife, ensure compliance with nuisance plant regulations, and ensure adequate resources for public use. Agricultural development and limited forested and open areas around Lake Ashtabula warrant supplemental feeding of deer and other wildlife in the winter.

4. Old Highway 26

OBJECTIVE: Maintain existing native rangeland; increase acreage of woodland; continue efforts to erradicate leafy spurge; implement program to reclaim wetland via fencing/exclusion of cattle. This site was enlarged in 1996 through the abandonment and removal of all remaining campsites.

RATIONALE: Exclusion of cattle will reduce erosion and allow the resurgence of native wetland vegetation at this site. The proposed plantings and control of leafy spurge will secure habitat for wildlife, ensure compliance with nuisance plant regulations, and ensure adequate resources for public use.

5. Sibley

OBJECTIVE: Rehabilitate existing woodland; reduce predator access on nesting island; continue efforts to erradicate leafy spurge.

RATIONALE: The plantings, and the control of leafy spurge will secure habitat for wildlife, ensure compliance with nuisance plant regulations and ensure adequate resources for public use. Predator control is a site-specific need and will improve the success of breeding migratory waterfowl.

6. Luverne North

OBJECTIVE: Improve native rangeland; rehabilitate existing woodland; improve shoreline vegetation and habitat; create habitat for early season migratory waterfowl broods via construction of a sub-impoundment; improve pedestrian access;continue efforts to erradicate leafy spurge.

RATIONALE: The plantings and control of leafy spurge will secure habitat for wildlife, ensure compliance with nuisance plant regulations, and ensure adequate resources for public use. The construction of a sub-impoundment would increase the diversity of wetlands in the area. Improved pedestrian access would allow additional recreation use of the site.

7. Sheyenne East

OBJECTIVE: Maintain native rangeland via restrictive haying leases; prevent introduction of leafy spurge via inspection.

RATIONALE: Maintenance of existing native rangeland by the use of haying leases, as opposed to burning, for rangeland maintenance will provide food for wildlife in winter. Inspection will suffice for the present to control the spread of leafy spurge to this wildlife management area.

8. Hannaford

OBJECTIVE: Enhance wood duck nesting potential; re-establish area of riparian woodland habitat; maintain native rangeland via restrictive leases; continue efforts to erradicate leafy spurge.

RATIONALE: The placement of wood duck boxes will increase the amount of nesting habitat available for that species. Re-establishment of riparian woodland will help ensure that habitat for future use by wildlife and visitors. Maintenance of native rangeland via restrictive leases will also provide some control of leafy spurge. This will ensure compliance with nuisance plant regulations.

9. Karnak

OBJECTIVE: Maintain existing rangeland; prevent introduction of leafy spurge via inspection.

RATIONALE: Maintenance of existing native rangeland will provide more diverse habitat for wildlife and ensure adequate resources for public use. Inspection will suffice for the present to control the spread of leafy spurge to this wildlife management area.

10. Luverne South

OBJECTIVE: Establish riparian woodland habitat; re-establish areas of habitat via fencing and cattle exclusion; continue efforts to erradicate leafy spurge.

RATIONALE: Establishment of riparian woodland will help increase species diversity and ensure that habitat is available for future use by wildlife and visitors. Exclusion of cattle will reduce erosion and allow the resurgence of native vegetation at this site. The proposed plantings, resurgence of native vegetation, and control of leafy spurge will secure habitat for wildlife, ensure compliance with nuisance plant regulations, and ensure adequate resources for public use.

11. Martin

OBJECTIVE: Continue efforts to erradicate leafy spurge using herbicides and biological control (flea beetles); increase fingerling/fry habitat.

RATIONALE: Control of leafy spurge will secure habitat for wildlife. The use of biological control will help reduce the herbicide load on project lands while ensuring compliance with nuisance plant regulations. Placement of a Christmas tree reef will provide additional habitat for the fishery of the lake, ensuring adequate resources for public use.

12. Sheyenne West

OBJECTIVE: Prevent cattle encroachment and leafy spurge infestation via inspection.

RATIONALE: These areas are relatively inaccessible and inspection will suffice to prevent encroachment and leafy spurge infestation.

13. Creek View

OBJECTIVE: Reclaim areas of native habitat via fencing and cattle exclusion; continue efforts to erradicate leafy spurge.

RATIONALE: Exclusion of cattle will reduce erosion and allow the resurgence of native vegetation at this site. It will also prevent erosion of the site due to trampling or overgrazing. Control of leafy spurge will

increase species diversity, ensure compliance with nuisance plant regulations, and ensure adequate resources for public use.

14. Wieland

OBJECTIVE: Maintain area of native rangeland; introduce property signage in this area to prevent encroachment.

RATIONALE: Maintenance of existing native rangeland will provide more diverse habitat for wildlife and ensure adequate resources for public use. Placement of boundary signs will encourage adjacent landowners to ensure that encroachment by grazing cattle does not occur, with overgrazing and subsequent erosion.

15. Johnsons

OBJECTIVE: Maintain and improve a diverse native rangeland and woodland habitat, establish various tree plantings on the shoreline and upland areas, and prevent the spread of noxious weeds.

RATIONALE: A major portion of the WMA lies entirely in the Sheyenne River bottom. This 300 acre area has considerable variety, with meandering river channel, oxbow ponds, marsh, wet meadows, bottomland forest, upland forest, hay fields, and upland meadows. The area is similar to habitat that existed prior to impoundment of the reservoir. Maintenance and protection of this WMA will provide more diverse habitat for wildlife and ensure adequate resources for public use.

CHAPTER 5

RESOURCE PLAN

GENERAL

This chapter introduces the recommended development for the Lake Ashtabula project. It presents conceptual plans of physical development through the modification or expansion of existing facilities. These concepts are referenced to a specific management unit, or units, in which the proposed development should occur. Illustrative conceptual plans for these units are provided in the Plates section of this document. Existing facilities and improvements at each recreational site and the operations area is illustrated on Plates 3 - 11; proposed development for these areas is shown on Plates 12 - 20. The plates are conceptual in nature, presenting ideas rather than construction specifics. These concepts are to be used only as a guide in implementing the specific Resource Objectives and management and development concepts presented in Chapter 4. Actual design and/or construction documentation is beyond the scope of this document. Management concepts for Wildlife Management Areas will also be discussed although plates are not provided.

DEVELOPMENT PHASES

To promote the orderly development of the project resources, these concepts are presented in two phases: Initial Development Phase and Ultimate Development Phase. The priorities for these development phases are based upon projected regional needs, expressed local desires, and on requirements for protecting project resources. Actual development schedules may vary depending on the capabilities and policies of the Corps of Engineers. Detailed cost estimates are beyond the scope of this master plan. All costs associated with specific developments and management actions will have to be fully evaluated and justified, in accordance with Corps policy, prior to initiation.

INITIAL: This development phase is projected to occur over the next five years, 2005 - 2010. Existing facilities at the project are expected to meet visitor demand for this period. The emphasis during this period will be to replace and/or upgrade the existing project facilities so that they will continue to provide quality

recreation experiences and an even distribution of use over all of the project's recreational facilities.

Special emphasis will be placed on implementing the concept of universal accessibility—promoting a diversity of recreational experiences that are completely accessible to all persons. Each site will have an accessibility inventory completed before any changes are implemented. All subsequent design and construction will prioritize universal accessibility.

ULTIMATE: The ultimate development phase will occur from about 2010 to 2020. Emphasis during this period will be on improving usability, sustainability, circulation, aesthetics, and safety. Long term development will focus on protection of the resource base, improving vehicular circulation within each site, and reducing pedestrian/vehicle conflicts.

UNIVERSAL ACCESSIBILITY

All development concepts discussed in this chapter are presented with due consideration to the Americans with Disabilities Act of 1990 (ADA). All design guidelines provided here are to conform to the Uniform Federal Accessibility Standards. New items and features that are recommended for development shall be universally (fully) accessible upon completion of construction; as such, full accessibility is the assumed minimum acceptable standard and will not be mentioned except in special circumstances and when discussing upgrades or modification of existing features.

PROPOSED DEVELOPMENT – RESOURCE SPECIFIC

GENERAL

1. Water Quality

INITIAL: Ensure that water quality, including that of reservoir releases, is suitable for applicable project purposes. Define a baseline for water quality conditions for the project; determine whether the water quality is in compliance with applicable state and Federal water quality standards. Continue the water quality monitoring program and work on development of a diagnostic model of Lake Ashtabula.

ULTIMATE: Continue to promote and encourage watershed planning that will reduce non-point source pollution of the lake by the run-off of excess nutrients and other pollutants from cropland, feedlots, pastures. Consideration should be given for participation in non-point source pollution abatement programs that are in place during the target years. At present such programs include the Clean Lakes Program and the Non-point Source Pollution Program, both administered by the North Dakota State Department of Health.

2. Environmental Interpretation

INITIAL: Continue the multiple focus interpretive program, including the project operation, natural and cultural resources, and safety. Displays, bulletin boards, tours, brochures, maps and special events are used to provide information to the public regarding the project and its environment. In addition the project staff can remain actively involved in off-site events, using them to share information about the project and its importance for the local community.

ULTIMATE: Continue to enhance public awareness of the role of the Army Corps of Engineers in the administration of water resource projects and wildlife management on Corps lands; to increase public awareness and understanding of the Baldhill Dam/Lake Ashtabula project in relation to its constructed, natural and cultural settings.

RECREATION

1. Accessibility

INITIAL: Complete accessibility surveys for all areas of the project – work toward the goal of universal accessibility.

ULTIMATE: Provide optimum recreational opportunities for all individuals through facilities and programs designed for universal access.

2. Low Density

INITIAL: Work toward improving access to the lake and its environs and continue to develop the North Country Trail.

ULTIMATE: Provide the users of the project with sustainable water based recreation opportunities.

3. Intensive and Day Use

INITIAL: Add, or upgrade, playgrounds on those sites with day use areas. Revise day use areas to optimize their potential and reduce upkeep and maintenance. Work toward redistributing recreation facilities across the project

ULTIMATE: Modern playgrounds available at all day use areas. Maximize use of the available project recreation resources.

4. Boating

INITIAL: Extend launch lane ramps into deeper water.

ULTIMATE: Maintain the current level of lake access.

5. Camping

INITIAL: Continue to offer a satisfactory camping experience to the public.

ULTIMATE: Offer the highest quality campgrounds possible to the optimum number of people.

FISHERIES

1. Game Fish

INITIAL: Continue to support both the North Dakota Game and Fish Department in management of the Lake Ashtabula Fishery, and U.S. Fish and Wildlife Service in its management of the hatchery located on project lands.

ULTIMATE: Develop methods to improve habitat for fishery resources such as water level manipulation objectives, i.e. holding the reservoir at elevation 1266.0 NGVD for a period of 60 days after the initiation of spring spawn, whenever possible. In addition to fish habitat improvement, the District will continue to support recreational fisheries resources, recognized in 1995 by Executive Order 12962 and implemented through existing operations as well as the Recreational Fisheries Resource Conservation Plan.

2. Non-game Fish

INITIAL: Continue to support both the North Dakota Game and Fish Department in management of the Lake Ashtabula Fishery through participation in creel surveys

ULTIMATE: Develop methods to improve habitat for fishery resources such as water level manipulation objectives, i.e. holding the reservoir at elevation 1266.0 NGVD for a period of 60 days after the initiation of spring spawn, whenever possible.

WILDLIFE

1. General

INITIAL: Implement projects that will correct deficiencies in habitat quality, erosion, encroachment and other immediate needs. Initiate planting plans to fulfill objectives of providing more diverse cover and food for wildlife.

ULTIMATE: Maintain diverse habitat types and manage land use to support a diverse mixture of game and non-game species.

2. Waterfowl

INITIAL: Support waterfowl at the project by implementing measures that will improve the acreage of appropriate cover and food, reduce predation, increase nesting areas or structures, and implement other, as yet undefined, projects. These undefined objectives shall be in accordance with the North American Waterfowl Management Plan (NAWMP).

ULTIMATE: Continue support of NAWMP, explore opportunities to support other waterfowl management programs that are developed prior to and during the target years.

3. Habitat

INITIAL: Continue maintenance and improvement of the variety of vegetation communities at the project site as well as structural improvements ranging from the construction of impoundments to control of water levels in wetlands adjacent to tributaries of the Sheyenne River, to the construction of wood duck houses and nesting islands.

ULTIMATE: Maintain vegetation communities diverse in species and in age, improving them when conditions warrant. Maintain habitat structures, repairing as needed and building additional structures when and where appropriate.

4. Threatened or Endangered Species or Habitats

INITIAL: Comply with the Endangered Species Act and continue working to restore native grasslands and eradicate noxious plants to help increase species diversity at the project area.

ULTIMATE: Continue to comply with the Endangered Species Act and explore opportunities to provide critical habitat on project lands.

VEGETATION

1. Woodland

INITIAL : In general, continue the planting programs now in place while working at increasing the rate of forestation throughout the project.

a. Floodplain Forest. This type of vegetation will be replanted in areas appropriate for this vegetation community.

b. Upland Forest. Trees of this vegetation community will be used where appropriate in the forestation efforts now underway in the recreation areas.

c. Shelterbelts. Plantings of this type will continue to be maintained where needed.

ULTIMATE:

a. Floodplain Forest. Permanent habitat contributing to sustainable project wide species diversity. Establishment of the riparian edge along most areas of the lakeshore.

b. Upland Forest. Areas of sun and shade appropriate to intensive recreation sites for this area and climate. Wooded areas that contribute to aesthetic enjoyment and are suitable for other recreation uses.

c. Shelterbelts. Sustainable windbreaks for recreation sites and areas where this type of planting would benefit the users or the environment.

2. Prairie

INITIAL: Continue the efforts to re-establish areas of native prairie plant communities using species adapted to the climate and soils of the site. This will require intensive work at the outset, but consideration should be given to using hay or grazing leases to assist in re-establishment of the native prairie. Consider incorporation of grazing rotations, allowing foraging on brome or bluegrass in spring, early summer and fall with grazing on native grasses limited to mid- to late-summer only.

ULTIMATE: Stands of mature prairie in selected areas. This will be aesthetically pleasing, provide wildlife habitat and should eventually require less maintenance.

3. Wetlands

INITIAL: Establish additional wetland acreage via impoundment of a tributary to the Sheyenne River at the upper end of Lake Ashtabula, focusing on restoration and enhancement of waterfowl nesting and brood-rearing habitat.

ULTIMATE: Maintain wetland habitat for waterfowl habitat and consider improving vegetation species diversity to provide habitat for non-game species as well.

4. Threatened or Endangered Plant Species

INITIAL: Comply with the Endangered Species Act and continue working to restore native grasslands and eradicate noxious plants to help increase species diversity at the project area.

ULTIMATE: Continue to comply with the Endangered Species Act and explore opportunities to provide critical habitat on project lands.

CULTURAL RESOURCES

INITIAL: Complete the evaluation of the 1979 inventory of prehistoric and historic sites to determine their eligibility on the National Register of Historic Places.

ULTIMATE: Continue to protect the sites that have been determined eligible for inclusion, or are awaiting determination of eligibility for inclusion, on the National Register of Historic Places. Develop or update interpretive information available to project visitors.

PROPOSED DEVELOPMENT – SITE SPECIFIC

WILDLIFE MANAGEMENT AREAS

1. General

The objectives of the wildlife management program at the Lake Ashtabula Project are to restore and maintain high quality habitat for

wildlife on project lands, working towards self-sustaining populations, as well as support and implement the North American Waterfowl Management Program.

Routine maintenance of access points, existing trails, existing boat ramps and other features will not be delineated in this document because the list of maintenance items require change annually. Specific routine maintenance to ensure safe use and stability of the site will be described in detail regularly in the Operational Management Plan.

Management Areas that are not discussed in the following paragraphs of this section are not targeted for specific management actions other than those discussed in paragraph General, above.

INITIAL: Continue programs to restore and improve habitat in the wildlife management areas without compromising other resource uses.

ULTIMATE: Attain a balance of habitats on project lands that will sustain a diverse population of wildlife without compromising other resource uses.

2. Habitat Objectives

A variety of different types of habitat are maintained at the Wildlife Management units. Objectives and methods used to manage for these types of habitat are described below.

INITIAL: Initiate new projects and continue existing ones to establish or maintain healthy and diverse habitats on project lands.

ULTIMATE: Maintain or increase the acreage of the diverse habitats. Maintain flexibility in reaching habitat objectives keeping in mind that methods for achieving habitat objectives will change as opportunities arise and as safer, better ideas and methods to maintain self-sustaining populations of native flora and fauna are established.

3. Baldhill Creek

INITIAL: Plantings to establish riparian edge and floodplain forest. Establish or maintain 200 acres of diverse or native rangeland. Establish or rehabilitate 20 acres of shelterbelts. Control erosion at existing dry wash sites. Provide habitat structures; supplement food for wildlife.

ULTIMATE: Sufficient shoreline plantings of water-tolerant tree species and inland areas of native grasslands that will improve the visual character of the reservoir and replace the historic habitat corridor along the Sheyenne River that was inundated by Lake Ashtabula. Forest plantings and shelterbelts sufficient to provide woody cover for the region's wildlife species and provide adjacent areas some protection from wind and blowing snow, in addition to providing wildlife habitat.

4. Old Highway 26

INITIAL: Establish or maintain 20 acres of diverse or native rangeland. Establish or rehabilitate 20 acres of shelterbelts. Exclude cattle from 7 acres of wetland by fencing

ULTIMATE: Inland areas of native grasslands sufficient to improve the visual character of the reservoir and replace the historic habitat corridor along the Sheyenne River that was inundated by Lake Ashtabula. Forest plantings and shelterbelts sufficient to provide woody cover for the region's wildlife species and provide adjacent areas some protection from wind and blowing snow in addition to providing wildlife habitat.

5. Sibley

INITIAL: Establish or rehabilitate 14 acres of shelterbelts. Reduce predator access to the nesting island within the WMA.

ULTIMATE: Forest plantings and shelterbelts sufficient to provide woody cover for the region's wildlife species and provide adjacent areas some protection from wind and blowing snow in addition to providing wildlife habitat.

6. Luverne North

INITIAL: Plantings to establish riparian edge and floodplain forest. Establish or maintain 70 acres of diverse or native rangeland. Establish or rehabilitate 14 acres of shelterbelts. Develop a wetland plant community in the area of the sub-impoundment.

ULTIMATE: Sufficient shoreline plantings of water-tolerant tree species and inland areas of native grasslands that will improve the visual character of the reservoir and replace the historic habitat corridor along the Sheyenne River that was inundated by Lake Ashtabula. Forest plantings and shelterbelts sufficient to provide woody cover for the region's wildlife species and provide adjacent areas some protection from wind and blowing snow in addition to providing wildlife habitat.

7. Sheyenne East

INITIAL: Establish or maintain (via restrictive leases) 10 acres of diverse or native rangeland. To control public access: construct entrance gates and establish a trail through the WMA.

ULTIMATE: Sheyenne East WMA has reached full potential—no further refinements or amenities are being planned at this time.

8. Hannaford

INITIAL: Plantings to establish riparian edge and floodplain forest. Establish or maintain (via restrictive leases) 65 acres of diverse or native rangeland. Build and install 10 wood-duck nesting boxes

ULTIMATE: Sufficient shoreline plantings of water-tolerant tree species and inland areas of native grasslands that will improve the visual character of the reservoir and replace the historic habitat corridor along the Sheyenne River that was inundated by Lake Ashtabula.

9. Karnak

INITIAL: Establish or maintain 20 acres of diverse or native rangeland.

ULTIMATE: Inland areas of native grasslands sufficient to improve the visual character of the reservoir and replace the historic habitat corridor along the Sheyenne River that was inundated by Lake Ashtabula

10. Luverne South

INITIAL: Plantings to establish riparian edge and floodplain forest.

ULTIMATE: Sufficient shoreline plantings of water-tolerant tree species to improve the visual character of the reservoir and replace the historic habitat corridor along the Sheyenne River that was inundated by Lake Ashtabula.

11. Martin

INITIAL: Build Christmas tree reefs in deep water.

ULTIMATE: Martin WMA has reached full potential—no further refinements or amenities are being planned at this time.

12. Wieland

INITIAL: Establish or maintain 30 acres of diverse or native rangeland.

ULTIMATE: Inland areas of native grasslands sufficient to improve the visual character of the reservoir and replace the historic habitat corridor along the Sheyenne River that was inundated by Lake Ashtabula.

13. Johnsons

INITIAL: Continue efforts to establish this new addition.

ULTIMATE: Maintain and improve a diverse native rangeland and woodland habitat, establish various tree plantings on the shoreline and upland areas, and prevent the spread of noxious weeds.

RECREATION AREAS

Information on site characteristics, amenities and existing facilities is available in Chapter 2, 1. Resource Analysis.

1. Baldhill Dam Operations Area (Plate 10)

INITIAL: A planting plan should be initiated to restore native prairie to some areas that are currently mowed, also plant vegetation to screen and shade the parking lots.

Over the long-term, prairie restoration will reduce maintenance and provide an opportunity to interpret the natural heritage of the area. This area is clearly visible from Mel Rieman Recreation Area on the opposite shore. If the prairie is planted with an abundance of native wildflowers, it can be a colorful visual attraction. Shrubs and/or trees planted on the island in front of the maintenance building will screen it from views both near and far. Plantings in front of the equipment lot will screen it from those using the access road; existing vegetation adequately screens this lot from Mel Rieman.

ULTIMATE: Pave the road and provide a small parking lot for the new office building.

2. Mel Rieman (Plate 11)

INITIAL: The swimming area here is the most popular lake-wide; however it is seriously impacted by Lake Ashtabula's water quality problems. A possible solution for this localized portion of the lake are biofilters that are low cost and easy to maintain. To maintain the current level of use, a beach area retaining wall will be added, the beach expanded, and a sprinkler system for beach area turf installed (using water from the lake); these actions are necessary to protect this resource. A picnic shelter adjacent to the beach area is also planned.

Sanitary facilities will be upgraded to accessible units. The privies at the South Ravine tent camping area will be removed.

Plate 13 shows the five northeast campsites relocated to Eggert's Landing. The remaining sites will be connected to the rural water system. A trail is shown which provides pedestrian connections between use areas. It will also provide a variety of experiences for hikers: wooded ravine, shoreline, and prairie. Environmental interpretation could be provided.

ULTIMATE: A dump station is proposed with a vegetative screen for visual separation from the trail. Trees will be added in the campground area for a shaded "woodsy" feel and to provide more privacy and separation from the access road. The Visitor Center will be winterized and connected to the rural water supply and generally refurbished. This will involve upgrading the capacity of the existing sewage disposal system and installation of a drainfield.

Prairie restoration is proposed in the open areas. This will restore some of the natural heritage to the area and add to the visual attraction of the site; the tall grasses move in the wind and turn color in the fall and the wildflowers of this plant community also add much color and beauty to the landscape.

3. Sundstrom's Landing (Plate 12)

INITIAL: The playground needs to be updated and made completely accessible. It is also proposed that the concrete pads from former buildings or shelters be removed and the ground be returned to its prior state. Prairie restoration with an abundance of wildflowers is proposed at the entrance of the site.

ULTIMATE: Paving the road and parking lots here is recommended only if the access road should ever be paved. The restroom will be relocated to a central, accessible location on the site.

Primitive walk-in camping is proposed as a possible use for the northeast area, along with management for wildlife habitat. These are compatible uses if no campsites are designated and no campfires or development of any kind allowed. This would allow those so inclined the opportunity for a "back country" camping experience. These campers would be expected to pack out everything they brought in. A permit system could help with enforcement.

4. Eggert's Landing (Plate 13)

INITIAL: Add a lane to the boat ramp and an overflow parking lot.

ULTIMATE: The many trees at Eggert's are one of the reasons why it is so popular for camping however, these trees are fast-growing, short-lived shelterbelt species – planted in straight rows with minimal spacing. As these trees were all planted at one time, it is likely that they will die within a short period of each other; in any event they will never reach optimum height or longevity. A planned reforestation program is recommended to maintain the forested character of this site. Randomly spaced plantings of appropriate native varieties would help establish a more natural looking area.

5. Katie Olson's Landing (Plate 14)

INITIAL: Recent land movement above the site has made the continuation of service at KO problematic. Further slippage could engender closure of this recreation area..
If the area remains operable: Lengthen the existing boat ramp, extending it into deeper water. Additional tree planting and prairie restoration are proposed for this site.

ULTIMATE: Like Sundstrom's, paving is not recommended unless the access road were to be paved sometime in the future. Without a substantial increase in the use of the site, ultimate development will be accomplished upon completion of the initial Resource Objectives.

6. East Ashtabula Crossing (Plate 15)

INITIAL: Vegetation is proposed between the boat ramp parking lot and County Road 21 to screen and shade the parking lot.

ULTIMATE: As at Mel Rieman, the swimming area is seriously affected by the water quality problems of the lake. Again, an inexpensive localized solution such as a string of biofilters around the swimming area may be one of the few viable options in the short term. Replace comfort station when age and condition warrants such.

7. West Ashtabula Crossing (Plate 16)

INITIAL: Add a playground to the day use area. A major tree planting program is proposed for this site both for riparian edge and for shade.

ULTIMATE: A fully developed campground and comfort staion. The area should be shaded and paved and sufficiently developed to complement, and (or) relieve use pressures from the East Crossing area.

8. Sibley Crossing (Plate 17)

INITIAL: Lengthen the existing boat ramp, extending it into deeper water. Some plantings are proposed to screen the parking lot from the highway.

ULTIMATE: The Corps managed portion of this area with its paved parking lot, boat launch, restrooms and fish cleaning station has reached its optimum level of development. These existing facilities will only need to be evaluated for accessibility and updated as necessary to serve the public well. The area north of Highway 26 (Sibley Village) is privately managed. The managers have installed a swimming beach and boat docks. This type of development is encouraged as recreation facilities at this end of Lake Ashtabula are lacking.

RECREATION DEVELOPMENT PLANNING AND MANAGEMENT PROBLEMS

a. The poor water quality of the lake, remarked on throughout this document, is stifling recreation development of a tremendous natural resource for this region.

b. Management of Lake Ashtabula is difficult. In addition to the length of the lake, the lack of convenient access to the various recreation areas complicates routine patrolling, upkeep, and maintenance; also, remote sites tend to have higher incidences of vandalism. A single patrol through all eight recreation areas can take most of one day.

EVALUATION

Because of the negative influence poor water quality has on the recreation potential of the project, current planning efforts are focused on best use practices of the existing recreation resource base; further development or expansion is not considered. Without a comprehensive water quality program applied to the Upper Sheyenne River basin, planning beyond the present level of development is not recommended.

RECOMMENDATIONS

1. Operations:

Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose, the Federally administered land and water areas of the lake are also being managed to help fill other regional needs. An examination of Corps administration policies at the Lake Ashtabula Project indicates that the current classification of project lands and allocation of project resources is providing protection of the resource and accommodating the recreational needs of the public. These management policies should continue.

2. Natural Resources:

The natural resource base of the project is managed primarily for waterfowl and fishery production. The North Dakota Game and Fish Department and the U.S. Fish and Wildlife Service collaborate on fishery production. In consideration of the resources available to the project (large open water area, long shoreline,

relatively small land area, etc.), Corps of Engineer management policies are concentrated primarily on waterfowl reproduction and habitat restoration—habitat for other wildlife is a secondary consideration. This is considered the best fit of project resources to regional needs.

The current policies concerning management of the natural resources of the project benefit the region and the nation; these policies should continue.

3. Recreation:

The potential of the natural resources of the lake have yet to be realized; without positive changes in the management policies of the watershed, it is doubtful that they will ever be fully utilized. The types of recreation that the project will support are heavily dependent on the natural resources of the watershed and have been negatively affected by the poor water quality previously discussed. With the recreation potential of the lake thus constricted, or repressed, sponsors willing to invest money on expanding the recreation facilities are lacking. Without sponsors to share the costs of development, Federal participation in further expansion of the recreation resource base is not possible.

With continued maintenance and some small alterations, the existing recreational development will support the current and projected use. The existing facilities should be modified to meet existing regulations for universal accessibility and to provide for increased visitor safety and facilitate ease of operation. The management of the Lake Ashtabula Project should continue to refine the distribution of the existing recreation resources of the project with the objective of fitting these resources to the patterns of use. This will maximize the potential of the resources and, with good design and planning, minimize (recreation) management and maintenance costs for the project. The present efforts to protect the recreational resources of the project should continue; current management policies should remain in place.

FUTURE RECREATION DEVELOPMENT

FUTURE RECREATION DEVELOPMENT ALTERNATIVES

Future recreation development at the Lake Ashtabula Project is most dependent on three considerations: water quality; the availability of qualified non-Federal sponsors; and Federal resources.

Lake Ashtabula is the primary attraction for the project. Even though large water features are rare in this landscape, the irritations and annoyances associated with the poor water quality nullify the advantages associated with this phenomenon – thus the state of near (visitation) equilibrium that currently exists. Although an analysis of the carrying capacity of the lake has not been done, observation of the recreation activity on the lake reveals that most of the resources of the lake are under-used and there is tremendous potential for expansion. If water quality were improved it could be assumed that visitation would also improve. If visitation were sufficient to positively affect the area economy and support private recreation ventures, sponsors for additional Federal recreation facilities could be found. If an increase in Federal funding could be justified by the preceding assumptions, Federal resources might be increased.

Two unknowns that would affect these assumptions are, how much would visitation

increase as a result of improved water quality, and what is the outlook concerning Federal recreation funding?

Information on the first could be achieved by studies to determine how water quality affects the recreation potential of the reservoir and to establish the carrying capacity of the lake and the possible impacts maximum capacity might have on the surrounding economy and infrastructure. From the results of these studies, a range of increase and an estimate of dollar values could be established.

The second unknown, Federal cost sharing, is more ambiguous but it is assumed that Federal expenditures for recreation are going to continue to decline and that funding is going to continue to be hard to come by; however, if prognostications from the previously mentioned studies were favorable enough, it is possible that private capital could be invested into recreation ventures on the lake.

Because of the size and complexity of the problem, the subject of water quality improvement has not been addressed in this master plan. Although the Corps of Engineers has taken steps to reduce erosion on Federal lands, and the resulting sedimentation in the lake, the majority of the sources of the pollutants affecting Lake Ashtabula water are non-point, located throughout the watershed of the Upper Sheyenne River.

CONCLUSIONS AND RECOMMENDATIONS

Within the constraints of operating the Lake Ashtabula Project for its primary authorized project purpose of water supply, the Federally administered land and water areas of the lake can also be managed to help fill other regional resource needs. These needs have been identified as including recreation, wildlife management, habitat restoration and enhancement, fisheries augmentation, cultural resource preservation, and reinforcement of aesthetic qualities.

This Master Plan contains design and management concepts to help Lake Ashtabula meet these needs. It is recommended that it be adopted and that it serve as the guiding document for future Operational Management Plans as well as any future development.

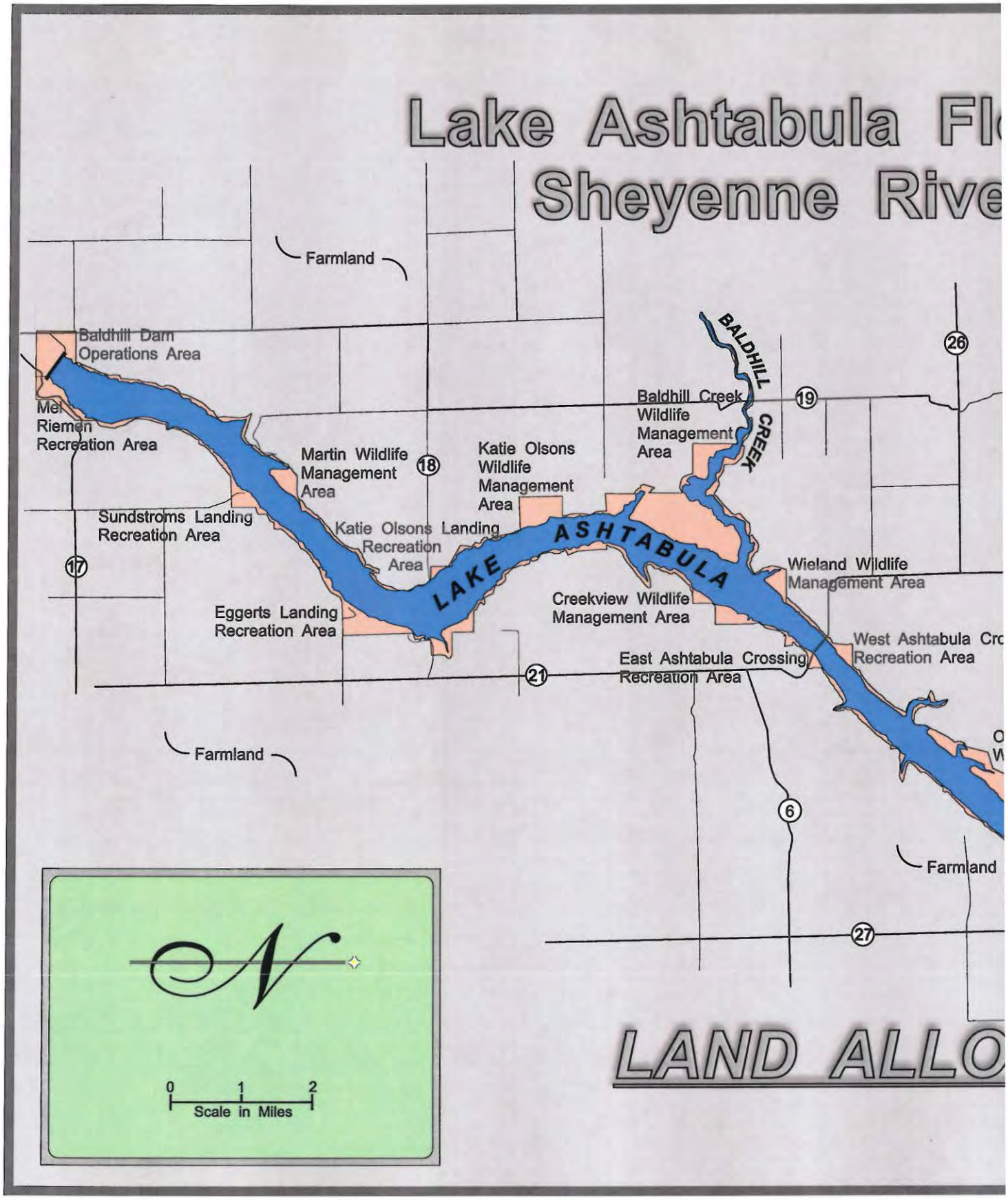
Lake Ashtabula
Baldhill Dam

Upper Sheyenne River–Hannaford Wildlife Management Area

Western St. Paul District Flood Control Project Master Plan

Technical Appendices

February 2006


Lake Ashtabula Fl
Sheyenne Rive
Farmland
Baldhill Dam
Operations Area
Mel
Riemen
Recreation Area
Martin Wildlife
Management
Area
18
Katie Olsons
Wildlife
Management
Area
Baldhill Creek
Wildlife
Management
Area
BALDHILL
CREEK
19
26
Sundstroms Landing
Recreation Area
Katie Olsons Landing
Recreation
Area
LAKE ASHTABULA
17
Wieland Wildlife
Management Area
Creekview Wildlife
Management Area
Eggerts Landing
Recreation Area
West Ashtabula Cro
Recreation Area
East Ashtabula Crossing
Recreation Area
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Farmland
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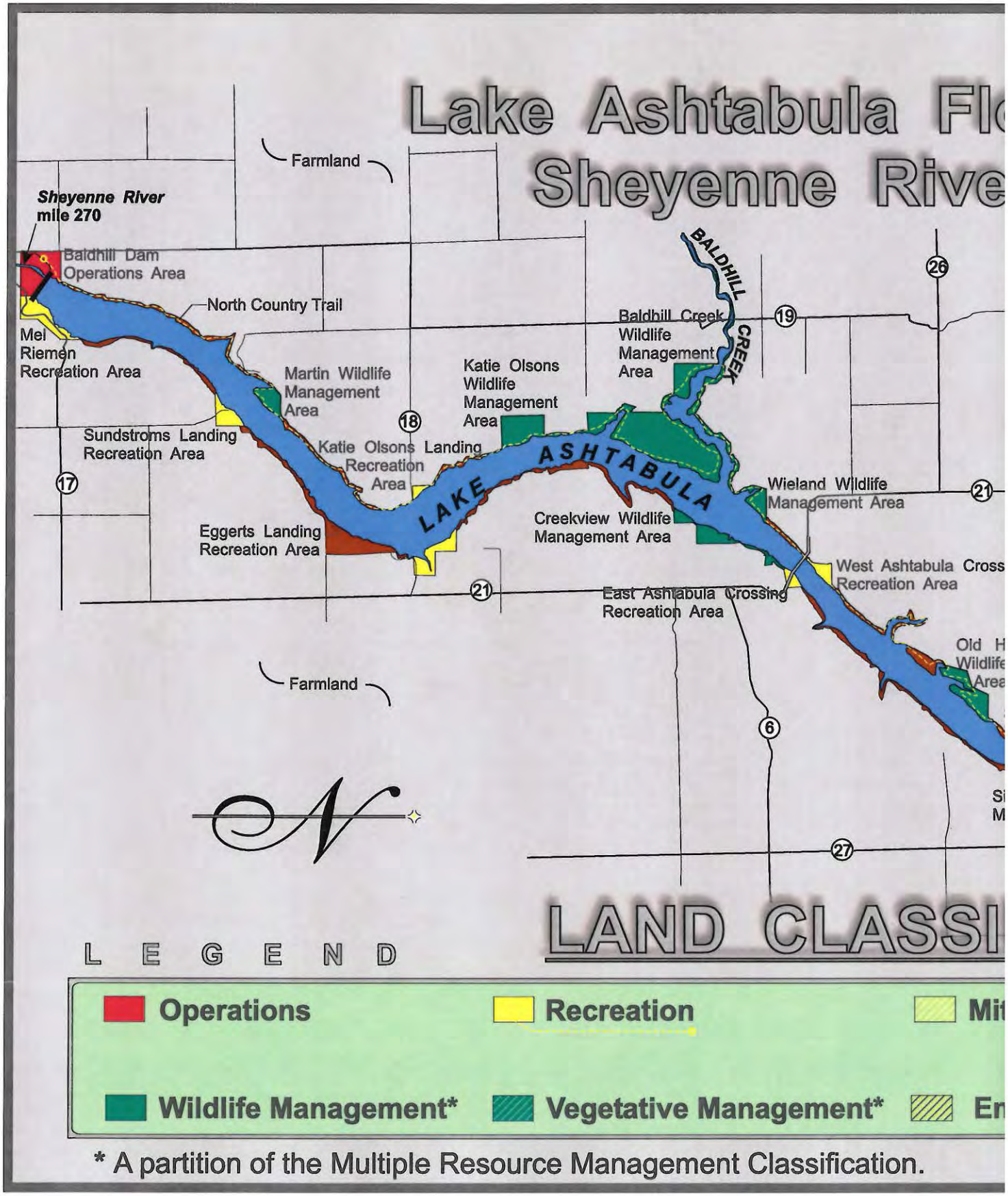
LAND ALLO



* A partition of the Multiple Resource Management Classification.

APPENDIX B

RECREATION PROGRAM STATISTICS

PROJECT VISITATION

Table B 1 – Yearly Visitation to Lake Ashtabula

Year	Visitor Hours	Year	Visitor Hours
1983:	1,109,000	1994:	1,479,900
1984:	1,128,800	1995:	1,699,100
1985:	991,008	1996:	1,410,300
1986:	1,066,907	1997:	1,866,500
1987:	1,120,400	1998:	2,532,800
1988:	1,451,200	1999:	2,408,400
1989:	2,431,500	2000	1,070,282
1990:	2,020,400	2001	1,493,332
1991:	1,513,000	2002	1,595,115
1992:	1,401,900	2003	2,227,330
1993:	1,330,200		

Table B 2 – Annual Visitation Hours – By Site

Year of Survey	Mel Rieman	Sundstroms Landing	Eggerts Landing	K. Olsons Landing	Ashtabula Crossings	Sibley Crossing	Old Hwy. 26
1988:	143,900	19,200	125,100	56,200	341,800	47,200	22,900
1989:	579,900	236,600	674,100	127,900	691,400	34,300	150,400
1990:	324,700	104,000	394,000	94,500	504,600	37,200	133,400
1991:	229,100	21,600	391,300	123,100	517,000	36,200	146,100
1992:	223,700	19,000	332,000	88,600	558,600	36,600	117,200
1993:	184,700	26,200	373,000	29,500	530,100	35,400	8,500

Table B 2 Continued – Annual Visitation Hours – By Site

Year of Survey	Mel Rieman	Sundstroms Landing	Eggerts Landing	K. Olsons Landing	Ashtabula Crossings	Sibley Crossing	Old Hwy. 26
1994:	176,300	34,000	503,500	26,000	642,600	40,500	12,300
1995:	159,300	44,300	557,600	22,800	774,200	30,100	10,400
1996	126,200	43,200	290,000	26,600	812,300	9,300	9,300
1997	129,800	52,000	438,100	30,300	1,153,400	38,900	4,800
1998	185,354	59,919	725,680	29,739	1,445,562	70,423	2,894
1999	43,400	25,800	663,800	30,200	1,576,300	68,900	**CLOSED**
2000	96,398	21,678	312,014	12,910	497,676	124,283	—
2001	110,319	23,939	547,560	12,933	602,779	43,481	—
2002	113,285	21,690	737,012	19,645	521,950	32,266	—
2003	144,454	43,597	930,982	32,812	858,903	54,365	—

POPULATION TRENDS

Table B 3 – State and County Population Trends

Year	Barnes	Cass	Griggs	Steele	North Dakota
1930:	18,804	48,735	6,889	6,947	680,845
1940:	17,814	52,849	5,818	6,193	641,935
1950:	16,884	58,877	5,460	5,145	619,636
1960:	16,719	66,947	5,023	4,719	632,446
1970:	14,669	73,653	4,184	3,749	617,761
1980:	13,960	88,247	3,714	3,106	652,717
1990:	12,545	102,874	3,303	2,420	638,800
2000:	11,775	123,138	2,754	2,258	642,200

Source: U.S Census

APPENDIX C

PUBLIC LAWS, EXECUTIVE ORDERS, AND REGULATIONS PERTAINING TO RESOURCE MANAGEMENT

APPLICATION

The following paragraphs are a partial listing of the applicable Public Laws (PL), Executive Orders (EO), Corps of Engineers' Engineer Manuals (EM), Engineer Pamphlets (EP), and Engineer Regulations (ER) for planning, development, and management of natural and cultural resources at Corps of Engineers Civil Works Projects. Part 2 provides a more detailed annotation of these PL's, EO', EM's, EP's, and ER's; FR denotes an entry to the Federal Register.

SPECIFIC PROJECT AUTHORITY

PL 78-534	Flood Control Act of 1944 – enacted 22 December 1944

PLANNING

PL 79-14	River and Harbor Act of 1945.
PL 79-526	The Flood Control Act of 1946.
PL 89-80	Water Resources Planning Act of 1965, 22 July 1965.
PL 91-190	National Environmental Policy Act of 1969, 1 January 1970.
EO 11514	Protection and Enhancement of Environmental Quality, 5 March 1970 (Amended by EO 11991).
EO 11990	Protection of Wetlands, 24 May 1977.
EO 11991	Relating to Protection and Enhancement of Environmental Quality, 24 May 1977 (Amended EO 11514).

EP 1105-2-35	Public Involvement and Coordination, 5 February 1982 (Change 1).
EP 1165-2-1	Digest of Water Resource Policies and Authorities.
EP 1165-2-501	Environmental Policies, Objectives, and Guidelines for the Civil Works Program of the Corps of Engineers, 18 December 1988.
ER 202-2-2	Policy and Procedures for Implementing NEPA, 1 November 1971 (Change 3).
ER 1105-2-20	Project Purposes Planning Guidance, 29 January 1982 (Change 3).
ER 1130-2-435	Project Operation Preparation of Master Plans, 30 December 1987.
ER 1130-2-550	Recreations, Operations, and Maintainance Policies, 15 November 1196
ER 1165-2-400	Water Resource Policies and Authorities: Recreation Planning, Development, and Management Policies, 9 August 1985.

RESOURCE MANAGEMENT, GENERAL

PL 86-717	Forestry Management Practices at Corps Reservoirs.
PL 96-366	Fish and Wildlife Conservation Act of 1980, 29 September 1980.
ER 190-1-50	Law Enforcement Policy, U.S. Army Corps of Engineers.
ER 1130-2-401	Visitor Center Program.
ER 1130-2-404	Recreation Use Fees, 2 July 1985.
ER 1130-2-405	Use of Off Road Vehicles on Civil Works Projects.
ER 1130-2-406	Lakeshore Management of Civil Works Projects.
ER 1130-2-407	Operating and Testing Potable Water Systems.
ER 1130-2-411	Regulation of Seaplane Operations.
ER 1130-2-412	Aquatic Plant Control Program.
ER 1130-2-413	Pest Control Program for Civil Works Projects.

ER 1130-2-414	Recreation-Resource Management System (RRMS).
ER 1130-2-418	Law Enforcement Service Contracts.
ER 1130-2-420	Visitor Assistance Program.
ER 1130-2-428	Interpretive Services.
ER 1130-2-432	Corps of Engineers Resources Volunteer Program (CERV).

AESTHETIC RESOURCES

PL 91-190	National Environmental Policy Act of 1969, 1 January 1970.
ER 1105-2-50	Environmental Resources: Aesthetic Resource Considerations, Chapter 5 (Draft 1984).
EP 1165-2-501	Environmental Policies, Objectives, and Guidelines for the Civil Works Program of the Corps of Engineers, 18 December 1988.

CULTURAL AND HISTORICAL RESOURCES

PL 59-209	Antiquities Act of 1906, 8 June 1906.
PL 74-292	Historic Sites, Buildings and Antiquities Act of 1935, 21 August 1935.
PL 86-523	Reservoir Salvage Act of 1960, 27 June 1960.
PL 89-665	National Historic Preservation Act of 1966, 15 October 1966.
PL 91-190	National Environmental Policy Act of 1969, 1 January 1970.
PL 93-291	Archeological and Historic Preservation Act of 1974, 24 May 1974.
PL 95-341	American Indian Religious Freedom Act of 1978.
PL 96-95	Archaeological Resources Protection Act of 1979, 31 October 1979.
PL 96-515	National Historic Preservation Act, Amendments of 1980, 12 December 1980.
PL 99-662	Water Resources Development Act of 1986

PL 100-555	Archeological Resources Protection Act, Amendment of 1988, 28 October 1988
PL 101-601	Native American Graves Protection and Repatriation Act, 16 November 1990
PL 102-575	National Historic Preservation Act, Amendments of 1992
EO 11593	Protection and Enhancement of Cultural Resources, 13 May 1971.
ER 1105-2-50	Environmental Resources, 29 January 1982 (Change 2).
ER 1105-2-100	Planning Guidance – Historic Preservation, 28 December 1990
ER 1130-2-438	Project Construction and Operation – Historic Preservation Program, 25 October 1987.
ER 1130-2-433	Collections Management and Curation of Archeological and Historic Data.
53 FR 4727-46	Guidelines for Federal Agency Responsibilities Under Section 110 of the National Historic Preservation Act
32 CFR Part 229	Uniform Regulations for ARPA
36 CFR Part 60	National Register of Historic Places.
36 CFR Part 78	Waiver of Federal Agency Responsibilities Under Section 110 of the National Historic Preservation Act
36 CFR Part 800	Advisory Council on Historic Preservation's Regulations for the Protection of Historic Properties

ENDANGERED SPECIES

PL 93-205	Conservation, Protection, and Propagation of Endangered Species, 28 December 1973.
PL 95-632	Endangered Species Act Amendments of 1978, 10 November 1978.
PL 96-159	Endangered Species Act of 1973, 28 December 1979.

FISH AND WILDLIFE

PL 78-534	Flood Control Act of 1944.

PL 85-624	Fish and Wildlife Coordination Act of 1958, 12 August 1958.
PL 89-72	Federal Water Project Recreation Act (also see public laws under Endangered Species).
PL 96-366	Fish and Wildlife Conservation Act of 1980, 29 September 1980.
EL 86-25	Technical Report: U.S. Army Corps of Engineers Wildlife Resources Management Manual.
EO 11990	Protection of Wetlands, 24 May 1977.
ER 1105-2-50	Environmental Resources, 29 January 1982 (Changes 1-2).
ER 1130-2-400	Management of Natural Resources and Outdoor Recreation at Civil Works Water Resource Projects, 1 June 1986.

PEST CONTROL

PL 92-516	Federal Insecticide, Fungicide, and Rodenticide Act.
ER 1130-2-413	Pest Control Program for Civil Works Projects, 1 February 1982.

RECREATION (ALSO SEE RESOURCE MANAGEMENT, GENERAL)

PL 78-534	Flood Control Act of 1944, 22 December 1944.
PL 79-526	Flood Control Act of 1946, 24 July 1946.
PL 88-578	Land and Water Conservation Fund Act of 1965, 9 July 1965.
PL 89-72	Federal Water Project Recreation Act of 1965, 9 July 1965.
EO 11644	Use of Off-Road Vehicles on Public Lands, 8 February 1972 (Amended by EO 11989).
EO 11989	Off-Road Vehicles in Public Lands, 24 May 1977 (Amends EO 11644).
EM 1110-1-103	Design for the Physically Handicapped, 15 October 1976.
EM 1110-2-400	Design of Recreation Sites, Areas, and Management Policies, 31 May 1988.
EM 1110-2-410	Design of Recreation Areas and Facilities – Access and Circulation,

	31 December 1982.
EP 310-1-6	Graphic Standards Manual, December 1980, (Change 1).
ER 70-2-7	Recreation Research and Demonstration System.
ER 1105-2-20	Project Purposes Planning Guidance, 29 January 1982 (Change 3).
ER 11101-102	Design for the Physically Handicapped, 15 October 1976.
ER 1120-2-400	Recreation Resources Planning, 1 November 1971 (Change 3).
ER 1130-2-400	Management of Natural Resources and Outdoor Recreation at Civil Works Water Resource Projects, 1 June 1986.
ER 1130-2-405	Use of Off-Road Vehicles on Civil Works Projects, 17 January 1974.
ER 1130-2-411	Regulation of Seaplane Operations at Civil Works Water Resource Development Projects, 15 November 1977.
ER 1130-2-413	Pest Control Program on Civil Works Projects.
ER 1165-2-400	Recreation Planning, Development, and Management Policies, 9 August 1985.
EO 12962	National Recreational Fisheries Conservation Plan, 1995.

WATER SUPPLY AND QUALITY

PL 87-88	Federal Water Pollution Control Act Amendments of 1961, 20 July 1961.
PL 95-217	Clean Water Act of 1977, 15 December 1977.
EO 11990	Protection of Wetlands, 24 May 1977.

REAL ESTATE

EO 12512	Federal Real Property Management.
ER 405-1-12	Real Estate Handbook, 20 November 1985 (Change 23).

ANNOTATION

The following paragraphs present a brief description of many of the key Public Laws, Executive Orders, Engineers Manuals, Engineer Regulations, and Engineer Pamphlets that provide guidance for resource use, development, and management of Corps of Engineers Civil Works Project. The annotated descriptions are not inclusive of all of the items listed in Part 1.

PUBLIC LAWS

PL 59-209, Antiquities Act of 1906 (8 June 1906): This Congressional Act placed primary responsibility for archaeological investigation on professionals while cooperating with the Smithsonian Institution and the National Park Service. It applies specifically to the appropriation or destruction of antiquities on Federally owned or controlled lands and has served as precedent for subsequent legislation (34 Stat. 225).

PL 74-292, Historic Sites Act of 1935 (21 August 1935): This act placed the responsibility for the administration and operation of historic and prehistoric preservation activities under the Secretary of the Interior and the National Park Service (49 Stat. 666, 16 U.S. C. 461-467).

- PL 78-534, Flood Control Act of 1944 (22 December 1944):
  Recreation. Section 4 authorized providing facilities in reservoir areas for public use, including recreation and conservation of fish and wildlife (58 Stat. 889, 16 U.S. C. 460d).

- Water Supply. Section 6 authorized disposal by the Secretary of the Army, for domestic and industrial uses, of surplus water available at reservoirs (33 U.S.C. 708). PL 79-526, Flood Control Act of 1946 (24 July 1946):

- Leases. Section 4 Amended Public Law 534, 78th Congress, to include authority to grant leases to nonprofit organizations at recreation facilities in reservoir areas at reduced or nominal charges (60 Stat. 642, 16 U.S.C. 460d).

PL 85-624, Fish and Wildlife Coordination Act (12 August 1958) : Provided that fish and wildlife conservation receive equal consideration and coordination with other project purposes. Proposals for work affecting any body of water by coordinated with the Fish and Wildlife Service (FWS) and the State wildlife agency. The recommendations of the FWS and the State agency are to be given full consideration and that justifiable means and measures for wildlife purposes, including mitigation measures, be adopted. Adequate provisions are to be given to use of project lands for the conservation, maintenance, and management of wildlife resources, including their improvement and development. The use of project lands for wildlife management will be in accordance with general plans approved jointly by Army, Interior, and the State wildlife agency (72 Stat. 563.16 U.S.C. 661).

PL 86-523, Reservoir Salvage Act of 1960 (27 June 1960): Provides for the preservation of historical and archaeological data, by the Secretary of the Interior, which might otherwise be lost as the result of the construction of a dam and attendant facilities and activities (74 Stat. 220). Act further amended by PL 93-291.

PL 87-88, Federal Water Pollution Control Act Amendments of 1961 (20 July 1961) : Amended the Federal Water Control Act (70 Stat. 498) to provide for a more effective program of water pollution control, and for other purposes (75 Stat. 204, 33 U.S.C. 1151).

PL 88-578, Land and Water Conservation Fund Act of 1965 (3 September 1964) : Established a fund from which Congress can make appropriations for outdoor recreation. The fund derives revenue from entrance and user fees, sale of surplus Federal property, and the Federal motorboat fuel tax. Entrance and user fees at reservoirs were made possible by Section 2(a) which deleted the words "without charge" from Section 4 of the 1944 Flood Control Act as amended (78 Stat. 897, 16 U.S.C. 4601-4). Flood Control Act as amended (78 Stat. 897, 16 U.S.C. 4601-4). NOTE: Section amended and restated by Section 101(1), PL 94-422.

PL 89-72, Federal Water Project Recreation Act (9 July 1965): Requires that full consideration be given to opportunities for recreation and fish and wildlife enhancement. Recreation planning is to be based on coordination of use with existing and planned Federal, State and local recreation, and non-Federal administration of recreation and enhancement areas will be encouraged. The law requires that, without cost sharing by a local sponsoring entity, no facilities for recreation and fish and wildlife enhancement can be provided except those justified to serve other project purposes or needed for public health and safety. If, in the absence of a local sponsor, lands are acquired to preserve the recreation and fish and wildlife potential of the project, and if 10 years after the lands may be sold or used for other project purposes. The views of the Secretary of the Interior on the extent to which the proposed recreation and fish and wildlife development conforms to included in any project report.

PL 89-80, Water Resources Planning Act of 1965, (22 July 1965): Declares a policy of encouraging the conservation, development, and utilization of water and related land resources. The Act established the Water Resources Council and river Basins Commissions, and provides for financial assistance to States.

PL 89-665, National Historic Preservation Act of 1966 (15 October 1966) Amended PL 74-292: Declared a national policy of historic preservation, including the encouragement of preservation on the State and private levels; provided authority for the expansion of the National Register of Historic Places to include cultural resources of State and local as well as national significance; authorized matching Federal grants to the States and the National Trust for Historic Preservation for the established the Advisory Council on Historic Preservation (one of which is the Secretary of Defense); provided certain procedures to be followed by Federal agencies in the event of a proposal that might have an effect on National Register properties; and defined the term "historic preservation' as the protection, rehabilitation, restoration, and reconstruction of Districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, or culture.

PL 91-190, National Environmental Policy Act (1 January 1970): Section 101 established a broad Federal policy on environmental quality (83 Stat. 852, 42 U.S.C. 4331). The Federal Governmental quality (83 Stat. 852, 42 U.S.C. 4331). The Federal Government shall ". . . assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings . . . preserve important historic,

cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice." (83 Stat. 852, 42 U.S.C. 4331). Section 102 requires an Environmental Impact Statement (EIS) on proposed Federal actions. "All agencies of the Federal Government shall . . . identify and develop methods and procedures . . . which will insure that presently unquantified environment consideration in decision making along with economic and technical considerations . . . ." (83 Stat. 853, 42 U.S.C. 4332).

PL 91-243, (9 May 1970): This legislation amended the National Historic Preservation Act of 1966 by extending the funding for the program through 1973, increasing the membership of the Advisory Council on Historic Preservation, and authorizing the participation of the United States as a member in the International Centre for the Study of Preservation and Restoration of Cultural Property, and authorized funds for that purpose.

PL 93-205, Conservation, Protection, and Propagation of Endangered Species (28 December 1973): Repeals the Endangered Species Conservation Act of 1969. Directs all Federal departments/agencies to carry out programs to conserve endangered and threatened species, in consultation with the Secretary of the Interior (or commerce in appropriate situations), and to preserve the habitat of such species (87 Stat. 884). NOTE: Section 7 of the Endangered Species Act Amendments of 1978 (PL 95-632) authorizes procedures by which a Federal agency, State governor, or license applicant may apply for an exemption to the Act.

PL 93-291, The Archaeological and Historic Preservation Act of 1974 (24 May 1974): This Act amended the 1960 Salvage Act, provided for the preservation of significant scientific, prehistoric, historic, or archaeological data, including relics and specimens, that might be lost or destroyed as a result of the construction of dams, reservoirs, and attendant facilities and activities, or any alteration of the terrain caused as a result of any Federal construction project of Federally licensed project, activity, or program. It provided that the Secretary of the Interior be notified of impending loss of such resources, and that the agency or the Secretary may survey and recover the data and publish the results. It provided for agreement on time limits for initiation and completion of survey and recovery efforts. It requires the Secretary to coordinate, report on, consult with appropriate experts, and distribute funds appropriated for those survey and recovery efforts. It provides that up to 1 percent of the total amount authorized to be appropriated for the Federal activities may be transferred to the Secretary for implementation of the Act, and provides funds for certain other costs. Compliance with this Act presumes prior compliance with Section 106 of the National Historic Preservation Act of 1966 with regard to properties listed in or eligible for listing in the National Register of Historic Places (88 Stat. 174).

PL 94-422 (28 September 1976): Amended Section 106 of the National Historic Preservation Act to apply to properties eligible for inclusion in the National Register. Additional funding was appropriated to carry out the provisions of the Act, the organization of the Advisory Council was clarified, and the membership was expanded to 29 members. The Council was established as a fully independent agency within the Executive Branch and authorized to promulgate such rules and regulations it deemed necessary to implement Section 106 of the Act.

PL 95-341, American Indian Religious Freedom Act of 1978: This act insures the " . . . inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians including but not limited to access to sites, use, and possession of sacred objects and the freedom to worship through ceremonials and traditional rites." The Act requires consultation with Indian leaders (92 Stat. 469, 42 U.S.C. 1996).

PL 95-217, Clean Water Act of 1977 (15 December 1977): Amends Federal Water Pollution Control Act and extends the appropriations authorization.

- Section 51: Requires the Environmental Protection Agency to enter into written agreements with Secretaries of Agriculture, Army, and Interior to provide maximum utilization of the laws and programs to maintain water quality.

- Section 60: Provides for Federal compliance with all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions in the same manner and extent as other entities.

- Section 67: Provides for the processing of permits for dredged or fill material through the Secretary of the Army acting through the Chief of Engineers and defines requirements to meet in the construction of Federal projects (91 Stat. 1566).

PL 95-632, Endangered Species Act Amendment of 1978 (10 November 1978): Amends the 1973 Act (PL 93-205) to establish an Endangered Species Interagency Committee to review proposed actions to determine whether exemptions from certain requirements of the Act should be granted. Prescribes a consultation process between Federal agencies and the Secretary of the Interior, Secretary of Commerce, or Secretary of Agriculture, as appropriate, for carrying out programs for the conservation of endangered and threatened species. Directs agencies to conduct a biological assessment to identify endangered or threatened species which may be present (92 Stat. 3752).

PL 96-95, Archaeological Resources Protection Act of 1979 (31 October 1979): Protects archaeological resources and sites which are on public lands and Indian lands and fosters increased cooperation and exchange of information between Governmental authorities, the professional archaeological community, and private individuals; defined archaeological resources to be any material remains of past human life or activities which are of archaeological interest and are at least 100 years old; established permit requirements for the excavation or removal of archaeological resources from public or Indian lands, with special permit and disposition rules for the protection of archaeological resources on Indian lands in light of the American Indian Religious Freed Act; provided that information regarding the nature and location of archaeological resources may remain confidential; established civil and criminal penalties, including forfeiture of vehicles and equipment used, fines of up to $100,000 and imprisonment of up to 5 years for second violations for the unauthorized appropriation, alteration, exchange, or other handling of archaeological resources; and provided for

rewards for furnishing information about such unauthorized acts. Archaeological reso by the Antiquities Act of 1906 are now covered by this Act.

PL 96-159, Endangered Species Act of 1973 (28 December 1979): E to protect endangered plants; require the Secretary of Interior, when proposing land as to publish a summary of the proposal and a map in the local newspapers; and to requi cies to insure their projects "are not likely" to jeopardize an endangered species. It als those seeking exemptions from the Act to get permanent exemptions for a project unle study indicates the project would result in the extinction of a species (93 Stat. 1225).

PL 96-366, Fish and Wildlife Conservation Act of 1980 (29 Septembe Provides funds to States to conduct inventories and conservation plans for conservatio wildlife. Also encourages Federal departments and agencies to use their statutory and authority to conserve and promote conservation in accordance with this Act (94 Stat. 1

PL 96-515, National Historic Preservation Act Amendments of 1980 (12 December 1980): Amends the National Historic Preservation Act of 1966 and au Secretary of Interior to expand and maintain a national register of Historic Places. Wit the date of enactment, the Secretary shall establish, in consultation with the Secretary other agencies, standards for the preservation of historic properties in Federal ownersh (94 Stat. j2987).

EXECUTIVE ORDERS PERTINENT TO THE WATER RESOURCES

EO 11514, Protection and Enhancement of Environmental Quality (5 March 1970): Section 2 of the Order outlines the responsibilities of Federal ag sonance with Title I of the National Environmental Policy Act (NEPA) of 1969 (a EO 11991, 24 May, 1977).

EO 11593, Protection and Enhancement of Cultural Environment (1971): Section 2 of the Order outlines the responsibilities of Federal agencies in with the NEPA (1969), the National Historic Preservation Act of 1966, the Histor 1935, and the Antiquities Act of 1906. Instructed all Federal agencies to provide ership in historic preservation, to assure the preservation of cultural properties in ership, and to "institute procedures to assure that Federal plans and programs cont preservation and enhancement of non-Federally owned sites, structures, and objec cal, architectural, or archaeological significance." Directed all Federal agencies to inventory, and nominate to the Secretary of the Interior jurisdiction or control that qualify for listing in the National Register of Historic Places." The order further e procedures to be followed by all Federal agencies pending completion of the cultu inventories.

EO 11644, Use of Off-Road Vehicles on Public Lands (8 February 1972): This Order establishes a uniform Federal policy regarding the use of vehicles such as trail bikes, snowmobiles, dune buggies, and others on public lands. Section 3 provides guidance for establishing zones of use for such vehicles (amended by EO 11989, 24 May 1977).

EO 11989, Off-Road Vehicles on Public Lands (24 May 1977): Agency heads are authorized to close areas or trails, within their jurisdiction, to off-road vehicles which cause adverse effects to soil, vegetation, wildlife, wildlife habitat, and cultural or historical resources. Fire, military, emergency and law enforcement vehicles are excluded when used for emergency purposes. This Order amends EO 11644, 8 February 1972.

EO 11991, Relating to Protection and Enhancement of Environmental Quality (24 May 1977): Section 1 of this Order amends Section 3(h) of EO 11514 by directing the Council of Environmental Quality to issue guidelines to Federal agencies for implementing procedural provisions of NEPA (1969). These regulations will include procedures for early EIS preparation and require impact statements to be concise, clear, and supported by evidence that agencies have made the necessary analyses. The Council will resolve conflicts between agencies concerning the implementation of NEPA and Section 309 of the Clean Air Act, as amended.

EO 11990, Protection of Wetlands (24 May 1977): Restricts Federal agencies from taking action which would destroy or modify wetlands when there is a practical alternative.

EO 12512, Federal Real Property Management (29 April 1985): Requires all executive departments to set annual real property management goals and designated OMB as the agency to review progress toward those goals. Under the provision of this EO, project lands are surveyed to identify those areas of real property which are not being utilized, are underutilized, or are not being put to optimum use. Project real property identified as excess to project needs is reported to the General Services Administration for disposal. Revoked EO 12348 of 25 February 1982.

ENGINEER MANUALS

EM 1110-1-103, Design for the Physically Handicapped (15 October 1976): This manual sets forth criteria for the provision and design of features to make facilities designed by the Corps of Engineers accessible to, and usable by, physically handicapped persons.

EM 1110-2-400, Design of Recreation Site, Area and Facilities (7 July 1972) Change 1, 13 September 1974:

EM 1110-2-410, Design of Recreation Areas and Facilities – Access and

Circulation (31 December 1982): This manual presents data compiled from experience and research that should be useful in the design of access and circulation to recreation sites, areas, and facilities.

ENGINEER PAMPHLETS

EP 310-1-6, Graphic Standards Manual (December 1980), Change 1: This manual is a reference book for use by all Corps activities. It establishes a unified approach regarding the use of Corps logotype and preparation of visual communications. The manual covers use of the logo in business cards, signs, publications, forms, vehicles, and miscellaneous items. EP 1105-2-35, Public Involvement and Coordination (5 February 1982), Change 1: This regulation provides guidance for public involvement and coordination in the Corps planning process.

EP 1165-2-501, Environmental Policies, Objectives, and Guidelines for the Civil Works Program of the Corps of Engineers (18 December 1988): Provides a summary of the environmental policies, objectives, and guidelines for the Civil Works Program.

ENGINEER REGULATIONS:

ER 202-2-2, Policy and Procedures for Implementing NEPA (1 November 1971), Change 3: Provides policy and procedural guidance to supplement Council of Environmental Quality regulation and requirements and consideration related to NEPA.

ER 405-1-12, Real Estate Handbook (20 November 1985), Change 25: Provides guidance for real estate activity on Corps of Engineers projects.

ER 1105-2-20, Project Purposes Planning Guidance (29 January 1982), Change 3: Provides policy guidance to project purposes of navigation, flood damage reduction, shore protection, hydroelectric power, recreation, and water supply. The guidance covers the subject of Federal interest, types of projects and facilities provided, and Federal and non-Federal participation. Guidance for the project purposes of fish and wildlife enhancement and water quality is contained in ER 1105-2-50.

ER 1105-2-50, Environmental Resources (29 January 1982), Change 2: This regulation is consistent with national policies to both create and maintain conditions under which human and natural environments can exist in productive harmony and to preserve important aesthetic, historical, and archaeological resources. This regulation provides requirement for environmental resource planning. Chapter 2 provides guidance for consideration of fish and wildlife resources in Civil Works planning studies; Chapter 3 – Historic Preservation; Chapter 4 – Water Quality; and Chapter 5 – Aesthetic Resources (draft).

ER 1110-1-102, Design for the Physically Handicapped (15 October 1976): Stipulates procedures and responsibilities to assure compliance with criteria herein.

ER 1110-2-400, Design of Recreation Sites, Areas, and Facilities (31 May 1988), Change 1: Provides information and criteria related to planning and design of recreation facilities at water resource projects.

ER 1130-2-400, Management of Natural Resources and Outdoor Recreation at Civil Works Water Resource Projects (1 June 1986), Changes 1-2: This regulation provides policy and procedural guidance for the administration and management of Civil Works water resource projects. The objectives are to manage natural resources on Corps lands to insure their continued availability, to provide outdoor recreation opportunities, and to provide a safe and healthful environment for project visitors. This regulation also requires and gives guidance for operational management plans.

ER 1130-2-405, Use of Off-Road Vehicles on Civil Works Projects (17 January 1974): Provides uniform policies, procedures, and criteria for designations of project lands where use of off-road vehicles will and will not be permitted.

ER 1130-2-411, Regulation of Seaplane Operations at Civil Works Water Resource Development Projects (15 November 1977): This regulation is designed to provide uniform policies and criteria for designating Corps projects, or portions thereof, at which seaplane operations are prohibited, restricted, or allowed.

ER 1130-2-413, Pest Control Program for Civil Works Projects (1 February, 1982): This regulation is to assign responsibilities and prescribe procedures concerning the use of chemicals in the Corps pest control program at all civil works projects.

ER 1130-2-435, Project Operations Preparation of Master Plans (30 December 1987): Provides policy and procedure for the conduct of USACE Civil Works Master Planning Program and guidance for the preparation of master plans.

ER 1165-2-400, Recreation, Planning, Development, and Management Policies (9 August 1985): Defines the objectives and basic policies governing planning, development, and management of outdoor recreation resources and enhancement of fish and wildlife at Corps of Engineers water resource projects.

ER 1130-2-550, Recreation, Operations, and Maintainance Policies. Chapter 3, Project Master Plans and Operational Management Plans, 15 November, 1996. Provides policy and procedure update for the conduct of USACE Civil Works Master Planning Program and guidance for the preparation of master plans.

APPENDIX D

ENVIRONMENTAL RESOURCES

VEGETATION

Regional Wetland Plant Species

U.S. Army Corps of Engineers: Regulations (ER 33 CFR 328) define wetlands as: "... those areas inundated or saturated by surface or groundwater at a frequency or duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similiar areas."

The U.S. Fish and Wildlife Service: The definition used in classifying wetlands for the National Wetlands Inventory states: "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following attributes: (1) at least periodically, the land supports predominantly undrained hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year."

TABLE D 1 – Common Regional Wetland Plant Species:

COMMON NAME	*SCIENTIFIC NAME*
American waterplantain	*Alisma plantago-aquatica*
Beggartick	*Bidens cernua*
Water shield	*Brasenia schreberi*
Water arum	*Calla pulustris*
Water starwort	*Callitriche heterophylla*
Marsh marigold	*Caltha palustris*

Common Regional Wetland Plant Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
Tall bellflower	*Campanula americana*
Marsh bellflower	*Campanula aparinoides*
Sedge	*Carex alopecoidea*
Water sedge	*Carex aquatilis*
Slough sedge	*Carex atherodes*
Fescue sedge	*Carex brevior*
Sedge	*Carex conoidea*
Sedge	*Carex cristatella*
Sedge	*Carex granularis*
Sedge	*Carex gravida*
Sedge	*Carex pennsylvanica*
Bottlebrush sedge	*Carex hystericina*
Sedge	*Carex laeviconica*
Woolly sedge	*Carex pellita*
Mead sedge	*Carex meadii*
Sartwell sedge	*Carex sartwellii*
Fox sedge	*Carex vulpinoidea*
Coontail	*Ceratophyllum demersum*
Red-rooted flatsedge	*Cyperus erythrorhizos*
Flatsedge	*Cyperus ferruginescens*
Needle spikesedge	*Eleocharis acicularis*
Common spikesedge	*Eleocharis palustris*
Waterpod	*Ellisia nyctelea*
Field horsetail	*Equisetum arvense*
Swamp horsetail	*Equisetum fluviatile*
Scouring rush	*Equisetum hyemale*
Smooth horsetail	*Equisetum laevigatum*
Virginia waterleaf	*Hydrophylium virginianum*
Blue flag	*Iris virginica shrevei*
Baltic rush	*Juncus balticus*
Toad rush	*Juncus bufonius*
Dudley rush	*Juncus dudleyi*
Jointed rush	*Juncus nodosus*
Torrey rush	*Juncus torreyi*
Common duckweed	*Lemna minor*
Star duckweed	*Lemna trisulca*
Water milfoil	*Myriophyllum verticillatum*
Bushy pondweed	*Najas flexilis*
Yellow lotus	*Nelumbo lutea*
Yellow waterlily	*Nuphar variegatum*

Water smartweed	*Polygonum coccineum*
Water smartweed	*Polygonum amphibium*
Largeleaf pondweed	*Potamogeton amplifolius*
Curley-leaf Pondweed	*Potamogeton crispus*
Floating-leaf pondweed	*Potamogeton natans*
Sago pondweed	*Potamogeton pectinatus*
Snailseed pondweed	*Potamogeton spirillus*
Duckpotato arrowhead	*Sagittaria cuneata*
Arrowhead	*Sagittaria latifolia*
Stiff wapato	*Sagittaria rigida*
Hardstem bulrush	*Scirpus acutus*
Threesquare	*Scirpus pungens*
Green bulrush	*Scirpus atrovirens*
Wool grass	*Scirpus cyperinus*
River bulrush	*Scirpus fluviatilis*
Softstem bulrush	*Scirpus validus*
Giant burreed	*Sparganium eurycarpum*
Common ducksmeat	*Spirodela polyrhiza*
Narrowleaf cattail	*Typha angustifolia*
Common cattail	*Typha latifolia*
Common bladderwort	*Utricularia vulgaris*
Wild celery	*Vallisnaria americana*

Wildflowers of the Region

TABLE D 2 – Common Regional Forb Species

COMMON NAME	*SCIENTIFIC NAME*
Western yarrow	*Achillea millefolium*
Giant hyssop	*Agastache nepetoides*
Meadow garlic	*Allium canadense*
Prairie onion	*Allium stellaturi*
Textile onion	*Allium textile*
Creeping pigweed	*Amaranthus graecizans*
Red-rooted pigweed	*Amaranthus retroflexus*
Amaranth	*Amaranthus tamariscinus*
Common ragweed	*Ambrosia artemisiifolia*
Perennial ragweed	*Ambrosia psilostachya*
Giant ragweed	*Ambrosia trifida*
Fairy candelabra	*Androsace occidentalis*
Canada anemone	*Anemone canadensis*
Spreading pasque-flower	*Anemone patens*
Spreading dogbane	*Apocynum androsaemifolium*
Indian hemp	*Apocynum cannabinum*
Prairie dogbane	*Apocynum sibiricum*

Common Regional Forb Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
Common burdock	*Arctium minus*
Bluntleaf sandwort	*Arenaria lateriflora*
Jack-in-the-pulpit	*Arisaema triphyllum*
Absinth	*Artemisia absinthium*
Biennial wormwood	*Artemisia biennis*
Green sagewort	*Artemisia dracunculus*
Fringed sagewort	*Artemisia frigida*
Louisiana sagewort	*Artemisia ludoviciana*
Blunt-leaved milkweed	*Asclepias amplexicaulis*
Swamp milkweed	*Asclepias incarnata*
Oval-leaved milkweed	*Asclepias ovalifolia*
Showy milkweed	*Asclepias speciosa*
Common mil*kweed*	*Asclepias syriaca*
Butterfly weed	*Asclepias tuberosa*
Whorled milkweed	*Asclepias verticillata*
Asparagus	*Asparagus officinalis*
Heath aster	*Aster ericoides*
Aster	*Aster borealis*
Smooth aster	*Aster laevis*
New England aster	*Aster novae-angliae*
Aromatic aster	*Aster oblongifolius*
Swamp aster	*Aster puniceus*
Silky aster	*Aster sericeus*
White prairie aster	*Aster simplex*
Flat-topped aster	*Aster umbellatus*
Prairie milkvetch	*Astragalus adsurgens*
Purple milkvetch	*Astragalus agrestis*
Canada milkvetch	*Astragalus canadensis*
Ground-plum milkvetch	*Astragalus crassicarpus*
Hoary false alyssum	*Berteroa incana*
Nodding beggarticks	*Bidens cernua*
Devil's beggarticks	*Bidens frondosa*
Tall beggarticks	*Bidens vulgata*
False aster	*Boltonia latisquama*
Rattlesnake fern	*Botrychium virginianum*
Field mustard	*Brassica kaber*
Marsh marigold	*Caltha palustris*
Shepherd's purse	*Capsella bursa-pastoris*
Downy paintbrush	*Castilleja sessiflora*
Prairie chickweed	*Cerastium arvense*

Common Regional Forb Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
Lamb's quarter	*Chenopodium album*
Pitseed goosefoot	*Chenopodium berlandieri*
Oakleaf goosefoot	*Chenopodium glaucum*
Mapleleaf goosefoot	*Chenopodium hybridum*
Red goosefoot	*Chenopodium rubrum*
Hairy goldaster	*Chrysopsis villosa*
Bulbous water hemlock	*Cicuta bulbifera*
Spotted water hemlock	*Cicuta maculata*
Enchanter's nightshade	*Circaea lutetiana*
Tall thistle	*Cirsium altissimum*
Canada thistle	*Cirsium arvense*
Prairie thistle	*Cirsium flodmanii*
Virgin's bower	*Clematis virginiana*
Bastard toadflax	*Comandra pallida*
Field bindweed	*Convolvulus arvensis*
Wild morning glory	*Convolvulus sepium*
Horseweed	*Grigeson canadensa*
Golden corydalis	*Corydalis aurea*
Honewort	*Cryptotaenia canadensis*
Small prairie ladyslipper	*Cypripedium candidum*
Plains larkspur	*Delphinium virescens*
Flixweed tansy mustard	*Descurainia sophia*
Canada tick-trefoil	*Desmodium canadense*
Yellow whitlowwort	*Draba nemorosa*
Black sampson	*Echinacea angustifolia*
Wild cucumber	*Echinocystis lobata*
Mud-purslane	*Elatine triandra*
Glandular willow-herb	*Epilobium ciliatum*
Willow-herb	*Epilobium leptophyllum*
Philadelphia fleabane	*Erigeron philadelphicus*
Fleabane daisy	*Erigeron strigosus*
Wormseed mustard	*Erysimum cheiranthoides*
Joe-Pye weed	*Eupatorium maculatum*
Boneset	*Eupatorium perfoliatum*
White snakeroot	*Eupatorium rugosum*
Leafy spurge	*Euphorbia esula*
Ridge-seeded spurge	*Euphorbia glyptosperma*
Thyme-leaved spurge	*Euphorbia serpyllifolia*
Virginia strawberry	*Fragaria virginiana*
Catchweed bedstraw	*Galium aparine*

Common Regional Forb Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
Northern bedstraw	*Galium boreale*
Bedstraw	*Galium obtusum*
Small bedstraw	*Galium trifidum*
Sweet-scented bedstraw	*Galium triflorum*
Scarlet gaura	*Gaura coccinea*
Bottle gentian	*Gentiana andrewsii*
Downy gentian	*Gentiana puberulenta*
Yellow avens	*Geum aleppicum*
White avens	*Geum canadense*
Torch flower	*Geum triflorum*
American wild licorice	*Glycyrrhiza lepidota*
Curlycup gumweed	*Grindelia squarrosa*
Wood stickseed	*Hackelia virginiana*
Rough pennyroyal	*Hedeoma hispida*
Sneezeweed	*Helenium autumnale*
Common sunflower	*Helianthus annuus*
Maximilian sunflower	*Helianthus maximiliani*
Prairie sunflower	*Helianthus petiolaris*
Stiff sunflower	*Helianthus rigidus*
Jerusalem artichoke	*Helianthus tuberosus*
False sunflower	*Heliopsis helianthoides*
Cow parsnip	*Heracleum maximum*
Alum root	*Heuchera richardsonii*
Greater St. John's-wort	*Hypericum majus*
Yellow stargrass	*Hypoxis hirsuta*
Spotted touch-me-not	*Impatien capensis*
Marsh elder	*Iva xanthifolia*
Summer cypress	*Kochia scoparia*
False boneset	*Kuhnia eupatorioides*
Blue wood lettuce	*Lactuca biennis*
Western wild lettuce	*Lactuca ludoviciana*
Wild blue lettuce	*Lactuca pulchella*
Wood nettle	*Laportea canadensis*
European stickseed	*Lappula echinata*
Marsh vetchling	*Lathyrus palustris*
Lion's tail	*Leonurus cardiaca*
Round-headed blazing star	*Liatris aspera*
Rocky Mountain gayfeather	*Liatris ligulistylis*
Dotted gayfeather	*Liatris punctata*
Tall gayfeather	*Liatris pycnostachya*

Common Regional Forb Species, continued:

COMMON NAME	SCIENTIFIC NAME
Wood lily	*Lilium philadelphicum*
Grooved flax	*Linum sulcatum*
Hoary puccoon	*Lithospermum canescens*
Narrow-leaved puccoon	*Lithospermum incisum*
Great blue lobelia	*Lobelia siphilitica*
Palespike lobelia	*Lobelia spicata*
Wild parsley	*Lomatium orientale*
Deervetch	*Lotus americanus*
Water hoarhound	*Lycopus americanus*
Bugle-weed	*Lycopus uniflorus*
Skeleton weed	*Lygodesmia juncea*
Fringed loosestrife	*Lysimachia ciliata*
Loosestrife	*Lysimachia hybrida*
Loosestrife	*Lysimachia lanceolata*
Loosestrife	*Lythrum alatum*
Purple loosestrife	*Lythrum salicaria*
Running mallow	*Malva rotundifolia*
Black medic	*Medicago lupulina*
Alfalfa	*Medicago sativa*
White sweetclover	*Melilotus alba*
Yellow sweetclover	*Melilotus officinalis*
Wild mint	*Mentha arvensis*
Yellow monkeyflower	*Mimulus glabratus*
Monkeyflower	*Mimulus ringens*
Four o'clock	*Mirabilis nyctaginea*
Wild bergamot	*Monarda fistulosa*
Catnip	*Nepeta cataria*
Common evening primrose	*Oenothera biennis*
Tooth-leaved evening primrose	*Oenothera serrulata*
False gromwell	*Onosmodium hispidi ssimum*
Wood sorrel	*Oxalis dillenii*
Common yellow sorrel	*Oxalis stricta*
Violet wood sorrel	*Oxalis violacea*
Purple loco weed	*Oxytropis lambertii*
Pennsylvania pellitory	*Parietaria pensylvanica*
Woodbine	*Parthenocissus*
Lousewort	*Pedicularis canadensis*
Swamp lousewort	*Pedicularis lanceolata*
Slender penstemon	*Penstemon gracilis*
Large beardtongue	*Penstemon grandiflorus*

Common Regional Forb Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
Ditch stonecrop	*Penthorum sedoides*
White prairie clover	*Petalostemum candidum*
Purple prairie clover	*Petalostemum purpureum*
Downy phlox	*Phlox pilosa*
Lopseed	*Phryma leptostachya*
Virginia ground cherry	*Physalis virginiana*
Obedient plant	*Physostegia parviflora*
Clearweed	*Pilea pumila*
Common plantain	*Plantago major*
Woolly Indianwheat	*Plantago patagonica*
Rugel's plantain	*Plantago rugelii*
Clammy-weed	*Polanisia dodecandra*
Whorled milkwort	*Polygala verticillata*
Small solomonseal	*Polygonatum biflorum*
Leathery knotweed	*Polygonum achoreum*
Prostrate knotweed	*Polygonum aviculare*
Pennsylvania smartweed	*Polygonum pensylvanicum*
Spotted ladysthumb	*Polygonum persicaria*
Purslane	*Portulaca oleracea*
Silverweed cinquefoil	*Potentilla anserina*
Tall cinquefoil	*Potentilla arguta*
Norwegian cinquefoil	*Potentilla norvegica*
Bushy cinquefoil	*Potentilla paradoxa*
Pennsylvania cinquefoil	*Potentilla pensylvanica*
Brook cinquefoil	*Potentilla rivalis*
White lettuce	*Prenanthes racemosa*
Silverleaf scurfpea	*Psoralea argophylla*
Indian breadroot	*Psoralea esculenta*
Mountain mint	*Pycnanthemum virginianum*
Early wood buttercup	*Ranunculus abortivus*
Shore buttercup	*Ranunculus cymbalaria*
Yellow water crowfoot	*Ranunculus flabellaris*
Bristly buttercup	*Ranunculus pensylvanicus*
White water crowfoot	*Ranunculus subrigidus*
Prairie coneflower	*Ratibida columnifera*
Coneflower	*Ratibida pinnata*
Poison ivy	*Rhus radicans*
Marsh yellow cress	*Rorippa palustris*
Black-eyed Susan	*Rudbeckia hirta*
Tall coneflower	*Rudbeckia laciniata*

Common Regional Forb Species, continued:

COMMON NAME	SCIENTIFIC NAME
Curly dock	*Rumex crispus*
Golden dock	*Rumex maritimus*
Western dock	*Rumex occidentalis*
Willow-leaved dock	*Rumex mexicanus*
Russian thistle	*Salsola kali*
Lance-leaved sage	*Salvia reflexa*
Black snakeroot	*Sanicula marilandica*
Lanceleaf figwort	*Scrophularia lanceolata*
Marsh skullcap	*Scutellaria epilobiifolia*
Blue skullcap	*Scutellaria lateriflora*
Ragwort	*Senecio pauperculus*
Cup plant	*Silphium perfoliatum*
Tumbling mustard	*Sisymbrium altissimum*
Blue-eyed grass	*Sisyrinchium campestre*
Water parsnip	*Sium suave*
False solomonseal	*Smilacina stellata*
Carrion flower greenbriar	*Smilax herbacea*
Black nightshade	*Solanum americanum*
Canada goldenrod	*Solidago canadensis*
Broad-leaved goldenrod	*Solidago flexicaulis*
Giant goldenrod	*Solidago gigantea*
Narrow-leaved goldenrod	*Solidago graminifolia*
Missouri goldenrod	*Solidago missouriensis*
Gray goldenrod	*Solidago nemoralis*
Riddell's goldenrod	*Solidago riddellii*
Stiff goldenrod	*Solidago rigida*
Perennial sowthistle	*Sonchus arvensis*
Giant burreed	*Sparganium eurycarpum*
Meadowsweet spiraea	*Spiraea alba*
Hedge nettle	*Stachys palustris*
Chickweed	*Myosoton aquaticum*
Dandelion	*Taraxacum officinale*
Germander	*Teucrium canadense*
Purple meadowrue	*Thalictrum dasycarpum*
Veiny meadowrue	*Thalictrum venulosum*
Field pennycress	*Thlaspi arvense*
Bracted spiderwort	*Tradescantia bracteata*
Goatsbeard	*Tragopogon dubius*
Alsike clover	*Trifolium hybridum*
Red clover	*Trifolium pratense*

Common Regional Forb Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
White clover	*Trifolium repens*
Nettle	*Urtica dioica*
Large bellwort	*Uvularia grandiflora*
Common mullen	*Verbascum thapsus*
Bracted vervain	*Verbena bracteata*
Blue vervain	*Verbena hastata*
Woolly verbena	*Verbena stricta*
Nettle-leaved vervain	*Verbena urticifolia*
Ironweed	*Vernonia fasciculata*
Purslane speedwell	*Veronica peregrina*
American vetch	*Vicia americana*
Yellow wood violet	*Viola eriocarpa*
Prairie violet	*Viola pedatifida*
Pink wood violet	*Viola rugulosa*
Hairy blue violet	*Viola sororia*
Wild grape	*Vitis riparia*
Cocklebur	*Xanthium strumarium*
Meadow parsnipmargins	*Zizia aptera*
Meadow parsnip	*Zizia aurea*
Mountain deathcamas	*Zygadenus elegans*
White camas	*Zygadenus glaucus*

Grasses of the Region

TABLE D 3 – Common Grass Species of the Region

COMMON NAME	*SCIENTIFIC NAME*
Crested wheatgrass	*Agropyron desertorum*
Quackgrass	*Agropyron repens*
Western wheatgrass	*Agropyron smithii*
Slender wheatgrass	*Agropyron trachycaulum*
Redtop	*Agrostis alba*
Bentgrass	*Agrostis perennans*
Ticklegrass	*Agrostis scabra*
Short-awn foxtail	*Aopecurus aequalis*
Big bluestem	*Andropogon gerardi*
Little bluestem	*Andropogon scoparius*
Red three-awn	*Aristida longiseta*
Oat	*Avena sativa*
American sloughgrass	*Beckmannia erucaeformis*
Sideoats grama	*Bouteloua curtipendula*

Common Grass Species of the Region, continued:

COMMON NAME	*SCIENTIFIC NAME*
Blue grama	*Bouteloua gracilis*
Smooth bromegrass	*Bromus inermis*
Japanese chess	*Bromus japonicus*
Bluejoint	*Calamagrostis canadensis*
Northern reedgrass	*Calamagrostis inexpansa*
Prairie sandreed	*Calamovilfa longifolia*
Inland saltgrass	*Distichlis spicata stricta*
Barnyard grass	*Echinochloa crusgalli*
Canada wild rye	*Elymus canadensis*
Slender wild rye	*Elymus villosus*
Teal lovegrass	*Eragrostis hypnoides*
Carolina lovegrass	*Eragrostis pectinacea*
India lovegrass	*Eragrostis pilosa*
Lovegrass	*Eragrostis poaeoides*
Meadow fescue	*Festuca elatior*
Northern mannagrass	*Glyceria borealis*
Rattlesnake mannagrass	*Glyceria canadensis*
American mannagrass	*Glyceria grandis*
Fowl mannagrass	*Glyceria striata*
Sweetgrass	*Hierochloe odorata*
Foxtail barley	*Hordeum jubatum*
Bottlebrush	*Hystrix patula*
Prairie junegrass	*Koeleria cristata*
Rice cutgrass	*Leersia oryzoides*
Whitegrass	*Leersia virginica*
Alkali muhly	*Muhlenbergia asperifolia*
Plains muhly	*Muhlenbergia cuspidata*
Wirestem muhly	*Muhlenbergia mexicana*
Green muhly	*Muhlenbergia racemosa*
Mat muhly	*Muhlenbergia richardsonis*
Witchgrass	*Panicum capillare*
Leiberg panicum	*Panicum leibergii*
Scribners panicum	*Panicum oligosanthes*
Panic grass	*Panicum perlongum*
Switchgrass	*Panicum virgatum*
Reed canary grass	*Phalaris arundinacea*
Timothy	*Phleum pratense*
Common reed	*Phragmites australis*
Canada bluegrass	*Poa compressa*
Fowl bluegrass	*Poa palustris*

Common Grass Species of the Region, continued:

COMMON NAME	*SCIENTIFIC NAME*
Kentucky bluegrass	*Poa pratensis*
Yellow bristlegrass	*Setaria glauca*
Green bristlegrass	*Setaria viridis*
Indian grass	*Sorghastrum nutans*
Prairie cordgrass	*Spartina pectinata*
Prairie wedgegrass	*Sphenopholis obtusata*
Tall dropseed	*Sporobolus asper*
Sand dropseed	*Sporobolus cryptandrus*
Prairie dropseed	*Sporobolus heterolepis*
Porcupine grass	*Stipa spartea*
Green needlegrass	*Stipa viridula*

Trees and Shrubs of the Region

TABLE D 4 – Common Regional Tree and Shrub Species

COMMON NAME	*SCIENTIFIC NAME*
Boxelder	*Acer negundo*
Silver maple	*Acer saccharinum*
Alderleaf serviceberry	*Amelanchier alnifolia*
Lead plant	*Amorpha canescens*
False indigo	*Amorpha fruticosa*
Dwarf indigo	*Amorpha nana*
Hackberry	*Celtis occidentalis*
Red-osier dogwood	*Cornus stolonifera*
Russian olive	*Elaeagnus angustifolia*
Green ash	*Fraxinus pennsylvanica*
Black walnut	*Juglans nigra*
Eastern red cedar	*Juniperus virginiana*
Tatarian honeysuckle	*Lonicera tatarica*
Jack pine	*Pinus banksiana*
Cottonwood	*Populus deltoides*
American wild plum	*Prunus americana*
Common chokecherry	*Prunus virginiana*
Bur oak	*Quercus macrocarpa*
Common buckthorn	*Rhamnus catharticus*
Smooth sumac	*Rhus glabra*
Staghorn sumac	*Rhus typhina*
American black currant	*Ribes americanum*
Missouri gooseberry	*Ribes missouriense*
Black locust	*Robinia pseudoacacia*

Common Regional Tree and Shrub Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
Smooth wild rose	*Rosa blanda*
Blackcap raspberry	*Rubus occidentalis*
Peachleaf willow	*Salix amygdaloides*
Hoary willow	*Salix candida*
Sandbar willow	*Salix exigua*
Shining willow	*Salix lucida*
Heart-leaved willow	*Salix eriocephala*
Western snowberry	*Symphoricarpos occidentalis*
Basswood	*Tilia americana*
American elm	*Ulmus americana*
Siberian elm	*Ulmus pumila*
Slippery elm	*Ulmus rubra*
Prickly ash	*Zanthoxylum americanum*

WILDLIFE

Characteristic Wildlife Species of North Dakota

TABLE D 5 – Common Regional Mammal Species

COMMON NAME	*SCIENTIFIC NAME*
Badger	*Taxidea taxus*
Beaver	*Castor canadensis*
Big Brown Bat	*Eptesicus fuscus*
Bobcat	*Felis robertii*
Coyote	*Canis latrans*
Deer Mouse	*Peromyscus maniculatus*
Eastern Fox Squirrel	*Sciurus niger*
Eastern Pipistrel	*Pipistrellus subflavus*
Eastern Cottontail	*Sylvilagus floridanus*
Eastern Mole	*Scopalus aquaticus*
Eastern Chipmunk	*Tamias striatus*
Franklin's Ground Squirrel	*Citellus franklinii*
Gray Squirrel	*Sciurus carolinensis*
Gray Fox	*Urocyon cinereoargenteus*

Common Regional Mammal Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
Hoary Bat	*Lasiurus cinereus*
House Mouse	*Mus musculus*
Keen's Myotis (3)	*Myotis keenii*
Least Weasel (3)	*Mustelea rixosis*
Little Brown Bat	*Myotis lucifugus*
Long-tailed Weasel	*Mustela frenata*
Masked Shrew	*Sorex cinereus*
Meadow Jumping Mouse	*Zapus hudsonius*
Meadow Vole	*Microtus pennsylvanicus*
Mink	*Mustela vison*
Moose (2)	*Alces alces*
Mule deer (2)	*Odocoileus hemionus*
Muskrat	*Ondatra zibethica*
Northern Grasshopper Mouse	*Onychomys leucogaster*
Norway Rat	*Rattus norvegicus*
Plains Pocket Gopher	*Geomus bursarius*
Plains Pocket Mouse	*Perognathus flavescens*
Prairie Vole	*Microtus ochrogaster*
Pronghorn Antelope (2)	*Antilocapra americana*
Raccoon	*Procyon lotor*
Red Fox	*Vulpes fulva*
Red-backed Vole	*Different commonneme?*
Red Squirrel	*Tamiasciurus hudsonicus*
Red Bat	*Lasiurus borealis*
Richardson Ground Squirrel	*Citellus richardsoni*
River Otter (1)	*Lutra canadensis*
Ermine	*Mustela erminea*
Short-tailed Shrew	*Blarina brevicauda*
Silver Haired Bat	*Lasionycterio novtivagans*
Southern Flying Squirrel (3)	*Glaucomys volans*
Spotted Skunk	*Spilogale putorius*
Striped Skunk	*Mephitis mephitis*
Thirteen-lined Ground Squirrel	*Citellus tridecem-lineatus*
Oppossum	*Didelphus marsupialis*
Western Harvest Mouse	*Reithrodontomys megalotis*
White-footed Mouse	*Peromysous leocopus*
White-tailed Jackrabbit	*Lepus townsendi*
White-tailed Deer	*Odocoileus virginianus*
Woodchuck	*Marmota monax*

Reptiles of the Region

TABLE D 6 – Common Reptiles and Amphibian Species of the Region

COMMON NAME	SCIENTIFIC NAME
American Toad	*Bufo americanus*
Blue Spotted Salamander	*Ambystoma laterale*
Bluetailed or Five-lined Skink	*Eumeces fasciatus*
Boreal Chorus Frog	*Pseudacris triseriata maculata*
Bull Snake	*Pituophis melanoleucus*
Canadian Toad	*Bufo hemiophrys*
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*
Eastern Garter Snake	*Thamnophis sirtalis sirtalis*
Gray Tree Frog	*Hyla versicolor*
Great Plains Toad	*Bufo cognatus*
Mud Puppy	*Necturus maculosus*
Northern Leopard Frog	*Rana pipens*
Northern Prairie Skink	*Eumeces septentrionalis*
Painted Turtle	*Chrysemys picta belli*
Plains Garter Snake	*Thamnophis radix*
Prairie Skink	*Eumeces septentrionalis*
Red-sided Garter Snake	*Thamnophis sirtalis parietalis*
Red-bellied Snake	*Storeria occipitomaculata*
Smooth Green Snake	*Opheodrys vernalis*
Snapping Turtle	*Chelydra serpentina*
Tiger Salamander	*Ambystoma tigrinum*
Upland Chorus Frog	*Pseudacris triseriata*
Western Painted Turtle	*Chrysemys picta belli*
Western Spiny Softshell	*Apalone spinifers*
Western Hognose Snake	*Heterodon nasicus*
Western Plains Garter Snake	*Thamnophis radix haydeni*
Western Chorus Frog	*Pseudacris triseriata*
Wood Frog	*Rana sylvatica*

Birds of the Region

TABLE D 7 – Regional Bird Species

KEY			
	A = abundant	C = common	U = uncommon
	* = gamebird	R = rare	Cas = casual
	X = probable (domestic birds breeding in the wild)		

A O U Number	Common Name	Permanent Resident	Migrant	Summer Resident	Winter Visitor	Game Bird
1	Common Loon		U			
4	Horned Grebe		C	U		
5	Eared Grebe		U	U		
6	Pied-billed Grebe		C	C		
7	Red-necked Grebe		R	R		
8	Western Grebe		C	U		
14	Double-crested Cormorant		C	C		
17	Tundra Swan		C			*
18	Snow Goose		C			*
19	Ross' Goose		Cas			
20	White-fronted Goose		U			*
21	Canada Goose	U	A	A		*
23	American Black Duck		R	R		*
25	Gadwall		C	U		*
26	Mallard	U	A	A		*
27	Northern Pintail		C	C		*
28	American Wigeon		C			*
29	Wood Duck		C	C		*
30	Northern Shoveler		C	C		*
31	Blue-winged Teal		A	A		*
32	Green-winged Teal		A			*
33	White-winged Scoter		U			*
34	Surf Scoter		R			*
36	Oldsquaw		R			*
40	Canvasback		C	U		*
41	Redhead		C	U		*
42	Ring-necked Duck		C			*
43	Lesser Scaup		C			*
44	Greater Scaup		U			*
45	Common Goldeneye		C			*
46	Barrow's Goldeneye		Cas			*
47	Bufflehead		C			*
48	Ruddy Duck		C	C		*

Regional Bird Species, continued:

KEY			
	A = abundant	C = common	U = uncommon
	* = gamebird	R = rare	Cas = casual
	X = probable (domestic birds breeding in the wild)		

A O U Number	Common Name	Permanent Resident	Migrant	Summer Resident	Winter Visitor	Game Bird
49	Common Merganser		C			*
50	Red-breasted Merganser		C			*
51	Hooded Merganser		R			*
52	American Coot		A	A		*
53	Common Gallinule		R			
61	White Pelican		A	C		
68	Glaucous Gull		R			
70	Herring Gull		U			
71	Ring-billed Gull		A			
74	Franklin's Gull		A	C		
76	Bonaparte's Gull		R			
80	Caspian Tern		U			
83	Common Tern		C	C		
84	Forster's Tern		C	C		
86	Black Tern		C	C		
88	Great Blue Heron		C	C		
89	Little Blue Heron		Cas			
92	Great Egret		C	C		
93	Snowy Egret		R			
96	Black-crowned Night Heron		C	C		
98	Green Heron		U	U		
99	Least Bittern		U	U		
100	American Bittern		U	U		
102	Sandhill Crane		U			*
104	White-faced Ibis		Cas			
107	Virginia Rail		C	C		*
108	King Rail		R	R		
110	Sora		C	C		*
115	American Avocet		R	R		
116	Black-bellied Plover		C			
117	Lesser Golden Plover		A			
118	Ruddy Turnstone		U			
119	Semipalmated Plover		U			
120	Piping Plover		R			
123	Killdeer		A	A		

Regional Bird Species, continued:

KEY			
	A = abundant	C = common	U = uncommon
	* = gamebird	R = rare	Cas = casual
	X = probable (domestic birds breeding in the wild)		

A O U Number	Common Name	Permanent Resident	Migrant	Summer Resident	Winter Visitor	Game Bird
124	American Woodcock		U	R		*
125	Common Snipe		C	C		
126	Short-billed Dowitcher		U			
127	Long-billed Dowitcher		U			
127	Red Knot		R			
128	Hudsonian Godwit		U			
129	Marbled Godwit		U	U		
130	Long-billed Curlew		Cas			
132	Willet		Cas			
133	Greater Yellowlegs		C			
134	Lesser Yellowlegs		R			
135	Solitary Sandpiper		A			
136	Sanderling		U			
136	Buff-breasted Sandpiper		R			
137	Upland Sandpiper		C	C		
138	Pectoral Sandpiper		C			
139	Stilt Sandpiper		U			
142	Spotted Sandpiper		C	C		
143	Least Sandpiper		C			
144	Semipalmated Sandpiper		U			
145	Western Sandpiper		C			
146	Baird's Sandpiper		U			
147	White-rumped Sandpiper		C			
148	Wilson's Phalarope		C	U		
149	Northern Phalarope		R			
151	Wild Turkey	X				*
153	Ring-necked Pheasant	C				*
159	Gray Partridge	C				*
163	Sharp-shinned Hawk		U			
164	Cooper's Hawk		U	R		
165	Northern Goshawk				R	
166	Northern Harrier		C	C		
167	Red-tailed Hawk		C	C		
168	Swainson's Hawk		C	C		
169	Rough-legged Hawk		U		C	

Regional Bird Species, continued:

KEY	A = abundant	C = common	U = uncommon
	* = gamebird	R = rare	Cas = casual
	X = probable (domestic birds breeding in the wild)		

A O U Number	Common Name	Permanent Resident	Migrant	Summer Resident	Winter Visitor	Game Bird
171	Broad-winged Hawk		C	C		
173	Bald Eagle		C		U	
174	Golden Eagle				R	
175	Osprey		U			
176	Turkey Vulture		U			
179	American Kestrel		C	C		
180	Merlin		R			
181	Peregrine Falcon		R			
182	Gyrfalcon				R	
183	Short-eared Owl	R				
184	Common Screech Owl	C				
185	Long-eared Owl		U			
186	Great Horned Owl	C				
187	Barred Owl	U				
190	Snowy Owl				U	
192	Saw-whet Owl	R				
193	Burrowing Owl	R				
195	Mourning Dove		A	A		*
196	Rock Dove	A				
197	Yellow-billed Cuckoo		U	U		
198	Black-billed Cuckoo		U	U		
200	Common Nighthawk		C	C		
201	Whip-poor-will			R		
204	Ruby-throated Hummingbird		C	C		
205	Belted Kingfisher		C	C		
206	Red-headed Woodpecker		C	C		
207	Pileated Woodpecker	R				
208	Common Flicker		C	C		
209	Red-bellied Woodpecker		R	R		
211	Yellow-bellied Sapsucker		C	U		
212	Downy Woodpecker	C				
213	Hairy Woodpecker	C				
217	Eastern Kingbird		C	C		
218	Western Kingbird		C	C		
220	Great Crested Flycatcher		U	U		

Regional Bird Species, continued:

KEY			
	A = abundant	C = common	U = uncommon
	* = gamebird	R = rare	Cas = casual
	X = probable (domestic birds breeding in the wild)		

A O U Number	Common Name	Permanent Resident	Migrant	Summer Resident	Winter Visitor	Game Bird
221	Eastern Pewee		U	U		
222	Eastern Phoebe		C	C		
223	Olive-sided Flycatcher		U			
225	Yellow-bellied Flycatcher		U			
226	Least Flycatcher		U	U		
227	Willow Flycatcher		U			
229	Horned Lark	C				
230	Water Pipit		C			
231	Sprague's Pipit		R			
232	Purple Martin		C	C		
233	Cliff Swallow		C	C		
234	Barn Swallow		C	C		
235	Tree Swallow		C	C		
236	Rough-winged Swallow		C	C		
237	Bank Swallow		C	C		
238	Chimney Swift		C	C		
240	American Crow	C				
242	Blue Jay	C				
245	Black-billed Magpie				U	
246	Black-capped Chickadee	C				
250	White-breasted Nuthatch	C				
251	Red-breasted Nuthatch		U			
253	Brown Creeper	U	C			
254	House Wren		A	A		
255	Winter Wren		U			
258	Marsh Wren		C	C		
259	Sedge Wren		A	A		
260	Golden-crowned Kinglet		C			
261	Rudy-crowned Kinglet		C			
263	Brown Thrasher		C	C		
264	Gray Catbird		C	C		
265	Northern Mockingbird		C	C		
265	Mountain Bluebird		Cas			
266	Eastern Bluebird		U	U		
267	American Robin		A	A		

Regional Bird Species, continued:

KEY			
	A = abundant	C = common	U = uncommon
	* = gamebird	R = rare	Cas = casual
	X = probable (domestic birds breeding in the wild)		

A O U Number	Common Name	Permanent Resident	Migrant	Summer Resident	Winter Visitor	Game Bird
269	Gray-cheeked Thrush		U			
270	Swainson's Thrush		C			
271	Hermit Thrush		C			
272	Veery		U	U		
274	Northern Shrike				U	
275	Loggerhead Shrike		U	U	U	
277	Cedar Waxwing		C	U		
278	Red-eyed Vireo		C	C		
280	Warbling Vireo		C	C		
281	Philadelphia Vireo		U			
282	Yellow-throated Vireo		U	U		
285	Solitary Vireo		U			
287	Northern Parula Warbler		R			
289	Black-throated Green Warbler		R			
290	Black-and-White Warbler		C			
291	Blackpoll Warbler		C			
292	Black-throated Blue Warbler		R			
294	Nashville Warbler		A			
294	Magnolia Warbler		C			
295	Yellow-rumped Warbler		C			
297	Canada Warbler		U			
298	Cape May Warbler		R			
299	Chestnut-sided Warbler		U			
300	Bay-breasted Warbler		U			
301	Blackburnian Warbler		U			
302	American Redstart		C			
303	Pine Warbler		R			
305	Palm Warbler		A			
307	Yellow Warbler		C	C		
310	Tennessee Warbler		A			
311	Orange-crowned Warbler		C			
312	Wilson's Warbler		C			
314	Golden-winged Warbler		U			
316	Connecticut Warbler		C			
317	Mourning Warbler		U			

Regional Bird Species, continued:

KEY			
	A = abundant	C = common	U = uncommon
	* = gamebird	R = rare	Cas = casual
	X = probable (domestic birds breeding in the wild)		

A O U Number	Common Name	Permanent Resident	Migrant	Summer Resident	Winter Visitor	Game Bird
319	Common Yellowthroat		A	A		
321	Northern Waterthrush		U			
323	Ovenbird		C			
324	Red-winged Blackbird	U	A	A		
325	Yellow-headed Blackbird		A	A		
326	Brown-headed Cowbird		A	A		
327	Rusty Blackbird		C			
328	Brewer's Blackbird		C	C		
329	Common Grackle		A	A		
331	Bobolink		C	C		
333	Western Meadowlark		C	C		
334	European Starling	A				
335	Orchard Oriole		U	U		
337	Northern Oriole		A	A		
340	Scarlet Tanager		R	R		
341	House Sparrow	A				
343	Dickcissel		C	C		
344	Lark Bunting		R	R		
345	Lapland Longspur				C	
346	Chestnut Collared Longspur		U			
349	Northern Junco				C	
350	Snow Bunting				C	
351	Cardinal	R				
352	Red Crossbill				U	
354	Common Redpoll				C	
357	Purple Finch				U	
359	Evening Grosbeak				C	
360	American Goldfinch	C				
361	Pine Siskin				C	
363	Indigo Bunting		C	C		
365	Rose-breasted Grosbeak		C	C		
366	Rufous-sided Towhee		U			
367	White-throated Sparrow		A			
368	White-crowned Sparrow		U			
369	Harris' Sparrow		C			

Regional Bird Species, continued:

KEY			
	A = abundant	C = common	U = uncommon
	* = gamebird	R = rare	Cas = casual
	X = probable (domestic birds breeding in the wild)		

A O U Number	Common Name	Permanent Resident	Migrant	Summer Resident	Winter Visitor	Game Bird
370	Chipping Sparrow		C	C		
371	Field Sparrow		U	U		
372	Swamp Sparrow		U	U		
373	American Tree Sparrow	U		C		
374	Lark Sparrow		R	R		
375	Clay-colored Sparrow		C	C		
376	Grasshopper Sparrow		C	C		
378	Fox Sparrow		U			
379	Song Sparrow		A	A		
380	Vesper Sparrow		C	C		
381	Lincoln's Sparrow		C			
382	Savannah Sparrow		C	C		
385	Henslow's Sparrow		R	R		
386	Sharp-tailed Sparrow		R			
387	Le Conte's Sparrow		U	U		

Common Wildlife by Habitat Type

TABLE D 8 – Common Animal Species by Habitat Preferences

HABITAT	COMMON NAME	
Shallow Marsh:	Western Chorus Frog	Blue-winged Teal
	Upland Chorus Frog	Green Winged Teal
	Northern Leopard Frog	Great Blue Heron
	Gadwall	Sedge Wren
	Mallard	Marsh Wren
	Northern Pintail	Red-winged Blackbird
	American Wigeon	Yellow-headed Blackbird
	Wood Duck	Common Yellowthroat
	Northern Shoveler	Mink
		Muskrat
Deep Marsh:	Snapping Turtle	Ring-necked Duck
	Western Painted Turtle	Lesser Scaup
	Western Spiny Softshell	Common Goldeneye
	Pied-billed Grebe	Hooded Merganser

Common Animal Species by Habitat Preferences, continued:

HABITAT	COMMON NAME	
	Canvasback	American Coot
	Redhead	Beaver
Open Water:	Common Loon	White Pelican
	Double Crested Cormorant	Herring Gull
	Tundra Swan	Ring-billed Gull
	Snow Goose	Franklin's Gull
	Canada Goose	Mud Puppy
Grasslands:	Common Flicker	Franklin's Ground Squirrel
	Eastern Kingbird	Richardson Ground Squirrel
	Western Kingbird	Thirteen-lined Ground Squirrel
	Eastern Bluebird	Redback Vole
	American Robin	Starnose mole
	Bobolink	Plains Pocket Gopher
	Western Meadowlark	White-tailed Jackrabbit
	White-throated Sparrow	Prairie Vole
	Chipping Sparrow	Meadow Vole
	Song Sparrow	Deer Mouse
	Western Hognose Snake	White-footed Mouse
	Bull Snake	Eastern Mole
	Red-bellied Snake	Masked Shrew
	Western Plains Garter Snake	Badger
	Short-tailed Shrew	Red Fox
	Coyote	Meadow Jumping Mouse
Farmland:	Rock Dove	Virginia Oppossum
	American Crow	Raccoon
	European Starling	Ring-necked Pheasant
	House Sparrow	Gray Partridge
		Mourning Dove
Shrublands:	Woodchuck	Swainson's Hawk
	Eastern Cottontail	American Kestrel
	Short-tailed Weasel	Great Horned Owl
	Least Weasel (3)	House Wren
	Striped Skunk	Brown-headed Cowbird
	Gray Fox	Brown Thrasher
	Northern Harrier	Gray Catbird
	Red-tailed Hawk	American Goldfinch

Common Animal Species by Habitat Preferences, continued:

HABITAT	COMMON NAME	
Forest:	White-tailed Deer	Hairy Woodpecker
	Gray Squirrel	Eastern Phoebe
	Eastern Fox Squirrel	Black-capped Chickadee
	American Woodcock	White-breasted Nuthatch
	Broad-winged Hawk	Cedar Waxwing
	Red-headed Woodpecker	Red-eyed Vireo
	Pileated Woodpecker	Northern Oriole
	Downy Woodpecker	Cardinal
		Rose-breasted Grosbeak

Fish Species of North Dakota

Table D 9 – Common Regional Fish Species

COMMON NAME	*SCIENTIFIC NAME*
American Eel	*Anquilla rostrata*
Banded Killifish	*Fundulus diaphanus*
Bigmouth Shiner	*Nostropis dorsalis*
Black Crappie	*Pomoxis nigro maculatus*
Black Bullhead	*Ictalurus melas*
Blackside Darter	*Percina maculata*
Bluegill	*Leopomis macrochirus*
Bluntnose Minnow	*Pimephales notatus*
Bowfin	*Amia calvabofin*
Banded Darter	*Etheostoma zonale*
Brassy Minnow	*Hybognathus hankinsoni*
Brook Stickleback	*Culaea inconstans*
Brown Bullhead	*Ictalurus nebulosus*
Common Carp	*Cyprinius carpio*
Weed Shiner	*Notropis texanus*
Central Mudminnow	*Umbra limi*
Channel Catfish	*Ictalurus punctatus*
Common Shiner	*Notropis cornutus*
Creek Chub	*Semotilus atromaculatus*
Emerald Shiner	*Notropis atherinoides*
Fantail Darter	*Estheostoma flabellare*
Fathead Minnow	*Pimephales promelas*
Freshwater Drum	*Aplodinotus grunniens*
Gizzard Shad	*Dorsoma cepedianum*
Golden Redhorse	*Moxostoma erythrumum*
Golden Shiner	*Notemigonis crysoleucas*
Goldeye	*Hiodon alosoides*
Green Sunfish	*Hybopsis biguttata*
Hornyhead Chub	*Nocomis bigulatus*

Common Regional Fish Species, continued:

COMMON NAME	*SCIENTIFIC NAME*
Iowa Darter	*Etheostoma exile*
Johnny Darter	*Etheostoma nigrum*
Largemouth Bass	*Micropterus salmoides*
Bigmouth Buffalofish	*Ictiobus cypinellus*
Longnose Gar	*Lipisosteus osseus*
Mimic Shiner	*Notropis volucellus*
Mooneye	*Hiodon tergisus*
Ninespine Stickleback	*Pungitius pungitius*
Northern Pike	*Esox lucius*
Redbelly Dace	*Clinostomas elongatus*
Lake Chub	*Couesius plumbeus*
Northern Hog Sucker	*Hypentelium nigricans*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Orange-spotted Sunfish	*Leopomis humilis*
Pearl Dace	*Semotilis margarita*
Quillback Carpsucker	*Carpiodes cyprinus*
Rainbow Darter	*Etheostoma caeruleum*
River Shiner	*Notropis blennis*
River Carpsucker	*Ictiobus niger*
Northern Rockbass	*Ambloplites rupestris*
Rosyface Shiner	*Notropis rubellus*
Sand Shiner	*Notropis stramineus*
Sauger	*Stizostedion canadense*
Shortnose Gar	*Lepisosteus platostomus*
Silver Chub	*Hybopsis storiana*
Silver Redhorse	*Moxostroma anisurum*
Slenderhead Darter	*Percina Phoxocephala*
Smallmouth Buffalofish	*Ictiobus bubalus*
Smallmouth Bass	*Micropterus dolomieui*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Speckled Chub	*Hybosis aestivalisp*
Spottail Shiner	*Notropis hudsonius*
Stoneroller	*Camposoma anomalum*
Stone Cat	*Noturus flavus*
Tadpole Madtom	*Noturus gyrinus*
Walleye	*Stizostedion vitreum*
White Bass	*Manone chrysops*
White Sucker	*Catostomus commersoni*
White Crappie	*Promoxis annularis*
Yellow Perch	*Perca flavescens*
Yellow Bullhead	*Ictalurus natalis*

APPENDIX E

TABULAR LISTING OF PROJECT DATA

GENERAL

Primary drainage area ..... 1,690 square miles
Secondary drainage area ..... 1,660 square miles
Noncontributing area ..... 462 square miles
Devils Lake basin (noncontributing) ..... 3,573 square miles
Probable maximum flood (PMF) ..... 126,000 cfs
Project lands ..... 8,116 acres fee title
Project flowage easements ..... 666.2 acres

LAKE ASHTABULA:

Summer pool surface elevation (conservation pool) ..... 1266 feet NGVD.
Desirable summer operating limits ..... 1265.0 to 1266.0 feet elev.
Storage capacity* ..... 70,600 acre-feet
Surface area * ..... 5,430 acres
Length of pool* ..... ±27 miles
Width of pool* ..... 0.6 miles
Total shoreline* ..... ±78 miles
Maximum storage capacity, elev. 1276.0 NGVD ..... 137,500 acre-feet
Maximum depth* ..... ±46 feet

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* conservation pool – **cfs** = cubic feet per second – **NGVD** = National Geodetic Vertical Datum

Mean depth* ..... ±13 feet
Maximum elevation attained (July 1993) ..... 1268.61 NGVD
Minimum elevation attained (March 1996) ..... 1257.1 NGVD

BALDHILL DAM:

Type ..... Compacted earth fill
Length 1,650-feet
Crest elevation ..... 1283.5 NGVD
Top width 20-feet
Maximum height 66-feet
Freeboard above project pool 5-feet

SPILLWAY:

Type ..... Gated, gravity type ogee
Crest elevation ..... 1252 NGVD.
Length 140-feet
Three tainter gates ..... 40 feet wide, 20 feet high, radius = 20-feet
Elevation, top of gates when sealed ..... 1271 NGVD.
Elevation, service bridge, base of rail ..... 1278.92 NGVD.
Diameter of the two low-flow conduits 3-feet
Invert elevation conduit intake ..... 1238 NGVD.
Invert elevation of conduit outlet ..... 1234.5 NGVD
Total conduit discharge at project pool ..... 425 cfs
Total spillway discharge capacity at PMF ..... 60,000 cfs

CHUTE AND STILLING BASIN:

Width ..... 140 to 145 to 170-feet
Total length 169.9-feet

---

*conservation pool – **cfs** = cubic feet per second – **NGVD** = National Geodetic Vertical Datum

APPENDIX F

RECORD OF PUBLIC REVIEW AND COMMENTS

Public Review Period February 1 - 16, 2006.

NO COMMENTS RECEIVED

Lake Ashtabula Master Plan

US Army Corps of Engineers
St. Paul District

PLATES

January 2006

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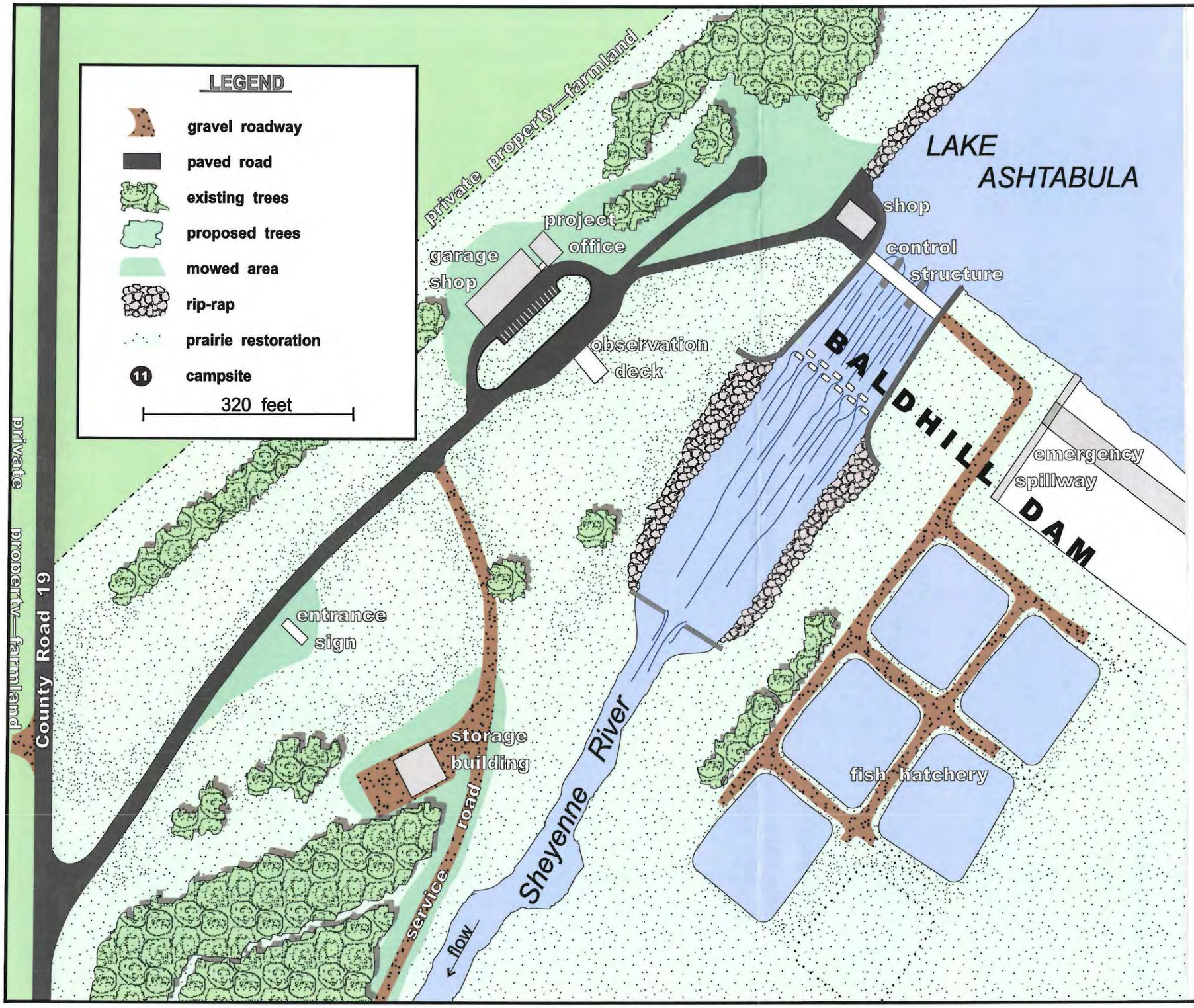
Lake Ashtabula Master Plan

US Army Corps of Engineers
St. Paul District

Regional, Area, and Vicinity Maps

plate 1



Lake Ashtabula Master Plan

US Army Corps of Engineers
St. Paul District

Baldhill Dam Operations Area

EXISTING CONDITIONS

plate 2

LEGEND

gravel roadway

paved road

existing trees

proposed trees

mowed area

rip-rap

prairie restoration

11 campsite

480 feet

LAKE ASHTABULA (Sheyenne River)

BALDHILL DAM

picnic area

boat launch and dock

fish cleaning station

visitor center

boat docks

fishing pier

concessions

swimming beach

beach shower

showers

parking

restrooms

picnic shelter

water

playground

volleyball court

tent camping area

fish cleaning station

restrooms

water

fee station

private property—farmland

tent camping area

restrooms

Lake Ashtabula Master Plan

US Army Corps of Engineers

St. Paul District

Mel Reiman Recreation Area

EXISTING CONDITIONS

plate 3

LEGEND

- gravel roadway
- paved road
- existing trees
- proposed trees
- mowed area
- rip-rap
- prairie restoration
- 11 campsite

400 feet

LAKE

ASHTABULA

(Sheyenne River)

boat launch and dock

private property—farmland

picnic shelter

fishing dock

play area

restrooms

water

information kiosk

concrete pad

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Sundstroms Landing Recreation Area

EXISTING CONDITIONS

plate 4

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St. Paul District

Eggerts Landing Recreation Area

EXISTING CONDITIONS

plate 5

LEGEND

- gravel roadway
- paved road
- existing trees
- proposed trees
- mowed area
- rip-rap
- prairie restoration
- 11 campsite

600 feet

LAKE ASHTABULA

private property—farmland

water

restrooms

showers/restrooms

trail

fee station and water

Campground Host (campsite 32)

tent camping area (sites 35-38)

swimming beach

playground

accessible campsite

water

docks

leased cabins

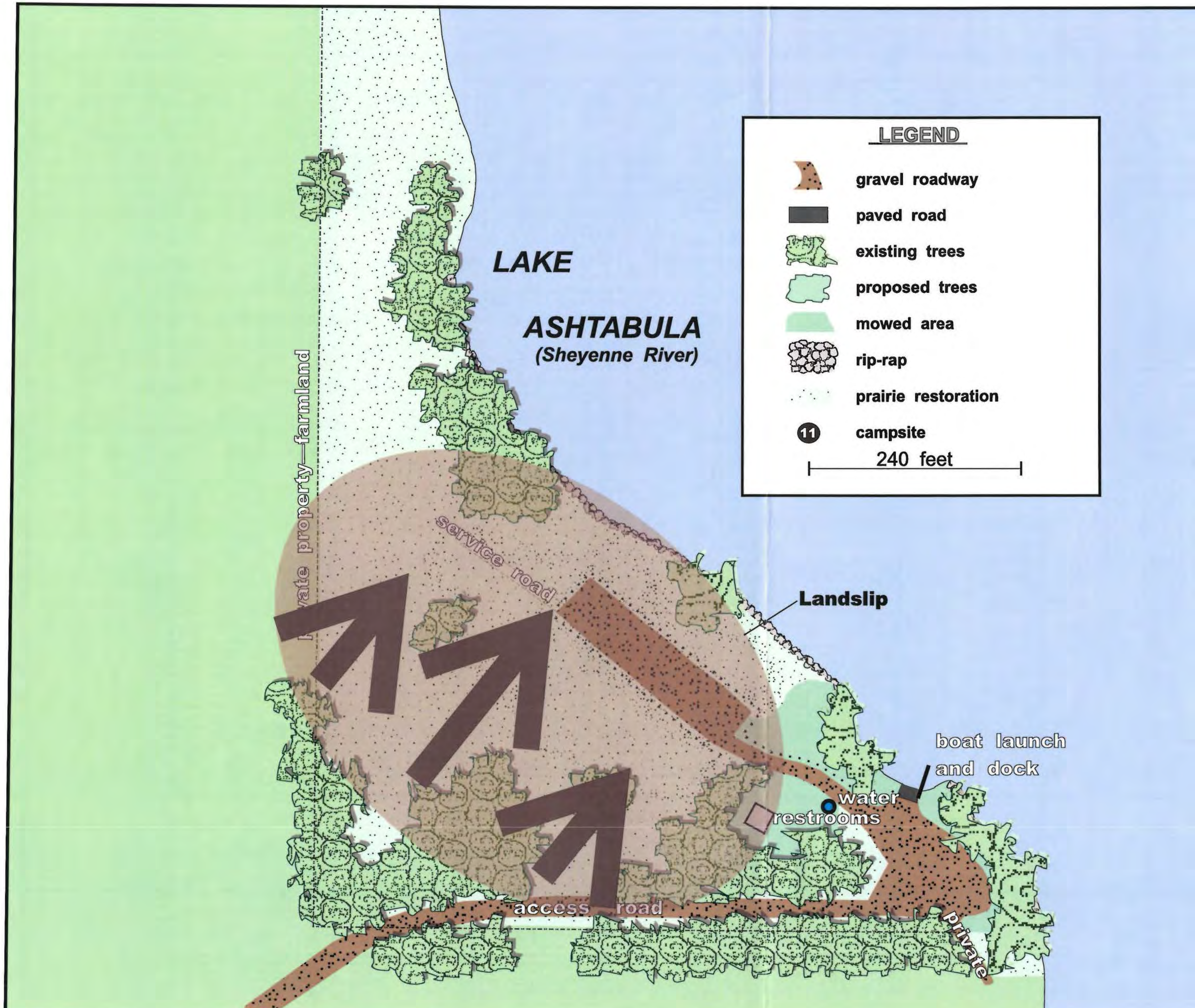
dump station

concessions

restrooms

fish cleaning station

boat launch and dock



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St. Paul District

Katie Olsons Landing Recreation Area

EXISTING CONDITIONS

plate 6

LEGEND

gravel roadway

paved road

existing trees

proposed trees

mowed area

rip-rap

prairie restoration

11 campsite

240 feet

LAKE ASHTABULA (Sheyenne River)

Campground Host (campsite 22)

tent camping area

beach shower

playground

swimming beach

picnic shelter

boat launch and dock

fee station

tent camping area

comfort station

entrance sign

County Road 21

private property

Lake Ashtabula Master Plan

US Army Corps of Engineers
St. Paul District

Ashtabula Crossing, East Recreation Area

EXISTING CONDITIONS

plate 7

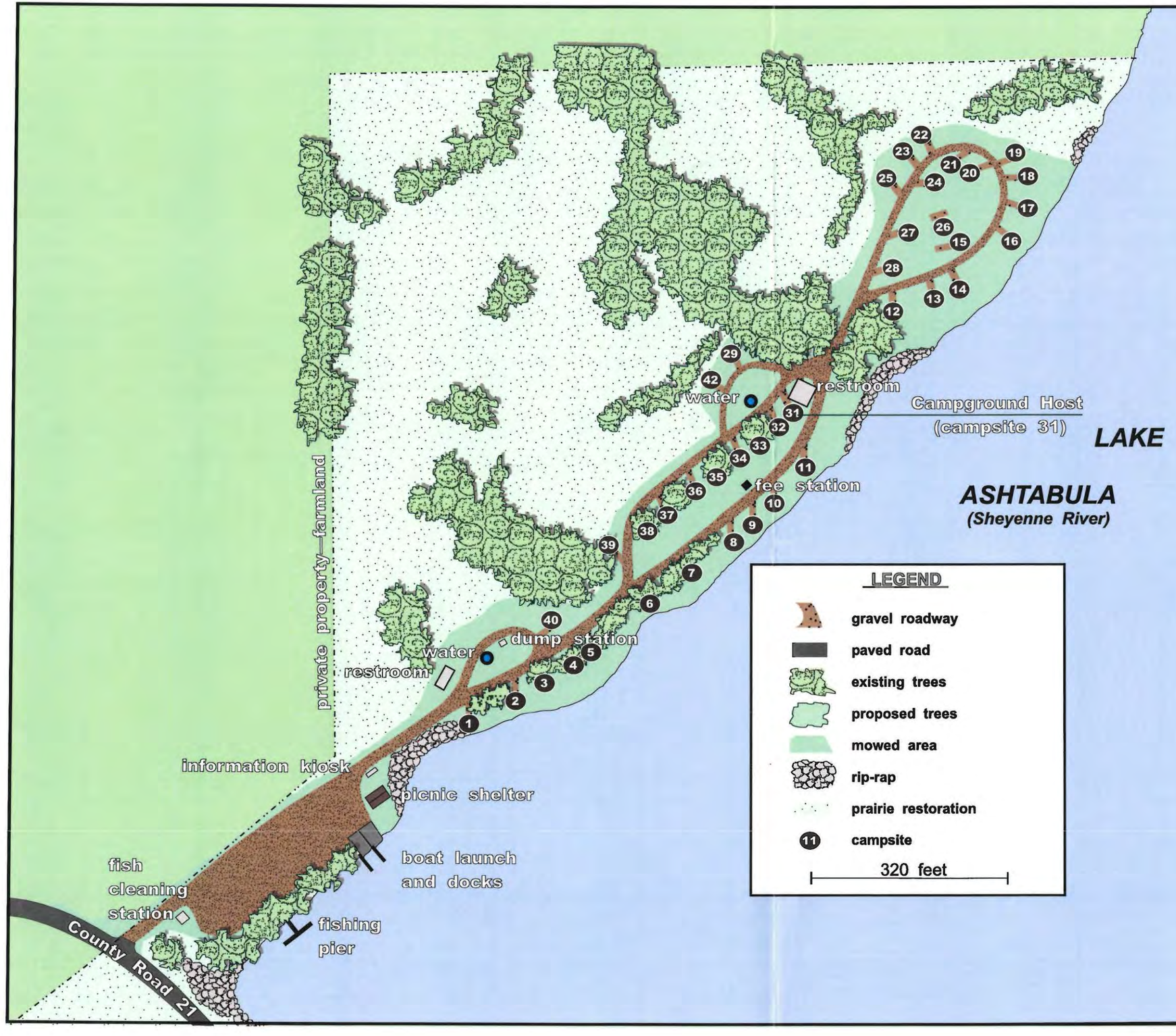
Lake Ashtabula Master Plan

US Army Corps of Engineers
St. Paul District

Ashtabula Crossing, West Recreation Area

EXISTING CONDITIONS

plate 8



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Sibley Crossing Recreation Area

EXISTING CONDITIONS

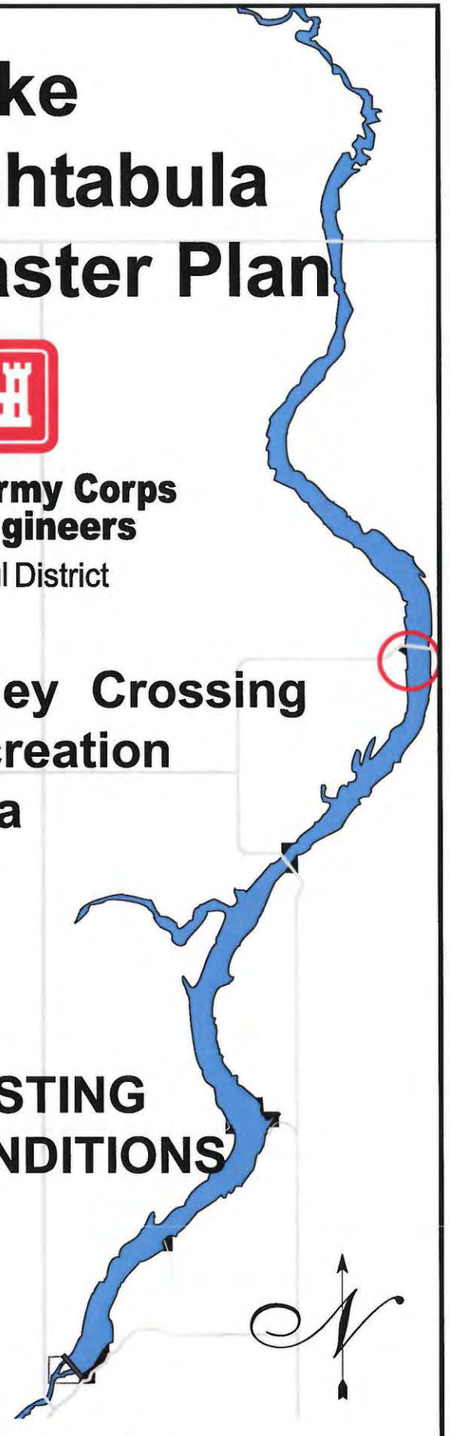
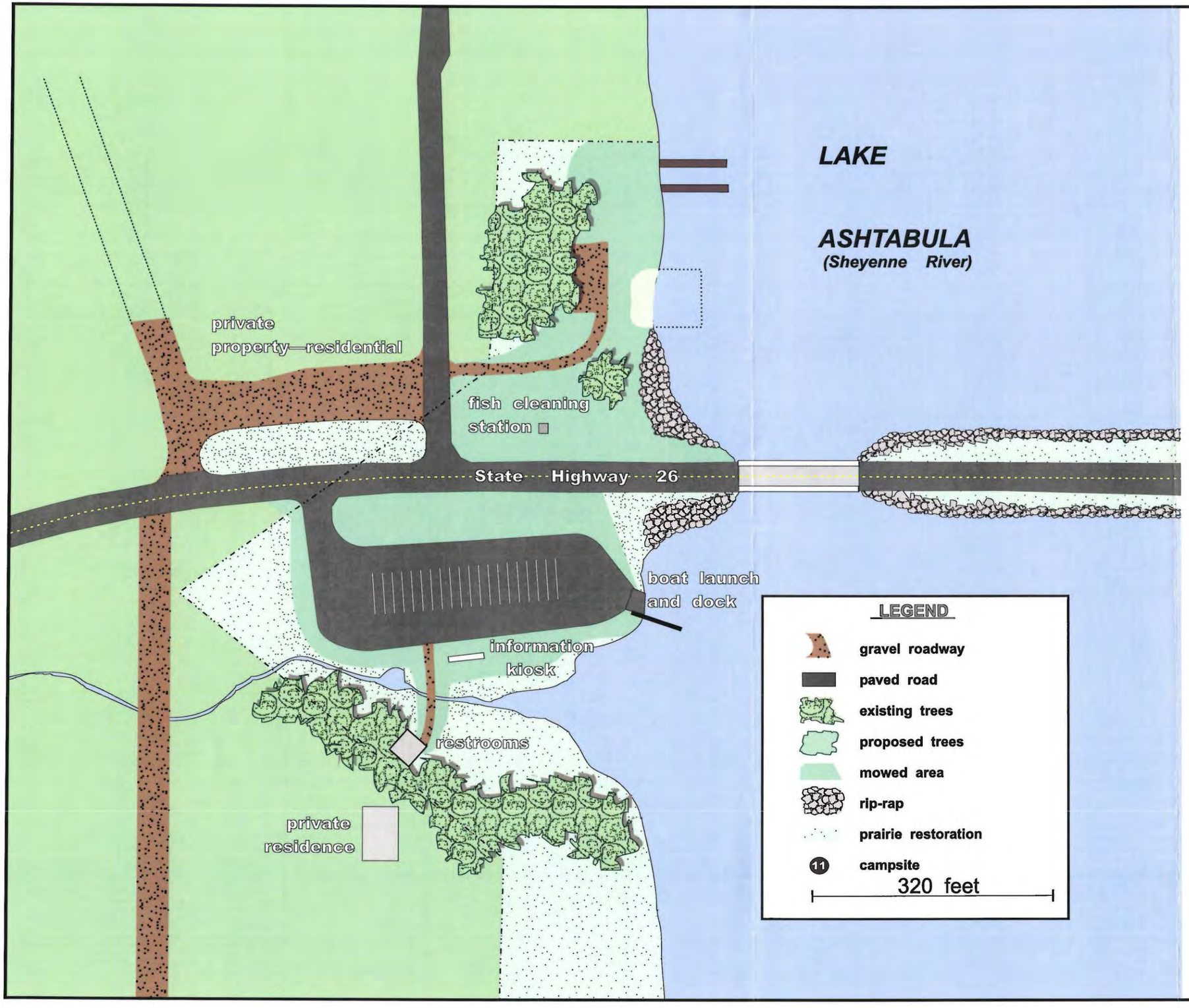


plate 9



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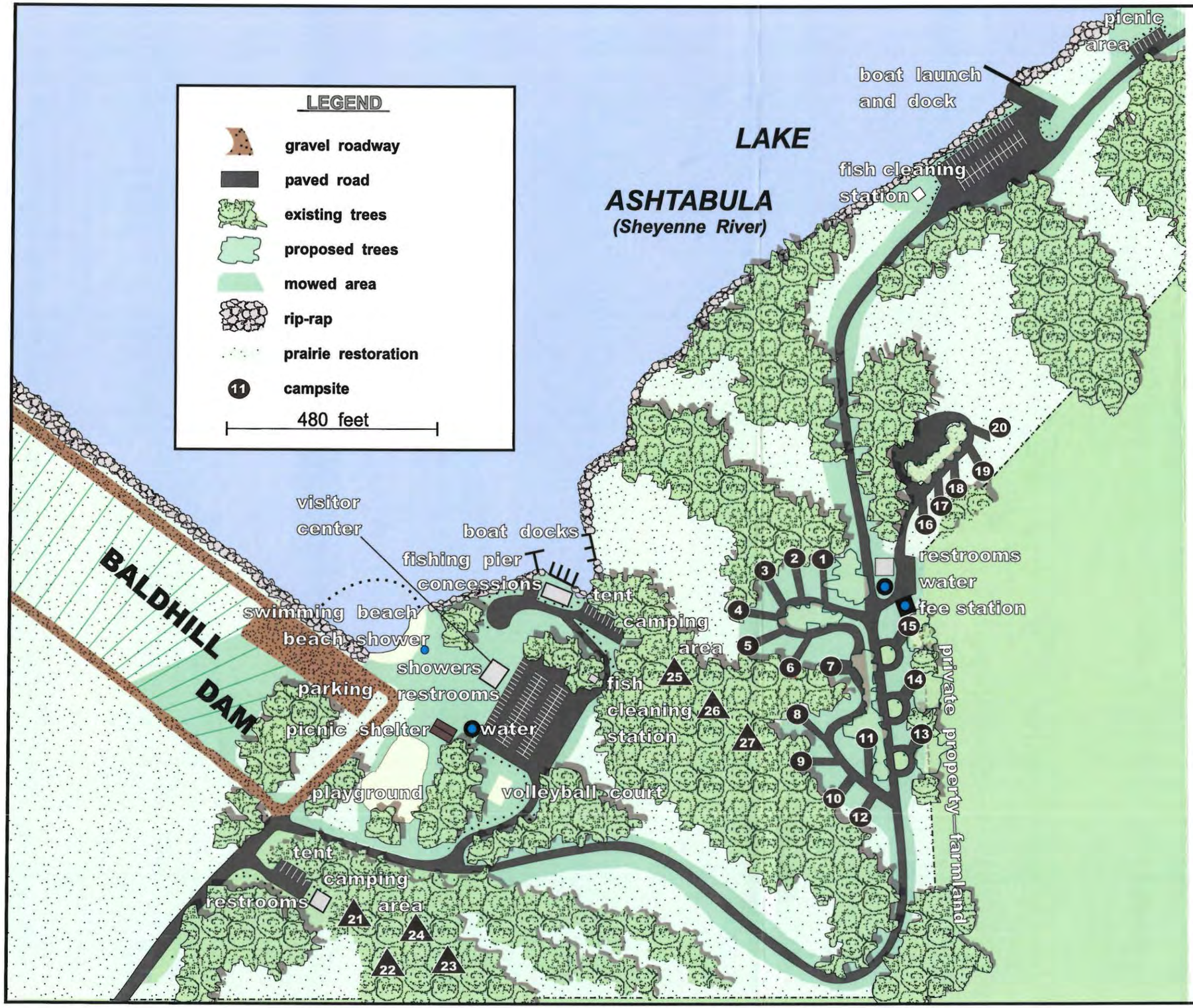
St. Paul District

Mel Reiman Recreation Area

PROPOSED DEVELOPMENT

plate 11



Lake Ashtabula Master Plan

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St. Paul District

Baldhill Dam Operations Area

PROPOSED DEVELOPMENT

plate 10

LEGEND

- gravel roadway
- paved road
- existing trees
- proposed trees
- mowed area
- rip-rap
- prairie restoration
- 11 campsite

320 feet

private property—farmland

LAKE ASHTABULA

shop

control structure

project office

garage shop

observation deck

BALDHILL DAM

emergency spillway

private property—farmland

County Road 19

entrance sign

storage building

service road

Sheyenne River

flow

fish hatchery

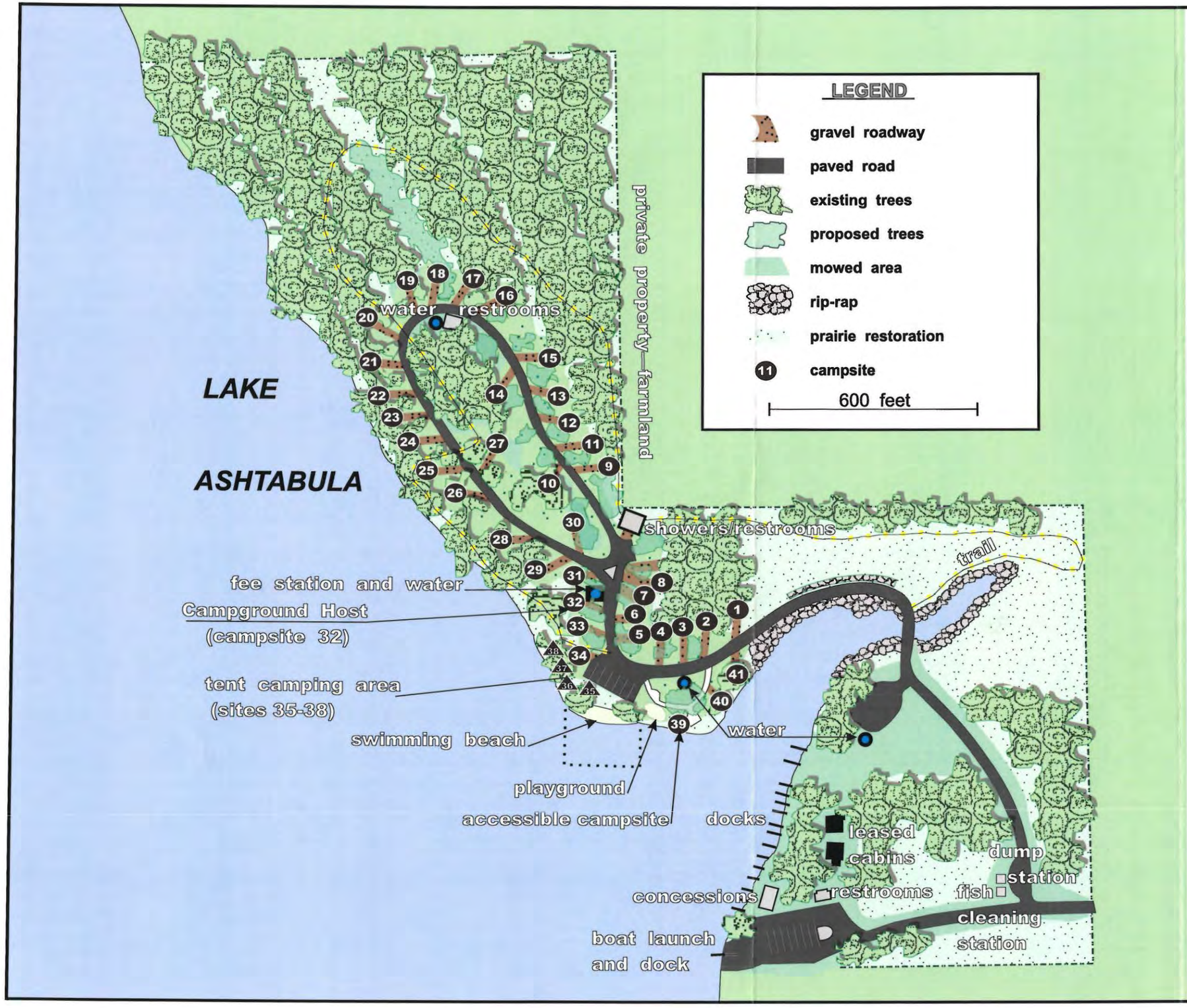
Lake Ashtabula Master Plan

US Army Corps of Engineers
St. Paul District

Eggerts Landing Recreation Area

PROPOSED DEVELOPMENT

plate 13



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Sundstroms Landing Recreation Area

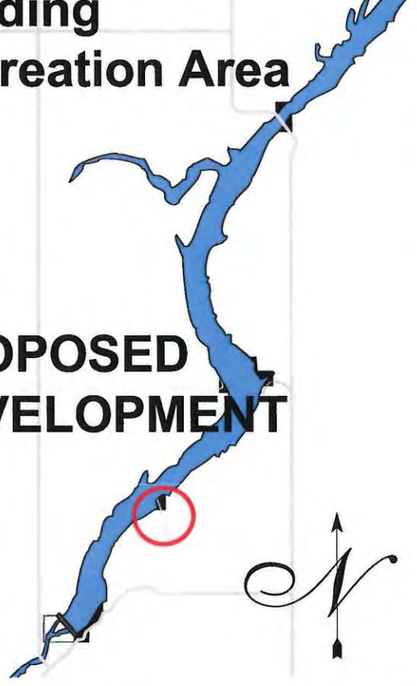
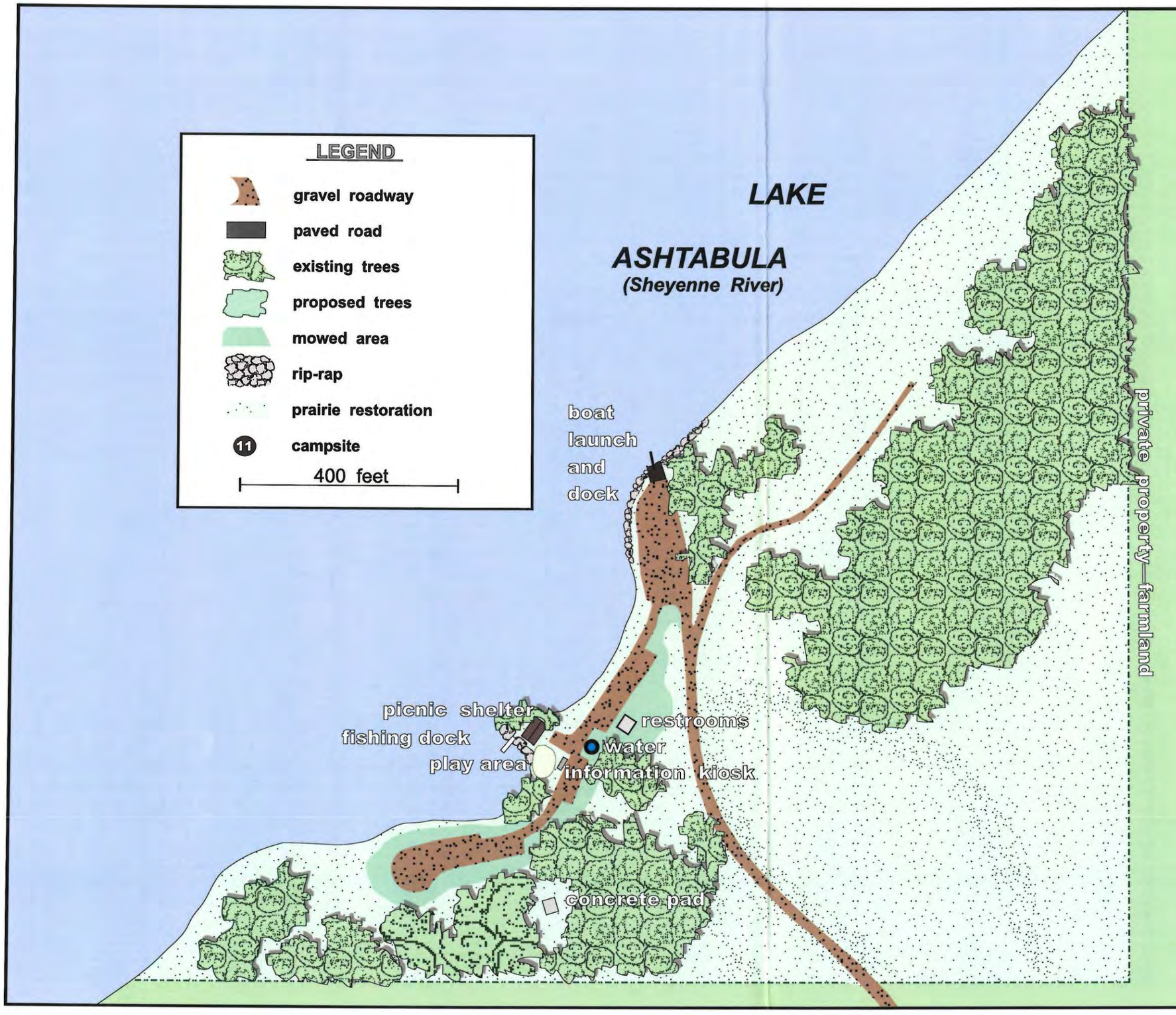


plate 12



Lake Ashtabula Master Plan

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St. Paul District

Katie Olsons Landing Recreation Area

PROPOSED DEVELOPMENT

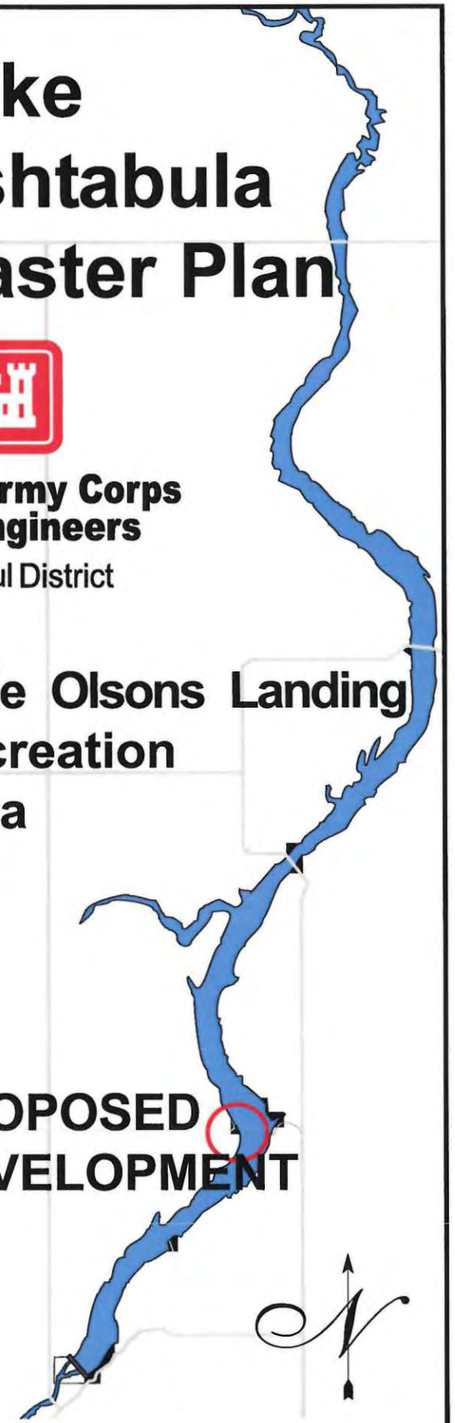
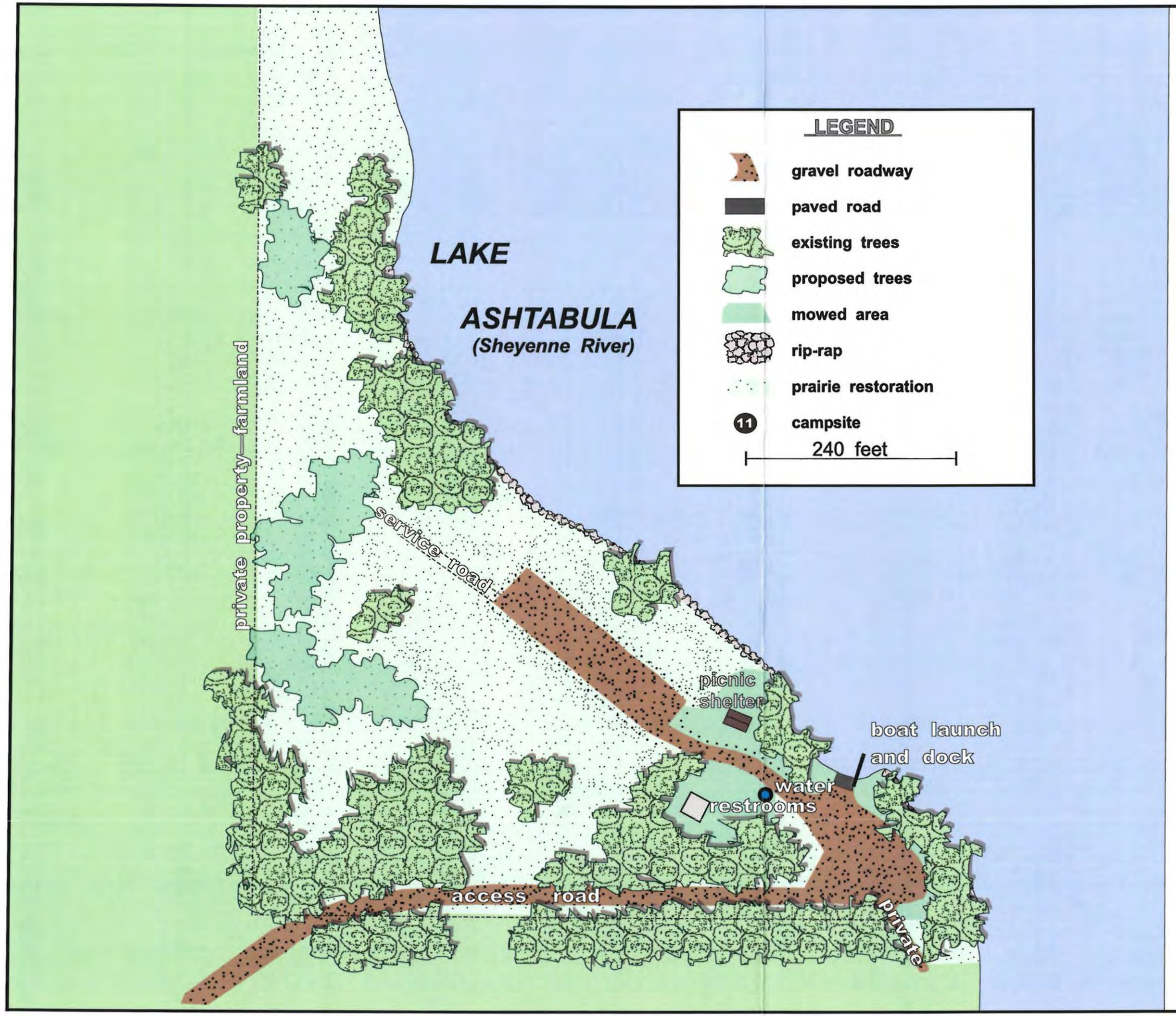


plate 14



Lake Ashtabula Master Plan

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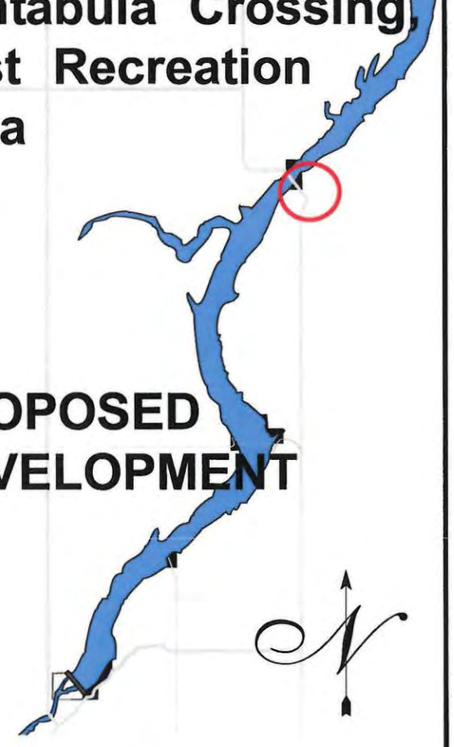
Ashtabula Crossing, East Recreation Area



PROPOSED DEVELOPMENT

plate 15

LEGEND

- gravel roadway
- paved road
- existing trees
- proposed trees
- mowed area
- rip-rap
- prairie restoration
- 11 campsite

240 feet

LAKE ASHTABULA (Sheyenne River)

Campground Host (campsite 22)

tent camping area

beach shower

playground

swimming beach

picnic shelter

private property

boat launch and dock

fee station

tent camping area

comfort station

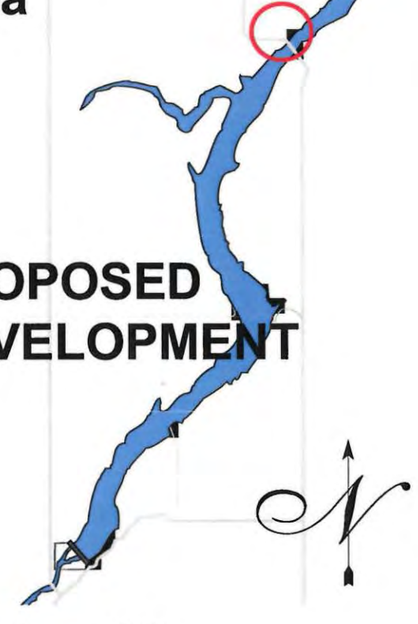
entrance sign

County Road 21

Lake Ashtabula Master Plan

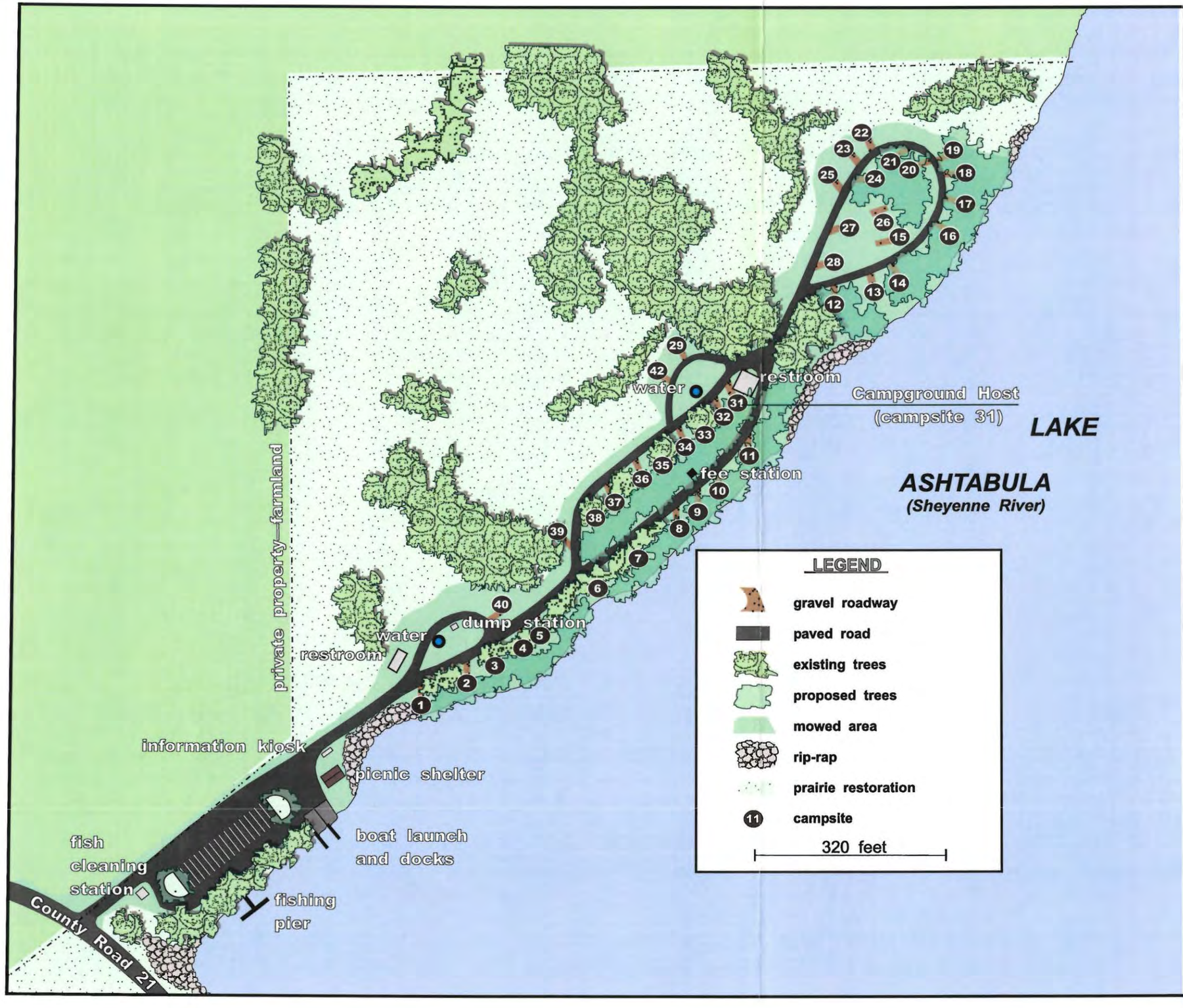
US Army Corps of Engineers
St. Paul District

Ashtabula Crossing, West Recreation Area



PROPOSED DEVELOPMENT

plate 16



Lake Ashtabula Master Plan

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Sibley Crossing Recreation Area

PROPOSED DEVELOPMENT

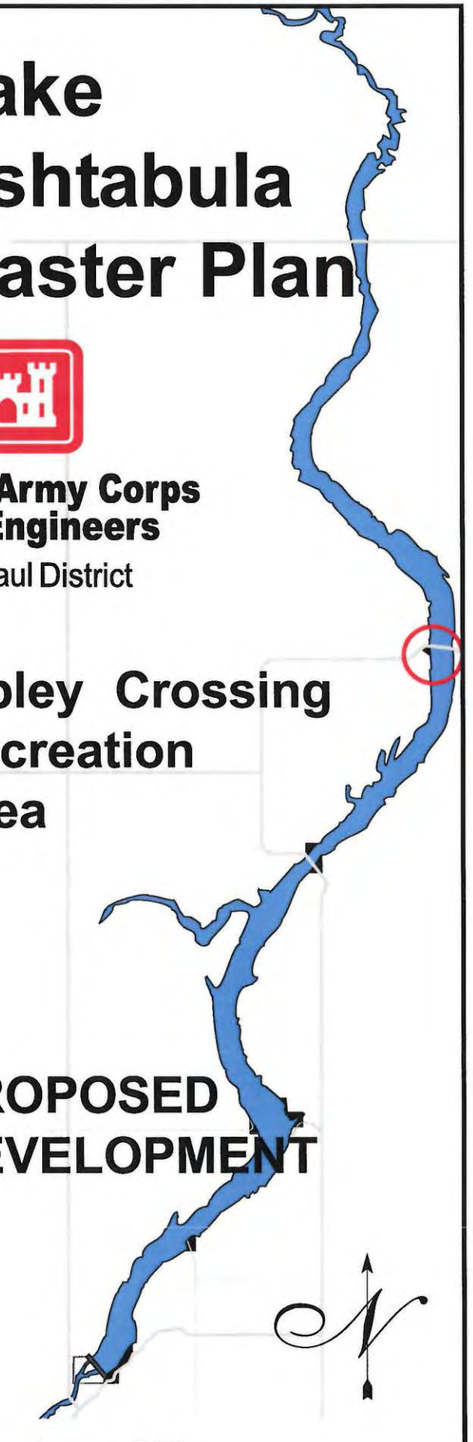

plate 17