Draft

US Army Corps of Engineers®
New Orleans District

Bonnet Carré Spillway Master Plan

May 2009

EXECUTIVE SUMMARY

United States (U.S.) Army Corps of Engineers (USACE), New Orleans District (MVN) has updated the 1998 Bonnet Carré Spillway Master Plan and this document supersedes the previous Bonnet Carré Spillway Master Plan. This Master Plan provides a comprehensive guide for use and development of the natural and man-made resources of the Bonnet Carré Spillway. Additionally, the Master Plan provides resource objectives, an overall land and water management plan, and associated design and management concepts.

BACKGROUND

Bonnet Carré Spillway was constructed to reduce flood damage risk, loss of life in the New Orleans metropolitan area, and other downstream communities, caused by high flood stages along the Mississippi River. Construction of the spillway was authorized by the Flood Control Act of 1928, as amended. It is an integral flood control feature of the Mississippi River and Tributaries project. Construction of the spillway structure began in 1929 and was completed in 1931. The spillway is designed to function like a valve that can be opened to divert a portion of the river's flow into Lake Ponchartrain, helping to relieve stress on the levees downstream.

The original Bonnet Carré Spillway Master Plan was approved by MVN's District Commander in 1998. The development of the plan included extensive involvement and input from the Bonnet Carré Citizen's Advisory Committee, which was appointed by the St. Charles Parish Council to represent the interest of various user groups at Bonnet Carré spillway. MVN also coordinated in depth with U.S. Fish and Wildlife Service and the Louisiana Department of Natural Resources.

The major goals of the 1998 Master Plan have been achieved over the past 11 years. One of the premier accomplishments of the 1998 Master Plan was the development of the partnership between MVN and South Louisiana Trailblazers Club. This partnership has resulted in the designation of two all-terrain vehicle (ATV) riding area totaling approximately 900 acres. This partnership has inspired other groups to work with MVN to advance their interests in Bonnet Carré Spillway. Specifically, the New Orleans Mountain Biking Club has developed extensive multi-purpose trails along the east guide levee as volunteers to the spillway.

Increased enforcement of Federal regulations on visitor activities and increased coordination and support from the St. Charles Parish Sheriff's Department has made Bonnet Carré Spillway a safer place for people to visit and has reduced noxious activities such as trash dumping, illegal gun firing, removal of trees, and vandalism and damages to Bonnet Carré Spillway resources. Also, road improvements have been accomplished and basic restroom facilities have been installed. Furthermore, an interpretive service and outreach program (ISOP) that provides information on the history and purpose of Bonnet Carré Spillway, environmental stewardship, and water safety was initiated as part of the 1998 Bonnet Carré Spillway Master Plan.

PURPOSE

The purpose of this Master Plan update is to provide guidance for further improvements needed to advance the natural resources program at Bonnet Carré Spillway for the next 5 years. This Master Plan update lists the improvements necessary to achieve Bonnet Carré Spillway's potential as a recreation resource for the people of Louisiana and to ensure the long-term health and productivity of the spillway's natural resources.

MAJOR FEATURES OF THE MASTER PLAN UPDATE

The Master Plan update focuses on expanding and further developing the decade-old Natural Resources Management program and interpretive services program, and providing guidance for future development of natural and man-made resources at Bonnet Carré Spillway. Future management and development of the Bonnet Carré Spillway consists of improving management of existing uses and potential development of facilities and actions with non-Federal sponsors.

A. Improved On-site Management

1. New Natural Resources Management Facilities. A new administrative building for the park ranger staff is needed to accommodate and advance the Natural Resources Management staff and better serve the visiting public. The optimal site for the Natural Resources Management office would be along the lower guide levee just south of U.S. Highway 61.

2. Spillway Road and Access Plan. A reliable road network is essential to spillway maintenance, surveillance of spillway resources, and control of public activities. The spillway's roadways also provide access for sand haulers, clay borrow operators, and spillway operations. Public use of the spillway's roadways is incidental to the purpose of the roads but nonetheless provides valuable recreational benefits. While providing access for the public to enjoy the spillway's natural resources is consistent with USACE policy, it is also necessary to institute some controls over vehicular access on spillway lands to enhance surveillance of prohibited activities and minimize damage to natural and man-made resources.

3. Improved Restrooms. Currently, restroom facilities at the Bonnet Carré Spillway consist of portable toilets at numerous sites around the spillway. These basic facilities do not meet the USACE's standard for minimum facilities and should be replaced with vault toilets at strategic locations of high visitor use and access. The recommended locations for toilet installation, in order of priority, are listed below:

   - U.S. Recreation Area: Vault toilets should be installed adjacent to the area leased to St. Charles Parish with potential for upgrade with water and sewer utilities through partnering with non-Federal sponsor.

- ATV Parking Lot: Facility will need to be design to account for flooding during leakage events and spillway openings. A possible solution is to design building to be removed and underground tank sealed during expected floods. Another possible solution is to sufficiently anchor the building so it will not be subject to movement during flood events.
- Jetty/Boat Launch at lake end of lower guide lsevee: Vault toilets should be installed adjacent to the area leased by St. Charles Parish.
- USACE Boat Launch at U.S. 61 and upper guide levee.
- St. Charles Road 12 (SC-12) near upper guide levee. The same design issues discussed for the ATV parking lot facility would apply at this restroom location.

4. Sand Hauling Program. The informal annual permitting program that has been in place for several decades needs to be replaced with a real estate leasing program that awards sand excavation and hauling privileges through a open and competitive process. The initial area identified for enactment of the leasing program is the spillway forebay, the area between the Mississippi River and the spillway control structure. The leasing program will employ reasonable lease conditions that are designed to set high standards for sand mining activities and define acceptable site conditions at the conclusion of excavation in a permit area.

5. Vegetative Management Plan. Prior to the approval of the 1998 Bonnet Carré Spillway Master Plan, the schedule for mowing and bush-hogging the clear areas of the spillway was driven almost exclusively by maintenance concerns. Over the last several years, mowing operations in specific areas have been curtailed or rescheduled to minimize conflicts with the spillway's natural resources.

6. Management of Clay Borrow Activities. The fisheries value of borrow pits created by clay borrow activity should be enhanced by increasing the diversity of the land water interface as well as providing structure for aquatic organisms. With the increase in clay borrow activity at the Bonnet Carré Spillway in the aftermath of Hurricane Katrina, spillway staff must remain involved in planning efforts for clay borrow pits at Bonnet Carré Spillway and closely monitor borrow operations to ensure adherence to contract stipulations.

7. Interpretive Services and Outreach Program. Bonnet Carré Spillway's ISOP has been effective in educating spillway visitors on the rules and regulation in force at the spillway. Efforts in the areas of water safety education, providing background information of Bonnet Carré Spillway, and environmental education will be stepped up to ensure fulfillment of MVN's mission.

8. Landscape Improvements. Spillway aesthetics have benefited greatly from implementation of the Natural Resources Management program since the

approval of the 1998 Master Plan. Dumping of trash has been greatly reduced and responses to eyesores on the spillway's landscape have been a priority with the spillway staff. However, opportunities for improving the landscape qualities of Bonnet Carré Spillway exist and have been identified in this Master Plan update.

9. Limited Expansion of ATV Use. Following the spillway opening in 2008 and during the 2008 to 2009 hunting season, the Bonnet Carré manager allowed limited use of ATVs outside the designated riding area to make access easier for those individuals trying to reach areas to crawfish and hunt. The limited allowance of ATV use outside the designated riding areas should continue. There is a clear distinction between off-road vehicle recreation where riding the vehicle off-road is the recreational activity and the use of ATVs to provide access for other activities such as hunting or fishing. This is especially true for persons with disabilities for whom ATVs provide access. This limited expansion of ATV use will be carefully managed to ensure it does not lead to abuse and undermine the successful ATV riding area program. Management should include the use of special use permits to ensure appropriate control, limitations on speed and area access, and required use of safety equipment for riders.

10. Shoreline Management and Stabilization. In the years since USACE purchased spillway lands in 1929, there has been significant erosion along the spillway's shoreline with Lake Ponchartrain. Spillway lands have been lost to this erosion and valuable wetlands have been damaged or lost. Over the years, efforts have been made to control the erosion and land loss with the placement of construction debris and riprap in areas accessible from the upper and lower guide levees. A shoreline management plan is needed to address the problems with erosion along the spillway's lakefront. The plan should evaluate possible solutions, identify funding options, and recommend an overall approach.

11. Bonnet Carré Freshwater Diversion Project. The construction of the Bonnet Carré Freshwater Diversion Project would directly affect a narrow corridor of spillway lands and waters adjacent to the upper guide levee. The purpose of the freshwater diversion project is to enhance Lake Ponchartrain and Mississippi Sound ecosystems. Although the freshwater diversion project has been designed to reduce adverse environmental effects in the spillway, more design features could be included to minimize impacts to and eventually enhance the spillway's natural resources. Seven modification to the freshwater diversion project are provided in the updated Master Plan and include:

    - Modify the design of the freshwater diversion project to significantly reduce the clearing of forest between the diversion structure and U.S. 61.
    - Modify the design of the freshwater diversion project to route a portion of the diverted freshwater into forested wetlands north of U.S. 61.

- Modify the design of the freshwater diversion project to retain diverted water to increase retention time within the spillway's wetlands.
- Modify the design of the freshwater diversion project to provide edge diversity along the diversion channel.
- Modify the design of the freshwater diversion project to locate dredge disposal haul roads north of U.S. 61 to minimize impacts to forested areas and maximize recreational access after completion of the freshwater diversion project.
- Modify the design to include a boat ramp on the Upper Borrow Canal near the U.S. 61 bridge crossing for spillway maintenance activities and to maintain existing recreational activities.
- Provide safe fishing access to the tailwater area of the proposed diversion structure. Minimal facilities (*i.e.*, guardrails, stair steps, and handrails) for public health and safety should be integrated into the design of the freshwater diversion project.

12. Potential Railroad Crossing Consolidation. Since 1993, the possibility of consolidating the three railroad crossings that cross the Bonnet Carré Spillway into one new, modern steel or concrete bridge on the Kansas City Southern Railroad alignment has been under study. The impacts on the spillway's operation, aesthetic resources, natural resources, and recreational activities will have to be evaluated. Continued coordination with the railroad design team is recommended.

B. Facilities/Actions Proposed for Development

1. Establishment of Four-Wheel Drive (4-WD) Truck Area. During the first public involvement meeting for the updated Master Plan, 4-WD enthusiasts requested MVN consider establishing a 4-WD truck area on spillway lands. This initial request at the public meeting and a subsequent meeting with 4-WD enthusiasts resulted in the review of options for establishing a 4-WD truck area. A proposed 4-WD truck area has been designated along the upper guide levee and immediately south of U.S. 61. Initially the 4-WD truck area would be authorized through USACE's special event permit program and the 4-WD enthusiasts would be required to provide insurance, site security and control, and to restore the area to previous conditions. The special event permit would be limited to several days or weekends.

2. Establishment of Horseback Riding Area. Since approval of the 1998 Master Plan, there has been an increase in horseback riding activity in the spillway. Currently, there are no designated use areas or prohibitions on this activity in the spillway. Generally, there are no conflicts between the horseback riders and other user groups. However, large group riding events typically are held at the U.S. 61 and Lower Guide Levee Recreational Area and conflicts between

user groups have been problematic at times. As part of the updated Master Plan, MVN has established a horseback riding area along the upper guide levee in the southern portion of the spillway. Initially, the designated riding area would be authorized through the USACE's special event permit program and the equestrian clubs would be required to provide insurance, site security and control, and to restore the area to previous conditions. The special event permit would be limited to several days or a weekend.

3. Provide a Safe Channel into Lake Ponchartrain. The St. Charles Parish boat launch located between the twin spans of Interstate 10 is utilized primarily by boaters accessing Lake Ponchartrain. Currently, the channel leading into Lake Ponchartrain is a poorly marked and unmaintained. The channel should be cleared and snagged, and properly marked to remove safety hazards and thereby provide a safe channel into Lake Ponchartrain.

4. Bike Trail along St. Charles Parish Road 12 (SC-12). Construction of a bicycle lane should be constructed adjacent to SC-12 to provide a connection between the segments of River Road located east and west of the spillway. The bicycle path would be constructed under the authority of the Intermodal Surface Transportation Act which allows for 85 percent Federal participation and 15 percent local participation. The Louisiana Department of Transportation and Development would be the local sponsor and would design the bike lane in coordination with MVN.

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1.0 INTRODUCTION

1.1 INTRODUCTION

United States (U.S.) Army Corps of Engineers (USACE), Mississippi Valley Division (MVD), New Orleans District (MVN) is in the process of updating the Bonnet Carré Spillway (spillway) Master Plan. The original Master Plan provided a comprehensive guide for use and development of the natural and man-made resources of the Bonnet Carré Spillway. Additionally, the Master Plan provided resource objectives, an overall land and water management plan, and associated design and management concepts.

This report is organized into 11 major sections including this introduction. Section 2.0 provides a description of the Bonnet Carré Spillway. Natural, cultural and social resources within and in the vicinity to the Bonnet Carré Spillway are provided in Section 3. Section 4.0 discusses the recreational opportunities on Bonnet Carré Spillway lands. Factors influencing and constraining resource use, development, and management are discussed in Section 5.0. Resource use objectives are discussed in Section 6.0 and a land classification plan for development and resource management is discussed in Section 7.0. Natural resources management guidelines are provided in Section 8.0. Master plan development and design criteria are discussed in Section 9.0 and special problems and constraints on Bonnet Carré Spillway lands are discussed in Section 10.0. A list of references used in the preparation of the updated master plan is provided in Section 11.0. Maps and drawings used to support the text in the master plan are provided as plates in Appendix A. A list of acronyms and abbreviations used in the master plan are provided in Appendix B. The Mississippi River and Tributaries (MR & T) Master Plan is provided in Appendix C and St. Charles Parish Ordinance 14-6 (Discharge of Weapons) is provided in Appendix D. St. Charles Parish Parish Ordinance No. 96-4-8 (Visitation Hours) is provided in Appendix E. A list of avian species found in the Bonnet Carré Spillway and vicinity is provided in Appendix F. Public comments from the informational workshop are provided in Appendix G. The Bonnet Carré Spillway Interpretive Plan developed as part of this update of the master plan is provided in Appendix H. Bonnet Carré Spillway hunting and fishing regulations for 2008 and 2009 are provided in Appendix I. Federal and state Hazardous, Toxic, and Radioactive Waste database definitions are provided in Appendix J.

1.2 PURPOSE AND SCOPE

The purpose of this document is to update the Bonnet Carré Spillway Master Plan. The Bonnet Carré Spillway is an integral flood control feature of the MR&T project. The spillway is located approximately 25 river miles upstream of New Orleans in St. Charles Parish, Louisiana (Figure 1-1). It consists of a massive concrete weir structure, upper and lower guide levees, and a 7,623 acre floodway that stretches from the Mississippi River to Lake Pontchartrain (Plate 1). Spillway construction was completed in 1936.

The purpose of the Bonnet Carré Spillway is to reduce flood damage risk and loss of life in communities downstream of the project.

The spillway was constructed to reduce flood damage risk, loss of life in the New Orleans metropolitan area, and other downstream communities, caused by high flood stages along the Mississippi River. The spillway is designed to function like a valve that can be opened to divert a portion of the river's flow into Lake Pontchartrain, helping to relieve stress on the levees downstream and prevent overtopping. First opened during the 1937 flood, it has also been used in the floods of 1945, 1950, 1973, 1975, 1979, 1983, 1997, and 2008.

Although the spillway has never been operated as a dedicated Federal recreation area, it has developed into an extensively used outdoor recreation area. Use estimates from the years 1959 through 1972 ranged from 250,000 to over 400,000 visitors annually. Recreation use surveys performed in 1994 indicated that visitation was approximately 250,000 per year. From 2007 through 2008 visitation estimates averaged 400,000 annually. Visitors to the spillway engage in a variety of outdoor recreation activities including boating, waterskiing, fishing, crawfishing, swimming, hunting, dog training, camping, picnicking, birding, operating off-road motorcycles, all-terrain vehicles (ATV's), and four-wheel drive (4-WD) trucks.

For three decades, outgrants for recreation activities in small portions of the spillway lands have been issued to local Government agencies. Limited facilities have been constructed by local interests as part of their recreation leases; however, most of the spillway's grounds and waterways are in a primitive condition. In addition to the designated recreation areas, the public has been allowed extensive access to spillway lands provided their activities do not interfere with operation and maintenance (O&M) of the spillway.

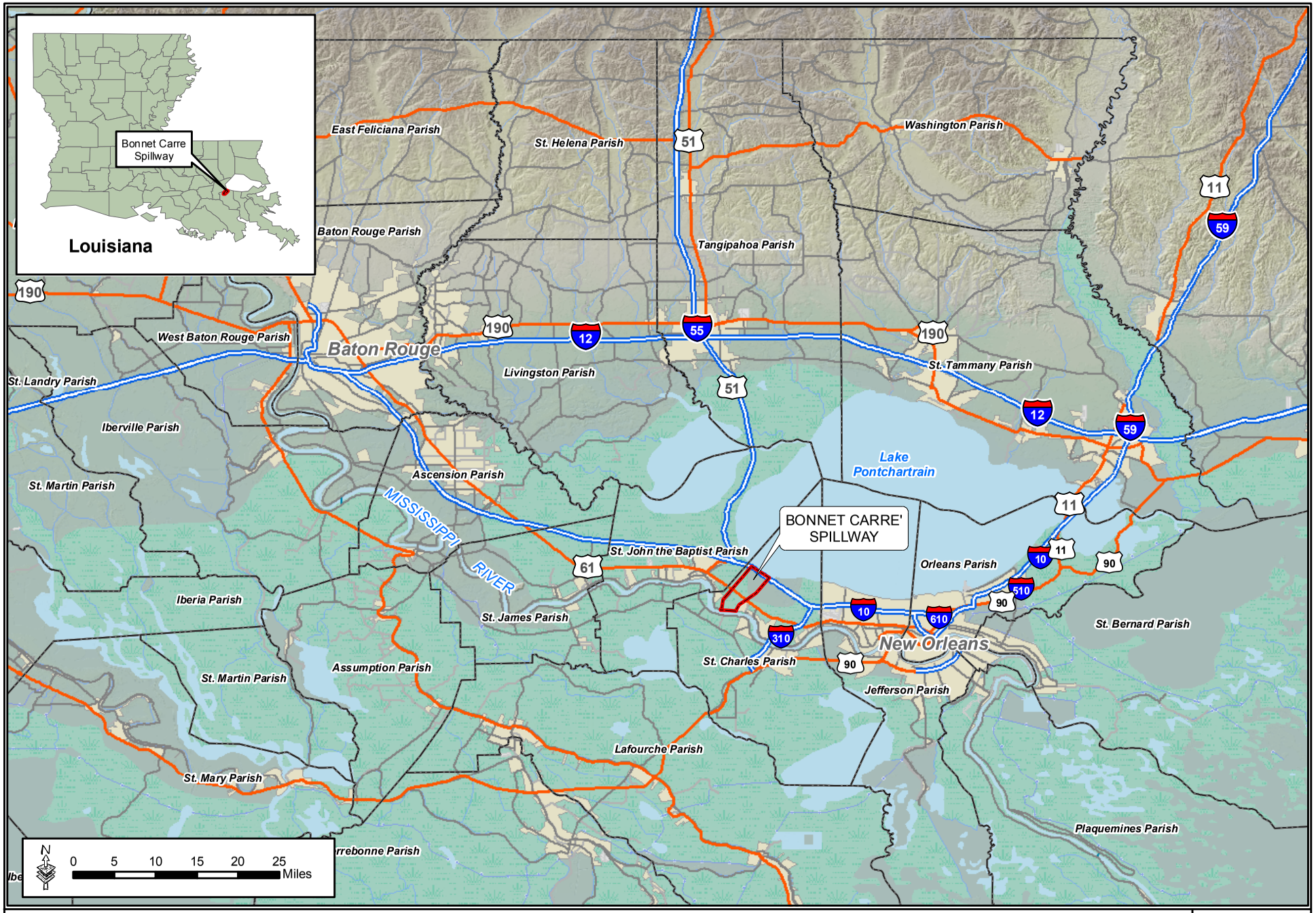

Figure 1-1: Vicinity Map

GSRC

April 2009

For decades public activities on spillway lands were unregulated.

For decades, public activities on the spillway's lands and waters were largely unregulated. The personnel assigned to the spillway were maintenance staff whose responsibilities were limited to the O&M of the spillway. Over time, the increasing popularity of the spillway led to numerous conflicts between users, and problems between users and neighboring residential areas. Conflicts between users were usually the result of incompatible activities occurring in the same or adjacent locale. An example is waterskiing activities occurring in the same areas as boat- or bank-fishing. In addition, several activities that occured in the vicinity of residential areas on the spillway's east boundary were problematic. These included riding of motorcycles and other off-road vehicles, and the discharge of firearms.

Beyond the concern over these conflicts, uncontrolled usage of the spillway also resulted in public health and safety problems as well as degradation of the spillway's recreational and natural resource values.

1.3 1998 SPILLWAY MASTER PLAN

Recognizing that changes in management of the spillway's man-made and natural resources were needed, U.S. USACE MVD, MVN undertook the development of a Master Plan for the spillway in the mid-1990s. The goals of the Master Plan were to:

- manage activities to avoid or reduce conflicts between existing users on spillway lands;
- address public health and safety issues related to public use activities;
- establish guidelines for the protection, conservation and enhancement of natural, cultural and man-made resources;
- provide guidance for the review and management of existing and proposed leases, easements, and permits for various activities in the spillway; and
- provide a comprehensive plan for future use and development.

Policy and guidance for the preparation of Master Plan documents are provided in Engineering Regulation (ER) and Pamphlet No. 1130-2-550, Chapter 3. In accordance with this regulation, the plan was developed by an interdisciplinary planning team.

The planning process focused on three primary objectives:

USACE Engineering Regulation 1130-2-550 provides the policy and guidelines for the preparation of Master Plans.

- the plan should address regional needs, particularly the goal of providing a high degree of recreational diversity;
- the plan should take advantage of the particular qualities and potentials of the spillway's natural and cultural resources; and
- the plan should be responsive to expressed public interests and desires.

The primary goal of the Master Plan process is to develop the best possible combination of natural and man-made features responsive to the above-listed objectives, consistent with the authorized purposes and Federal laws and directives of the spillway. In order to adequately understand public interests and desires, the Master Plan team employed an open and inclusive planning process.

The original Master Plan was approved by MVN's Commander in 1998.

The final Master Plan for the Bonnet Carré Spillway was approved by MVN's Commander in 1998. The development of the plan included extensive involvement and input from the Bonnet Carré Citizen's Advisory Committee, which was appointed by the St. Charles Parish Council to represent the interests of the various user groups at the spillway. Also heavily involved were staff of the U.S. Fish and Wildlife Service (USFWS) and the Louisiana Department of Natural Resources.

During the agency and public review period for the draft plan, a public meeting was held at Destrehan High School in Destrehan, Louisiana to obtain comments from the users of spillway lands and its neighbors. Comments received during the public and agency review period were generally positive and resulted in a few minor changes to the Master Plan. One significant change to the plan resulted from the public review. Numerous individuals and groups commented that the designated off-road vehicle areas in the draft Master Plan were too limited in size and physical characteristics. As a result and after additional environmental review, the final Master Plan provided for an expansion of ATV and motorcycle use into the wooded area adjacent to the Lower Borrow Canal (Plate 2).

1.4 STATUS OF PROJECT NATURAL RESOURCES MANAGEMENT

The approval of the 1998 Master Plan was a watershed event for the spillway, resulting in a significantly expanded management role for MVN. After decades focused exclusively on maintenance activities, the spillway staff was augmented with the addition of park

The 1998 Bonnet Carré Spillway Master Plan expanded MVN's management functions of spillway.

rangers whose primary responsibilities were natural resources management (NRM) and enforcement of rules and regulations governing public use of the spillway's lands and waters. More recently, the organization of spillway staff was altered to install a project manager on-site to oversee all spillway personnel (*i.e.*, park rangers and maintenance workers).

The major goals of the Master Plan have been achieved over the past 11 years. Of prime importance has been the partnership developed between MVN and local ATV and motorcycle enthusiasts who formed South Louisiana Trailblazers Club. This partnership has resulted in the designation of two ATV use area encompassing a total size of approximately 900 acres. This partnership has inspired other groups to work with MVN to advance their interests on spillway lands. Most notable is New Orleans Mountain Biking club that through volunteer efforts has developed extensive multi-purpose trails along the lower guide levee.

The enforcement of Federal regulations on visitor activities and increased coordination and support from the St. Charles Parish Sheriff's Department has made spillway lands a safer place for people to visit and has reduced illegal and unsafe activities such as trash dumping, illegal gun firing, removal of trees, and vandalism and damage to the spillway's resources. Road improvements have been accomplished and basic restroom facilities have been installed. An interpretive services program that provides information on the history and purpose of the spillway, environmental stewardship, and water safety has been initiated.

Much has been accomplished but the purpose of this Master Plan update is to provide guidance for further improvements needed to advance the NRM program at the spillway. This Master Plan update lists the improvements necessary to achieve the spillway's potential as a recreation resource for the people of Louisiana and to ensure the long-term health and productivity of the spillway's natural resources.

1.5 PERTINENT MEMORANDA AND REPORTS

1.5.1 Bonnet Carré Spillway Public Use, Health and Safety: Quality Circle Study Report, September, 1986

This report presented an analysis of public use, health and safety issues on spillway lands. The liability exposure revealed by three lawsuits resulting from serious injuries and deaths on spillway lands during 1980 and 1982 spurred the formation of the Quality Circle to study the problems and develop alternative solutions. The lawsuits

alleged negligence by the Government in not providing adequate protection for visitors to the spillway.

The basic problem identified by the study team was the hazardous nature of much of the public use activity occurring in the spillway. This problem is compounded by the lack of official (MVN or other Government entity) supervision or control over user activities. Only minimal public safety features had been constructed at the Bonnet Carré Spillway and on-site spillway staff were limited to maintenance activities.

The Quality Circle Study Report identified hazardous activities resulting from the lack of management as the primary problem at the spillway.

Finding that Alternative A., the "no action" alternative, was not acceptable, the study team recommended three responses to the problem, listed below in descending order of preference:

- Alternative B. Joint Development with Local Sponsor(s)
- Alternative C. Federal Development
- Alternative D. Closure to the Public

In a 16 October 1986 first endorsement to the study team's recommendations, MVD agreed that Alternative B. [Joint Development with Local Sponsor(s)] should be pursued first. MVD also concluded that Alternatives C and D were not viable options and recommended the consideration of two additional alternatives. These included the interim measures proposed in the study report that would limit unsanctioned and dangerous activities throughout the spillway. The other alternative to be considered was disposal of the fee title interest on spillway lands.

No action was taken by MVN on the Quality Circle study report.

MVN responded to MVD's comments in a December 1987 second endorsement. Although initial interest in local sponsorship was expressed by several state and parish agencies, MVN reported that no agency was willing to commit to joint recreational development (Alternative B.). MVN also found that disposal of the fee title interest on spillway lands was not a viable solution. Having exhausted the recommended alternatives contained in the Quality Circle study report, MVN suggested implementation of the interim action plan contained in that report. This plan included the prohibition of certain hazardous activities (boating, swimming, off-road vehicle use, *etc.*), empowerment of the spillway maintenance foreman with Federal citation authority, termination of the St. Charles Parish recreation lease along the lower guide levee near U.S Highway 61 (U.S. 61), signage and a public information program (Plate 1).

Although a team from MVD made an on-site visit to view the problem and gather information, no response to the second endorsement was received from MVD. Consequently, no action was taken by MVN.

1.5.2 MR&T Design Memorandum No. 1A Preliminary Master Plan for Public Access and Recreation, September 1964

This document presented a preliminary Master Plan for recreational development on the Mississippi River within MVN. The report was approved for planning purposes by the Chief of Engineers on 19 January 1966. However, with this approval USACE required that implementation be deferred until adequate assurance is obtained from local sponsor(s) to participate on a 50 percent basis in the cost of developments proposed in the plan. A copy of the preliminary Master Plan and approvals is provided in Appendix C.

The plan stated that recreational use on MR&T project lands exceeded 400,000 annual visitors and projected that, with adequate facilities, the visitation would exceed 1,000,000 annually. Facility development recommended in the plan consisted of roads, boat ramps, parking areas, trails, comfort stations, landscaping, information signs, and picnicking and camping areas. Construction of the proposed facilities was estimated to cost $1,584,300 in 1964 dollars.

1.5.3 Bonnet Carré Spillway O&M Manual, September 1962

This document provides general instructions for the inspection, O&M of Bonnet Carré Spillway. The O&M manual directs the superintendent to maintain all structures, plant, equipment, property, and grounds in a state of readiness for spillway operation as required.

Paragraphs 14 and 15 of the O&M manual explicitly address the handling of visitors to the spillway. Visitors are not permitted on the spillway structure during operations. However, small groups of visitors accompanied by an MVN employee may be permitted on the structure when not in operation. Spillway personnel are directed to contact local law enforcement authorities when visitors become “unruly to the extent of endangering the welfare of others.” The manual further directs that “trespassers” and those who violate laws at the spillway will be arrested and prosecuted utilizing “established procedure.”

1.5.4 Bonnet Carré Spillway Water Control Manual, September 1999

The purpose of this manual is to provide information in sufficient detail to aid the water control decision-making process. In section 2-06. Public Facilities, the visitor control guidelines provided in the O&M manual described above are largely reiterated.

1.5.5 Bonnet Carré Spillway Master Plan, April 1998

The 1998 Bonnet Carré Spillway Master Plan presented provided recreation and NRM goals and objectives, as well as details on possible improvements to the site for public health and safety and visitor assistance. The plan outlined three separate phases to bring the spillway towards compliance. Recreational facility development would be cost-shared with non-Federal interests and would consist of minimal type features that would serve the visiting public while cognizant of the flood prone nature of spillway lands.

1.6 MASTER PLAN APPROVAL AND FUTURE DOCUMENTS

The approved Master Plan serves as the definitive guide for use and development of the natural and man-made resources on spillway lands. All actions by MVN and outgrantees must be consistent with the approved Master Plan. The Master Plan is reviewed every 5 years to ensure its relevance to conditions at the spillway. This Master Plan is being prepared as an update to the 1998 Bonnet Carré Spillway Master Plan.

The Master Plan guides the development and management of resources within the Bonnet Carré Spillway.

The approved Master Plan serves as the basis for preparation of an Operational Management Plan (OMP). The OMP is prepared as a separate document which provides in detail the specific operation and administration requirements for natural resources and park management. These details include implementation plans, funding, staffing, and equipment needs. Essentially, the OMP is the working document that implements the objectives and concepts contained in the approved Master Plan. The OMP is updated annually.

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SECTION 2.0
BONNET CARRÉ SPILLWAY DESCRIPTION

2.0 BONNET CARRÉ SPILLWAY DESCRIPTION

2.1 AUTHORIZATION

The Bonnet Carré Spillway was authorized by the Flood Control Act of 15 May 1928, as amended. It is an integral part of the comprehensive MR&T project which was implemented in response to the Great Flood of 1927.

Construction of the spillway structure began in 1929 and was completed in 1931. The guide levees were completed in 1932; highway and railroad crossings were completed by 1936. The total cost was $14.2 million.

MR&T Design Memorandum No. 1A, Preliminary Master Plan for Public Access and Recreation (1964) authorizes the preparation of a separate Master Plan for the spillway. A Master Plan was prepared in April 1998 in accordance with this memorandum and the guidance provided in ER 1130-2-550 dated 15 November 1996. This document is an update to the April 1998 Master Plan.

2.2 LOCATION AND PURPOSE

The Bonnet Carré Spillway is located near LaPlace in St. Charles Parish, Louisiana. Situated between New Orleans and Baton Rouge and traversed by Interstate 10 (I-10) and U.S. 61, the spillway is a significant landscape feature in southeastern Louisiana.

The Spillway protects the New Orleans metropolitan area from Mississippi River floods.

As a component of the MR&T project, the primary purpose of the spillway is flood damage and risk reduction. Specifically, it protects New Orleans and other downstream communities from Mississippi River floods by discharging excess floodwaters into Lake Pontchartrain and thence into the Gulf of Mexico (Photograph 2-1). The spillway is designed to convey

Photograph 2-1. Operation of Spillway Structure in 2008

250,000 cubic feet per second (cfs) of Mississippi River floodwaters. In a major or project flood, it can be operated alone or in combination with the Morganza Floodway (located on the west bank of the Mississippi River, approximately 50 rivers miles above Baton Rouge) and the Old River Control Structure (approximately 35 rivers miles north of Morganza).

The authorizing legislation requires that the spillway be operated to prevent river stages from exceeding 20 feet National Geodetic Vertical Datum (NGVD) at the Carrollton Gauge in New Orleans. All other uses of the spillway are subordinate to keeping the spillway in a physical state of readiness to accomplish its primary purpose.

2.3 ENGINEERING FEATURES AND PERTINENT DATA

The spillway consists of a massive concrete weir adjacent to the Mississippi River, a leveed floodway stretching from the river to Lake Pontchartrain, spillway office and warehouse buildings, various highway and railroad crossings, and miscellaneous pipeline and utility crossings.

2.3.1 Control Structure

The control structure is a concrete, gravity overfall dam controlled by manually operated timber needles. The control structure is founded on untreated timber pilings and has a steel sheet piling cutoff wall 45 to 55 feet in depth on the riverside of the weir. Immediately lakeward of the control structure and integral to it is a shallow, reinforced concrete stilling basin approximately 50 feet wide with three rows of low concrete baffle piers. Beyond the lakeward row of baffle piers there is a heavy articulated concrete mat 175 to 225 feet wide, underlain by an inverted filter of gravel, spalls, and riprap.

The control is 7,000 in length and consists of 350 bays.

The control structure is 7,000 feet in length. It consists of 350 bays, each 20 feet in width, separated by reinforced concrete piers 2 feet thick which carry two I-beam and concrete operating bridges. There are 176 bays with a weir crest of 17.0 feet NGVD and the remaining 174 bays have a weir crest of 15.0 feet NGVD. Each bay is closed with 20 timber needles whose actual dimensions are 8” x 11.5” to permit operation without binding. The loose fit of the needles also allows seepage of river water into the floodway during high Mississippi River stages.

The lengths of the timber needles are 10 and 12 feet, depending on the elevation of the crest of the control structure’s weir. When in

place, the needles are seated on the control structure crest and lean against a reaction beam. When the bays are opened, the needles are stored by hooking one end of each below the upstream service bridge and resting the other end on the reaction beam. Two diesel-powered, traveling gantry cranes are provided for removing and installing the needles.

2.3.2 Floodway

The floodway conveys the floodwaters from the weir structure to Lake Pontchartrain (Photograph 2-2). This flooding is confined by upper and lower guide levees. The levees in the upland portion of the floodway are of standard Mississippi River Commission cross-section, but the levees located in forested wetlands (swamp) closer to the lake are designed with broad bases and flat slopes for construction by hydraulic methods. The elevation of the levees is approximately 19 feet NGVD. The floodway is 5.7 miles long, 7,700 feet wide at the river end and 12,400 feet wide at the lake end. Ground elevations in the floodway range from approximately 12 feet NGVD near the river to 0 feet NGVD at the Lake Pontchartrain shoreline. The area of the floodway is approximately 7,623 acres.

Flooding during spillway operation is confined by the spillway's upper and lower guide levees.

Photograph 2-2. Aerial View of Floodway from Lake Ponchartrain during 2008 Opening

2.3.3 Project Buildings

The spillway office building (Photograph 2-3) is located directly adjacent to the downstream terminus of the spillway structure. It is situated on the protected side slope of the Mississippi River Levee and its confluence with the lower guide levee, and is elevated to allow full view of the structure and bordering floodway. The building includes an office

Photograph 2-3. Bonnet Carré Office

for the spillway manager, a reception area, a large conference room, a rest room and small kitchen area. Five parking spaces are provided in front of the building with additional parking space for vehicles available across the road and near the structure.

Adjacent to the office building and located on the protected side of the levee is the maintenance facility and fenced storage yard. Spillway maintenance equipment is secured in this area.

2.3.4 Highway and Railroad Crossings

The floodway is crossed by two highways, a local parish road, and three railroad lines.

The floodway is crossed by two highways and a local parish road. I-10 crosses the floodway approximately 2.1 miles east of U.S. 61, follwing the southern boundary of Lake Ponchartrain (Plate 1). It is a divided bridge resting on concrete piers. U.S. 61, also known as Airline Highway, is located in the central portion of the floodway. This crossing is also elevated on concrete piers for the majority of its length in the spillway. Earthen embankments extend for some distance into the floodway from both ends of the bridge.

The remaining road crossing is St. Charles Parish Road 12 (SC-12) immediately lakeward of the spillway structure (Plate 1). This is a grade level crossing which essentially is a continuation of Louisiana Highway 48 (River Road). SC-12 is also known as Spillway Road. Another roadway located on spillway lands is Louisiana Highway 628, also known as CC Road, which connects River Road on the upstream side of the spillway with U.S. 61. This roadway is located on the protected side of the upper guide levee.

The floodway is crossed by three railroad lines (Plate 1). All three lines predate the construction of the spillway and, therefore, required the construction of new bridge crossings at the time of spillway construction. All three are ballast railway beds elevated on timber trestles. Two of the lines are located between the spillway structure and U.S. 61. Closest to the structure is the National Canadian Railroad - Baton Rouge Subdivision. The next rail line away from the spillway structure is the Kansas City Southern Railway – New Orleans Subdivision located just south of U.S. 61. The final railroad crossing in the floodway is the Canadian National Railroad - McComb Subdivision which is located near Lake Pontchartrain just south of I-10.

2.3.5 Miscellaneous Features

In addition to the highway and railroad crossings, the Bonnet Carré Spillway contains numerous pipeline, powerline and other utility rights-of-way. Miscellaneous encroachments on spillway lands

such as foot bridges over the outside drainage canals, radio tower locations, *etc.* also exist. These uses are allowed under various outgrants.

2.4 PROJECT OPERATION

The Bonnet Carré Spillway has been operated nine times in 76 years.

The estimated frequency of spillway operation is once every 10 years. In the 76 years the spillway has been available for use, it has been opened nine times. First opened during the 1937 flood, it has been used also in the floods of 1945, 1950, 1973, 1975, 1979, 1983, 1997, and 2008. All 350 bays were opened except in 1937, 1975, 1997, and 2008 when 285, 225, 298, and 160 bays were used, respectively. During the 1937 flood, the spillway was open for two months and lowered river stages at New Orleans by 3.5 feet. Dates and maximum flows for each opening are provided in table 2-1:

Table 2-1. Bonnet Carré Spillway Openings

Year	Dates of operation	Bays Open	Maximum Flow (cfs)
1937	28 Jan to 16 Mar	285	211,000
1945	23 Mar to 18 May	350	318,000
1950	10 Feb to 19 Mar	350	228,000
1973	8 Apr to 21 Jun	350	207,000
1975	14 Apr to 26 Apr	225	110,000
1979	17 Apr to 31 May	350	228,000
1983	20 May to 23 Jun	350	268,000
1997	17 Mar to 18 Apr	298	243,000
2008	11 April to 8 May	160	160,000

The spillway is operated and maintained by MVN Operations Division. A permanent staff of nine employees maintains the structure and floodway in a state of readiness at all times. This staff forms the nucleus of the larger operating crew necessary to open the spillway structure during a flood. Additional temporary labor may be hired during an emergency and quickly trained to assist in opening the control structure and other flood fighting duties.

During the great majority of the time when the structure is not being operated during a flood, spillway personnel are involved in maintenance and inspection duties. Annual inspections of the spillway structure are performed and problems corrected as noted. Equipment testing and maintenance are performed on a regular schedule. Field staff maintains the floodway by mowing the levee slopes, and by clearing vegetation along range lines and in the central portion of the floodway.

2.5 PROJECT LANDS

Spillway lands consist of 7,623 acres of land acquired in fee in a corridor stretching from the Mississippi River to Lake Pontchartrain. The only exceptions to fee ownership in the project's boundaries are the former location of U.S. 61 and the three railroad rights-of-way. These road and railroad crossings were in existence at the time of spillway authorization in 1928. Rather than fee title, USACE purchased flowage easements over these rights-of-way. These easements amount to 126.8 acres.

USACE maintains fee ownership of spillway lands with the exception of the former location of U.S. 61 and railroad rights-of-ways.

At the time of purchase (circa 1929-1931), land use on spillway lands was typical of the regional landscape (Plate 2). Several sugar plantations existed along the Mississippi River. Houses and support buildings were concentrated along the river; agricultural fields stretched from the river to the edge of the swamps (near the present location of U.S. 61). Drainage ditches ran perpendicular to the river's orientation ending at drainage machines (water wheels) which pumped excess rainwater into the swamps. The swamps stretching to Lake Pontchartrain were the scene of extensive logging prior to USACE purchase. Several canals had been cut through the swamps including a canal paralleling the railroad crossing near the lakeshore.

After USACE purchase of the land, all the buildings were demolished and the spillway structure and guide levees were constructed. Beginning with the flood of 1937, the landscape began to change in dramatic ways. Heavy deposits of sediment obliterated previous landmarks such as field edges and vegetation corridors. Subsequent spillway openings, land clearing and sand hauling has molded the landscape to its present condition. The modern landscape shares some aspects of its historic condition, but is largely the product of spillway O&M practices (Photograph 2-4).

Photograph 2-4. Sediment Accretion from 2008 Opening

2.6 EXISTING LAND USES

In addition to spillway's O&M activities, several uses of spillway lands occur with the consent and approval of the MVN. These permitted uses are described below:

The sand hauling program is integral to maintaining the functionality of the spillway.

(a) Sand Hauling Permit Program. The most significant private use of spillway lands is the commercial removal of sediment from the floodway. Each time the spillway is operated, the diverted Mississippi River floodwaters deposit various amounts of sediment (mostly silt and sand) as they flow through the floodway. In a major flood, it is not unusual for the river to deposit more than 12 million cubic yards of sediment on spillway lands. In addition to deposits from spillway openings, the spillway's forebay area experiences significant deposition during each high water event on the river. There is a commercial use for this sediment as landfill material for public and private development projects in the surrounding region. For many years, MVN has operated a sand hauling permit program which assigned areas to interested commercial haulers on an annual basis for no fee. This program was developed to allow for an orderly and efficient removal of these deposits by private interests. Commercial removal benefits the Government because it prevents a buildup of deposits that would restrict flows through the floodway and, eventually, impair the spillway's ability to achieve its design capacity of 250,000 cfs. In addition, MVN derives other benefits at the spillway in the form of land clearing, drainage improvements, and road maintenance.

A typical sand hauling operation involves the use of an excavator to remove the deposits and stack them in linear rows. The material dries out and is then placed in truck trailers or dump trucks for transport out of the spillway to various job sites. Use of a particular lease area may require the construction and/or maintenance of haul roads. The annual letter permits require sand hauling trucks to observe a 20 mile per hour speed limit and also require them to stop at all four-way intersections within the spillway.

With implementation of the spillway's NRM program after completion of the 1998 Master Plan, problems related to the annual permitting program have become evident. In keeping with USACE prolicy on disposal of excess resources on spillway lands that have commercial value, MVN, as a part of the updated master plan, has decided to implement a competitive leasing program.

(b) Clay Borrow. The Bonnet Carré Spillway is also a major source of clay material for the construction of Greater New Orleans

Hurricane and Storm Damage Risk Reduction System (HSDRRS) projects; these include the Lake Pontchartrain and Vicinity Project and the west Bank and Vicinity Project. The importance of the spillway as a reliable source of high-quality levee clay has increased in the years after Hurricane Katrina as the demand for levee building materials has expanded greatly.

After removal of the top layers of sediment, the native earth material on most of the land within the spillway is suitable for levee construction. A number of clay borrow pits have been completed over the last 20 years; many of these now serve as high quality fishing ponds in the lower portion of the floodway (*i.e.* between the structure and U.S. 61). Additional clay borrow activity is underway; mostly in the areas between the spillway structure and U.S. 61. This use will continue over the next 5 to 10 years and will spread to portions of the project north of U.S. 61.

U.S. Bureau of Land Management manager sub-surface minerals in the spillway.

(c) Oil and Gas Development. A total of 21 oil and gas exploratory wells have been drilled on spillway lands over the past 40 years. A few of these were producing wells resulting in the naming of the "Norco Oil and Gas Field" within the spillway. The annual revenue generated by natural gas and oil leases are shared with St. Charles Parish. Between fiscal years (FYs) 1978 and 1985, the 75 percent share ranged from $16,514 to $166,644. No producing wells currently exist on spillway lands. Sub-surface minerals in the spillway are administered by the U.S. Bureau of Land Management (BLM), subject to MVN review and approval of the outgrant land use stipulations.

With the increasing prices for oil and gas in the world market, BLM has recently coordinated with MVN regarding the possibility of renewed oil and gas exploration on spillway lands and waters. In view of concerns about any impairments to the spillway's flood control purpose as well as the possibility of environmental damages to the Lake Pontchartrain estuary, MVN has advised BLM that any future exploration and development of oil and gas resources of the spillway must be accomplished through directional drilling from outside of the spillway's guide levees. No structures or facilities will be allowed within the floodway.

(d) Recreation Outgrants. Currently, there are four recreational outgrants at the spillway. All four agreements are with St. Charles Parish. There is one recreational use (Remote Controlled Airplane Permit Area) authorized by permit on an annual basis as well as numerous use permits issued on a case-by-case basis (Plate 3). There are two recreational areas (ATV Areas 1 and 2) established

through a challenge partnership agreement between MVN and a non-profit club. Additionally, one recreation area and developed and maintained through volunteer efforts.

(1) U.S. 61 Recreation Area. This is the most heavily utilized, officially designated recreational area on spillway lands (Plate 3). Lease No. DACW29-1-81-44 was originally issued in 1981 for an area of 68 acres adjacent to the lower guide levee on the north side of U.S. 61 (Photograph 2-5). When the lease was issued, the Parish provided MVN with a four-phase plan for development of the area. The plans included facilities for camping, baseball, football, tennis, basketball, and a bait shop. The Parish eventually scaled back their plans and the lease was amended in 1986 to reduce the area to 26 acres. The recreation area currently features a two-lane concrete boat launch, paved parking for 15 vehicles with trailers, fishing docks, a metal shed pavilion, several picnic tables, primitive camping sites, and two portable toilets for visitors.

The U.S. 61 Recreation Area is the most heavily used recreation area on spillway lands.

Photograph 2-5. U.S. 61 Recreation Area

In the mid-1980s, the boat launch facility was improved with funding provided through the Sport Fish Restoration Account of the Wallop-Breaux Trust Fund. In Louisiana, this program is administered by the Louisiana Department of Wildlife (LDWF). The program provides 75 percent Federal funding with a 25 percent state or local matching share for a variety of activities including sport fishery restoration, wetlands conservation, construction and maintenance of boat launching facilities and water control structures, and public education. The local share for this boat launch facility was provided by St. Charles Parish who is required to maintain the facility “in reasonable repair” throughout its useful life.

Boats launched at this recreation area generally use the waterways within the floodway, particularly the Lower Borrow Canal. The area is heavily utilized, especially on the

weekends, and it is often the site of organized activities. At present, the recreation area is adequately maintained and is regularly patrolled by the St. Charles Parish Sheriff's Office. Access is provided via a paved road from U.S. 61 along the top of the lower guide levee to the leased area. The lease currently expires on 31 December 2013.

(2) I-10 Boat Launch. This facility is authorized under Easement No. DACW29-2-07-01, issued in 1981, for an area of 3.1 acres. The facility provided at this site is a two-lane concrete boat launch located on the I-10 construction access channel, between the two highway spans, adjacent to the lower guide levee (Plate 3). An unpaved parking area is provided in the area of the boat launch. Boaters using this launch generally enter Lake Pontchartrain via a poorly marked channel. Access to the site is provided by the unpaved road atop the lower guide levee. This facility is not as heavily used as the U.S. 61 Recreation Area. The lease expires on 1 October 2031.

The Remote Controlled Airplane Permit Area has been used since 1972 though annual use permits issued to the Spillway Radio Control Club.

(3) Montz Park . This 1.86 acre site is located outside of the spillway, next to the upper guide levee near the Mississippi River. This outgrant allows St. Charles Parish to continue the use of a narrow strip of spillway lands along Louisiana Highway 628 as part of a public park at Montz (Plate 3). Montz Park, which is mostly on land owned by the parish, includes basketball courts and playground equipment. The portion on spillway lands contains some playground equipment but is mostly undeveloped. This recreation area seems to be only lightly utilized. Lease No. DACW29-3-08-217 expires on 29 November 2013.

(4) Fishing Jetty. This facility is authorized under License No. DACW29-3-94-73 which was issued in 1994. The facility consists of a 300-foot long jetty extending into Lake Pontchartrain from the end of the lower guide levee (Plate 3). The jetty was constructed largely from construction debris (*e.g,* broken concrete from street repairs and other demolitions). The intent of the jetty is to provide enhanced fishing opportunities to the public. Access to the site is provided by the unpaved road atop the lower guide levee. The lease expires on 30 November 2009 and MVN will likely renew the lease.

(5) Remote Controlled Airplane Permit Area. Since 1972, the MVN Operations Division has issued annual use permits to the Spillway Radio Control Club, Incorporated to operate radio control model airplanes from a designated site near the spillway structure (Plate 3). The permittee is required to obtain liability insurance from a reputable company acceptable to the Government naming MVN as an insured party. The club has an exemplary record in the maintenance of its designated area, its safe manner of operation, and its compliance with all permit conditions.

(6) Miscellaneous Use Permits. Numerous use permits for recreational activities are issued by MVN Operations Division on a case-by-case basis. These include permits for dog trial events, cross country running races, and similar type activities.

(7) ATV Use Areas. As part of Phase 2 of the 1998 Master Plan, the ATV use areas were established through a challenge partnership between MVN and South Louisiana Trailblazers. South Louisiana Trailblazers is a non-profit group of off-road enthusiasts. The ATV use areas consist of two areas designated for the use and enjoyment of ATVs, motorcycles, and go-karts. ATV Use Area 1 is located south of U.S. 61 and provides a off-road track setting and ATV Use Area 2 (Photograph 2-6) consists of trails in the forested area west of the U.S. 61 Recreation Area (Plate 3).

Photograph 2-6. ATV Trail in ATV Area 2

(8) Mountain Bike Area. New Orleans Mountain Biking Club has developed and maintains extensive multi-purpose trails in the forested area along the lower guide levee (Plate 3). These efforts are performed on volunteer basis to the spillway.

(e) Other Outgrants. In addition to the recreation agreements described above, there are numerous other outgrants allowing

special use of spillway lands. These include agreements for pipeline, powerline and other utility crossings, radio station towers, highway and road crossings, a stormwater pumping station, and other minor activities (Plate 4).

2.7 EXISTING MANAGEMENT OF PROJECT

2.7.1 Corps of Engineers

A permanent staff of nine employees maintains and manages the spillway structure and floodway. The staff is directed by an on-site project manager who is responsible for all aspects of spillway O&M. The staff is divided into two groups. The spillway maintenance staff consists of five personnel who are responsible for the day-to-day O&M of the spillway. The park ranger staff consists of three personnel who are dedicated to visitor assistance, enforcement of rules and regulations, and the management of the spillway's natural resources. Except during high water events, the maintenance staff typically works a daytime, Monday through Friday schedule. The park ranger staff, however, work a rotating schedule that provides coverage for the weekends when public visitation is greatest.

2.7.2 St. Charles Parish

Through the exercise of local police authority over the spillway and the management and control over four recreation outgrants of spillway lands, the St. Charles Parish is the predominate local sponsor of the Bonnet Carré Spillway. Enforcement of local laws in the spillway is the responsibility of the St. Charles Parish Sheriff's Office. To accomplish this duty, the Sheriff's Office performs regular patrols of spillway lands in addition to responding to calls from spillway personnel and others regarding violations of local law in the spillway.

In addition to regular patrols of the spillway, MVN has entered into a law enforcement support agreement with the St. Charles Parish Sheriff's Office to provide for supplemental patrols of the spillway. These patrols are designed to provide additional enforcement of MVN and local rules when spillway staff are not available, when high levels of visitor activity are anticipated, and when specific management concerns, such as vandalism or other criminal activity need to be addressed. The frequency and scheduling of these patrols are established monthly by spillway staff.

Two local ordinances specific to law enforcement problems in the Bonnet Carré Spillway have been enacted over the past few years. The first of these measures is contained in Section 14-6 Discharge

of weapons of the St. Charles Parish Code of Ordinances (Appendix D). This ordinance prohibits the possession or discharge of any rifle, pistol or other weapon discharging ball ammunition in the spillway. Only shotguns are allowed within the spillway and their use is prohibited within 800 feet of the spillway levees and highway crossings.

St. Charles Parish Sheriffs Office is integral to law envorcement in the Bonnet Carré Spillway.

The second local ordinance specific to the spillway was passed by the Parish Council in April 1996 (copy provided as Appendix E to this Master Plan). Ordinance No. 96-4-8 amends Section 17 of the St. Charles Parish Code of Ordinances to restrict public visitation between the hours of 10 p.m. and 5 a.m. Specific exceptions are provided for persons authorized by MVN or St. Charles Parish to access the spillway during the restricted hours; in particular, persons launching boats earlier than 5 a.m. The purpose of the ordinance is to address growing concerns regarding public safety and criminal activity, especially during night-time hours. MVN has concurred in this local action and the spillway thereby has been established as a "day use area." Later ordinances further modified Section 17 to adopt most MVN rules on public use activites in the spillway. This action has enabled the St. Charles Sheriff to more effectively support MVN.

In addition to law enforcement, St. Charles Parish has constructed and maintained several recreational developments within the spillway. These facilities are described in Section 2.6.(d) above and represent a significant, long-term commitment to recreation on spillway lands.

2.8 RELATIONSHIP TO OTHER PROJECTS

2.8.1 Lake Pontchartrain and Vicinity Hurricane Protection Project

As described in section 2.6.1.(b) above, a significant portion of the spillway's lands is dedicated to providing clay borrow material for the Lake Pontchartrain and vicinity project. Additionally, the spillway has served as the location of a sand stockpile area for levee construction in the St. Charles Levee reach of the project. The western terminus of the St. Charles Levee is the lower guide levee approximately 4,000 feet north of U.S. 61.

2.8.2 Bonnet Carré Freshwater Diversion Structure

This project was authorized by the Water Resources Development Act (WRDA) of 1988. It is designed to divert up to 30,000 cfs of fresh water from the Mississippi River into Lake Pontchartrain. This diversion would reduce marsh loss by 10,500 acres over the 50-

year project life and would increase annual oyster production by 5.7 million pounds in Louisiana and 1.9 million pounds in Mississippi.

The diversion structure and outflow channel would be constructed within the Bonnet Carré Spillway in a corridor along the upper guide levee (Plate 5). The freshwater diversion project would not significantly impact any existing user activity occurring in the spillway and, in fact, would create additional recreational opportunities such as tailwater fishing.

In July 1996, the State of Louisiana withdrew as a local sponsor for the Bonnet Carré Freshwater Diversion project. As a result, work on the project has been stopped. The likelihood of future construction of the project, as currently designed or in a modified form, is undetermined at present. Notwithstanding the indefinite status of the project, this Master Plan update contains Sections 5 and 9 relative to the freshwater diversion plan. The reason for retaining these guidelines is the need for the Master Plan update to be comprehensive in its treatment of all possible management needs on spillway lands and waters. The guidelines will be available if the original or modified freshwater diversion project is eventually built in the spillway.

SECTION 3.0
RESOURCES OF THE PROJECT AREA

3.0 RESOURCES OF THE PROJECT AREA

3.1 NATURAL AND CULTURAL RESOURCES

3.1.1 Climate

Annual average precipitation at the spillway is 60 inches.

The climate in the Bonnet Carré Spillway area is humid subtropical, characterized by mild winters and hot, humid summers. The area is dominated by warm, moist, maritime tropical air from the adjacent Gulf of Mexico. This maritime air is displaced frequently during winter and spring by incursions of continental polar air from Canada that usually persist no longer than three to four days. These incursions of cold air occur less frequently in autumn and only rarely in summer. Tropical storms and hurricanes are likely to affect the area three out of every ten years, with a severe hurricane causing widespread damage once every two or three decades. Annual average temperature is 70 degree Fahrenheit (^{o}F), with monthly normal temperatures varying from 81^{o}F in July to 53^{o}F in January. Average annual precipitation is 60 inches, varying from 7 inches in July to 3 inches in October. Annual average evapotranspiration varies from a maximum rate of 66.5 inches to a minimum rate of 41.6 inches. The predominant wind directions are south to south-southeast from January through July and northeast to east-northeast from September through November. River fog is prevalent in the winter and spring when the temperature of the Mississippi River is cooler than the air temperature (USACE 1962).

3.1.2 Geomorphology/Geology/Minerals

The Bonnet Carré Spillway consists of approximately 7,623 acres located on the east side of the Mississippi River in southeastern Louisiana. The lands, characteristic of an alluvial flood plain, vary in elevation from 12 feet near the river to mean sea level near Lake Pontchartrain. The water areas consisting of the Mississippi River, Lake Pontchartrain, borrow pits, drainage canals, and natural bayous form the principal physiographic features. Guide levees extend across the floodway from 7,700 feet at the river to 12,400 feet at the lake end. Two miles lakeward of the river, the swamp land extends about 4 miles to Lake Pontchartrain, averaging 1 to 2 feet above mean sea level. The area is similar to most deltaic plain environments in that it is of low elevation, low relief and gentle slopes. There are no obvious significant geologic features within the confines of the spillway. Subsurface faults are located in the spillway area but cause little apparent surface displacement (Gagliano 2003). Mineral deposits in the area include petroleum, sand, gravel, and clay.

3.1.3 Soils/Topography

Soils are derived from alluvial deposits and organic matter. Swamp soils consist of soft to very soft organic clays with layers of silt and peat, wood and roots, and high water content. Such soils usually support tree growth. Marsh soils, consisting of soft to very soft organic clays of high water content and layers of silt and peat, support grasses and sedge growth. Natural levee soils derived from recent Mississippi River deposits consist of stiff to very stiff oxidized clays with layers of silts, silty sands, and sands of low water content (McDaniel 1987).

The Convent-Commerce soil series, widespread within the spillway area, consists of level to gently undulating, poorly drained soils that have a loamy surface and subsurface layer, or have a loamy or clayey surface layer and a clayey subsoil (McDaniel 1987).

3.1.4 Wetlands/water

Jurisdictional wetlands comprise the entire spillway from the Mississippi River to Lake Pontchartrain and are an important habitat for fish and wildlife resources. There are also several large water bodies including the Upper and Lower Borrow Canals and numerous shallow ponds created by sand excavation activities. These are currently utilized for many recreational activities (*e.g.*, crabbing and fishing).

3.1.5 Vegetation

Plant communities in the Bonnet Carré Spillway include bottomland hardwood forests, baldcypress-tupelo gum swamps, aquatics in canals and ponds, and disturbed areas. The land slopes from near the Mississippi River with elevations of 10 to 12 feet NGVD to Lake Pontchartrain with elevations of 1-2 feet NGVD. These elevations dictate forest types in the undisturbed wooded zones. Dry bottomland hardwood forests are located near the river and grade into baldcypress-tupelo gum swamps near Lake Pontchartrain. The forested areas were logged in the past and second-growth forest dominate these areas.

Bottomland hardwood, baldcypress-tuplelo gum swamps, aquatic and disturbed are the dominate plant communities in the spillway.

The spillway acts as a catch-basin during operations when floodwaters are released from the Mississippi River into Lake Pontchartrain. The introduction of seeds, rhizomes, and other plant propagules permits establishment of new species and this ever-changing environment can be expected to continue.

Plant species have been recorded during previous vegetation studies of the spillway by Clark (1970), Howard and Penfound

(1942), Kessler (1983), Montz (1970, 1976, 1978, 1979 and 1985) and Thieret (1980). These studies provided the background for this overview of vegetation resources.

(b) Major Vegetation Types. Two major forested types and two non-forested vegetation types are recognized in the spillway. The total forested area in the Bonnet Carré Spillway is approximately 3,020 acres, or 40 percent of the total spillway acreage. The vast majority of these forested areas (approximately 2,780 acres, or 92 percent of the total) are located between U.S. 61 and Lake Ponchartrain.

Approximately 40 percent of the spillway is forested.

(1) Bottomland Hardwood Forest Type. Bottomland hardwood forests are located from the river to areas near U.S. 61 on higher ground. Common tree species are live oak (*Quercus virginiana*), water oak (*Q. nigra*), overcup oak (*Q. stellata*), obtusa oak (*Q. obtusa*), and Nuttall oak (*Q. nuttallii*); sugarberry (*Celtis laevigata*); sweetgum (*Liquidambar styraciflua*); green ash (*Fraxinus pennsylvanica*); boxelder (*Acer negundo*); Drummond red maple (*Acer rubrum* var. *drummondii*); roughleaf dogwood (*Cornus drummondii*); persimmon (*Diospyros virginiana*); Chinese tallow-tree (*Sapium sebiferum*); sweet pecan (*Carya illinoensis*); black and sandbar willows (*Salix nigra* and *S. interior*); cottonwood (*Populus deltoides*) and American elm (*Ulmus americana*).

Common shrubs and vines species include poison ivy (*Toxicodendron radicans*), deciduous holly (*Ilex decidua*), green hawthorn (*Crataegus viridis*), palmetto (*Sabal* spp.), eastern baccharis (*Baccharis halimifolia*), climbing hempweed (*Mikania scandens*), trumpet creeper (*Campsis radicans*), elderberry (*Sambucus canadensis*), common greenbriar (*Smilax rotundifolia*), rattan vine (*Calamus rotang*), Japanese climbing fern (*Lygodium japonicum*), peppervine (*Ampelopsis arborea*), blackberry (*Rubus* sp.), Virginia creeper (*Parthenocissus virginiana*), and muscadine (*Vitis rotundifolia*). Herbaceous plant species in these wooded areas are diverse with the more common species including water willow (*Justicia* sp.), Nuttall water-hemp (*Amaranthus rudis*), southern shield fern (*Thelypteris kunthii*), asters (*Symphyotrichium* spp.), sumpweed (*Cyclachaema xanthifolia*), seaside goldenrod (*Solidago sempervirens*), Virginia dayflower (*Commelina virginica*), morning glories (*Ipomoea* spp.), smooth horsetail (*Equisetum laevigatum*), American germander (*Teucrium*

canadense), smartweeds (*Polygonum* spp.), false nettle (*Boehmeria* spp.), and numerous grasses, rushes, and sedges.

(2) Baldcypress-Tupelo gum Swamp. The swamps in the spillway are located in the lower elevations near Lake Pontchartrain. They have a firm substrate in comparison to swamps outside the guide levees. This is due to the deposition of alluvium from each spillway operation. Dominant trees and shrubs include baldcypress, tupelo gum, Drummond red maple, Carolina ash (*Fraxinus caroliniana*), pumpkin ash (*Fraxinus profunda*), palmetto, eastern baccharis, rattlebox (*Sesbania punicea*), buttonbush (*Cephalanthus occidentalis*), overcup oak, swamp-privet (*Foresteria acuminata*), waxmyrtle (*Morella cerifera*), black willow and waterelm (*Planera aquatica*). Common herbaceous and vines species include alligatorweed (*Alternanthera philoxeroides*), smartweeds, pennyworts (*Hydrocotyle* spp.), climbing hempweed, creeping spilanthes (*Spilanthes americana*), broadleaf panicum (*Panicum deustum*), frogfruit (*Phyla lanceolata*), and numerous grasses, rushes, and sedges.

(3) Aquatic Vegetation in Canals and Ponds. Many various size canals and ponds are located within the spillway. Most of these are shallow and are filled with aquatic vegetation, while others are deeper and exhibit open water. Emersed, floating and submersed plants in these waterbodies include water hyacinth (*Eichhornia* spp.), delta duckpotato (*Sagittaria platyphylla*), duckweeds (*Lemna* spp.), alligatorweed, water pennywort (*Hydrocotyle bonariensis*), mosquito fern (*Azolla* spp.), sedges and rushes (*Carex* spp.), *Cyperus* spp., *Juncus* spp., floating waterprimrose (*Ludwigia peploides*), and pickerelweed (*Pontederia rotundifolia*).

(4) Disturbed Areas. These areas have been modified to a great extent by man. Land clearing for the spillway eliminated bottomland hardwood and baldcypress-tupleo gum swamp forests. Different plant communities may be found in these disturbed areas following each operation of the spillway. Sand-loving colonizers become established on dunes formed from deposition of river alluvium. Perennial herbs are more common in the disturbed areas following successional trends after several years without a spillway operation. A variety of plants may be found in these disturbed areas. Common species are carpetweed (*Mollugo*

spp.), southern waterhemp (*Amaranthus* sp.), pigweed (*Amaranthus* spp.), mock bishopweed (*Ptilimnium macrospermum*), ragweed (*Ambrosia* spp.), asters, spiny thistle (*Cirsium horridulum*), yankeeweed (*Eupatorium compositifolium*), goldenrod (*Solidago* spp.), cocklebur (*Xanthium* spp.), peppergrass (*Lepidium* spp.), morning glories (*Ipomra* spp), wolly croton (*Croton capitatus*), coffeeweed (*Sesbania* spp.), clovers (unknown), polly-prin (*Polypremum procumbens*), ironweed (*Vernonia* spp.), evening primroses (*Oenothera biennis*), wood sorrel (Oxalis spp.), bushy beardgrass (*Andropogon glomeratus*), Bermuda grass (*Cynodon dactylon*), Dallis grass (*Paspalum dilatatum*), smartweeds, buttercups (*Ranunculus* spp.), bedstraw (*Galium* spp.), vervain (*Verbena* spp.), peppervine, and numerous grasses, rushes and sedges. These disturbed areas have a rich and diversified flora.

(c) Rare Species of Plants. A number of plants considered rare for the southeastern portion of the state have been collected in the Bonnet Carré Spillway. Collections by Montz (1985) recorded rare species, several of which have been published by others. The following gives a list of plants collected in the spillway which are considered rare in southeastern Louisiana:

A number of rare plant species have been recorded in the spillway.

- Indian hemp (*Apocynum cannibinum).*
- Wormwood (*Artemisia annua*).
- Plantain signalgrass (*Brachiaria plataginaceae*). Reported by Allen (1992) in only two parishes in the state.
- False flax *(Camelina microcarpa).*
- Cyperus *(Cyperus distinctus).* Reported by Kessler (1983) as new to Louisiana.
- Upright burhead *(Echinodorus rostratus)*.
- Ferris's horsetail (*Equisetum X ferrissii*). Reported by Thieret (1980) as a hybrid and from only two parishes in the state.
- Water-spider orchid *(Habenaria repens)*.
- Sunflower *(Helianthus debilis* var. *cucumerifolius)*. Reported by Gandhi and Thomas (1989) from only two parishes in the state.
- Mousetail *(Myosurus minimus)*.
- Yellow cress *(Rorippa heterophylla)*.

- Dock *(Rumex paraguayensis)*.
- Wool-grass *(Scirpus cyperinus)*.
- Gray dropseed *(Sporobolus cryptandrus)*. Reported by Allen (1992).

These rare species were collected in the forebay of the spillway near the river following high water years. A seed source or plant propagules for each species apparently floated into the area and became established. It should be noted that many of these rare species have not become permanently established in the spillway over the years.

(d) Endangered and Threatened Plant Species. No endangered or threatened plant species, according to the Federal Register, have been identified in the Bonnet Carré Spillway.

3.1.6 Wildlife

The fauna present in the spillway include inhabitants of bottomland hardwood forests, baldcypress-tupleo gum swamps, disturbed areas and open water. The diversity and areal extent of productive habitat types in the spillway support a wide variety of wildlife including game species, commercially important furbearers and alligators, endangered species, and numerous nongame species that are important from an ecological standpoint. Approximately 30 species of mammals, the majority being non-game species, have been recorded from the Bonnet Carré Spillway and vicinity (Table 3-1).

Table 3-1. Mammals recorded from the Bonnet Carré Spillway and Vicinity

Common Name	Species
Virginia Opossum	Didelphis virginiana
eastern Pipistrelle	*Pipistrellus subflavus*
Red Bat	*Lasiurus borealis*
Seminole Bat	*Lasiurus seminolus*
Northern Yellow Bat	*Lasiurus intermedius*
Evening Bat	*Nycticeius humeralis*
Rafinesque's Big-eared Bat	*Plecotus rafinesquii*
Brazilian Free-tailed Bat	*Tadarida brasiliensis*
Nine-banded Armadillo	*Dasypus novemcinctus*
Table 3-1, continued	*Sylvilagus aquaticus*
Gray Squirrel	*Sciurus carolinensis*
Fox Squirrel	*Sciurus niger*
southern Flying Squirrel	*Glaucomys volans*
American Beaver	*Castor canadensis*
Marsh Rice Rat	*Oryzomys palustris*

Common Name	Species
Fulvous Harvest Mouse	*Reithrodontomys fulvescens*
White-footed Mouse	*Peromyscus leucopus*
Cotton Mouse	*Peromyscus gossypinus*
Hispid Cotton Rat	*Sigmodon hispidus*
Muskrat	*Ondatra zibethicus*
Roof Rat	*Rattus rattus*
Norway Rat	*Rattus norvegicus*
House Mouse	*Mus musculus*
Nutria	*Myocastor coypus*
Coyote	*Canis latrans*
Northern Raccoon	*Procyon lotor*
Mink	*Mustela vison*
Nearctic River Otter	*Lutra canadensis*
White-tailed Deer	*Odocoileus virginiana*
Feral Hog	*Sus scrofa*
Red fox	*Vulpes vulpes*
Gray fox	*Urocyon cinereoargenteus*
Bobcat	*Lynx rufus*

Source: Lowery 1974a and Brantley 1994, pers. obs.

(a) Game and Commercial Species. Important game mammals include the gray and fox squirrels (*Sciurus carolinensis* and *S. niger*), swamp rabbit (*Sylvilagus aquaticus*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginiana*). Squirrels are found predominately in the forested habitats. The swamp rabbit and raccoon inhabit the bottomland hardwood forests, wooded swamps, and ecotone region along forest edges. Other mammalian wildlife species of commercial importance include the following: nearctic river otter (*Lutra canadensis*), mink (*Mustela vison*), nutria (*Myocastor coypus*), muskrat (*Odatra zibethicus*), raccoon, Virginia opossum (*Didelphis virginiana*), and American beaver (*Castor canadensis*). The forested wetlands and shallow margins of permanent water bodies provide excellent feeding and resting areas for a number of waterfowl species such as American coot (*Fulica americana*) and dabbling ducks, such as the wood duck (*Aix sponsa*), mallard (*Anas platyrhyncos*) and the mottled duck (*Anas fulvigula*). Diving ducks, such as the lesser scaup (*Aythya affinis*), are most common in Lake Pontchartrain and adjacent open water areas of the spillway. Other game birds occasionally found in the spillway include American woodcock (*Scolopax minor*) and common snipe (*Gallinago gallinago*). Snakes, turtles, lizards, bullfrog (*Rana catesbeiana*), and pig frog (*Rana grylio*) are all commercially taken from the spillway.

(b) Non-game Species. Common non-game mammals include nine-banded armadillo (*Dasypus novemcinctus*), southern flying squirrel (*Glaucomys volans*), and marsh rice rat (*Oryzomys palustris*).

A great diversity of avian fauna inhabit the Bonnet Carré Spillway and adjacent lands including sea birds, waterfowl, shorebirds, wading birds, songbirds, and raptors. Seabirds include American white pelican (*Pelecanus erythrorhynchos*), herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), Forster's tern (*Sterna forsteri*), laughing gull (*Larus atricilla*), and gull-billed tern (*Sterna nilotica*). Waterfowl include mallards, mottled duck, green- and blue-winged teal (*Anas crecca* and *A. discors*), northern pintail (*Anas acuta*), and wood duck. Wading birds present include such species as the tricolored heron (*Egretta tricolor*), great blue heron (*Ardea herodias*), yellow-crowned night-heron (*Nycticorax violaceus*), green-backed heron (*Butorides striatus*), cattle egret (*Bubulcus ibis*), great egret (*Casmerodius albus*), snowy egret (*Egretta thula*), white ibis (*Eudocimus albus*), glossy ibis (*Plegadis falcinellus*), and white-faced ibis (*Plegadis chihi*). Shorebirds common to the area include black-necked stilt (*Himantopus mexicanus*), killdeer (*Chardrius vociferous*), greater and lesser yellowlegs (*Tringa melanoleuca* and *T. flavipes*), and numerous sandpipers (*Calidris* spp. and *Actitis minutilla*). Common raptors include red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), barred owl (*Strix varia*), and American kestrel (*Falco sparverius*). Other non-game birds inhabiting the area are the Carolina wren (*Thryothorus ludovicianus*), northern cardinal (*Cardinalis cardinalis*), white-eyed vireo (*Vireo griseus*), boat-tailed grackle (*Quiscalus major*), common grackle (*Quiscalus quiscalus*), red-winged blackbird (*Agelaius phoeniceus*), and belted kingfisher (*Ceryle alcyon*). A complete listing of avian species can be found in Appendix F.

The various habitats found in the Bonnet Carré Spillway provide a great diversity of avian species.

Numerous species of reptiles and amphibians are found in the area. The American alligator (*Alligator missippiensis*), common snapping turtle (*Chelydra serpentine*), red-eared slider (*Trachemys scripta*), stinkpot (*Sternotherus odoratus*), green anole (*Anolis carolinensis*), ground skink (*Scincella lateralis*), banded water snake (*Nerodia fasciata*), and Western cottonmouth (*Agkistrodon piscivorus*) are common reptiles. Amphibians in the area include the bullfrog (*Rana catesbeiana*), pig frog (*Rana grylio*), bronze frog (*Rana clamitans*), Southern leopard frog (*Rana sphenocephala*), Gulf coast toad (*Bufo valliceps*), green and squirrel treefrogs (*Hyla cinerea* and H. *squirella*), and several species of salamanders. A list of reptiles and amphibians can be found in Table 3-2.

Table 3-2. Reptiles and Amphibians Recorded from the Bonnet Carré Spillway and Vicinity

Common Name	Species
Common Snapping Turtle	*Chelydra serpentina*
Cooter	*Pseudemys floridana*
Red-eared Slider	*Trachemys scripta*
Eastern Mud Turtle	*Kinosternon subrubrum*
Stinkpot	*Sternotherus odoratus*
Spiny Softshell	*Apalone spinifera*
Green Anole	*Anolis carolinensis*
Five-lined Skink	*Eumeces fasciatus*
Broad-headed Skink	*Eumeces laticeps*
Ground Skink	*Scincella lateralis*
Racer	*Coluber constrictor*
Rat Snake	*Elaphe obsoleta*
Mud Snake	*Farancia abacura*
Eastern Hog-nosed Snake	*Heterodon platyrhinos*
Speckled Kingsnake	*Lampropeltis getulus*
Milk Snake	*Lampropeltis triangulum*
Green Water Snake	*Nerodia cyclopion*
Yellow-bellied Water Snake	*Nerodia erythrogaster*
Banded Water Snake	*Nerodia rhombifera*
Diamond-backed Water Snake	*Nerodia fasciata*
Rough Green Snake	*Opheodrys aestivus*
Graham's Crayfish Snake	*Regina grahamii*
Glossy Crayfish Snake	*Regina rigida*
Brown Snake	*Storeria dekayi*
Western Ribbon Snake	*Thamnophis proximus*
Eastern Ribbon Snake	*Thamnophis sauritus*
Common Garter Snake	*Thamnophis sirtalis*
Western Cottonmouth	*Agkistrodon piscivorus*
Canebrake Rattlesnake	*Agkistrodon contortri*
Copperhead	*Crotalus horridus atricavdatusx*
American Alligator	*Alligator missippiensis*
Three-toed Amphiuma	*Amphiuma tridactylum*
Southern Dusky Salamander	*Desmognathus fuscus*
Dwarf Salamander	*Eurycea quadridigitata*
Eastern Newt	*Notophthalmus viridescens*
Gulf Coast Toad	*Bufo valliceps*
Woodhouse's Toad	*Bufo woodhousei*
Northern Cricket Frog	*Acris crepitans*
Bird-voiced Treefrog	*Hyla avivoca*
Gray Treefrog	*Hyla chrysoscelis/versicolor*
Green Treefrog	*Hyla cinerea*
Spring Peeper	*Hyla crucifer*
Squirrel Treefrog	*Hyla squirella*
Striped Chorus Frog	*Pseudacris triseriata*
Eastern Narrow-mouthed Toad	*Gastrophryne carolinensis*
Bullfrog	*Rana catesbeiana*
Bronze Frog	*Rana clamitans*
Pig Frog	*Rana grylio*
Southern Leopard Frog	*Rana sphenocephala*

Source: Dundee and Rossman 1991, Brantly 1994, pers. obs.

A wide variety of terrestrial and aquatic invertebrates can be found in the area including arthropods, snails, annelids, nematodes, and protozoans. Insects are the most important invertebrates in the area and sometimes function as vectors, transmitting disease organisms to other animals and humans.

(c) Special Status Species.

Bald Eagle. The bald eagle (*Haliaeetus leucocephalus*), a former Federally listed protected species, inhabits the Bonnet Carré Spillway. The bald eagle was originally listed as an endangered species in March 1967 (23 *Federal Register* 4001): due to an increase in the number of active nests, the bald eagle was reclassified by the USFWS in July 1994 as a threatened species (60 *Federal Register* 36000). In July 2007 (72 *Federal Register* 37346), the bald eagle was delisted by the USFWS as a result of a reduction in the threats to the bald eagle and the increase from approximately 487 breeding pairs in 1963 to an estimated 9,789 breeding pairs currently in the contiguous 48 states. The bald eagle is still afforded protection under the Bald Eagle Protection Act of 1940 (16 U.S. Code [U.S.C.] 668-668d) and the Migratory Bird Treaty Act of 1972 (16 U.S.C. 703-712). The Bald Eagle Protection Act was amended in 1962 to add protection for the golden eagle and the amended statue became known as the Bald and Golden Eagle Protection Act.

The bald eagle was delisted by USFWS in July 2007.

One known active nest site is located in the Bonnet Carré Spillway. As of the last survey conducted by LDWF and Fisheries survey, several known nest sites are located in the vicinity of the Bonnet Carré Spillway. Bald eagle nest sites are considered environmentally sensitive areas and are further discussed below.

(d) Endangered and Threatened Species. One Federally listed threatened wildlife species occurs in the Bonnet Carré Spillway. The following is a brief description of this species.

American Alligator. Currently, American alligators are listed as threatened under the Similarity of Appearance clause in the Endangered Species Act of 1973, as amended. Population levels in Louisiana are sufficient to legally allow a state regulated trapping season. Tags are issued by the LDWF to regulate harvest and harvest is dependent upon the potential carrying capacity of the harvest area. The alligator population in the Bonnet Carré Spillway is very robust and individuals can be expected in all waterways and open water (*e.g.*, ponds) on spillway lands.

American alligator is abundant in the Bonnet Carré Spillway and can be found in most waterbodies in the spillway.

In 2007, a pilot alligator trapping program was initiated in the spillway and a total of 19 alligators were trapped in the spillway. Most of the alligators were trapped from ponds located in the western portion of the spillway near the spillway structure, and the largest alligator trapped was 11 feet in length. As a result of the success during the 2007 alligator trapping season, a total of 30 tags were issued to hunters during the 2008 alligator trapping season. A total of 29 alligators, averaging 7 feet 6 inches in length, were trapped during the 2008 trapping season.

3.1.7 Fisheries

Various water bodies interspersed throughout the area include ponds, lakes, borrow pits, bayous, canals, tidal passes, rivers, and navigation channels. This diversity of aquatic habitat types supports a wide range of finfish, shellfish, and other aquatic invertebrate resources important from a commercial, recreational, and ecological standpoint.

Recreational fishing is a primary use of the Bonnet Carré Spillway.

(a) Recreational Species. Sport fishing is popular in the freshwater and brackish water habitats in the immediate area. Primary freshwater species sought by anglers include largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), warmouth (*Lepomis gulosus*), channel catfish (*Ictalurus punctatus*), blue catfish (*Ictalurus furcatus*), and freshwater drum (*Aplodinotus grunniens*). Recreational fishing for red swamp crawfish (*Procambarus clarkii*), white river crawfish (*Procambarus zonangulus*), and blue crab (*Callinectes sapidus*) occurs throughout the open and wooded areas of the spillway, but primarily in the many borrow pits and sandhauling pits. Saltwater sportfishing includes not only finfish, but also recreational shrimp trawling and crabbing. Shrimping involves brown shrimp (*Farfantepenaeus aztecus*) and white penaeid shrimp (*Litopenaeus setiferus*). Some recreational pursuit of bait shrimp primarily grass shrimp (*Palaemonetes pugio*) and river shrimp (*Macrobrachium* spp.) occurs near the Bonnet Carré Spillway structure and guide levee borrow pits. Popular saltwater finfishes sought by sport fishermen in Lake Pontchartrain include spotted seatrout (*Cynoscion nebulosus*), Atlantic croaker (*Micropogonias undulatus*), red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis*), sheepshead (*Archosargus probatocephalus*), and southern flounder (*Paralichthys lethostigma*).

(b) Commercial Species. Commercially important freshwater fish include the channel catfish (*Ictalurus punctatus*), blue catfish

(*Ictalurus furcatus*), flathead catfish (*Pylodictis olivaris*), yellow bullhead (*Ameiurus natalis*), carp (*Cyprinus carpio*), largemouth buffalo (*Ictiobus cyprinellus*), smallmouth buffalo (*Ictiobus bubalus*), alligator gar (*Atractosteus spatula*), spotted gar (*Lepisosteus oculatus*), bowfin (*Amia calva*), and freshwater drum (*Aplodinotus grunniens*). Red swamp crawfish also are harvested commercially from the Bonnet Carré Spillway although it is somewhat limited due to water levels, temperature, and competition from recreational fisheries. Shad and river shrimp fishing occurs near the spillway structure during high Mississippi River stages when floodwater is entering the floodway. Most of the commercial fisheries in the area are dependent on estuarine finfish and shellfish in Lake Pontchartrain. The species of commercial importance include brown and white penaeid shrimp, blue crab, Atlantic croaker, spotted seatrout, spot (*Leiostomus xanthurus*), and black drum.

(c) Endangered and Threatened Species. The pallid sturgeon (*Scaphishynchus albus*), a Federally listed endangered species, occurs in the Mississippi River. The Gulf sturgeon (*Acipenser oxyrinchus desotoi*), a Federally listed threatened species, occurs in Lake Pontchartrain. A brief description of these fish species follows.

(1) Pallid Sturgeon. The pallid sturgeon was listed as an endangered species in September, 1990 (55 *Federal Register* 36641) (Photograph 3-1). The range of the pallid sturgeon includes the middle and lower Mississippi, the Atchafalaya, the Missouri, the Platte, and Yellowstone rivers. Pallid sturgeon require large, turbid, free-flowing riverine habitat with a rocky or sandy substrate (USFWS 1993). They prefer main channel pools below sandbars (Kallemeyn and Novotny 1977). The pallid sturgeon is known to occur in the lower Mississippi River and has been documented in the Mississippi River adjacent to the spillway structure as well as within the Bonnet Carré Spillway. On 4 April 2008 at least

A total of 12 pallid sturgeons were captured and rescued in the spillway following the 2008 opening.

Photograph 3-1. Pallid sturgeon
Source: Louisiana Department of Wildlife and Fisheries

one pallid sturgeon was captured in the flooded bank of the Mississippi River adjacent to the Bonnet Carré Spillway structure by LDWF personnel. On 11 April 2008, the Bonnet Carré Spillway was partially opended for 28 days to relieve floodwater pressure downstream. Following the closure of the Bonnet Carré Spillway, on 8 May 2008, a total of 12 pallid sturgeons were captured and rescued within the Bonnet Carré Spillway. Nearly all of the sturgeon captured within the Bonnet Carré Spillway came from the headwaters of Barbar's Canal. The USACE initiated formal after-the-fact consultation as provided by the Endangered Species Act of 1973, as amended for impacts to the pallid sturgeon from the 2008 opening of the Bonnet Carré Spillway. A biological assessment was prepared by MVN in partial fulfillment of the formal after-the-fact consultation and formal consultation is currently on-going. The resulting biological opinion will be implemented as part of the Bonnet Carré Spillway operation and Maintenance Plan (O&MP).

(2) Gulf Sturgeon. The Gulf sturgeon was listed as a threatened species in October 1991 (USFWS 1991). A subspecies of the Atlantic sturgeon, the Gulf sturgeon once ranged from Tampa Bay, Florida to the Mississippi River. Although they may still be found in reduced numbers throughout this range, Gulf sturgeon are now largely confined to the eastern Gulf of Mexico (Barkuloo 1988).

Within Louisiana, Gulf sturgeon can be found in coastal lakes, streams and rivers east of the Mississippi River including Lakes Maurepas and Pontchartrain, and the Bogue Chitto, Amite, Tangipahoa, Tchefuncte, Pearl, and Tickfaw Rivers (USFWS 1995). A 1974 survey reported Gulf sturgeon only from the Lake Pontchartrain Basin and Pearl River. Occurrences of Gulf sturgeon in the lower Mississippi River as rare (USFWS, 1995 *et al.*). In March 2003 (68 *Federal Register* 13369 – 13418), the USFWS designated critical habitat for the Gulf sturgeon. The critical habitat designation includes portions of Lake Ponchartrain east of the Causeway Bridge which is approximately 14.5 miles east of the spillway.

3.1.8 Water Quality

Major water bodies in proximity to the Bonnet Carré Spillway consist of the Bonnet Carré Spillway, Mississippi River and Lake Pontchartrain. Smaller hydrologic features include a number of drainage canals, wetlands and marshes. The most prominent water body is the Mississippi River which is North America's second longest river and the third largest river worldwide. The Mississippi

River flows 2,348 miles from Lake Itasca in northern Minnesota to its delta in southeast Louisiana (Gatewayno 2007). The Mississippi River drainage basin is the world's second largest, draining approximately 1.25 million square miles, including tributaries from 31 U.S. states and two Canadian provinces (USACE 2004). Lake Pontchartrain is a large, brackish shallow estuary which receives fresh water from various lakes, rivers, bayous, and canals, while receiving salt water from the Gulf of Mexico (Environmental Atlas of the Lake Pontchartrain Basin 2002). The Bonnet Carré Spillway provides an aquatic connection between Lake Pontchartrain and the Mississippi River.

The Bonnet Carré Spillway is classified as sub-watershed LA 041101 by Louisiana Department of Environmental Quality.

Louisiana Department of Environmental Quality (LDEQ) has prescribed water quality standards for surface waters of the state of Louisiana in order to promote a healthy and productive aquatic system. Surface water standards are set to protect the quality of all waters of the state, including rivers, streams, bayous, lakes, reservoirs, wetlands, estuaries, and many other types of surface water. Standards apply to pH range, temperature, bacterial density, dissolved oxygen, chloride concentration, sulfate concentration, and total dissolved solids. The LDEQ assigned the Bonnet Carré Spillway a subsegment number named LA 041101 sub-watershed.

The LDEQ 041101 sub-watershed is 7,119 acres and contains several ponds, wetland areas and numerous meandering bayous. Water quality in the sub-watershed is improving. In the past, the sub-watershed was not meeting designated uses for all of the recreational uses (*i.e.* primary and secondary contact recreation and fish and wildlife propagation). Suspected causes of impairment were low dissolved oxygen, nutrients and pathogen indicators. The suspected sources of pollutants were thought to originate from upstream sources (Environmental Protection Agency 1998). Today, coliform bacteria levels, an important water quality criterion for water contact activities, are within state standards for water contact recreation.

Sub-watershed LA 041101 is in non-attainment for fish and wildlife propagation but is in attainment for other recreational uses such as boating (LDEQ 2008a). The water quality concerns associated with LA 041101 and neighboring watersheds are presented in Table 3-3.

Table 3-3. List of LDEQ Sub-watersheds Found in Study Area and Water Quality Attainment Status

Sub-watershed Name & LDEQ Identification (ID)	Water Quality Attainment Status	Suspected Causes of Impairment	Suspected Sources of Impairment
Bonnet Carré Spillway 041101	Not meeting for fish and wildlife propagation and primary contact recreation	Chlorides, sulfates, and total dissolved solids Water temperature	Loss of wetlands Habitat modification Shoreline modification Hydro-structure Flow
Mississippi River 070301	Fully meeting standards	NA	NA
Lake Pontchartrain 041001	Not meeting primary contact recreation	Fecal coliform	Sanitary sewer overflow and urban runoff

Source: LDEQ 2008a
NA – Not Applicable
Key:
Primary Contact Recreation. No more than 25 percent of the total samples collected on a monthly or near-monthly basis shall exceed a fecal coliform density of 400/100 mL. This primary contact recreation criterion shall apply only during the defined recreational period of May 1 through October 31. During the nonrecreational period of November 1 through April 30, the criteria for secondary contact recreation shall apply.
Fish and Wildlife Propagation (FWP) includes the suitability of the water body to sustain fish and wildlife and is based water quality parameters such as dissolved oxygen (DO), nutrients, turbidity, pH, chlorides, metals, and toxics.

The Mississippi River at the Bonnet Carré Spillway is considered suitable for any use or activity where human ingestion of untreated water is not probable. Such uses or activities include secondary contact recreation, propagation of fish and wildlife, and domestic raw water supply. Water quality within the Bonnet Carré Spillway when operation of the control structure or leakage through the structure is occurring is comparable to Mississippi River water quality.

3.1.9 Prehistoric and Historic Sites

Numerous prehistoric and historic resources are recorded in the general vicinity of the spillway. Historic sites, including plantation houses and related features, are concentrated along the natural levee of the Mississippi River (Plate 2). Prehistoric sites tend to be found in the and marshes closer to Lake Pontchartrain. These resources are generally shell middens and, because they are often deeply buried, are sometimes only discovered during dredging operations.

The Kenner and Kugler Cemeteries are listed on the National Register of Historic Places.

A cultural resource inventory of spillway lands at Bonnet Carré Spillway was completed in several phases between 1986 and 1991. The result of these efforts was the listing of one property on the National Register of Historic Places (NRHP) and the determination

that another property is eligible for inclusion on the NRHP. The listed property is the Kenner and Kugler Cemeteries Archeological District (Plate 2). This district consists of two African-American cemetery plots which date to the early nineteenth century and continued to receive interments until Federal purchase of the property in 1928. Each cemetery contains approximately 100 to 150 burials. The cemeteries are located north (or lakeside) of SC-12 and south of the most southerly Canadian National Railroad crossing.

Currently, management of these sensitive cultural resources has been conservation-oriented. All spillway personnel are aware of the cemetery locations and buffer zones have been established to provide protection from spillway operations. The maintenance and NRM staff maintain regular surveillance over the two sites to ensure that visitor activities do not purposely or inadvertently damage these resources. In concert with district archeologists over the past several years, actions have been taken at both sites to stabilize their condition by filling in low areas and re-routing water flows away from the cemeteries. Acting upon the expressed desires of the descendant community and with adequate manpower resources available to the spillway, the management of these resources will become more active in the future. The proposed measures include demarcation of the cemetery boundaries, improved visitor access, and interpretation of the cemeteries as important community resources.

The spillway structure is eligible for listing on the National Register of Historic Places.

The other NRHP-eligible property at the spillway is the spillway structure itself. The structure, built between 1929 and 1931, is significant as an engineering landmark and is also significant for its important historical association with flood control efforts on the Lower Mississippi River. The historical significance of the spillway structure is currently a major component of the spillway's interpretive services program. An interpretive plan has been developed as part of this update to the Master Plan and is included in Appendix H. In addition, MVN will prepare and submit the nomination form for the structure so that it will be formally listed on the NRHP. Besides recognition provided by such designation, listing on the NRHP will help promote visitation to the spillway because the spillway structure would be included in the National Park Service's publication of historic places.

Because construction of the Bonnet Carré Freshwater Diversion project would require the demolition of approximately 10 percent of the spillway structure (see Plate 5), a Memorandum of Agreement was developed in 1992 to provide for appropriate mitigation

measures. Included in the agreement were the preparation of a popular history and the development of a public interpretive display at the spillway. Conceptual designs for the public interpretive display are provided in the Bonnet Carré Spillway Interpretive Plan in Appendix H.

3.1.10 Aesthetics

The Bonnet Carré Spillway offers a wide variety of aesthetic environments. This is largely the result of its unique geographical situation stretching from the Mississippi River to Lake Pontchartrain. Significant viewpoints exist at numerous locations along the lower and upper guide levees, along the three vehicular crossings of the spillway, and at many ground-level locales within the floodway itself.

One of the significant aesthetic resources of the spillway is the outstanding visual access provided for the Mississippi River. The guide levees provide elevated and unobstructed views of a large expanse of the river. The surrounding land uses are largely industrial, including chemical plants and a nuclear power station, but this does not diminish the powerful image of the river. Rather, it allows for the proper interpretation of the Mississippi as a working river, an avenue of commerce and industry. In addition to the levee viewpoints, the Bonnet Carré Spillway also provides more immediate access to the river. Visitors can descend into the forebay (the area between the spillway structure and the river) where they fish and picnic, giving them a close-up experience of the river's aesthetics. They can see, touch, smell, and hear the river in a personal way without fear of trespassing or danger.

Spillway openings provide a great opportunity to view the power of the Mississippi River and are always big regional events.

Excellent views of the spillway structure, a powerful aesthetic resource in its own right, and the wide pastoral expanse of the forebay and floodway are also available from the elevated perspective offered by the levees. Ground-level views of the spillway structure and cleared landscape from within the floodway are also powerful and are experienced daily by scores of spillway visitors and travelers along SC-12.

Close to the spillway structure, the guide levees offer an entirely different viewing experience when the Mississippi River floods the forebay and laps against the structure. These conditions occur for several weeks in the spring of most years. During these periods, the power of the river is imprinted upon spillway visitors. The purpose of the spillway is also clearly illustrated as some of the river's flow leaks through the structure, flooding the road and immediate floodway area. On the rare occasions when the

structure is opened to release floodwaters to Lake Pontchartrain, the levees offer an unparalleled view of the river's power rushing through the structure's opened bays. Spillway openings are big events in the region and are attended by the news media and thousands of citizens.

The Bonnet Carré Spillway also provides one of the few physical and visual access points to the western shore of Lake Pontchartrain. This access is provided where the lower guide levee intersects the lakeshore. At this locale, a cleared area of several acres is available to spillway visitors. Panoramic views of the lake and adjoining shoreline are utilized by the visiting public who fish, crab and picnic in this area.

Another significant aesthetic resource of the spillway is the outstanding viewing experiences provided by I-10 which crosses the Bonnet Carré Spillway near its lake edge. This stretch of I-10 provides unobstructed, elevated views of Lake Pontchartrain to thousands of travelers on a daily basis. Also provided is the diverse visual environment of the Bonnet Carré Spillway's lake edge. Visual elements include cypress tree stands, tree stumps and mudflats; a railroad crossing on trestles with rock erosion protection; and miscellaneous spillway features including the guide levees and remnant wooden guide walls.

Aesthetic environments within the floodway are extremely varied due to the broad range of habitat types and spillway activities. Habitat types include disturbed areas almost denuded of vegetation, wide expanses of re-vegetated grasslands, innumerable water bodies of various sizes, bottomland hardwood forests, and baldcypress/tupelo gum swamps. Spillway visitors experience these areas from vehicles, on foot, and from boats launched in the two large borrow pits adjacent to the guide levees. Many of these areas, especially between U.S. 61 and the lake, offer a high quality natural environment.

Unauthorized trash dumping severly degrades the aesthetics of the spillway.

The spillway, of course, also has negative aesthetic attributes. Chief among these are the numerous locales of unauthorized trash dumping. Several remote areas of the spillway are plagued by the dumping of abandoned vehicles, household garbage, and construction debris. In addition, the spillway has many areas that are severely degraded from an aesthetic standpoint by operational and maintenance activities as well as visitor activities. Where sand hauling activities are underway, highly disturbed landscapes are in evidence. Areas frequented by large numbers of off-road vehicles are scarred by vehicle ruts, vegetation damage, trash, and noise

pollution. Over the years, the spillway has suffered from a lack of attention to aesthetic concerns and poor maintenance practices. Future natural resources management of the spillway will include actions to implement a landscape improvement and management program.

3.2 SOCIAL RESOURCES IN THE PROJECT VICINITY

3.2.1 General

The primary function of the Bonnet Carré Spillway is to reduce the potential flood hazards to the large population centers downstream, particularly the New Orleans metropolitan area. The spillway was authorized by the Flood Control Act of 1928, following the Flood of 1927. During this flood, the Mississippi River levee below the City of New Orleans was intentionally breached to avoid heavy damage and potential loss of life. Since then, economic expansion, urbanization, and natural increases have led to significant population growth. For purposes of this report, the socio-economic study area includes the five parishes (Primary Parishes) which are essentially within a radius of 25 miles of the spillway guide levees, and the population of an additional ten parishes (Secondary Parishes) largely within 25 to 50 miles of the spillway. Small portions of Ascension, Lafourche, Livingston, St. Tammany, and Tangipahoa parishes are also within 25 miles of the spillway and are included as Secondary Parishes. Small portions of East Baton Rouge, St. Helena, St. Martin, and Washington parishes are also within 50 miles of the spillway guide levees but are beyond the scope of the study.

3.2.2 Demographics

There are no permanent residents currently living within the spillway rights-of-way. For a brief period of time, prior to the opening of the structure gates in 1973, the boat-launch operator and his family lived in a mobile home along U.S. 61 inside the floodway. Since that time, no one has lived on Bonnet Carré Spillway lands.

Residential developments in closest proximity to the spillway include the small communities of Norco and Montz, both located in St. Charles Parish. Norco is located adjacent to the lower guide levee, between the east Bank of the river and U.S. 61. In 2000, Norco had a population of 3,579 persons. Montz is located along the east Bank of the river and Louisiana Highway 628, immediately adjacent to the upper guide levee. The 2000 Census of Population and Housing identified Montz as a community of 1,120 persons.

Larger residential communities are located in the immediate vicinity of the spillway. Only a few miles upriver from Montz is the community of LaPlace in St. John the Baptist Parish. In 2000, LaPlace had a total population of 27,684 persons. Several larger population centers are located downriver from Norco. These include the communities of New Sarpy, Destrehan, and St. Rose with populations in 2000 of 1,568; 11,260; and 6,540 persons respectively. Below St. Rose, population densities tend to increase, generally in the direction of the Urbanized Area of New Orleans and the City of New Orleans.

Since the flood of 1927 the population of the entire study area has increased by more than a million people.

Table 3-4 compares the population trends of individual parishes in the study area with the population of the entire State from 1960 to 2007. Since the Flood of 1927, the population of the entire study area has increased by more than a million people. Census data indicate that the population of the 15-parish study area has grown from approximately 1,287,830 in 1960 to an estimated 1,761,489 in 2007. The population of the Primary Parishes actually declined between 1960 and 2007, from 894,321 to 849,758. However, the population of the Secondary Parishes has nearly tripled over the same time frame, from 393,509 in to 911,731 in 2007.

The population of the study area trends closely with the overall demographics of Louisiana. In 1960, the population of the primary and secondary market areas represented 40 percent of the state's population, and the most recent data from 2007 shows that the study area represents 41 percent of the state population. A slight upward trend to 42 percent of the state's population occurred between 1960 and 2000. This increasing concentration of population in the study area; however, was reversed in the period between 2000 and 2007 when the study area experienced a net loss of 136,397 persons. This loss was directly related to the impacts of Hurricanes Katrina and Rita in 2005.

Economic development and increased flood protection helped to sustain population growth rates beyond National trends in the study area until the early 1980s. From 1960 to 1970, for example, the population of the study area increased at a compound annual rate of 1.6 percent, while the population of the U.S. increased at a rate of about 1.3 percent. From 1970 to 1980 the population of the study area increased at an annual rate of about 1.5 percent, while the population of the U.S. increased at a rate of about 1.1 percent. From 1980 to 1990, however, the population of the study area increased only slightly at an annual rate of less than 0.1 percent. During the same time frame, the population of the U.S. grew at a rate of about 0.9 percent per year. This slowdown in population

growth in the 1980s is largely the result of downsizing and restructuring of the oil and gas industry during this decade (U.S. Census Bureau 2007).

Table 3-4. Historical Population Trends and Population Projections of the Study Area

	1960	1970	1980	1990	2000	2007
PRIMARY PARISHES						
Jefferson	208,769	337,568	454,593	448,306	455,466	440,339
Orleans	627,525	593,471	557,515	496,938	484,674	288,113
St. Charles	21,219	29,550	37,259	42,437	48,072	52,044
St. James	18,369	19,733	21,495	20,879	21,216	21,578
St. John	18,439	23,813	31,924	39,996	43,044	47,684
Sub-Total	**894,321**	**1,004,135**	**1,102,786**	**1,048,556**	**1,052,472**	**849,758**
SECONDARY PARISHES						
Ascension	27,927	37,086	50,068	58,214	76,627	99,056
Assumption	17,991	19,654	22,084	22,753	23,388	22,991
Iberia	51,657	57,397	63,752	68,297	73,266	74,965
Lafourche	55,381	68,941	82,483	85,860	89,974	92,713
Livingston	26,974	36,511	58,806	70,526	91,814	116,580
Plaquemines	22,545	25,225	26,049	25,575	26,757	21,540
St. Bernard	32,186	51,185	64,097	66,631	67,229	33,439
St. Tammany	38,643	63,585	110,869	144,508	191,268	226,625
Tangipahoa	59,434	65,875	80,698	85,709	100,588	115,398
Terrebonne	60,771	76,049	94,393	96,982	104,503	108,424
Sub-Total	**393,509**	**501,508**	**653,299**	**725,055**	**845,414**	**911,731**
STUDY AREA TOTAL	**1,287,830**	**1,505,643**	**1,756,085**	**1,773,611**	**1,897,886**	**1,761,489**
Percent of State	**40%**	**41%**	**42%**	**42%**	**42%**	**41%**
State Total	3,237,022	3,644,637	4,206,312	4,220,187	4,468,976	4,373,310

SOURCES: U.S. Census Bureau 2007.

Population growth in the study areas slowed in the 1980s, primarily as a result of downsizing of the oil and gas industry.

During the 1990s, economic recovery in the study area led to population growth of about 0.7 percent annually from 1990 to 2000, more closely resembling the National trend of 1.0 percent annually during the same general period. This trend continued into the first the new millennium but was significantly affected by the hurricane season of 2005. The catastrophic impacts of Hurricanes Katrina and Rita in August and September 2005 resulted in significant population shifts in south Louisiana. These shifts impacted the visitor base of the spillway and are documented in the 2007 estimates of population in the spillway's market area.

The post-Katrina population shift in the study area can generally be described as a movement of persons from the more heavily devastated areas in St. Bernard, Orleans and Jefferson parishes to communities north (across Lake Pontchartrain to St. Tammany, Livingston and Tangipahoa parishes) and west (upriver to St.

Charles, St. John, and Ascension parishes). The parishes immediately adjacent to the spillway (St. Charles and St. John parishes) have witnessed population increases post-Katrina. The westward and northern shift of population in the New Orleans metropolitan area, however, has also been accompanied by a reduction in total population; which has reduced the Bonnet Carré Spillway user population base (primary and secondary markets) by 136,397 persons or approximately 7 percent between 2000 and 2007.

Hurricanes Katrina and Rita changed the demographics of the project area.

While representing a relatively small portion of the total population of the region, the post-Katrina in-migration of Hispanics into the New Orleans metropolitan area has also changed the user profile at Bonnet Carré Spillway. Although official census Bureau estimates for 2006 show that the Hispanic population is only 6 percent of the total regional population, it is likely that the official surveys significantly underestimate the influx of Hispanic construction and service workers and their families (Brookings Institution 2007).

The area identified by the U.S. Census Bureau as the New Orleans Metropolitan Statistical Area (MSA) has increased from three parishes in 1960 to eight parishes as of 2000. In 1960 the MSA included Jefferson, Orleans, and St. Bernard parishes. Since then Plaquemines, St. Charles, St. James, St. John the Baptist, and St. Tammany parishes have been added to the New Orleans MSA. Lafourche and Terrebonne parishes make up the Houma MSA. The Secondary Parishes of Ascension and Livingston parishes are part of the Baton Rouge MSA. The Baton Rouge MSA also includes East Baton Rouge Parish, where the City of Baton Rouge and most of the urbanized area is located, and West Baton Rouge Parish.

3.2.3 Economic Development

Future population projections for the study area parishes through 2030 are available from demographic analyses conducted prior to Hurricanes Katrina and Rita. However, these parish-level projections however are not considered reliable due to the storm-related disruptions and significantly altered growth rates of individual parishes. Instead, the demographic and econometric projections prepared by the “Louisiana Speaks” planning initiative of the Louisiana Recovery Authority (LRA) will be used to address future trends.

Louisiana Speaks is a long-term planning initiative of LRA. The Louisiana Speaks Regional Plan process used a demographic and economic forecast developed by Moody's Economy.com, a National and regional economic modeling firm. Using its own baseline assumptions, the Moody's Economy.com model utilizes National and regional economic forecasts, updated monthly to estimate future population and economic growth. This custom forecast provided a starting point for post-hurricane growth in the five metropolitan areas (as defined by the U.S. Census Bureau) and 13 non-metropolitan parishes of south Louisiana. The custom forecast estimated what could happen to the populations and economies of these regions during the next 45 years if there are significant changes to regional industry composition and extensive efforts to stimulate local economies and encourage return migration.

The "Louisiana Speaks" planning initiative of the LRA is used to address future economic trends.

The population and employment forecast, starting from base year 2005 and ending in 2050, estimated that south Louisiana would grow by 1.7 million people and 1.25 million jobs. From this coast-wide projection, it is estimated that the three metropolitan areas surrounding the Bonnet Carré Spillway would grow by 1.56 million people and 1.08 million jobs (see Table 3-5).

Table 3-5. Population and Employment Projections for Year 2050

Metropolitan Planning Organization Area	Total Population			Total Employment		
	2005	2050	Increase	2005	2050	Increase
New Orleans	741,000	1,708,000	967,000	383,000	880,000	497,000
Baton Rouge	974,000	1,484,000	510,000	395,000	920,000	525,000
Houma	332,000	414,000	82,000	126,000	183,000	57,000
SE Louisiana Totals	2,047,000	3,606,000	1,559,000	904,000	1,983,000	1,079,000

The projected growth in southeast Louisiana will serve to significantly increase the population of the primary and secondary market areas for the spillway. In fact, the continued growth of the three metropolitan areas (New Orleans, Baton Rouge and Houma) places Bonnet Carré at the nexus of these growing populations, each with increasingly limited open land available for recreation.

3.2.4 Economic Development

The spillway is located in the heart of the heavy industrial corridor that stretches between Baton Rouge, Louisiana and the Port of New Orleans. This reach of the Mississippi River falls under the jurisdiction of the Port of south Louisiana, which stretches 54 miles along the river. The Port of south Louisiana is the largest tonnage port district in the western hemisphere. The facilities within St.

The Port of South Louisiana is the top ranked port in the U.S. for export and total tonnage.

Charles, St. John the Baptist, and St. James parishes handled over 258 million short tons of cargo in 2007, brought to its terminals via vessels and barges.

Over 4,000 oceangoing vessels and 55,000 barges call at the Port of south Louisiana each year, making it the top ranked port in the U.S. for export tonnage and total tonnage. With average exports of over 52 million short tons of cargo per year- more than any other port in North America - Port of south Louisiana cargo throughput accounts for 15 percent and 57 percent of total U.S. and Louisiana exports, respectively.

Several important industrial facilities are located in the vicinity of the spillway as illustrated in Figures 3-1 and 3-2, showing existing industries and available industrial sites in St. Charles and St. John the Baptist Parishes. As seen on these maps from the Port of south Louisiana, the Bonnet Carré Spillway is virtually surrounded by industry.

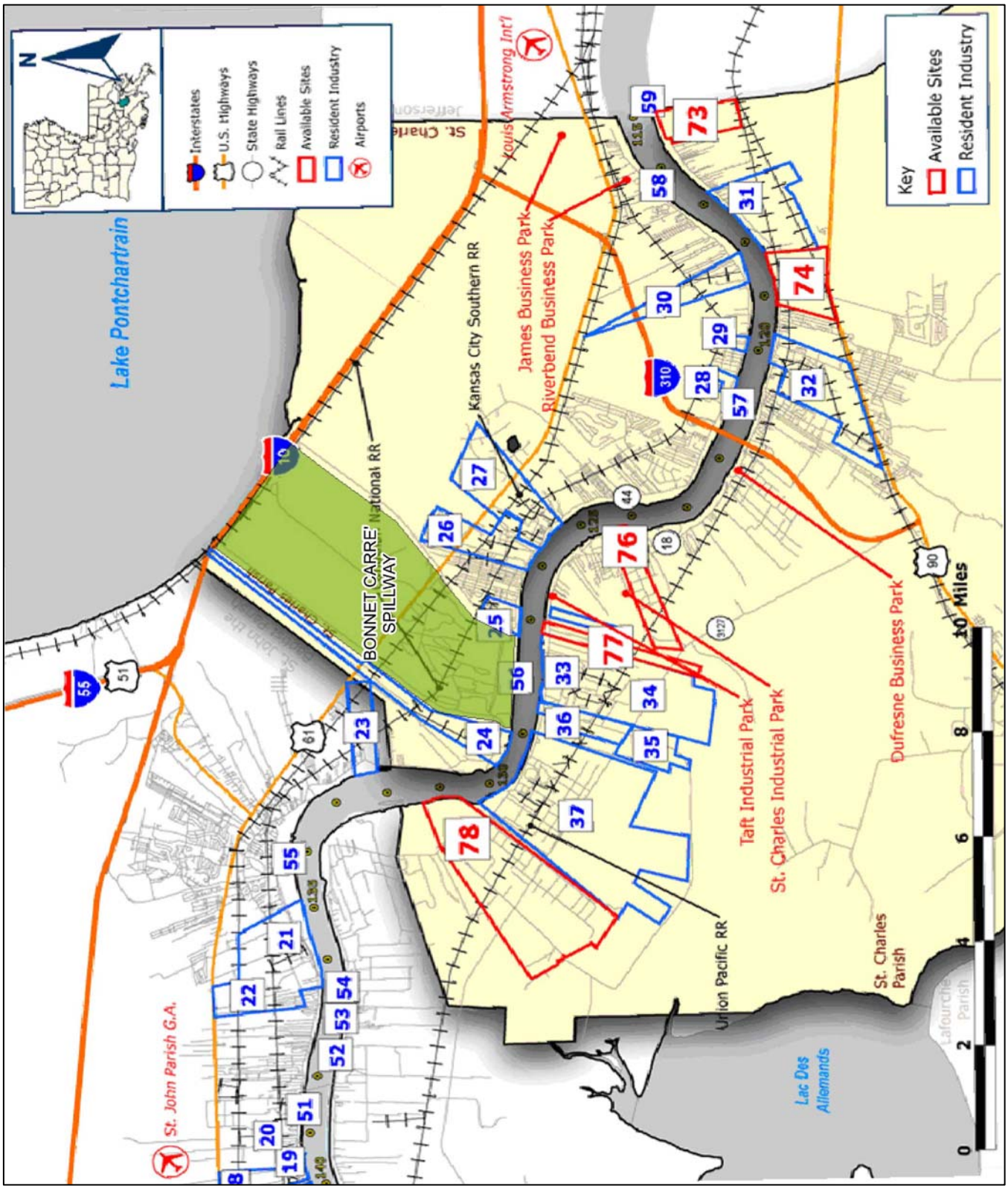
Numerous industrial facilities are located in the vicinity of the spillway.

Those facilities immediately upriver of the floodway include a metal processing plant (Bayou Steel) and an electrical generating plant (Entergy – Little Gypsey) located along the Mississippi River, and the St. Pierre Fabrication and Welding company, located immediately across from the upper guide levee and the lower Canadian National Railroad. Several petro-chemical processing plants are also located along the river, below the spillway and lower guide levee, at Norco and Valero Refinery. In addition to the industrial facilities, several small miscellaneous retail and service activities are located along the river to meet the immediate needs of the communities.

Located directly across the river from the spillway (*e.g.,* on the west Bank of the Mississippi River) are several industrial facilities. These include a nuclear powered electrical generating plant (Entergy Waterford 1, 2, 3), Occidental Chemical, Mosaic Agricultural Products, Crompton Chemical, and Dow – St. Charles Chemical.

Historically, economic development trends within the study area have included the commercial harvest of fish and wildlife in the coastal region; agricultural and timber production along alluvial ridges and upland areas; and waterborne commerce and marine construction centered on the Port of New Orleans. As the port expanded, associated marketing and financial activities increased, along with the sales and services required to support a large metropolitan area. In 1928, when the spillway was authorized,

Figure 3-1. Industrial Sites in St. Charles Parish



Source: Port of south Louisiana web site. http://www.portsl.com/gis/stcharlesparish.htm

Table 3-6. Key to Industries and Available Sites

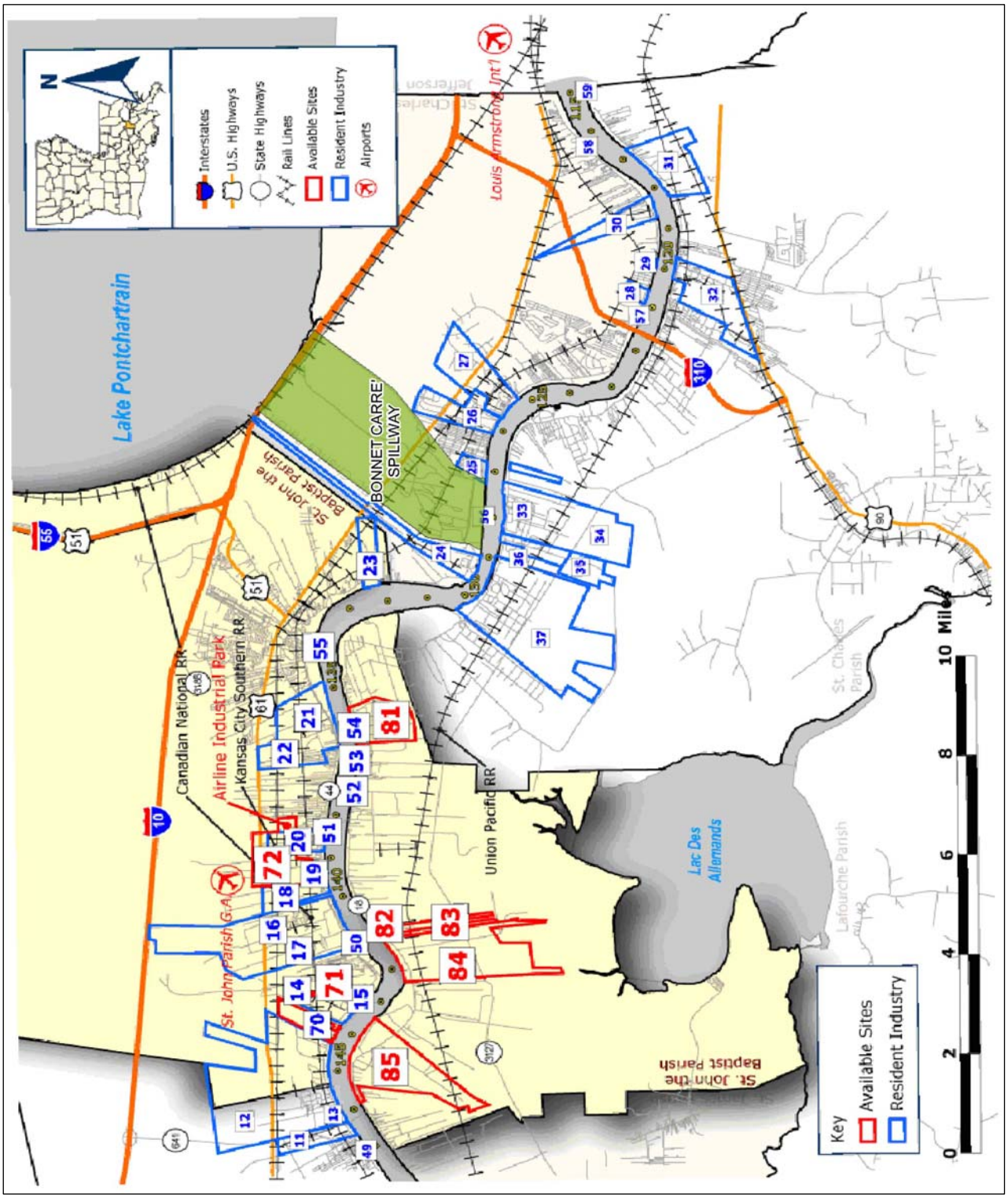
Site Number	Facility Name
24	Entergy – Little Gypsey
25	Shell Chemical
26	Motiva Enterprises – Norco
27	Valero Refinery
28	Archer Daniels Midland (ADM) Growmark - Destrehan
29	Bunge Grain
30	International Matex Tank Terminals
31	ADM Growmark – Ama
32	Monsanto
33	Dow – St. Charles
34	Crompton
35	Occidental Chemical
36	Mosaic
37	Entergy Waterford 1, 2, 3
56	Bonnet Carré Anchorage
57	ADM Midstream Buoy
58	Ama Anchorage
59	Kenner Bend Anchorage
73	Bunge
74	Davis Levert
76	Homeplace
77	Pelican Occidental
78	Coleman / St. Charles Riverplex

economic developments below the spillway centered largely on the Port of New Orleans. The 1930 population of the five Primary Parishes of the study area was about 540,000, with almost 459,000 or 85 percent living in Orleans Parish.

With increases in technology, a more industrialized economy has emerged, including deep-draft navigation on the Mississippi River and the exploration and production of oil and gas, both on and offshore. Other important mineral resources have been produced and processed in the area as well, including sulfur, salt, sand, and shell (used largely as an aggregate). The availability of large volumes of fresh water have contributed to the development of numerous petro-chemical plants along the Mississippi River and connecting waterways, including those in the vicinity of the spillway. Large volumes of agricultural products shipped down from the mid-west and south-central States have also contributed to the development of the ports located along the river. In 2007, the combined traffic at the Port of New Orleans, the Port of south Louisiana located in the spillway area and the Port of Baton Rouge, totaled more than 360 million tons. This port complex is the largest in the U.S. Total tonnage reported for the next two largest ports

The Port of New Orleans, Port of south Louisiana and Port of Baton Rouge make up the largest port complex in the U.S.

Figure 3-2. Industrial Sites in St. John the Baptist Parish



Source: Port of south Louisiana web site. http://www.portsl.com/gis/stjohnparish.htm

Table 3-7. Key to Industries and Available Sites

Site Number	Facility Name
16	Marathon Petroleum
17	Pinnacle Polymers
18	Cargill Terre Haute Elevator / Liguid Bilk
19	Archer Daniels Midland (ADM) Growmark – Reserve
20	Globalplex Intermodal Terminal
21	Dupont / Dow
22	El Dupont
23	Bayou Steel
50	St. John Fleet Midstream Buoy
51	Reserve Midstream Buoy
52	Reserve Anchorage
53	Capital Marine Tigerville Midstream Buoy
54	Gold Mine Fleet Midstream Buoy
55	CGB Midstream Buoy
70	Angelina Petroleum Storage Terminal
71	Hope
72	Airline Industrial Park
81	Goldmine
82	Alliance
83	Whiterose
84	Willow Bend
85	Whitney/Formosa

were 216 million tons for the Port of Houston and 157 million tons at the Port of New York. Primary economic forces influencing growth since the 1980s have been the construction of convention facilities, hotels, and restaurants, to accommodate a growing tourist trade.

These conditions, the National trend toward a more market-oriented economy, and construction of mass transit systems (i.e. metropolitan bus stations), have led to a large suburban population in New Orleans, like most major metropolitan areas. The 1990 Census estimated that only 47 percent of the population within the Primary Parishes lives within the City of New Orleans (coextensive with Orleans Parish). By 2007, this trend toward outmigration from New Orleans was greatly accelerated by the extensive displacement from Hurricane Katrina. In 2007, the City of New Orleans represented only 34 percent of the primary study area population and 16 percent of the total market area.

Table 3-8 provides a summary of employment and per capita personal income (PPI) of persons living in the Primary and Secondary Parishes with the Study Area from 1970 to 2006. The table compares employment trends in the primary and secondary

parishes with that of the total study area. These data on employment closely track the population changes discussed earlier in this section. While there was a net loss of jobs in the primary parishes, the secondary parishes experienced a strong increase. This trend is consistent with the pre-Katrina suburbanization that was shifting population and employment northward and westward away from the City of New Orleans. The displacements associated with Hurricanes Katrina and Rita accelerated this trend.

Table 3-8. Employment by Industry Category

	1970	1980	1990	2000	2006
PRIMARY PARISHES					
Employment	351,339	460,194	457,125	642,641	528,348
Income (PPI)*	$3,720	$9,760	$16,440	$26,038	$41,230
% of State PPI*	121%	112%	108%	113%	130%
SECONDARY PARISHES					
Employment	152,396	249,732	288,700	386,516	462,420
Income (PPI)*	$2,700	$8,730	$13,460	$22,971	$31,013
% of State PPI*	88%	101%	94%	99%	97%
TOTAL STUDY AREA					
Employment	503,735	709,926	745,825	1,029,157	990,768
Income (PPI)*	$3,380	$9,390	$15,260	$24,669	$35,720
% of State PPI*	110%	108%	107%	107%	112%

* PPI- Per capita Personal Income.
SOURCES: U.S. Dept. of Commerce, Bureau of the Census, "County and City Data Book", 1977, 1983, 2006.

Table 3-8 also compares PPI expressed as a percentage of the average PPI for the State of Louisiana. The percentages indicate a higher level of economic activity in the primary parishes than in the secondary parishes. Also noteworthy is the higher level of personal income in the study area when compared to the state average.

Table 3-9 summarizes recent estimates of employment in the total market area and the State of Louisiana by industrial classification for both 1990 and 2006. Even with the tremendous impacts of hurricanes in 2005, the total market area experienced a 13.2 percent growth in employment between 1990 and 2006. This growth, however, lagged behind the state increase of 20.8 percent over the same time period. Employment in most industries fell during this time period. The exceptions were construction, which grew by 73.9 percent in the market area (compared to 59.6 percent growth statewide) and services, which grew by 69.2 percent (91.3 percent growth statewide).

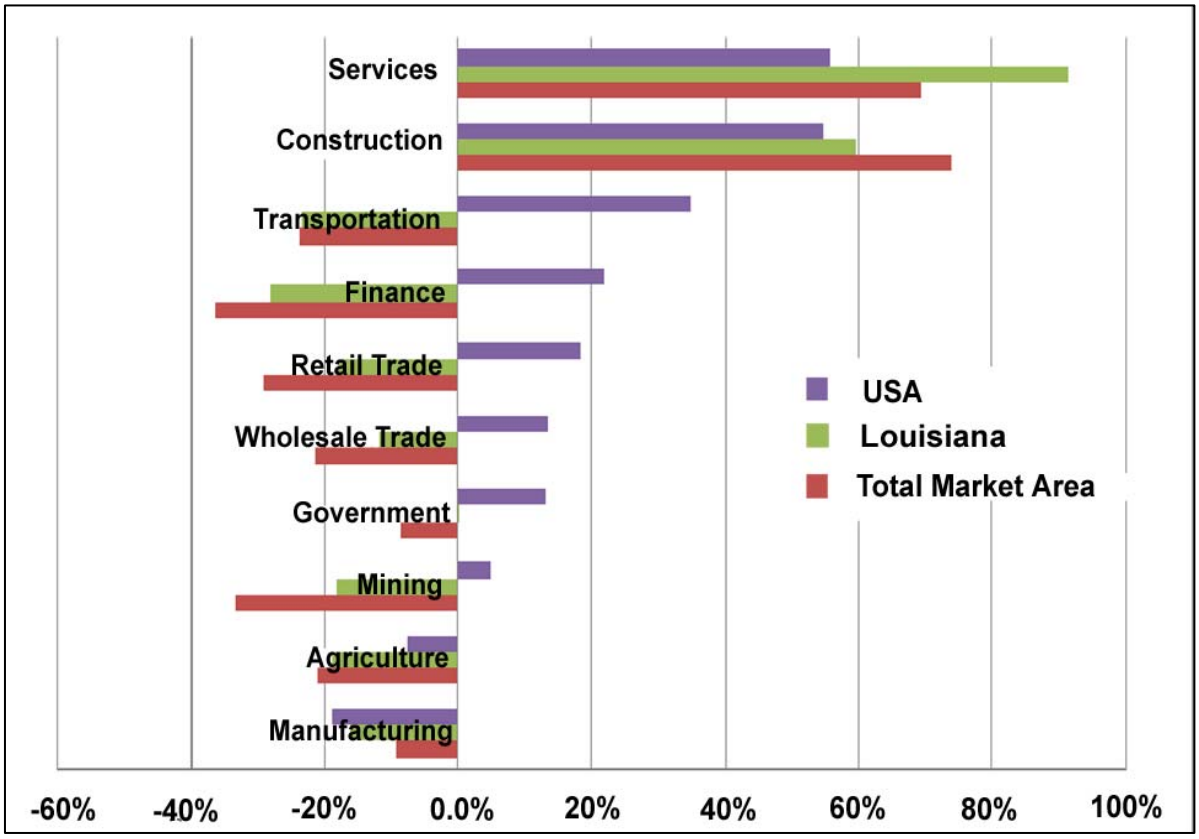
Table 3-9. Employment by Industry Category, 1990 and 2006

INDUSTRY	1990 Market Area	2006 Market Area	Percent Change	1990 Louisiana	2006 Louisiana	Percent Change
Agriculture	11,329	8,948	-21.0%	76,785	62,424	-18.7%
Mining	30,057	20,037	-33.3%	67,910	55,582	-18.2%
Construction	47,589	82,777	+73.9%	121,428	193,754	+59.6%
Manufacturing	71,301	64,734	-9.2%	189,729	159,021	-16.2%
Transportation	63,441	48,372	-23.8%	122,435	93,794	-23.4%
Wholesale Trade	43,591	34,301	-21.3%	91,012	80,457	-11.6%
Retail Trade	151,184	107,160	-29.1%	329,207	269,734	-18.1%
Finance	56,636	36,134	-36.2%	119,575	85,875	-28.2%
Services	253,485	429,002	+69.2%	533,573	1,020,589	+91.3%
Government	141,105	128,971	-8.6%	378,458	379,141	+0.2%
TOTAL	**875,115**	**990,768**	**+13.2%**	**691,311**	**2,439,028**	**+20.8%**

SOURCE: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce. CA25N 1990 and 2006

The increased employment in services and construction between 1990 and 2006 is consistent with the National trends in employment as illustrated in Figure 3-3. Other employment sectors, however, highlight differences between the economy of the study area versus National trends. Employment in agriculture was reduced at all three levels of analysis, although the decline is much stronger in the study area and Louisiana. Conversely, the study area showed declines in manufacturing jobs but at a much slower rate than the state or the National losses. In other employment categories, the study area and Louisiana as a whole showed declines while the Nation experienced growth. These industries include mining, transportation, wholesale trade, retail trade, finance and Government. Undoubtedly, these variations from the National trends are somewhat related to the hurricane damages of 2005 but likely indicate broader differences in the state and local economies.

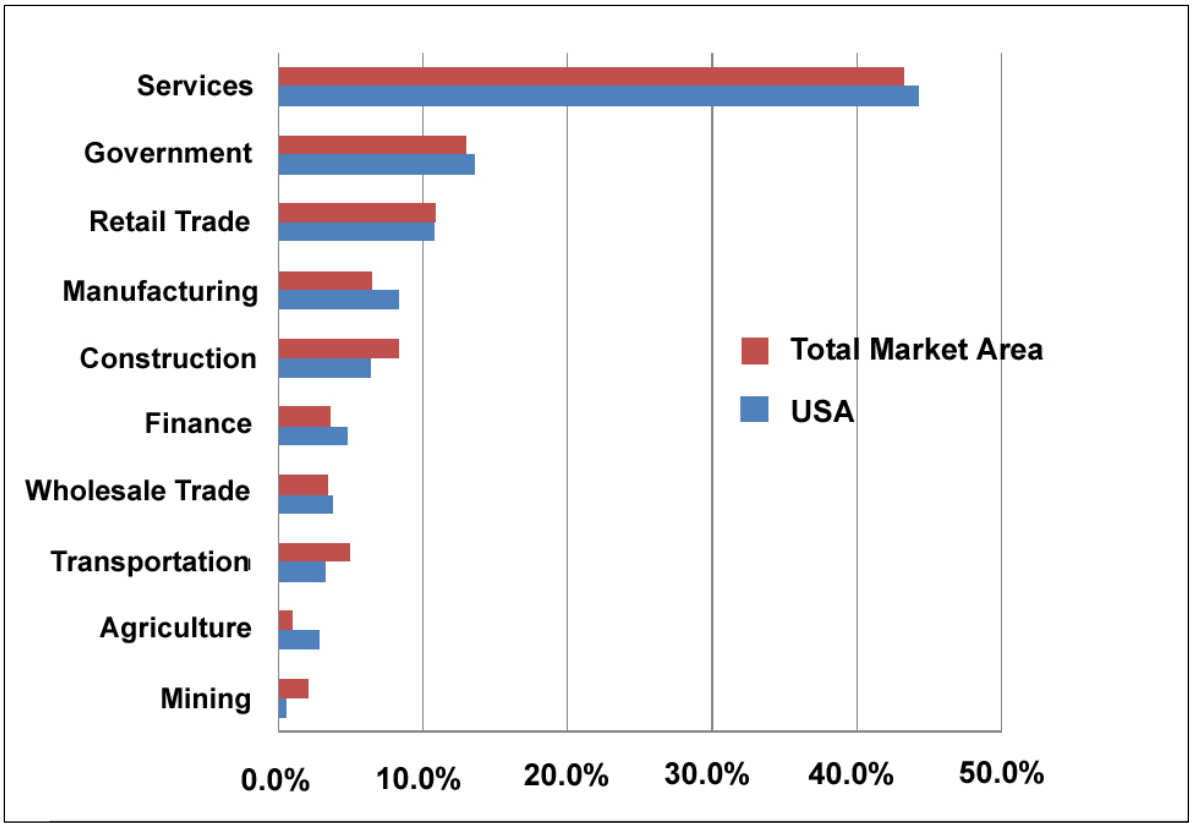
Figure 3-3. Employment Trends, 1990 to 2006



Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce. CA25N 1990 and 2006.

The distribution of employment by industry in the market area is very similar to the National profile of employment. Figure 3-4 illustrates the percentages of employment in the various industries in the study area versus the Nation as a whole. Approximately 43 percent of the jobs in the study area are service jobs, which is very close to the National employment in the service industries of 44 percent. Next in significance is employment in Government jobs, which represent 13 percent of all jobs in the study area. Notable differences between the market area and the National employment distribution are the higher percentage of employment in construction, transportation, and mining in the study area. The local area shows less employment, by percentage, than the Nation in the industry sectors of manufacturing, finance and agriculture.

Figure 3-4. Employment by Industry in 2006



Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce. CA25N 1990 and 2006.

3.2.5 Adjacent Land Uses

Diverse land uses are contiguous to the spillway boundaries. On the upriver side of the spillway, the small community of Montz lies adjacent to the upper guide levee near the river. Louisiana Highway 628 parallels the levee toe from the river to U.S. 61. With the exception of the small manufacturing area occupied by Cembell Industries, Incorporated, the adjoining areas are wooded and undeveloped (Plate 6).

Adjoining land use on the downriver (Norco) side of the spillway is more intensive and diverse. Beginning at the Mississippi River Levee and extending to the Canadian National Railroad is an extensive Valero Chemical facility (Plate 6). This heavy manufacturing facility is located in immediate proximity to the spillway office building. The character of property adjoining the lower guide levee abruptly changes, however, between this railroad crossing and the next railroad crossing (Kansas City Southern Railroad). This area is residential in nature, including an elementary school, a recreation area, and a row of single family

homes immediately adjacent to the levee toe (Plate 6). Between the Kansas City Southern Railroad and U.S. 61, the adjoining land use is a narrow band of woodlands surrounding a former borrow pit.

Above U.S. 61 and stretching to the St. Charles Parish Hurricane Protection Levee, the nature of the adjoining properties changes once again. Located in this reach is an industrial facility, Valero Entergy Corporation, and the Norco community sewerage treatment facility (Plate 6). From the St. Charles Parish Hurricane Protection Levee to the lake, the adjoining property is forested wetlands.

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SECTION 4.0
RECREATION OPPORTUNITIES ON SPILLWAY LANDS

4.0 RECREATION OPPORTUNITIES ON SPILLWAY LANDS

4.1 EXISTING RECREATION ON SPILLWAY LANDS

4.1.1 Types of Activites

The entire spillway, both guide levees, and borrow canals outside the spillway are extensively used by recreationists, predominately from St. Charles, St. John the Baptist, Jefferson, and Orleans Parishes. The spillway has a variety of ecological zones including open grass lands, disturbed areas (sand hauling areas), wetlands, forested areas, and ponded water. These public lands and waters provide resources for traditional recreation use such as picnicking, camping, crawfishing, crabbing, fishing, boating, water skiing, and hunting. They also provide ample space for more specialized activities that are generally not available elsewhere in the region such as off-road riding with dirt bikes and ATV's, dog training and retriever dog field trials, and model airplane flying. Additionally, several outgrants, a permit and a partnership for recreational activites exist on spillway lands as previously mainted in Section 2.6.

The spillway provides boat access to several interior borrow canals and Lake Pontchartrain.

Photograph 4-1. Recreational crawfishing on Bonnet Carré Spillway

The spillway has several boat launch sites which provide access into the interior borrow canals and into western Lake Pontchartrain where boating access is somewhat limited. One of these boat launches is located within the St. Charles Parish 26-acre leased recreation site. Boats launching from this site primarily use the upper and Lower Borrow Canals, and the cross-cut canal. Also this site includes fishing docks, a picnic pavilion, scattered picnic tables, primitive camping, and portable toilets.

Another boat launch in the spillway is located under I-10 along the lower guide levee. Boats launching from this site use the I-10 construction access channel and a poorly marked channel to gain access into Lake Pontchartrain. Located at the lake end of the

lower guide levee is a fishing jetty under construction which extends approximately 100 feet into Lake Pontchartrain. This facility was developed by St. Charles Parish.

An improved boat launch is also located on the upper borrow canal near U.S. 61, providing safe access into this major waterway. The boat launch was built for spillway maintenance access but receives significant incidental use by the general public. Additional boat launch sites are located along the outside of the lower guide levee near the lake providing access into Engineers Canal and Bayou Trepagnier and on the Mississippi River at the lower guide levee.

Numerous recreational opportunities are available on spillway lands.

A model airplane field operated by a private club under a USACE permit is located in the vicinity of the structure and the SC-12. This development is in an area of the spillway devoid of obstacles such as trees and overhead wires, providing a wide expanse of clear space for the flying of model airplanes.

In the vicinity, but out of the spillway, is Montz Park. This 1.86-acre neighborhood park is located next to the upper guide levee near the Mississippi River. The park is mostly on land owned by the parish and includes basketball courts and playground equipment.

During a 1994 survey of recreation at the spillway, 24 popular recreational activities were identified. The most popular traditional activities identified in the survey were: sightseeing, meeting friends, motorcycle and ATV riding, boating and water skiing, and bank and boat fishing. Other less popular activities having significant use include: hiking/walking, picnicking, camping, bird watching, swimming, photography, bicycle riding, and sun bathing. Specialized recreational activities or those needing vast acreage, isolation or special water conditions include: crawfishing, motorcycle, ATV, and vehicle riding, dog training, remote control boating, plane flying, 4-WD use and gun shooting.

4.1.2 Estimates of User Days

Over the years, estimates of annual recreation user days at Bonnet Carré have ranged widely from 148,000 to 400,000. Recreation survey data collected between the years of 1959 and 1970 and listed in the unapproved 1971 draft Bonnet Carré Master Plan indicate 315,000 average annual visits occurred for the 12-year reporting period. Similar reported figures obtained from Mr. C. A. Redmon of MVD indicate a 148,000 average annual visitation occurred for the 18-year period between 1965 and 1982. Use figures contained in the 1964 MR&T Design Memorandum Number

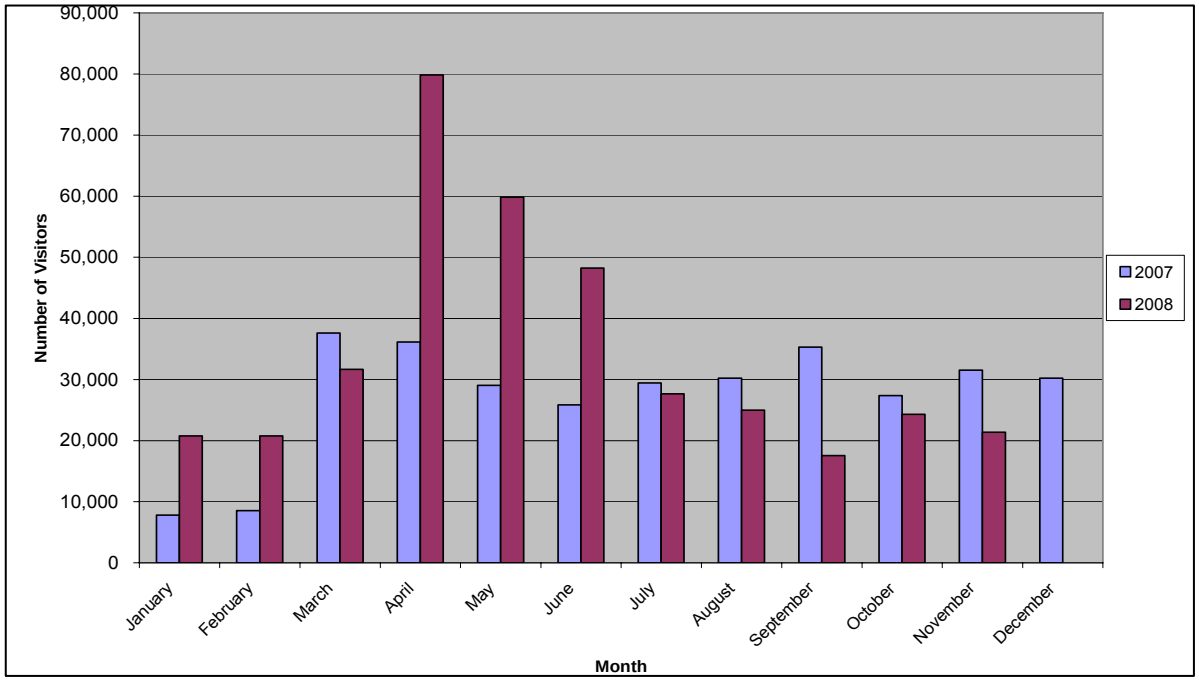
1A indicated recreational use of the spillway exceed 400,000 annually.

A recreation use survey was performed in 1994 by members of the original Master Plan study team to more accurately determine the level of usage at the time. Total use estimates indicated approximately 246,250 annual recreation user days involved in some type of leisure time activity ranging from consumptive to non-consumptive. Of this total estimate, recreation user days in the spillway were estimated at 184,800 general recreation days and 61,450 general fishing and hunting days.

A recreational use survey was performed during the preparation of the 1998 Master Plan.

The 1994 estimate of approximately 250,000 user days per year was carried forward into subsequent years as the NRM program became established. The NRM program started in 1997 with the hiring of the first park ranger at Bonnet Carré Spillway. With further implementation of a comprehensive NRM program at the spillway, traffic counters were installed at strategic locations along spillway roads and recreation user days are now estimated in VERS, the USACE-approved program for estimating visitation. Two full years of reliable visitation data is available on a monthly basis starting in January 2007 and extending through December 2008. These data are graphically illustrated in Figure 4-1.

Figure 4-1. Bonnet Carré Spillway Visitation 2007-2008



Source: MVN 2008

Total visitation during calendar year 2007 was 329,075 visitors, which represents an increase of 34 percent over the estimated visitation in 1994. While this increase can be attributed largely to improved recreational opportunities and property management by MVN, caution is warranted since the earlier estimate was less precise than the current data obtained with traffic counters. Visitation in 2008 totaled 403,989 persons, an increase of 74,914 visitors over the previous year. This 23 percent increase from 2007 to 2008 is probably due primarily to the fact that the spillway was operated in early 2008 (April 11 – May 8), which caused a significant increase in visitors coming out to view the spillway opening. The closure of the structure in early May 2008 was followed by a bumper crop of crawfish, which largely explains the increased visitation in May and June. The surge in visitation during the months of April, May and June 2008 is clearly illustrated in Figure 4-1.

The 2008 opening increased visitation by approximately 74,914 visitors.

Another important aspect of public use is well-illustrated in Figure 4-1. The typical recreation area in the U.S. experiences a high visitation season in the summer months bracketed by Memorial Day and Labor Day weekends (late May through early September). Public use of the spillway does not follow this pattern but rather shows a steady rate of visitation spread throughout the year (with a slight downturn experienced during the winter months of January and February). Of more relevance to Bonnet Carré Spillway is the weekly visitation profile that shows that most visitation occurs on the weekends, with the highest use documented on Sundays.

While spillway-wide visitation is useful for understanding overall visitation trends, the traffic counters and VERS software allows visitation to be reviewed within specific use areas. Table 4-1 illustrates the recreation area data from April 2007 through December 2008. The recreation areas listed in Table 4-1 are described in Table 4-2.

The visitor data in Table 4-1 illustrates the significant increase in public visits to the spillway with the spillway operation in April and May 2008 (under dispersed use) and the subsequent spike in visitors in May and June 2008 due to the ample availability of crawfish after closure of the structure. By disregarding these atypical data associated with the 2008 spillway operation, a review of the visitor data by recreation area helps to identify the high volume use areas and those that experience seasonal fluctuations.

Table 4-1. Bonnet Carré Spillway Visitor Data by Recreation Area 2007-2008

Date	U.S. 61 Recreation Area	Lower Guide Levee	Upper Guide Levee	ATV Area	Remote Control Airplane Area	Dog Trials/ Training	North Main Road	Dispersed Use	Spillway Office
April 2007	5,400	14,383	5,233	4,430	200	200	5,527	755	175
May 2007	10,501	7,501	2,253	3,137	160	100	4,505	875	45
June 2007	12,856	3,570	1,659	3,090	160	100	3,458	950	72
July 2007	13,321	4,604	2,028	3,830	160	150	4,224	1,125	33
August 2007	11,129	5,118	2,889	2,975	160	150	6,748	1,050	78
September 2007	11,861	9,908	1,805	3,239	200	350	6,859	1,100	151
October 2007	9,866	4,933	1,224	2,698	200	375	6,859	1,200	61
November 2007	6,864	10,834	1,445	2,860	240	400	7,698	1,200	92
December 2007	6,377	8,997	1,471	3,289	280	325	8,297	1,200	71
January 2008	5,832	4,681	1,584	2,823	280	500	3,868	1,200	79
February 2008	6,315	3,081	2,430	3,016	270	370	4,255	1,100	69
March 2008	9,502	7,160	3,065	3,671	240	1,200	5,585	1,250	141
April 2008	4,042	3,018	1,764	0	0	30	0	71,000	0
May 2008	2,337	8,632	97	0	25	30	2,713	46,000	0
June 2008	6,750	8,030	2,700	135	150	250	25,723	4,500	0
July 2008	7,200	6,215	3,785	2,935	150	220	6,257	1,800	0
August 2008	9,788	3,995	2,974	2,437	175	150	3,482	2,000	0
September 2008	7,798	4,038	1,434	1,255	150	300	384	2,200	0
October 2008	9,012	4,022	1,909	2,747	175	350	3,600	2,500	0
November 2008	5,981	4,632	2,045	2,821	175	350	3,960	1,400	0
Total	162,732	127,289	43,794	51,388	3,550	5,900	114,002	144,405	1,067

Source: MVN 2008

Table 4-2. Recreation Areas in Bonnet Carré Spillway

Area	Location	Activities
Parish Recreation Area	Adjacent to lower guide levee and north of US Hwy 61	Day use area, boat launch, primitive camping, mountain bike trailhead, horseback riding, group picnics and events, crabbing, fishing
Lower Guide Levee	lower (or east) guide levee, north of US Hwy 61	Boat launches closer to lake, canoe launch, crabbing, fishing, sightseeing
Upper Guide Levee	upper (or west) guide levee, north of U.S. 61	Boat launch, fishing, huniting, butterflies, birding, eagle nest viewing
ATV Area	ATV areas 1 (south of U.S. 61) and 2 (north of U.S. 61)	4-wheelers, 3-wheelers, dirt bikes, go-karts
Remote-Control Airplane Area	North side of SC-12 within spillway	Remote-controlled planes
Dog Trials/Training	Open areas between spillway structure and first railroad track north of the structure	Training of dogs and dog trial events
North Main Road	Main Road within spillway, north of U.S. 61	Hunting, fishing, crawfishing, crabbing
Dispersed use	Throughout spillway	Visitors not picked up by traffic counters or special use – includes sightseers, picnic, day use, fishing, hunting, crabbing and crawfish. Also includes spillway office visits by school groups, tour groups and lost tourists.

The U.S. 61 Recreation Area is the highest used day use area in Bonnet Carré Spillway.

The U.S. 61 Recreation Area typically registers the highest use, averaging over 8,000 visitors per month. Visitor use is variable, which is likely attributable to weekend weather conditions and fishing prospects. Next in popularity is the lower guide levee that provides access to the recreation facilities on the lake end of the levee; this area averages 6,400 visitors a month. The visitor activity on the lower guide levee is consistent from month-to-month. visitor use at the north Main Road averages 5,600 visitors per month. This area includes the interior of the spillway lands and waters north of U.S. 61, and is the main access for consumptive recreation including hunting, crabbing, crawfishing and fishing.

Next in popularity is the ATV area, which averages over 2,600 visitors per month. The visitation rate for the ATV area is fairly steady except when the areas are closed due to poor trail conditions or high water in the spillway. The ATV area probably experiences the greatest variability within the week with very low usage from Monday through Friday, and very high usage on the weekends. In fact, the ATV parking area is occasionally full on weekends, and prospective visitors are turned away at the entrance. Visitation is also strong at the upper guide levee that averages approximately 2,200 monthly visits. Lower in visitor days

are the specialized recreation areas for remote controlled airplanes and dog training.

Although empirical data are difficult to obtain, anecdotal evidence indicates an increase in hunting activity in the spillway since implementation of the NRM program in the late 1990s. Big-game hunting has probably seen the most dramatic increase. Nearly non-existent in 1994, the hunting of white-tailed deer has increased steadily over the past several years. Small game hunting for rabbit and squirrel and hunting of waterfowl have increased as well.

These increases are attributable to the improved control of recreation and spillway activities that negatively impact wildlife populations; better management of woodlands, grasslands and provision of wildlife food plots; and collaboration with LDWF to implement hunting restrictions and season dates similar to state and Federal wildlife management areas. These actions have increased the productivity of the spillway's lands and waters, improved visitor safety, and reduced the hunting pressure on the spllway's limited wildlife resources. Season dates and posted restrictions for the 2008-2009 hunting season are provided in Appendix I of this Master Plan.

4.1.3 National Economic Value

Public lands and waters managed by USACE provide a significant boost to local communities and to the Nation's economy as a whole. Recreational use of USACE projects also contributes to sales of recreation equipment such as boats, ATVs and fishing gear. Nationwide, visitors to USACE projects spend:

Unit day values are the most widely used and most representative method for calculating National Economic Development benefits.

- $13 billion a year on trip-related expenses such as gas, food and lodging within and outside of the local communities surrounding USACE projects, leading to 250,000 jobs and $16 billion in value added (includes wages & salaries, payroll benefits, profits and rents and indirect business taxes) to the Nation's economy.
- $5 billion a year on recreation equipment, creating 95,000 jobs and $6.4 billion in value added to the Nation's economy.

Outdoor recreation activities contribute to the National, regional and local economies. The most widely used USACE methodology for computing these National Economic Development (NED) benefits is through the use of unit day values (UDV). The UDV approach to estimating recreation values is described in USACE "Economic Guidance Memorandum 09-03, UDV for Recreation, Fiscal Year 2009," dated 8 November 2008.

The UDV method for estimating recreation benefits relies on expert or informed opinion and judgment to approximate the average willingness to pay of users of Federal or Federally assisted recreation resources. By applying a carefully evaluated and adjusted unit day value to estimated use, an approximation is obtained that may be used as an estimate of spillway recreation benefits.

Two categories of outdoor recreation days, general and specialized, are available for evaluation purposes. "General" refers to a recreation day involving primarily those activities that are attractive to the majority of outdoor users and that generally require the development and maintenance of convenient access and adequate facilities. "Specialized" refers to a recreation day involving those activities for which opportunities are limited, intensity of use is low, and a high degree of skill, knowledge, and appreciation of the activity by the user may often be involved. Point values are assigned based on measurement standards described for five criteria: types of activities, facilities, relative scarcity, ease of access, and aesthetic factors.

National Economic Development recreation values for Fiscal Year 2008 for the Bonnet Carré Spillway are estimated to be $3.5 million.

Using these guidance, the following UDVs were developed for the Bonnet Carré Spillway:

a. General recreation - $7.27/day
b. General fishing & hunting - $8.03/day
c. Specialized recreation (ATV areas) - $22.00/day

Using the VERS visitor data available for Federal Fiscal Year 2008 (October 2007 through September 2008), a total of 421,395 recreation user days were expended in the spillway. Out of this total, approximately 25,000 user days were specialized recreation occurring in the ATV areas. Of the remaining total, approximately one-third of the recreation is estimated to be related to hunting or fishing activity. Using the UDVs described above, NED recreation values for Fiscal Year 2008 at the Bonnet Carré Spillway are estimated to be $3.5 million (Table 4-3).

Table 4-3. Economic Benefits of Recreation in Bonnet Carré Spillway, Fiscal Year 2008

Activity	Fiscal Year 2008 User Days	UDV	NED Values
a. General recreation	264,158	$7.27	$1,920,425.60
b. General fishing & hunting	132,118	$8.03	$1,060,910.90
c. Specialized recreation (ATV)	25,119	$22.00	$552,618.00
Totals	421,395		$3,533,954.52

4.1.4 Current User Population

Since its completion as a flood control project in the 1930s, the Bonnet Carré Spillway has gained recognition as a large Federal outdoor recreation area. Visitors engage in a variety of diverse outdoor recreation activities, including boating, skiing, fishing, swimming, hunting, camping, picnicking, and operating ATVs and 4-WD vehicles.

Primary users of the spillway live within a 1-hour drive of the spillway.

Visitors are drawn to the Bonnet Carré Spillway because it is a large free public use area, it offers a variety of recreational opportunities, and it is easily accessible within a short travel time to a large portion of the surrounding population, including the New Orleans metropolitan area. As of mid-2007, an estimated total of 849,758 people reside within the primary market area (a 25-mile radius from the center of the spillway). This population base represents a decline of approximately 200,000 people (or 19 percent) from the 2000 census of 1,052,472. This decline is the result of population shifts resulting from Hurricanes Katrina and Rita in 2005. This primary market population base resides within a 30 minute to 1 hour travel time from a unique recreation site that can satisfy a broad base of experiences. Recreationists within this primary market area can enjoy a variety of outdoor experiences before work, during a lunch break, or after work especially during daylight savings time when daylight hours are extended. Maximum flexibility is afforded those within this primary market area.

Recent population dynamics document a shift in population from the city to the suburbs. Urbanization is occurring in the outlying areas of the east and west banks of St. Charles and St. John the Baptist parishes, due to the construction of Interstate 310 (I-310) and more recently, the displacement of people after Hurricane Katrina in August 2005. Since the development of I-10, the building of the Hale Boggs Bridge, and I-310, the Bonnet Carré Spillway has become easily accessible to residents on both banks of the river in the primary market area. The west bank is now easily accessible to the spillway because travel time and distance have been greatly reduced.

Forty percent of the population of Louisiana live within 50 miles of the spillway.

Within the secondary market area (50-mile radius), an additional population of 911,731 reside. This represents an increase of 66,317 from the 2000 census; much of this increase attributable to relocated persons from hurricane-impacted portions of the study area. Adding this population base to the primary market area produces a total of 1,761,489 people living within 50 miles of the spillway; this represents 40 percent of the population of Louisiana.

This population base represents a decline of 136,397 persons (or 7 percent) from the 2000 census.

The secondary market area satisfies needs similar to the primary market area; however, the difference is travel time and less flexibility. People living 25 to 50 miles away must make more of an effort to travel to the spillway and may not stay as long as those living close due to time and daylight hour constraints. It's important to recognize that the spillway is centrally located between major population centers in southeast Louisiana and is well-served by the transportation grid of the region.

While the great majority of spillway visitors come from the surrounding communities, the spillway also experiences visitors from distances greater than 50 miles and originating from other states and countries. Some of these visitors travel to the spillway to participate in specialized recreational activities including dog training and retriever trial events, and the ATV use area. Others are tourists to the New Orleans area who discover the spillway while visiting other cultural attractions; some visitors travel to the area specifically to visit the spillway. These special guests are drawn by the engineering, historical and/or ecological qualities of the spillway.

4.1.5 Population Dynamics

Hurricanes Katrina and Rita caused a population shift that has affected the user base for the spillway.

The catastrophic impacts of Hurricanes Katrina and Rita in August and September 2005 resulted in significant population shifts in south Louisiana. These shifts impacted the visitor base of the spillway and are documented in the 2007 estimates of population in the spillway's market area.

The post-Katrina population shift in the study area can generally be described as a movement of persons from the more heavily devastated areas in St. Bernard, Orleans and Jefferson parishes to communities north (across Lake Pontchartrain to St. Tammany, Livingston, and Tangipahoa parishes) and west (upriver St. Charles, St. John the Baptist, and Ascension parishes). The parishes immediately adjacent to the spillway (St. Charles and St. John the Baptist parishes) have witnessed population increases post-Katrina. The westward and northern shift of population in the New Orleans metropolitan area has also been accompanied by a reduction in total population; which has reduced the user population base for the spillway (primary and secondary markets) by approximately 7 percent between 2000 and 2007.

Hurricanes Katrina and Rita changed the demographics of spillway visitors.

While representing a relatively small portion of the total population of the region, the post-Katrina in-migration of Hispanics into the New Orleans metropolitan area has also changed the user profile at Bonnet Carré. Although official census Bureau estimates for 2006 show that the Hispanic population is only 6 percent of the total regional population, it is likely that the official surveys significantly underestimate the influx of Hispanic construction and service workers and their families (Brookings Institution 2007).

The impacts of Hurricanes Katrina and Rita on visitation to the Bonnet Carré Spillway can be summarized as follows:

- Population growth in the adjoining parishes has helped visitation grow.
- New visitors have joined long-time users.
- More visitors from north shore and upriver; less from downriver.
- More Hispanic visitors

Future population projections for the study area parishes through 2030 are available from demographic analyses done prior to Hurricances Katrina and Rita. However, these parish-level projections are not considered reliable due to the storm-related disruptions and significantly altered growth rates of individual parishes. Instead, the demographic and econometric projections prepared by the "Louisiana Speaks" planning initiative of the LRA will be used to address future trends. Data from Louisiana Speaks was previously provided in Section 3.2.4.

The Louisiana Speaks Regional Planning team developed three alternative community growth scenarios for south Louisiana; each representing a distinct way for south Louisiana to accommodate the expected growth in people and jobs.

Table 4-4. Population and Employment Projections for Year 2050

Metropolitan Statistical Areas	Total Population			Total Employment		
	2005	2050	Increase	2005	2050	Increase
New Orleans	741,000	1,708,000	967,000	383,000	880,000	497,000
Baton Rouge	974,000	1,484,000	510,000	395,000	920,000	525,000
Houma	332,000	414,000	82,000	126,000	183,000	57,000
SE Louisiana Totals	2,047,000	3,606,000	1,559,000	904,000	1,983,000	1,079,000

Regardless of the community growth scenario that eventually prevails, the projected growth areas in southeast Louisiana will serve to increase the population of the primary and secondary

market areas for the spillway. In fact, the continued growth of the three MSAs (New Orleans, Baton Rouge and Houma) places the Bonnet Carré Spillway at the nexus of these growing populations, each with less and less open land available for recreation.

4.2 VISITOR VIEWS

4.2.1 Public Comments During Master Plan Update

MVN hosted an informational workshop on 11 June 2008 at Destrehan High School to collect input on current and potential recreational uses and management of natural resources at the Bonnet Carré Spillway. The workshop included:

- A brief presentation discussing the 2008 opening of the spillway, current recreational uses and a description of items currently under consideration to include in the Master Plan update.
- Staffed information booths about current and potential uses including: hunting, fishing, ATV use, historic properties, borrow (sand and clay), access roads, recreation and potential improvements.

Public comments indicated a desire for an expanded ATV area and limited use of ATVs outside designated riding areas to access desirable destinations on spillway lands.

The workshop provided a venue for spillway users to provide input on development of the Master Plan update. Additional opportunities to provide feedback included submission of a brief written questionnaire that was available both during the workshop and on the spillway's web site. The purpose of the feedback questionnaire and workshop was to provide users with additional mechanisms to communicate their issues and suggestions and as a way to update the Master Plan. The majority of feedback was offered voluntarily by high frequency spillway users who attended the workshop or read about the Master Plan update in the newspaper and agreed to complete the feedback form or submit comments. The feedback was not collected through a proper scientific study of spillway users and is not necessarily representative of the general user population.

On 28 July 2008, MVN distributed a news release in the Times-Picayune newspaper reminding spillway users that feedback on the Master Plan update would be accepted until 31 July 2008. MVN received a total of 61 comments from June 11 through 31 July 2008. Public comments received are provided in Appendix G. Comments were accepted regardless of their format or submission method.

The limited expansion of ATVs is supported by people with disabilities.

Two substantive comments were received from spillway users with physical disabilities. Two separate submissions suggested that the USACE should alter its current policy and allow licensed visitors with disabilities to use ATVs in non-designated areas in order to more easily access boat launches or other desirable destinations within the spillway. Currently, ATV use is only permitted in designated riding areas.

Of the 61 respondents, 47 (or 77 percent) provided feedback on the frequency of their use of the spillway. Nearly 62 percent of respondents, who indicated how often they frequent the spillway, visited 50 or more times per year and can be labeled "high frequency users." ATV riders submitted the greatest number of comments. They were followed by those who enjoy fishing, hunting, boating and flying remote control model airplanes.

Common comments provided by ATV riders are summarized in the following list.

- Requests for the allocation of additional space and trails for ATV use.
- Move ATV Area 2 to the bank of the Lower Borrow Canal and extend the trail up the northern side of the canal.
- Move ATV Area 2 to the western side of the spillway where seasonal hunting is also allowed. They suggested they could share the hunting area during the hunting off-season.
- Requests for additional shade or trees at or near the ATV parking area.
- Allocate the area under U.S. 61 for parking vehicles and as an area to work on their ATVs.
- A nearby resident requested that MVN provide for a 500-yard buffer between the ATV riding area and homes by moving ATV Area 1 westward towards the Montz side of the spillway.
- A number of ATV participant suggested that the spillway could host a BMX/ESPN event if camping areas allowed ATV use. ATV enthusiasts see securing a BMX event as a very favorable result of reallocating their space.
- Enforcement of current rules and regulations is a common ATV participant concern. Verbally they offered the suggestion of developing "rain rules" to encourage other riders to slow down and take more caution while riding during and after inclement weather. They also suggest

additional Park Rangers to enforce the rules and provide a safe riding environment.

- Clearly delineate borrow sites, deter ATV participants, especially children, from riding near the borrow sites.
- Requests for well marked riding trails.

Of the people who indicated their activities in the spillway, 32 percent of the respondents said they fished. Two respondents requested improved boat launch facilities that include a visitor center with additional restrooms that are maintained by the state/city. There were no overarching sentiments from fishers.

A total of 20 respondents indicated they hunted in the spillway. Comments received from hunters are summarized in the following list.

- Four of the hunters indicated an additional need for enforcement of current spillway rules and regulations.
- Hunters do not favor the idea of co-sharing the hunting areas with ATVs.
- Several of the hunters suggested road improvements would improve their experience in the spillway.

A number of spillway users enjoy boating. Boaters asked for additional signage at the spillway to indicate location and better indication of waterways on maps. A verbal suggestion was that ponds be labeled with the same name on maps as referenced by users.

Remote control airplane users were well represented during the Master Plan update comment period. Comments from model airplane users are summarized in the following list.

- Remote control airplane users were complimentary of the current Park Rangers for having improved the recreation experience.
- Move the remote control airplane permit area from its current location at the west end of the spillway to the middle of the spillway.
- Requests for shade structures and additional picnic tables near the model airplane user space.

- Additional enforcement of current spillway rules and regulations. Remote control airplane users feel ATV riders are degrading spillway roads outside of the ATV use areas.

Suggestions across all user groups include:

- Enforcement of current regulations and assigning additional Park Rangers to the spillway. Park Ranger hours should be determined by volume of users in the spillway, not just 8 a.m. to 5 p.m.
- Additional garbage cans
- Markers or signs to indicate historic, educational or natural points of interest
- Additional/improved roads
- Additional restrooms that are regularly maintained
- Gazebos/canopies to provide shade
- Additional parking near activity centers
- Wildlife management (*i.e.,* removing alligators near dog training areas or improving rabbit areas)
- Use of spillway as a freshwater diversion.

All spillway visitors and users support enhanced enforcement of current regulations and extended work hours for Park Rangers.

A number of activities are not currently permitted in the spillway including off-road or road-damaging driving of 4-WD trucks, target shooting and combat games. Comments from those individuals not currently represented by a user group are summarized in the following list.

- Request for MVN to provide guidance on requirements necessary for a 4-WD use area to be permitted in the spillway.
- Multi-purpose vehicle use area located west of Barbar's Canal, south of U.S. 61, east of the upper guide levee, and north of the United Gas Pipeline ROW.
- Allow mud truck riding.
- Recommendations against the authorization of a 4-WD use area.
- Allowance for target or skeet shooting in spillway.

4.2.2 Customer Comment Card Surveys

A visitor comment card was developed in the mid-1990s for use by project managers in assessing satisfaction levels of recreation visitors to USACE-managed recreation areas. Since the introduction of the comment card, customer satisfaction surveys

have been routinely conducted at many USACE water resources development projects. Results of these surveys have provided managers with ongoing visitor feedback regarding the recreation facilities, services, and information available on their individual project(s).

Visitor comment cards are utilized to determine user satisfaction levels on USACE-managed recreation areas.

During times of declining budgets and manpower, customer satisfaction is a key indicator that can be used to guide managers in making critical decisions. For example, feedback from customers may indicate a willingness to pay new or higher fees, or feedback from customers could indicate that certain types of facilities or services are not important. In these examples, a manager could begin charging new or higher fees and/or eliminate facilities or services with little risk.

A high quality experience will likely lead to positive customer satisfaction, which may directly impact the customer's decision to return. The quality of the experience may be impacted by the policies, procedures, plans or people that are set in place and monitored by managers. Customer satisfaction is simply satisfaction at the customer level, from the customer's perspective.

In 2002, USACE conducted a pilot National satisfaction survey of visitors to USACE-managed recreation areas. The survey included a total sample of 2,400 visitors at 20 projects selected from 456 USACE projects Nationwide, in order to produce a National estimate of customer satisfaction. The results of this pilot study are summarized in Table 4-5 along with survey results from MVD (which includes MVN and five other USACE districts) in 2005, and survey results for the Bonnet Carré Spillway in 2005, 2006, and 2007.

Table 4-5. Comment Card Mean Satisfaction Scores

Satisfaction Item	National Pilot Study (Year 2002)	MVD[1] (Year 2005)	BCS[2] (Year 2005)	BCS[2] (Year 2006)	BCS[2] (Year 2007)
Safety & security*	4.4	4.5	4.7	4.5	4.4
Appearance & maintenance	4.4	4.5	4.4	4.4	4.2
Restroom cleanliness	4.1	4.3	3.8	4.1	3.9
Availability of staff	4.2	4.3	4.5	4.5	4.4
Adequate ranger patrols	4.3	4.4	4.7	4.5	4.4
Current & accurate info.	4.3	4.4	4.5	4.3	4.3
Water safety information	4.2	4.4	4.4	N/A	N/A
Value for fee paid	4.5	4.5	4.7	4.4	4.5
Overall quality	4.4	4.5	4.5	4.5	4.4

* Scale: 5-Very good, 4-Good, 3-Average, 2-Poor, 1-Very poor

[1] Mississippi Valley Division [2] Bonnet Carré Spillway

Cleanliness of restroom facilities at the spillway are ranked below the National benchmark.

The customer satisfaction data for the Bonnet Carré Spillway from 2005 through 2007 are fairly consistent with the National pilot study results. Noteworthy are several satisfaction items where the spillway lags behind National benchmark levels. Most notable is the cleanliness of restroom facilities. On a National level, USACE facilities do not score well in this area with an average score of 4.1. Bonnet Carré Spillway scores are even lower, with scores of 3.8, 4.1 and 3.9 in the three surveys. The other satisfaction measure where the spillway is somewhat below the National level is the appearance and maintenance of recreation areas, where the score for 2007 dropped to 4.2.

In addition to the rating of specific satisfaction concerns, the comment card surveys provide visitors with open-ended questions to elicit their feedback. The two questions asked at the end of the surveys are:

1. What do you like most about this area?
2. What improvements would you like to see in this area?

The responses from the three surveys conducted in the Bonnet Carré Spillway between 2005 and 2007 are useful in identifying the needs and priorities at the spillway from the visitors' perspective. Table 4-6 provides a summary of responses received and represents a compilation of all three survey years and lists the visitor responses by the identified recreation areas of the spillway (see Table 4-1 for description of the spillway's recreation areas).

Table 4-6. Use Recommended Improvements at Bonnet Carré Spillway

Recreation Area	Improvement	Number of Visitor Responses
Dog Trial/Training Area[1]		
	Restrooms needed	7
	Improved grass-cutting and trash removal	5
	Additional ponds with gentle side slopes	4
ATV Areas		
	Improved and additional trails	15
	Restroom improvements with running water and wash area	12
	More availability to ATV areas	10
	Signage improvement on trails	7
	Additional ATV use areas	6
	Additional Park Rangers and enforcement	5
	Parking area shade with trees and/or pavillion	5
Lower Guide Levee (includes U.S. 61 Recreation Area)		
	Restroom improvements with running water and wash	30

Table 4-6, continued

Recreation Area	Improvement	Number of Visitor Responses
	area	
	Road improvements	18
	Improved grass-cutting and trash removal	16
Upper Guide Levee		
	Restroom improvements with running water and wash area	30
	Road improvements	18
	Improved grass-cutting and trash removal	16
North Main Road		
	Road and parking improvements	18
	Habitat improvements for fishing, crawfishing, and hunting	12

Source: USACE 2005, 2006, and 2007

4.2.3 2008 Recreational Study

MVN commissioned a study to analyze the effect the 2008 spillway opening had on recreational use and biological resources.

In order to evaluate the effects of the 2008 Bonnet Carré Spillway opening on recreation use and commercial and recreational fishing in Lake Pontchartrain and associated waters, MVN commissioned a study to collect, analyze and report on biological and recreational aspects of the operation of the spillway. The recreational study included 16 days of interviews of recreational users in the spillway between June and October 2008. The survey gathered responses from 445 groups, representing a total of 1,660 persons.

While the study was specifically designed to measure short-term impacts to recreation (there were some disruptions of activity) and long-term impacts to recreation (no significant impacts were identified) as a result of operation of the spillway in 2008, the data provide useful supplemental information about recreational use on the spillway's lands and waters. In general, the results are consistent with earlier studies and recent visitation data. The survey instrument recorded the residential zip codes of those interviewed and these data confirmed that most spillway visitors come from communities within the primary market area (within 25 miles of the spillway). Equally important, the data also documents that many visitors reside in the secondary market area parishes surrounding the spillway.

Crabbing, bank fishing, motorcycle riding, and boating and skiing are the most popular activities on spillway lands.

The survey found that the most popular activites in the spillway were crabbing; bank fishing; ATV and motorcycle riding; and boating and water skiing. In fact, the study results indicated that two-thirds of total group activites were in these categories. Because the survey did not start until 8 June, one month after the spillway structure closed, it did not document the very high numbers of visitors who came to the spillway to witness the

opening, nor did it capture the thousands of visitors who participated in crawfishing in May and early June 2008.

The survey instrument included a question of what additional facilities or improvements would increase the user's enjoyment of the spillway. Not surprisingly, the most common response was for additional or improved restroom facilities. Those items mentioned by at least 10 persons are provided in Table 4-7

Table 4-7. Suggested Additional Facilities or Improvements From 2008 Recreational Study

Improvements	Responses
Bathrooms	72
Shade or Pavilions	47
Running Water	42
Additional Trails/Tracks	31
Additional Trash Cans	21
Picnic Tables	17
Boat Launch Improvements	13
Road/Trail Repairs	13
Barbeque Pits	12
Playground	12
Concession Stand	10

Source: USACE 2008

Those surveyed were also asked if they had any additional comments. This open-ended question elicited additional issues of concern to the visiting public. Those issues of interest to 10 or more survey participants are included in Table 4-8

Table 4-8. User Comments From 2008 Recreational Study

Comment	Responses
Appreciate the Ability to Use Spillway	38
Road/Trail Repairs	16
More Patrols	12
Improve Access	11
Agree with Decision to Open Structure	11
More Trash Cans	10

Source: USACE 2008

The results of this survey are very similar to the customer comment card surveys from 2005 to 2007. As such, they serve to validate the earlier surveys.

4.3 REGIONAL AND STATEWIDE RECREATION ANALYSIS

4.3.1 Demand

Demand is commonly viewed as an expression of desire to engage in an activity by an individual in a given area. The Louisiana State Comprehensive Outdoor Recreation Plan (SCORP) for 2003-2008 has identified an unfulfilled demand for essentially every activity measured by the survey. Based upon the regional demand and limited supply of space and facilities in the spillway and vicinity, a significant need exists for additional facility development.

The SCORP identifies the top statewide facility needs as:

1. access to water-based recreation areas
2. boat and bank fishing facilities
3. trails (walking, biking, hiking, two- and four-wheel riding)
4. connecting or linking trails
5. access to inner-city trails
6. campgrounds
7. picnic areas
8. basketball courts
9. support facilities (restrooms, parking lots, *etc.*)
10. playgrounds and play fields

4.3.2 Future Trends

Since the Bonnet Carré Spillway is one of the largest areas of public land in the region, use will continue to increase as families seek free recreational opportunities. According to the 2004 SCORP, the top 10 recreational activities in Louisiana are:

The Bonnet Carré Spillway offers a variety of unique outdoor experiences from active to passive.

1. walking for pleasure
2. bicycle riding
3. swimming in a pool
4. running
5. driving for pleasure
6. playing basketball
7. visiting playgrounds
8. fishing by boat
9. attending outdoor events
10. driving off-road vehicles.

Most of these activities are popular to those who use the spillway for their recreational leisure time. Fitness, referenced in the SCORP, is one of the prime reasons for recreation in Louisiana. Walking, bicycle riding, swimming and running account for more

than 520 million activity days statewide or approximately 51 percent of all recreation occurrences in 2002 to 2003.

In the future, the trend of people moving away from the city and into outlying areas is likely to continue. The Bonnet Carré Spillway offers a variety of unique outdoor experiences from active to passive. With the continued implementation of NRM approaches, the spillway will be more widely recognized as a prime recreation site. Participation will continue to increase as the quality of the resource improves.

Natural resource management at the spillway provides resources for consumptive and non-consumptive uses.

The SCORP projects that recreation such as hunting, fishing, camping, and hiking will continue to be in great demand, but the state's natural resources base that supports these activities continue to diminish. Within the spillway these natural resources are being protected and managed for environmental stewardship and will not be allowed to diminish, making their presence more significant and valuable to hunters and fishermen in the region. The spillway satisfies a significant portion of current recreation in the primary and secondary market areas for traditional and natural resource-based recreation (*e.g.*, hunting, fishing, bird watching) with minimal development. Also, the trend towards off-road motorcycle and horseback riding have shown a decline due to the closure of many private lands to public access. The spillway provides large public areas for these specialized recreation opportunities to flourish, especially ATVs. The spillway also provides boating and vehicular access to the Lake Pontchartrain shoreline which is not readily available to the public in this portion of the basin.

In the future, the freshwater diversion feature may be constructed within the spillway along the upper guide levee from the Mississippi River to Lake Ponchartrain. Increased public use opportunities to be provided includes tailwater fishing areas and enhanced fish and wildlife productivity throughout the floodway and adjacent Lake Pontchartrain waters.

4.4 NATIONAL RECREATION ANALYSIS

4.4.1 Nationwide Corps Recreation Program

Bonnet Carré Spillway's recreational and natural resources opportunities are fairly unique relative to the USACE National recreation program, which is focused on reservoir-based recreation. However, it is informative to compare the spillway with the National context of the USACE's traditional recreation program and policies. The USACE's NRM program (including recreation and

environmental stewardship) is analyzed in a 1999 study published by the USACE Waterways Experiment Station (Kasul *et al*; 1999).

The USACE operates more than 460 water resources development projects in 43 states. These projects consist of nearly 8 million acres of land and water resources that have been entrusted to USACE stewardship. About half of this area is permanent surface water associated with project reservoirs and river reaches. The other half is a riparian border of surrounding upland and wetland areas, that on most projects provides shoreline protection from development and other impacts.

Management of USACE land and water resources is a cooperative effort of National, Division, District, and project offices. In most instances, project natural resource managers have a primary responsibility for executing NRM programs on USACE projects. This responsibility includes monitoring natural resource conditions, developing and implementing management practices appropriate for management objectives and local resources, and adapting management efforts to meet changing user needs and resource conditions.

A variety of Government agencies and private organizations assist with natural resources management at USACE projects.

While USACE has ultimate responsibility for NRM, other Government agencies and private organizations participate in the management of these resources. Non-USACE management partners contribute a significant share of the total management effort on USACE projects, and as a result, they help shape the overall makeup of the USACE NRM program. Most influential were state fish and wildlife agencies who participated in some aspect of NRM on nearly all projects. State agency contributions to the management of USACE natural resources were primarily intended to support outdoor recreation, particularly recreational fishing and hunting.

The voluntary efforts of numerous private organizations also contribute to NRM on USACE projects. Volunteer groups supported NRM on 78 percent of surveyed projects. These organizations supported project management in two ways: by performing tasks that freed up staff time for more technically demanding jobs, and by performing tasks that would not otherwise be accomplished. The most frequent volunteers were:

- Boy and/or Girl Scout troops;
- Outdoor sporting clubs;

- Conservation organizations; and
- School groups.

These volunteer groups contributed unskilled labor for tasks such as:

- Trail maintenance;
- Tree planting;
- General cleanup; and
- Stacking brush for fish habitat (19 percent).

Some groups also provided semi-skilled or skilled labor for tasks such as:

- Nest box construction and maintenance;
- Development and maintenance of food plots;
- Wildlife surveys;
- Controlled burns; and
- Water quality monitoring.

Projects indicated that about half of the activities supported by volunteer organizations would be discontinued without continuing support from these organizations.

Public use management goals typically involved support for outdoor recreation, including sport fishing, recreational hunting, and a wide range of nonconsumptive recreational activities. NRM objectives supporting outdoor recreation were most often described in terms of individual species, groups of species, or the habitats of selected species. Game species were typically regarded as most important. Ratings of potential management objectives associated with different resources generally listed game species as one of their two most important management objectives. For terrestrial, aquatic, and wetland resources, respondents respectively identified game animals, warmwater fishes, and waterfowl as principal management targets.

Habitat and wildlife management practices and techniques at USACE projects can be grouped into inventory and monitoring efforts, conservation and protection measures, landscape and habitat management, and species management activities.

Approximately 50 percent of all USACE projects have been surveyed for natural resources.

Resource inventories are a primary source of information for documenting resource conditions and evaluating management needs. Survey responses indicated that inventory availability varied widely among projects. About half of the projects had species

inventories for birds, mammals, plants, reptiles/amphibians, and invertebrates. About half of the projects with forested lands had timber surveys, and less than half of the projects with wetlands had wetland inventories. In general, fewer than a third of the available inventories were considered to be complete, and many were cursory or based on informal methods.

Most projects listed one or more surveys conducted annually or periodically to monitor specific resources. Most were species surveys for fishes, terrestrial and wetland wildlife, and threatened and endangered species. The percentage of USACE projects surveyed for wildlife species is presented in Table 4-9.

Table 4-9. Species Surveys Completed on USACE Projects

Species	Percent of all Projects
Sport Fishes	87
Golden Eagle	29
Songbirds/Neotropical Birds	21
Deer	19
Quail	13
Waterfowl	13

Commerical forestry and agriculture management practices support habitat management on USACE projects.

Projects with a more substantial resource base, available staff and funding, and suitable management partners employed landscape-level activities to develop and maintain an appropriate mix of habitats to support fish and wildlife resources. Much of this effort included terrestrial cover type management and wetland creation and management activities. Also important were water level management practices designed to provide fish spawning habitat, improve aquatic cover and water fertility, and provide visitor access. Where feasible, commercial forestry and agriculture made an important contribution to overall habitat management efforts. About half of the projects with forested land employed commercial timber harvests as a habitat and wildlife management tool. Agricultural leases were also offered on about half of the projects. Leased agricultural acreage was almost equally for hay production/ grazing or for cultivated crops, primarily soybeans, cotton, corn, and wheat. Most projects used agriculture as a tool for maintaining grasslands, habitat edges, and early successional habitats. More than half also reported having lease requirements designed to benefit wildlife. Management activities most often required were crop residuals, cover strips, and restrictions on grazing and haying.

In addition to habitat management, most projects (91 percent) either through their own efforts or those of their management partners, carried out management activities directed at particular

species or groups of species. Many of these activities were directed at both game and nongame species and included efforts to maintain or increase species abundance and concentrate target species for recreational purposes. Management activities conducted for wildlife species at USACE projects is presented in Table 4-10.

Table 4-10. Management Activities for Wildlife Species at USACE Projects

Management Activity	Percent of all Projects
Nesting/Roosting Structures	79
Prescribed Burns	58
Edge Maintenance	55
Snag Management	42
Forest Openings	39

4.4.2 Declining USACE Funding for Recreation

The USACE's recreation program is facing budget challenges, which will lead to changes in budget allocations, operational policies and programs and processes. The USACE's operating budgets for recreation facilities have been stable the past three years (FY06 - $268 million, FY07 - $267 million, and FY08 - $267 million). While USACE budgets have remained stable, the costs of contract maintenance, utilities and other operations costs have increased resulting in the partial closure of more than 100 recreation sites and the full closure of 30 sites throughout the Nation in FY 2008. As a result of budget constraints, USACE will reduce its recreation offerings while attempting to maintain a level of opportunity and service in all regions.

USACE remains committed to providing quality recreation opportunities for the public. USACE will remain in the recreation business as the leading provider of outdoor recreation in the Nation. Increased use of partnerships and volunteers will be more important than ever in helping to leverage resources and provide services to the public.

A number of strategies have been developed to help USACE projects continue their important recreation functions into the future. Partnerships with communities, user groups, non-profit organizations, other Government agencies and private businesses can influence these strategies and provide the needed human and financial resources to make the strategies successful. These strategies include:

- Increase information and education about the USACE's recreation and stewardship programs to visitors, stakeholders and media.
- Develop a series of written and audio-visual products that promote the benefits (health and fitness) associated with outdoor recreation.
- Reach out to National, regional, local and trade media and solicit interest and coverage on USACE's recreational opportunities and special events at project sites.
- Foster existing partnerships and establish new ones with an educational focus on children in nature programs.
- Through partnerships, launch demonstration education programs and better promote the www.corpslakes.us web site.

Outreach programs and marketing will help USACE promote recreation on USACE lands.

- Explore the use of new "media" opportunities, such as blogs, podcasting, and social media links to reach various publics.
- Organize focus groups to discuss recreation development on Corps lands and increase visibility of the www.corpslakes.us and www.recreation.gov web sites as portals to the outdoors.
- Identify and develop better relationships with individuals, stakeholder organizations and policymakers.
- Create a guide to the USACE recreation program. The guide would include specific brand information about USACE regional or district recreation opportunities, value to the Nation information, stewardship goals and economic benefits, and distribute the guide to key stakeholders or policymakers. The guide should also be available at all USACE sites.
- More concerted efforts should be made to increase interaction with stakeholders and policymakers through scheduling meetings, staff rides, field trips and special events.
- Continue the important collaboration with the external Recreation Strategy Group, a group of representatives of National level stakeholder organizations, who are working to build support and visibility for the USACE's recreation and stewardship programs. This group provides the USACE with access to potential partners, program development opportunities, volunteer programs, and much more.

- Identify and establish stronger partnerships with National, state and local departments of tourism, travel industry representatives and private tourism organizations.
- Capture and promote successful partnering efforts through greater visibility on the www.corpslakes.us web site and through articles and photos published in USACE and partner publications.
- Explore opportunities to develop joint print or video materials, place exhibits and provide USACE speakers at major tourism conferences and other venues.
- Through partnerships with tourism organizations, develop and conduct specific events at USACE projects; identify and seek the support of popular, trusted local spokespersons; and partner the development of Google Earth applications and other innovative technologies to promote USACE recreational benefits.

Partnerships with National, State and local tourism departments would promote recreational opportunities on USACE lands.

- Work more closely with partners and stakeholders to identify, promote and recognize the USACE's support of National events, such as National Get Outdoors Day (June), National Public Lands Day (September) and other similar events.
- Increase the use of USACE recreation opportunities by active, retired and reserve military/veterans and their families. Develop materials and establish relationships with military commanders, base personnel and related military organizations to increase awareness and promote the use of USACE resources. Encourage managers of USACE project sites near military installations to develop and promote local recreation/education programs.

Additional activities to support the USACE's Recreation Strategy over the next 1 to 3 years include:

- Partnerships – Identify and seek additional authorities needed to improve the effectiveness of partnerships required to support the recreation program strategy.
- Revenue - Identify opportunities to increase access to non-appropriated revenue for use in the recreation program though recreation user fees; concession revenues including third party leases; utility and other easements.
- Cost Savings - Identify approaches to reduce costs through service contract strategies, consolidation of operations, *etc.*

- Operational Issues - Identify operational issues that either inhibit or that could enhance efforts to improve program efficiencies including increasing flexibility in transferring park operations responsibility (either temporarily or permanently) to other public/private organizations (working closely with Real Estate).
- Strategy Development - This will be an overarching activity that will consolidate the results of these individual activities into a single comprehensive strategy to transform the USACE's recreation program and position it for the future.

4.4.3 Outdoor Recreation Trends

In recent decades, there have been reported declines in U.S. resident's interest and participation in nature-based recreation. These reports result from the observation that visitation to state parks, National parks, and other public lands has been relatively stable after long-term growth in the 1960s through the 1980s. Several recreation research reports using data from the National Survey on Recreation and the Environment (NSRE) provide more definitive data on National trends in outdoor recreation activities in the U.S. (Cordell and Betz, 2008; Cordell et al, 2008).

The NSRE is a Nationwide survey of outdoor recreation activities conducted by the U.S. Forest Service research group in Athens, Georgia. The NSRE is a random-digit-dialed household telephone survey of a cross section of U.S. residents 16 years of age and older. The most recent NSRE survey was conducted between the summer of 2005 and spring of 2008 as part of a long-term data collection effort that began in the fall of 1999. Over the course of the survey, more than 100,000 people were asked, "During the past 12 months, did you go [hiking, *etc.*] outdoors?"

In 2008, an estimated 217 million individuals participated in outdoor activities.

From 1999 to 2008, the total number of people who participated in one or more of 60 outdoor activities as defined by the survey grew by 4.4 percent, from an estimated 208 million to 217 million. At the same time, the number of days of participation in outdoor activities increased from 67 billion to 84 billion, an increase of approximately 25 percent. The trends for some activities show strong growth, for some others there are declines. A major finding from this analysis is that nature-based outdoor activities chosen by U.S. residents now are different than in the past.

The National Survey of Fishing, Hunting, and Wildlife Associated Recreation reported increases in numbers of wildlife watching visitors to public parks and areas near this home. In 1996, the

number was 11.0 million; by 2006 this had increased to 13.3 million, a 21 percent increase. Of the 23 million people in 2006 who traveled away from home to watch wildlife, more than 80 percent visited a public area to do so. Viewing, photographing and studying nature; however, in all its forms, have grown strongly since 2000. These nature-interest activities include viewing flowers, trees, natural scenery, birds, other wildlife, fish, and visiting nature exhibits.

Some types of hunting and fishing are down in numbers participating. Between 1996 and 2006 there was a reduction of 5.2 million anglers and 1.5 million hunters. Camping and swimming are growing in popularity more slowly now. Some other activities have declined in popularity (*e.g.*, mountain biking, rafting, and horseback riding on trails). The trends for recreational activities relevant to Bonnet Carré Spillway are summarized below in Table 4-11.

Table 4-11. Outdoor Recreation Activity Trends

Activities on rise	% Gain	Activities in decline	% Loss
View/photograph flowers, *etc.*	77.8	Small game hunting	-0.7
View/photograph natural scenery	60.5	Driving for pleasure	-1.1
Drive off-road	56.1	Waterskiing	-3.9
View/photograph other wildlife	46.9	Use personal watercraft	-4.3
View or photograph birds	37.6	Picnicking	-17.2
Kayaking	29.4	Canoeing	-17.9
Visit nature centers	23.2	Migratory bird hunting	-18.8
Big game hunting	21.2	Day hiking	-20.9
Sightseeing	14.0	Mountain biking	-32.7
Walk for pleasure	13.9	Horseback riding on trails	-35.2
Family gatherings outdoors	13.7		
Primitive camping	12.1		
Developed camping	9.3		
Motorboating	7.3		
Warmwater fishing	5.6		
Swimming in lakes, ponds, *etc.*	2.2		
Gather mushrooms, berries, etc	1.9		

Source: OUTDOOR RECREATION ACTIVITY TRENDS: What's Growing, What's Slowing? A Recreation Research Report in the IRIS Series1. September, 2008

4.5 SYNTHESIS & SUMMARY

4.5.1 Population Trends

Southeast Louisiana experienced a significant demographic disruption as a result of Hurricances Katrina and Rita in August and September 2005. While the total population of the primary and

secondary market areas for the spillway experienced an overall decline between 2000 and 2007, the parishes in the immediate vicinity of the spillway experienced population increases. The demographic changes in the region have introduced new visitors to the spillway while continuing to accommodate long-term users.

Projections of population growth up through 2050 indicate that there will be sizable increases in the existing MSAs that surround the spillway – New Orleans, the northshore, Baton Rouge and Houma. With the expectation that future population growth will follow the dispersed pattern of the last several decades, the amount of open space available for outdoor recreation will continue to decline as the population increases. This loss of natural resources will only increase the significance of the spillway's public lands and waters for the growing population of the region.

4.5.2 Visitors' Perspectives

A wealth of information is available on the desires and expectations of the recreational visitors to the spillway. Several years of survey data have resulted in a clear expression of public demand for improvements. These can be summarized as:

- more and improved restrooms
- road and access improvements
- more park ranger patrols
- better signs
- more shade via trees or pavilions
- more trails and recreation areas
- better maintenance (grass-cutting, trash cans, trash pickup)
- habitat improvements for fish and wildlife

4.5.3 USACE Program Guidance

The review of USACE guidance for project natural resources programs as well as the review of activities at other projects across the Nation place the Bonnet Carré Spillway in context. In other words, it's important to understand where the spillway ranks relative to recreation and environmental stewardship within the USACE program. This review helps to identify areas where improvement and additional focus are needed.

The review indicates that more attention is required to inventory and assess the natural resources of the spillway. Once inventories and assessments are completed, management plans should be developed and implemented for game species, special status species and other resident and migratory species. These activities

will improve animal populations and directly benefit those recreational activities, both consumptive and non-consumptive, that depend on those resources.

Of importance also is to increase the spillway's role in environmental education and outreach and to increase public awareness of the spillway's natural resources and recreation values. In partnership with other Governmental agencies, non-profits and individuals, the spillway is well-positioned to increase public awareness and appreciation for a host of environmental issues in the region.

4.5.4 State and National Context

Review of SCORP provides further support of the importance of the spillway for recreational opportunities in the region. One of the primary obstacles for the provision of recreational opportunities by the state has been funding constraints, something not likely to change in the future. As a result, the public lands available through Federal agencies, such as the USACE, are essential complements to the formal state park system.

The spillway has the capability to help supply much of the unmet recreation needs for the people of Louisiana as identified in the SCORP. Notable among these are water-based recreation, trails, camping, picnic areas, and playgrounds.

4.5.5 Future Trends

Non-consumptive activities are increasing in popularity among recreational users.

Outdoor recreation continues to grow in terms of people participating and recreation days. This growth, however, is not across the board. Some activities are growing in popularity while others are declining. The highest growth is seen in non-consumptive activities such as birding, photography, and visiting nature centers. A number of traditional recreational pursuits continue to grow as well; among them big-game hunting, camping, fishing and boating.

The spillway's bountiful natural resources, diversity of habitats and water resources, and it's wide expanses of open land provide a great capacity for a wide range of outdoor recreational pursuits including several that are unique or, at least, not commonly available. As the population of the region grows and other outdoor recreation venues are lost or diminished, the spillway's role in satisfying the recreational needs of south Louisiana will increase. This Master Plan is intended to guide the management and

development of the spillway's resources to meet those needs while preserving the public interest for generations to come.

SECTION 5.0
FACTORS INFLUENCING AND CONSTRAINING RESOURCE USE, DEVELOPMENT AND MANAGEMENT

5.0 FACTORS INFLUENCING AND CONSTRAINING RESOURCE USE, DEVELOPMENT AND MANAGEMENT

5.1 PROJECT OPERATIONS

5.1.1 Spillway Openings

The authorized purpose of the Bonnet Carré Spillway is the diversion of floodwaters during a major flood on the Mississippi River. As previously mentioned in Section 2.4, the spillway has been open nine times; however, the frequency of these openings is erratic and unpredictable. The interval between spillway openings has ranged from 2 years, between 1973 and 1975, to the 23 year hiatus between 1950 and 1973 (see Table 2-1). In the 10 years between 1973 and 1983, the structure was opened four times. The irregular nature of spillway operation is a factor which must be considered in the planning and implementation of spillway features.

The short-term effect of spillway openings is the temporary discontinuance of virtually all other land use activities within the floodway. For example, land-based activities such as sand hauling and ATV use are interrupted by the flooding of spillway lands. In addition, safety and environmental protection measures are implemented during spillway operations which limit other users. These measures include the closure of both spillway guide levees to the public prior to and during spillway use to prevent disturbance of wildlife moving to and over the levees. Recreational boating within the spillway is also prohibited to insure human safety. In sum, virtually all recreation activities within the floodway are suspended when the spillway is conveying floodwaters.

Recreation activities are impacted in the spillway when it is open and conveying floodwaters.

Spillway openings have a short-term impact on recreational activities in the adjacent waters of Lake Pontchartrain. The primary impacts are related to the temporary displacement of certain aquatic species due to reduced salinities and water temperatures, and increased turbidity. These changes cause species such as spotted sea trout, red drum, and brown shrimp to move seaward, making them less accessible to local fishermen. These impacts affect recreational and commercial fishing in Lake Ponchartrain.

After closure of the spillway structure at the conclusion of a flood event, the long-term effects of spillway operation are the result of scour and significant deposition of river-borne sediments. This process of scour and deposition is especially heavy in the portion of the floodway between the river and U.S. 61. The amount of sediment deposited in the spillway varies with each opening and is

estimated by using cross-sectional surveys. For example, the 1973 flood deposited an estimated total of 12 million cubic yards. These effects argue against significant investment in the development of recreation facilities in that portion of the floodway between the river and U.S. 61. Investments in structures or landscaping in this area of high flood impacts would not be prudent.

5.1.2 Leakage Through Spillway Structure During High Water

During the high water season on the Mississippi River (*e.g.,* late winter through spring), the river often rises above the concrete weir heights of the structure. When this occurs, floodwaters leak between the timber needles and enter the floodway (Photograph 5-1). The volume of this leakage can range from 100 cfs to as much as 9,000 cfs, and the flow can last for several weeks to several months. Some years there is very little or no leakage through the structure and the effects are negligible in the floodway.

Photograph 5-1. Leakage through the spillway structure during high water events on the Mississippi River

Leakage events affect spillway resources similar to openings but on a lesser scale.

In other years such as 1994, the leakage is significant and can cause major changes within the floodway. These events have a similar but at a substantially smaller scale. Flooding of spillway lands essentially halts most land-based activities. SC-12 is closed to traffic and most of the haul roads are impassable. The leased recreation areas, however, remain open and water-based recreation is unhindered.

While leakage events cause temporary impacts to various public uses in the spillway (*e.g.*, dog training, ATV use, *etc.*), it also serves to introduce recreational diversity for visitors to the spillway. The recreation use survey performed in 1994 during and after an extended leakage event in the spillway documented the heavy public use of the spillway related to this event. The activity that most directly benefits is recreational crawfishing which increases significantly due to the optimal conditions produced by these events.

This introduction of fresh water simulates the natural cycle of overbank flooding and provides numerous benefits to the aquatic and terrestrial resources in the spillway. These benefits include improved water circulation in the spillway's water bodies, nutrient introduction which provides short- and long-term benefits to the ecosystem, and restocking of fishery resources. Additionally, the spillway's wetlands and shallow water habitat has significant value as a nursery area for estuarine species. Field sampling in early 1995 recovered menhaden, bay anchovy, blue crabs, and other estuarine species near the U.S. 61 crossing. Leakage events probably serve to scour entry channels from the lake enabling estuarine species to enter and complete life cycles in this vital nursery area. The spillway remains one of the few areas available as nursery habitat on the south shore of Lake Pontchartrain readily accessible to the public.

The flooding which results from these leakage events, although not as significant as spillway openings, occur approximately every other year. This frequency of low-level flooding provides additional constraints on development of spillway lands throughout the floodway.

5.1.3 Sand Hauling

Sedimentation which occurs with each spillway opening provides material for the sand hauling program administered by the Operations Division. Historically, sand has been excavated in the area between the spillway structure and U.S. 61 (Plate 7). The removal of these sediments takes several years and is essential for preparing the floodway for the next spillway opening. The sand hauling program is limited by current National Environmental Policy (NEPA) documentation to the cleared areas of the spillway.

The constraints imposed by the sand hauling activity in the floodway are its incompatibility with most other land uses, as a result of the movement of bulldozers, end loaders, large tractor trailer rigs and dump trucks through the spillway (Photograph 5-2). The immediate area of material extraction is highly disturbed and

Photograph 5-2. Sand excavation operations on spillway lands

unsafe for recreational users. Such areas are off-limits to recreational users of the floodway. At any given time, the extraction areas experiencing active disturbance from sand hauling operators is fairly limited.

On the other hand, truck traffic on sand hauling roads is quite extensive. The spillway's primary roads are built and maintained by spillway maintenance staff. Roads, built and maintained by commercial interests to provide truck access to their permit areas, are spread throughout the floodway. They provide the primary circulation routes within the floodway for spillway personnel and the visiting public. These roads are heavily utilized by recreationists for access to points within the spillway. Accidents between trucks hauling sand and recreationists have occurred along these haul roads. Speed limitations and warnings need to be posted and enforced.

5.1.4 Clay Borrow Activities for Lake Pontchartrain Project

The spillway is a critical source of clay for MVN levee projects.

The use of spillway lands as a source of clay material for various levee projects presents constraints similar to those of the sand hauling program. Clay borrow is typically excavated in the area between the spillway structure and U.S. 61 (Plate 7). The constraints imposed by the clay borrow activity in the floodway are its incompatibility with other land uses and the safety risk related to the movement of large trucks through the spillway. Active clay borrow sites are off-limits to recreational users of the floodway.

As with the sand hauling program, the area experiencing active disturbance from clay borrow activities is fairly limited at any given time.

5.1.5 Bonnet Carré Freshwater Diversion Project

The possible construction of a freshwater diversion structure and channel would occupy a narrow corridor of spillway lands located along the upper guide levee (Plate 5). The short-term construction impacts would limit recreational activity in proximity to the work. Work areas and access roads would be off-limits to the visiting public to ensure safety. The long-term impacts, however, are significant and positive. Increased public use opportunities would be provided including tailwater fishing areas and enhanced fish and wildlife productivity throughout the floodway and adjacent lake waters.

5.2 PHYSICAL AND ENVIRONMENTAL RESOURCES

5.2.1 Environmentally Sensitive Areas

No designated critical habitat is located on spillway lands.

Environmentally sensitive areas are defined as areas where scientific, ecological, or aesthetic features have been identified. Because of the sensitive nature of these areas, limited or non-development for public use should be considered (Plate 7). The USFWS has recommended that ecologically which are critical habitat for the continued existence of Federally listed threatened or endangered species. No such critical habitat areas currently exist on spillway lands.

(a) Forest/Vegetative Cover. Interrelationships among frequency and duration of flooding, topography, and soil type are the primary factors regulating the dynamics of vegetative development over time. Federally listed threatened or endangered plant species do not currently exist within the Bonnet Carré Spillway, but listing of particular species may potentially result in future designation of environmentally sensitive areas. Currently, forested tracts within the spillway are considered environmentally sensitive areas due to the aesthetic relief, vegetative stratification, diversity, and habitat for wildlife dependent upon forested cover. Spillway O&M activities, placement of recreation sites, and the public use and accessibility (both authorized and unauthorized) in forested areas can potentially impact these sensitive areas. Clearing of forested vegetation should be kept to the minimum necessary to accomplish activities compatible with the Master Plan. In most instances, replanting and management of natural vegetation will become necessary requirements of site design.

All lands within the spillway are considered jurisdictional wetlands.

(b) Wetlands/Water. Nearly the entire spillway inside the guide levees is subject to frequent and sometimes severe headwater flooding by spillway operation or leakage from the structure. Although such flooding represents a severe limitation for most types of development and is a key factor in assessing soil conditions and wetland management, it is compatible with some types of recreation use. All lands within the spillway are considered wetlands and any development of these lands would require a Department of the Army permit. The Bonnet Carré Spillway has water quality conditions that are good for all parameters except clarity during spillway operation. Turbidity limits visibility and is aesthetically displeasing for recreational uses, and creates the perception among many users of poor water quality. Coliform bacteria levels, an important water quality criterion for water contact activities, are within state standards for water contact recreation.

(c) Fish and Wildlife. Following the spillway opening in 2008, pallid sturgeon, a Federally endangered species, was captured and rescued within the Bonnet Carré Spillway. The presence of a Federally protected species within the spillway could potentially affect spillway operations and development of projects on spillway lands.

USACE regulations place some limits on the extent of resource management activities that the USACE may undertake on its own projects. Without participation of a local sponsor, fish and wildlife management in the Bonnet Carré Spillway is restricted to maintaining existing populations and resources. Enhancement of fish and wildlife resources, involving construction, operation, and maintenance of facilities or other improvements, requires the sponsorship of a non-Federal fish and wildlife management entity.

(d) Archeological Resources. The only significant archeological resources in the spillway are the Kenner and Kugler cemeteries (Plate 7). Both of these sites are, to varying degrees, buried by recent sediments. Both sites were previously impacted in 1975 by spillway-related dredging operations. Since their discovery and boundary delineation, buffer zones around the two cemeteries were established to remove them from sand hauling leases and clay borrow activity associated with the HSDRRS projects.

At present, the primary management objective for these cemeteries is site preservation. The precise locations of these two historic sites are kept confidential in order to discourage vandalism. On-site spillway personnel are aware of the cemetery locations and monitor their condition. Recently, direct and cultural descendants of people buried in these cemeteries have requested installation of fences and historical markers to indicate their historical significance. Implementation of this request is somewhat problematic due to purpose of the spillway as a floodway. Any structure (*i.e.*, fence) would have to be removed or designed to not impede floodwater conveyance during spillway operation.

5.2.2 Unrestricted Public Access

Closure of the upper guide levee to the public has eliminated trash dumping and illegal tree cutting north of U.S. 61.

At present, numerous entry points are available to the visiting public. SC-12, which crosses the floodway near the spillway structure, provides access to several haul roads entering the floodway. Another major entry point for spillway visitors is the intersection of U.S. 61 with the lower guide levee (Plate 7). To the north of U.S. 61, the levee crown provides access to the two St. Charles Parish recreation areas located within the floodway. South of U.S. 61, several access roads lead into the floodway from the

levee crown. The upper guide levee also provides access via several roads which enter the floodway between the spillway structure and U.S. 61. North of U.S. 61, the road on the upper guide levee has been recently been closed to reduce damage to the levee crown and to help control problematic activities such as trash dumping, tree cutting and illegal firearm usage.

Numerous entry points into the spillway is a serious constraint on management of public activities. Continued implementation of public use control and NRM may require closure of additional access routes and control of the remaining entry points.

5.3 ADMINISTRATIVE AND POLICY FACTORS

5.3.1 Federal Cost-Sharing Requirements.

The Flood Control Act of 1994 establishes the authority for recreational facilities on USACE projects.

(a) Recreation Facilities. National policy regarding the development of recreation features at Federal water resources projects is articulated in three Federal statutes. The basic authority for recreational features on USACE projects is provided by the Flood Control Act of 1944, as amended. This act authorized the Chief of Engineers to construct, maintain and operate public park and recreational facilities at water resource development projects under his control, and to permit the construction, maintenance and operation of such facilities by others. The Federal Water Project Recreation Act of 1965, as amended (Public Law 89-72) required that non-Federal agencies bear part of the cost of installing and all of the cost of maintaining recreation developments at Federal water resources projects.

Finally, the WRDA of 1986 (Public Law 99-662) specifically defines the basis for sharing the financial responsibilities in the development and maintenance of recreational facilities. Where these facilities represent a combination of Federal and local interests, the costs of development are shared on a 50 percent basis between Federal and non-Federal agencies. O&M of such facilities is entirely the responsibility of the non-Federal sponsor. A checklist of facilities which may be cost-shared in recreation developments at USACE projects is provided in ER 1165-2-400.

The 1964 Preliminary Master Plan for Public Access and Recreation for the MR&T project (see Appendix 4) included facility development at the Bonnet Carré Spillway. Facilities recommended in the plan consisted of roads, boat ramps, parking areas, trails, comfort stations, landscaping, information signs, and picnicking and camping areas. The report was approved for planning purposes by the Chief of Engineers on 19 January 1966.

This approval, however, required that implementation be deferred until adequate assurance is obtained from local sponsor(s) to participate on a 50 percent basis in the costs of development proposed in the plan.

Federal cost share is 25 percent for operation, maintenance, and rehabilitation of enhancement activities.

In the absence of a non-Federal public sponsor, no Federal investment in recreation development is authorized. Only minimal facilities for public health and safety, and safety features integral to the design of the spillway can be provided at total Federal expense.

(b) Fish and Wildlife Enhancement. The Federal/local cost sharing policy for fish and wildlife enhancement features follows subsection 906(e) of the WRDA of 1986. All first costs associated with fish and wildlife enhancement in the Bonnet Carré Spillway are a Federal cost if such enhancement provides benefits that are determined to be National, is designed to benefit species that have been listed as threatened or endangered, or located on lands managed as a National wildlife refuge. When benefits of the enhancement do not qualify as above, 25 percent of the first cost shall be provided by non-Federal interests. The non-Federal share of operation, maintenance, and rehabilitation of enhancement activities is 25 percent.

USACE is responsible for identifying and evaluating waterfowl habitat restoration and development opportunities for proposed USACE projects.

Responsibilities of USACE under the North American Waterfowl Management Program are contained in a Cooperative Agreement dated January 1989. The recognized mission of the North American Waterfowl Management Plan is to emphasize protection and restoration of waterfowl habitat and focus on a goal of 62 million breeding ducks and a fall flight in excess of 100 million birds by the year 2000. The plan provides a framework for a Federal, state, and private partnership to implement a combination of wetland habitat protection, restoration, and development actions designed and managed to benefit breeding, migrating, and wintering waterfowl. USACE responsibilities to this cooperative agreement are to identify the extent civil works projects address the plan goals, identify other opportunities at operating projects to plan goals, and identify and evaluate opportunities for restoring and developing waterfowl habitats during planning, design, and construction of new USACE projects. Minor modifications to operational features of existing projects can be accomplished with available funding if there are no adverse impacts on authorized project purposes. Funding through North American Waterfowl Management Plan can provide more costly modifications to projects, again provided they would have little or no significant adverse impacts to authorized project purposes.

5.3.2 Manpower Restraints for Project Management

The downsizing of the USACE workforce over past several decades has been a significant constraint in the attempt to more actively manage public use and wildlife and fisheries resources. As the spillway's NRM program continues to grow to meet the demands of the visiting public and to fulfill MVN program requirements, additional staff required to implement the Master Plan will have to come from a shrinking pool of MVN manpower.

5.4 SOCIAL AND CULTURAL FACTORS

5.4.1 Traditional Use Patterns

Another constraint to be considered in the further development and implementation of the Master Plan update is the long established pattern of existing public uses on spillway lands. While many of the disruptions to historical use patterns have been tackled during the implementation of the 1998 Master Plan, proposed changes to existing public uses, either through limitations on when and where certain activities can be undertaken or the prohibition of other uses, are likely to result in some level of public opposition.

This constraint is considered in the planning process by ensuring that existing public uses are accommodated to the maximum extent possible, consistent with established guidance. Comments and recommendations received as part of the informational workshop, recreation use surveys, and user questionnaires are fully considered in the Master Plan update process. Their recommendations represent the combined experience and desires of the current users of spillway lands.

5.4.2 Adjoining Land Uses

In the lower portion of the floodway between the Mississippi River and U.S. 61, most of the adjoining lands are either industrial in use or are undeveloped woodlands. The exception to this description is the residential area adjacent to the lower guide levee between the Canadian National Railroad crossing and the Kansas City Southern Railroad crossing. Part of the town of Norco, this area contains numerous single-family houses (some of these with backyards abutting spillway lands), a public elementary school, a recreational ballpark, a community swimming pool and a tennis court complex (Plate 6).

North of U.S. 61, most of the adjoining land is undeveloped wetlands. The exception here is the industrial complex along the

lower guide levee which terminates at the location of the St. Charles Parish hurricane protection levee.

The adjacent industrial uses constrain spillway resource development to a limited extent. Some potential spillway uses, such as wildlife enhancement or bird rookeries, are not entirely compatible with these adjoining manufacturing facilities. In addition to the external influence of adjacent land uses on spillway lands, the USACE also needs to be a good neighbor. The residential area of Norco along the lower guide levee presently suffers from noise and dust pollution generated by large trucks hauling sand and clay borrow. A buffer zone needs to be established in this area to protect the adjoining residents. Likewise, public use on spillway lands adjacent to wetlands needs to be controlled to ensure minimal impacts to the natural environment.

SECTION 6.0
RESOURCE USE OBJECTIVES

6.0 RESOURCE USE OBJECTIVES

6.1 USACE-WIDE OBJECTIVES

The objectives of the USACE's Natural Resources Stewardship and Recreation Management Programs (ER's 1130-2-540 and 1130-2-550 dated 15 November 1996) are listed below:

(1) to manage natural resources on USACE administered land and water in accordance with ecosystem management principles, to insure their continued availability;

(2) to provide a quality outdoor recreation experience which includes an accessible, safe and healthful environment for a diverse population;

(3) to increase the level of self-sufficiency for the USACE recreation program;

(4) to provide outdoor recreation opportunities on USACE administered land and water on a sustained basis; and

(5) to optimize the use of leveraged resources to maintain and provide quality public experiences at USACE water resources projects.

6.2 USACE ENVIRONMENTAL OPERATING PRINCIPLES

USACE has reaffirmed its commitment to the environment by formalizing a set of "Environmental Operating Principles" applicable to all its decision-making and programs. These principles foster unity of purpose on environmental issues, reflect a new tone and direction for dialogue on environmental matters, and ensure that employees consider conservation, environmental preservation and restoration in all USACE activities. Sustainability can only be achieved by the combined efforts of Federal agencies, tribal, state and local Governments, and the private sector, each doing its part, backed by the citizens of the world. These principles help USACE define its role in that endeavor.

By implementing these principles, USACE will continue its efforts to develop the scientific, economic and sociological measures to judge the effects of its projects on the environment and to seek better ways of achieving environmentally sustainable solutions. The principles are consistent with NEPA, the Army Strategy for the Environment with its emphasis on sustainability and the triple

bottom line of mission, environment and community, other environmental statutes, and the WRDAs that govern USACE activities. The princples also dovetail with the USACE 12 Actions for Change and specificially with Action Six, Focus on Sustainability. The following are USACE's environmental operating principals:

USACE uses ecosystem management principles to manage natural resources on USACE project lands.

Principle 1. Strive to achieve Environmental Sustainability - This principle is achieved by being true to the mission statement of USACE's NRM program: *"to manage and conserve natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations."*

Principle 2. Consider Environmental Consequences - This principle is achieved through thoughtful design of site development features on project lands, thorough reviews of management practices, consultations with Federal and state resource agencies and careful reviews of proposed activities on spillway lands and waters.

Principle 3. Seek Balance and Synergy – This is accomplished by seeking ways to develop the inherent and unique potential of the spillway for public recreation that also serve to enhance natural resources values.

Principle 4. Accept Responsibility - This principle is achieved by going beyond the minimal level of environmental compliance and adopting the philosophy of NEPA as our management approach. In all of our activities, we must be accessible and responsive to public and agency concerns.

USACE considers environmental consequences during the design of a project or project feature.

Principle 5. Mitigate Impacts – The spillway will comply with this principle by collaborating with other Federal, state and local interests and supporting research to consider the cumulative impacts of our management activities.

Principle 6. Understand the Environment - We achieve this principle through collaborative efforts to better understand ecological functions. Also we use our Interpretive Services and Visitor Center programs to increase social knowledge of environmental principles and USACE impacts.

Principle 7. Respect Other Views - This principle indicates that sustainability is achieved by listening - to our colleagues in other

agencies, experts in academia, public interest groups, our visitors, the general public, and elected officials.

6.3 PROJECT SPECIFIC OBJECTIVES

The primary objective for this Master Planning effort is to maintain the flood control function of the Bonnet Carré Spillway. Flood control is the spillway's authorized purpose; its importance in protecting the City of New Orleans and other downstream communities from high waters on the Mississippi River is undiminished from the time of its authorization and construction. For this reason, the requirement to maintain the spillway's flood control capacity and function overrides any conflicting purpose.

Additional objectives specific to public use of the Bonnet Carré Spillway include:

(1) manage activities to avoid or reduce conflicts between public uses and user groups in the spillway;

(2) to the extent practical, maintain and enhance existing recreational uses in the spillway;

(3) provide new recreational opportunities such as environmental education programs;

(4) maintain and improve spillway habitats for fish and wildlife resources;

(5) encourage and accommodate sustainable public utilization of the spillway's fish and wildlife resources; and

(6) manage all spillway natural resources, including water bodies, open areas, forests, fish, and wildlife as an integrated whole.

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SECTION 7.0
LAND CLASSIFICATION PLAN FOR DEVELOPMENT AND RESOURCE MANAGEMENT

7.0 LAND CLASSIFICATION PLAN FOR DEVELOPMENT AND RESOURCE MANAGEMENT

7.1 LAND ALLOCATION IN ACCORDANCE WITH AUTHORIZED PURPOSE

All spillway lands are allocated to the operation of the spillway for flood control purposes. No other purposes are authorized.

7.2 LAND CLASSIFICATION FOR DEVELOPMENT AND RESOURCE MANAGEMENT

The land classification scheme presented below is intended to fully utilize spillway lands relative to legislative authority and policy directives. The resource use objectives listed in Section 6 of this plan reflect these authorities and policy directives and, therefore, provide the goals for the classification process.

The suitability of the spillway's resources (Section 3) for the various management options were analyzed along with the spillway-specific and regional recreation analysis (Section 4). The planning constraints listed in Section 5 of this plan helped to refine the zoning of spillway lands. Also of importance in the derivation of this classification scheme were public desires for management and development of the spillway's resources, specifically those expressed in the January 1994 report of the Bonnet Carré Citizens Advisory Committee, and at a workshop held on 11 June 2008 at Destrehan High School.

Resource objectives and management principles for each classification category are provided. The land classification categories for the spillway are depicted on Plate 8. These guidelines provide a framework for management and development of spillway lands and resources.

7.2.1 Project Operations

Spillway lands classified for spillway operations are limited to the spillway structure, the spillway office building located on the lower guide levee, the maintenance and storage compound adjacent to the office, and the proposed NRM office on the lower guide levee (Plate 8). These areas are used solely for spillway purposes.

(a) Resource Objectives. The primary objective for these areas is the maintenance of flood control functions. These areas are essential for spillway readiness. Another objective is to support NRM, recreation, and environmental stewardship.

(b) Management Principles. These areas of the spillway are off limits to the visiting public except when accompanied by spillway personnel. The spillway structure, office, and storage/warehouse areas are secured by high fences and locks. Security measures should be maintained and enhanced where necessary.

7.2.2 Recreation

Included in this classification are the four developed recreation areas outgranted to the St. Charles Parish Government, the remote controlled airplane permit area, two ATV use areas under formal agreement with South Louisiana Trailblazers, and the incidental public use at the MVN boat launch on the upper guide levee (Plate 8).

(a) Resource Objectives. The primary objective for these recreation areas is to provide outdoor recreation opportunities on a sustained basis in a safe and healthful environment. These four areas should be managed to maintain and enhance existing recreational uses, and provide new recreational opportunities as appropriate. While wildlife and vegetative management are not the primary objectives in these areas, these values should be improved and enhanced where possible.

MVN, through partnerships, outgrants, and volunteers manages recreation areas to maintain and enhance recreational uses.

(b) Management Principles. The four existing outgrants for recreation use on spillway lands should be inspected monthly by spillway operations personnel and annually by real estate personnel to ensure compliance with the stipulations in the outgrants. Non-compliance should be promptly reported to the lessee with a request to correct any deficiencies. Maintenance of the existing recreation areas appears adequate at present with the exception of the I-10 boat launch. The courtesy piers are in poor condition, the site lights are damaged, trash collection is inadequate, and the general site conditions are less than satisfactory. Amenities such as barbeque grills, fire rings, restrooms, and picnic tables would enhance the recreational opportunities at all recreation areas.

Aesthetic conditions at all seven recreation areas are low to moderate in quality. Landscape management and upkeep of physical elements of each site should be improved. Signage is generally inadequate and should also be improved.

7.2.3 Mitigation

Three areas along the upper guide levee north of U.S. 61 have been established for the mitigation of wetland losses under the jurisdiction of Section 404 of the Clean Water Act (Plate 8). In the

future, mitigation credits could be generated for both civil works projects and those under the jurisdiction of Section 404 of the Clean Water Act, via implementation of features to create or restore wetland habitat values on spillway lands. Future wetland mitigation proposals should be concentrated in the wildlife/vegetation management classification.

Mitigation areas establish on spillway lands can be used to mitigate future MVN projects.

(a) Resource Objectives. The primary objective of these areas, is to provide wetland functions or values depleted or lost as a result of other Federal actions in the vicinity of the Bonnet Carré Spillway. Any proposal to use the spillway for mitigation purposes will be evaluated in the context of the extent and duration of flooding expected during a worst-case event. Such an event could destroy or severely damage any structural mitigation features within the spillway. Justifiable mitigation proposals must provide fish and wildlife benefits beyond those that can reasonably be expected to occur under current and future management schemes.

(b) Management Principles. Development and user activities will be limited to those which do not cause significant damage to wetland functions or values being replaced in designated areas.

7.2.4 Environmentally Sensitive Areas

7.2.4.1 Ecological Resources

The bald eagle is Federally protected under the Bald Eagle Protection Act of 1940 (16 U.S.C. 668-668d), as amended and the Migratory Bird Treaty Act of 1972 (16 U.S.C. 703-712). Consequently, bald eagle nesting sites are considered environmentally sensitive areas. One known active bald eagle nest site is located in the Bonnet Carré Spillway and several known bald eagle nest sites are located in the vicinity of the Bonnet Carré Spillway. Expansion of the bald eagle population in the vicinity is possible. Bald eagle nest site guidelines should be developed and implemented as part of the projects operational plan. No critical habitat for other threatened or endangered species currently exists on spillway lands.

(a) Resource Objectives. The goal of this designation is to preserve or retain the values associated with these resources.

(b) Management Principles. Development in these areas will be prohibited. User activities will be limited to those which do not disturb or cause significant impacts to ecological resources.

7.2.4.2 Cultural Resources

The locations of the historic Kenner and Kugler Cemeteries, including the buffer zones, are classified as sensitive areas (Plate 8). These properties are recognized as significant historic properties worthy of preservation and public interpretation through their listing on the NRHP.

(a) Resource Objectives. The goals of this designation are to preserve the historic and scientific values of these cultural resources and to provide an appropriate interpretive program for public benefit.

(b) Management Principles. Development is prohibited in these two areas. User activities are limited to those which do not cause significant damage to ground surfaces. The two archeological resources, and their buffer zones, are excluded from the sand hauling permit program and clay borrow activities for the Lake Pontchartrain Hurricane Protection project. No motorcycle or off-road vehicle use is allowed in the vicinity of these two properties. A public interpretive plan has been developed as part of this Master Plan and is included in Appendix H.

7.2.4.3 Aesthetic Resources

Two areas of high aesthetic value on spillway lands is the environmentally sensitive areas located along the upper borrow canal near Lake Pontchartrain and along the upper borrow canal immediately north of U.S. 61. Both areas consist of good baldcypress-tupelogum swamps (Plate 8). Although baldcypress trees occur throughout the forested areas of the spillway, they are found in mixed and disturbed contexts. The sensitive areas designated here retains a natural condition which is high in aesthetic value.

(a) Resource Objectives. This resource should be preserved and maintained in as near a natural state as possible.

(b) Management Principles. Development should be kept to a minimum. Access should be provided to allow the public to view the beauty and uniqueness of this natural swamp ecosystem, which is its greatest attraction. Baldcypress-tupleo gum swamps have the potential to support recreational activities such as crawfishing, wildlife observation, nature study, hunting, and canoeing.

7.2.5 Multiple Resource Management

Resource management has to be consistent with the purpose of the spillway.

The vast majority of spillway lands are classified in the multiple resource management category. This classification recognizes that although the primary allocation of spillway lands is operations, a wide range of management activities compatible with this purpose are appropriate. Various management measures can be implemented to continue and enhance public recreation opportunities and realize the potentials of the spillway's natural resources without hindering the flood control function of the spillway.

This classification is subdivided into two major units; first, those lands most suitable for low density recreation and, secondly, those lands better suited to wildlife and vegetation management on spillway lands. These are not mutually exclusive subdivisions. For example, some wildlife and vegetation management practices are recommended for the low density recreation subareas. Likewise, some forms of recreational activity are compatible with the subareas classified for wildlife and vegetation management. These subdivisions, then, are useful for identifying those portions of spillway lands where either low density recreation or wildlife and vegetation management activities take precedence over the other.

Spillway lands are classified for low density recreation or wildlife and vegetation management.

After partition of the multiple resource management category into low density recreation and wildlife/vegetative management subareas, future recreation areas are identified. These potential recreation developments are located in both subareas. Finally, an existing outgrant is described under the "other" category since it does not fall under the standard classification scheme.

(a) Low Density Recreation. These lands consist, for the most part, of the cleared (*e.g.,* non-forested) portions of the multiple resources management classification (Plate 8). Included in this subarea is the vast majority of the floodway between the Mississippi River and U.S. 61. Also included are corridors along the upper and lower guide levee. These corridors extend from the floodside toe of the levees to the outer property boundary.

The boundaries of this subarea correspond to the areas subject to various spillway related maintenance activities. The area within the floodway corresponds to the boundaries of the sand hauling permit program as well as the clay borrow areas for the HSDRRS Projects. The levee corridors included in this subarea are maintained through mowing operations.

(1) Resource Objectives. Maintenance activities related to spillway operations are of primary significance in this subarea. Other management activities are, therefore, subordinate to these programs. Of secondary importance is the provision of outdoor recreation opportunities on a sustained basis and in a safe and healthful environment. This includes the continued availability of existing recreational activity to the maximum extent practical. Another recreation objective is to address the problems of conflicting recreational use. Finally, measures to maintain and enhance habitats for fish and wildlife resources are included in the management of this classification.

(2) Management Principles. Spillway maintenance activities take precedence in this subarea. Permitted sand hauling activities, clay borrow excavation, mowing of levees, and clearing of vegetation by spillway personnel will be performed as necessary. The immediate work area of these activities will be off-limits to the visiting public due to safety concerns.

USACE Regulations and Executive Order 11644 prohibit off-road vehicle on USACE projects except in designated areas.

Most low density recreational activities will be permitted except in the immediate area of spillway-related maintenance activities. Activities which are compatible with this classification include hiking, wildlife observation, fishing, crawfishing, dog training, picnicking and similar non-disruptive pursuits. Hunting and discharge of shotguns is also allowed in strict conformance with Federal laws and regulations, state law and local ordinances. However, hunting and discharge of shotguns is prohibited in the Norco Buffer Zone and in any area where firearms would endanger any other user in the spillway (see Plate 6). Specifically prohibited in this subarea is all off-road vehicle activity except in designated areas. In accordance with EO 11644 and USACE regulations, all Federal lands and waters are closed to off-road vehicle use except in designated areas and trails. ATV and motorcycle use is allowed within ATV 1 and 2 within this subarea. An off-road vehicle use area is proposed below in the discussion of future recreation areas.

Wildlife and vegetative management measures for the low density recreation subcategory are described below.

(b) Fish and Wildlife Management. Included in this classification are the forested portions of the multiple resource management areas as well as the non-forested wetlands (French Cut Area) in the

central portion of the floodway (Plate 8). Located primarily between U.S. 61 and Lake Pontchartrain, these forested and wetland areas are valuable habitat for fish and wildlife resources. A discontinuous strip of woodlands along the upper guide levee south of U.S. 61 is also included in this category. Spillway maintenance activities required in this subarea are minimal (Plate 9).

Forested and wetland areas on spillway lands provide valuable wildlife and fisheries habitat.

(1) Resource Objectives. Of primary importance in this subarea is the maintenance and enhancement of fish and wildlife resources. Other management activities are subordinate to this objective. Fish and wildlife have ecological, economic, educational, aesthetic, historical, recreational, and scientific value to the region and Nation. The management of any population of threatened or endangered species that may be discovered on spillway lands (or that colonize spillway lands and waters) shall receive the highest priority from a management perspective. The objective of a non-consumptive fish and wildlife management program shall be to retain natural resources for the average visitor to observe and enjoy. This implies that the widest variety of species endemic to each community be maintained on spillway lands.

The provision of outdoor recreation opportunities which are compatible with or dependent upon fish and wildlife management is a secondary objective in this subarea. This will include the continued availability of existing recreational activity to the extent practical. New recreational opportunities such as nature trails and wildlife viwing stations should also be provided. Maintenance activities related to spillway operations are of minor significance in this subarea. When required, spillway maintenance activities should be designed and implemented to minimize adverse effects on the natural resources of this area.

(2) Management Principles. Primary use of spillway lands as a floodway precludes intensive management for fish and wildlife management. USACE regulations place limits on the extent of resource management activities that the USACE may undertake on its own projects. At a minimum, MVN fish and wildlife management in the Bonnet Carré Spillway is limited to maintaining existing populations and resources under Federal stewardship. Enhancement of fish and wildlife resources, involving construction, operation, and maintenance of facilities or other improvements, requires the financial participation of a local sponsor, usually 25 percent

contribution for construction and 25 percent for the operation, maintenance, and rehabilitation.

Aquatic resource measures for spillway lands are threefold. First, water areas outside of the active sand hauling areas, and beyond the immediate vicinity of the structure, will be passively managed for freshwater and estuarine finfish and shellfish. Secondly, areas within the sand hauling area will be restored, by the contractor, to a condition suitable for aquatic organisms upon completion of sand hauling operations in the area. Third, enhancement projects for fisheries resources will be pursued in cooperation with a local sponsor, especially in concert with the proposed Bonnet Carré Freshwater Diversion project. Currently, lakes and ponds are stocked in cooperation with USFWS, Natchitoches Fish Hatchery.

Wildlife resource objectives include management for wildlife observation, non-game, small game, waterfowl, furbearers, and commercial herpetofauna. This involves passive management and participation in various enhancement projects for wildlife resources in the spillway. Wildlife is a part of the outdoor experience of nature observers, hikers, campers, picnickers, and pleasure drivers. Wildlife observation and photography can be incidental to other spillway activities, or they can be a primary reason for visiting a particular site. Management activities will be undertaken to provide for both of these types of wildlife utilization.

Important existing or potential den or cavity nesting trees should be preserved and managed, and attempts should be made to make ample den or nest trees continuously available as a natural and vital component of the forest, as passive management for cavity-nesting species. Artificial nest structures for cavity nesters is a secondary technique to be used only when insufficient numbers of suitable cavities do not exist in the natural environment. Other active management procedures include intermediate timber harvests, promotion of an edge ecotone along forest and water margins, sub-impoundments, beaver pond management, water level manipulations and maintenance of vegetative openings. Nesting boxes and vegetative plantings (*i.e.*, food plots) can also be used to draw wildlife close to public use areas, trails, and other places for observation by the public.

Public hunting and trapping of a harvestable surplus of game will be the end result of passive and active management activities that will be undertaken for consumptive recreation of this type of wildlife utilization, particularly for deer, squirrels, rabbits, waterfowl, furbearers, frogs and alligators. If feasible, suitable land can be

licensed to the LDWF in order to assure public hunting in accordance with state regulations. A hunting and/or trapping permit system is utilized to control recreational and commercial take and control overuse within the Bonnet Carré Spillway. Although the LDWF licenses commercial takers of reptile and amphibian wildlife for use in the pet and biological supply trade, herpetofaunal species other than alligators and frogs will be protected in the Bonnet Carré Spillway as part of the non-game program.

(c) Vegetative Management. The subarea for vegetative management efforts is the same as the area delineated for fish and wildlife management. The objectives of recreation and wildlife management often impact or necessitate manipulation of vegetative resources. However, lands suitable for commercial or intensive management of forest resources are limited in the spillway because of the primary role of the spillway as a floodway to divert river floodwaters and the distance of the spillway to saw and paper mills.

Vegetation management is used to improve wildlife habitat.

Besides natural resource values, vegetation is also a significant component of aesthetic resource management. Aesthetically sensitive areas include lands along the major highways traversing spillway, primarily near I-10 and U.S. 61 (Plate 8). Retaining mature vegetation along these corridors and along water bodies or water courses near disturbed areas creates visual contrast, as well as habitat diversity.

(1) Resource Objectives. The objectives for this category of resource management are essentially the same as for fish and wildlife management. Maintenance and improvement of aesthetic resource quality, especially along transportation corridors is an objective. Therefore, vegetative manipulation in these areas will be an integral part of wildlife and fisheries management, and also integral to the provision of compatible recreational activities. Another major consideration when managing natural and created resources associated with USACE's projects is the preservation and enhancement of the aesthetic integrity of streambanks and shorelines.

(2) Management Principles. For the most part, natural processes will be permitted to proceed in an uncontrolled fashion in existing forested areas. Preservation may require management efforts to perpetuate ecologically balanced forest lands, including control of insects and disease both within and possibly outside the spillway. Technical assistance and coordination will be sought from U.S. Forest

Service, Louisiana Department of Agriculture and Forestry, LDWF, Louisiana State University, and USFWS. MVN will continue to maintain levees, especially mowing of grasses, and the maintenance of all open areas of the floodway to permit unrestricted flow of floodwaters through the spillway. However, open areas in the central portion of the Low Denisty Recreation area will not be maintained (*i.e.*, mowed) on an aggressive schedule as the levees. These areas will be mowed on an annual basis to enhance wildlife habitat, specifically mottled duck and rabbit habitat. Areas that are not mowed will be cleared of willows, but revegetation through natural colonization of volunteers will be allowed unless otherwise managed for recreation or wildlife. In Low Denisty Recreation use areas, management of forest resources will be consistent with the maintenance of natural characteristics. Plantings as well as necessary clearings or selective removal of trees will seek to promote the creation or preservation of natural landscapes and seek to enhance wildlife habitats.

Vegetation management on spillway lands is designed to increase habitat diversity and enhance wildlife habitat.

Any management plan to benefit wildlife should provide diversity of vegetation types and age classes. Nature provides this diversity through windstorms, catastrophic fires, disease epidemics, and insect infestations. With management, decisions can be made concerning the interspersion of vegetation types. Diversity is enhanced through creation and maintenance of openings in and near forested areas. Openings provide food, breeding habitat, nesting cover, brooding habitat, or escape cover. Wildlife openings can also be used to concentrate species populations in a given area in order to promote a more complete utilization of the resource or to increase the amount of edge effect.

SECTION 8.0
NATURAL RESOURCES MANAGEMENT GUIDELINES

8.0 NATURAL RESOURCES MANAGEMENT GUIDELINES

8.1 SPECIES SELECTED FOR MANAGEMENT

Land and water resources on spillway lands are managed to favor a group of species

Every land management decision that affects habitat configuration (including no action), favors a species or group of species (species guild) at the expense of others. A featured species guild management approach seeks to consciously establish a long-term direction for fish and wildlife management by utilizing the general habitat requirements of preferred guild species. These requirements provide guidance for coordination with other resource management practices and uses, for the application of direct improvements to overcome habitat limiting factors, for managing habitat of endangered and threatened species wherever they occur, and for being responsive to public interests and preferences for fish and wildlife.

This management concept designates specific tracts of land or water areas where management practices are implemented to favor a particular species guild. Guidelines based on the habitat requirements and mobility of the preferred species guild are developed and then used to direct the coordination of vegetation, fish, and wildlife management. Management practices such as intermediate forest cuttings and creation of subimpoundments then become the means of accomplishing management objectives. Featured guilds will be selected for all lands and waters except the structure, offices, maintenance compounds, and developed public use areas. Special practices can be implemented for developed public use areas which maximize species diversity for public observation. In all cases, if Federally listed threatened or endangered species are present, management for their protection is given priority.

Managed species are selected based on habitat compatibility and compatibility with other resources.

The decision to select featured guild species in the Bonnet Carré Spillway would be made after consideration of the following factors:

(1) Inherent capacity of the land to produce and sustain the food and cover within the species range under managed or natural conditions.

(2) Compatibility with other resources and public uses considering conflicts and the uniqueness of the management opportunity.

(3) Public interest and needs to include local fish and wildlife preferences, socioeconomic values, public use opportunities,

aesthetics, and resource needs from a local, regional, and National perspective.

(4) Cooperation and public involvement to include USFWS and LDWF for joint annual work planning and inventorying, and the additional resource management expertise.

(5) Selection of a variety of indigenous target species suitable for evaluation.

The following species guilds were preliminarily selected as fish and wildlife management guilds in the Bonnet Carré Spillway: freshwater crustaceans, freshwater game fish, small game mammals, furbearers, waterfowl, wading and shore birds.

8.1.1 Freshwater Crustaceans

Several species of freshwater crustaceans can be found in the Bonnet Carré Spillway, and two are taken by commercial and recreational pursuits. Red swamp crawfish and white river crawfish can be found in aquatic habitats throughout the spillway. Optimum habitat is permanent, static water bodies less than 15 inches in depth, with a mud bottom, abundant aquatic vegetation, and exposure to full sunlight. Crawfish activity is reduced at water temperatures below 45^{o}F, but activity increases as temperatures rise and is optimal between 70^{o}F and 85^{o}F. Detritus and aquatic vegetation are major food sources.

8.1.2 Freshwater Game Fish

Primary species within this species guild include largemouth bass, black crappie, white crappie, and bluegill. The optimal habitat for largemouth bass are lakes with extensive shallow areas to support submergent vegetation and deep enough to successfully overwinter this species. Good riverine habitat for largemouth bass is characterized by large, slow moving rivers or streams with soft bottoms, some aquatic vegetation, and relatively clear water. Fry feed mainly on microcrustaceans and small insects, juveniles consume mostly insects and small fish, and adults feed primarily on fish and crawfish. Adults often feed near vegetation within shallow areas, with a bimodal intensity, peaks in the early morning and late evening. Largemouth bass will nest on a wide variety of substrates including gravel, vegetation, roots, sand, mud, and cobble.

Habitat for black crappie include bodies of clear water in areas of low turbidity. Black crappie are less tolerant of high turbidities than are white crappie and, as a result, tend to dominate the latter

species in clear water areas. Abundant cover, particularly in the form of aquatic vegetation, is necessary for growth and reproduction. Common daytime habitat is shallow water in dense vegetation and around submerged trees, brush, or other objects. Fry feed mainly on microcrustaceans and planktonic insects, juveniles consume mostly planktonic insects and small fish, and adults feed primarily on fish and insects. Black crappie will nest on substrates of gravel, vegetation, sand, and mud.

Habitat for white crappie include bodies of relatively clear water in areas of moderate to low turbidity. White crappie are more tolerant of high turbidities than are black crappie and, as a result, tend to dominate the latter species in turbid water areas. Habitat requirements and food sources are the same as those for black crappie.

Bluegills are most abundant along shoreline areas in lentic and lentic-type environments such as ponds, lakes, reservoirs, and large low velocity streams; deeper areas are required for overwintering and summer heat. Cover in the form of submerged vegetation or logs and brush is especially utilized by juveniles and small adults. Bluegills are opportunistic feeders that can alter their diet according to food availability. Fry feed on zooplankton and small insects. Juveniles and adults feed on zooplankton, aquatic, and terrestrial insects, and some plant materials. Adults feed primarily on fish and insects.

8.1.3 Small Game Mammals

This species guild includes gray squirrel, fox squirrel, and swamp rabbit. These are herbivorous mammals with an affinity for edge type habitats, particularly forested ecotones. Although the two squirrel species may inhabit the same general area, they tend to concentrate in slightly different habitats. Gray squirrels prefer dense stands of mature hardwoods with a dense understory, and fox squirrels generally prefer open forested habitats with little understory vegetation. Gray and fox squirrels need some tree cover and areas that support both hard and soft mast bearing vegetation. Den trees are preferred nesting sites, but both species will utilize leaf nests.

Swamp rabbits inhabit stream bottoms, swamps, and marshes. They have a high reproductive potential producing up to four litters of three to four young/litter annually. Bottomland hardwood forest areas are essential habitat for swamp rabbits. Briar and honeysuckle thickets provide high quality cover and swamp rabbits will readily take to the water when pursued.

8.1.4 Furbearers

Common furbearers in the Bonnet Carré Spillway include Virginia opossum, American beaver, nutria, northern raccoon, and mink. Habitat needs for these species are a diversity of forested and non-forested wetland areas, and management of these habitats to provide the necessary food resources. Food resources for the American beaver and nutria are woody and herbaceous wetland plant material. Mink almost exclusively utilize small vertebrate prey. The opossum and raccoon feed upon large macroinvertebrates, small vertebrates and supplementary plant material.

8.1.5 Waterfowl

Primary species within this guild include wood duck, mottled duck, blue-winged teal, green-winged teal (*Anas crecca*), mallard, northern shoveler (*Anas clypeata*), gadwall (*Anas strepera*), and ring-necked duck (*Aythya collaris*). Wood ducks and mottled ducks are resident species in the Bonnet Carré Spillway, utilizing forested wetlands and marshes, respectively. Other duck species are primarily fall and spring migrants and winter visitors.

Habitat for waterfowl revolves around providing high-quality feeding and loafing habitat for waterfowl on a year-round basis, and brood-rearing and nesting habitat for resident species. Usually a good land/water interface in marsh environments provide the necessary habitat requirements.

8.1.6 Wading and Shore Birds

A wide variety of wading and shore birds utilize the Bonnet Carré Spillway. Common species include great blue heron, great egret, snowy egret, little blue heron (*Egretta caerulea*), tricolored heron, cattle egret, green heron (*Butoroides striatus*), yellow-crowned night-heron, white ibis, glossy ibis, white-faced ibis, killdeer, black-necked stilt, greater yellowlegs (*Tringa melanoleuca*), lesser yellowlegs, spotted sandpiper (*Actitis macularia*), western sandpiper (*Calidris mauri*), least sandpiper (*Calidris minutilla*), and common snipe. These species utilize a variety of wetland habitats in the spillway including swamp, marsh, shallow flooded fields, and borders of open water bodies. A few wading and shore bird species, such as the white Ibis, can utilize different habitats within the area, but the majority of species in this guild are restricted to microhabitats based upon their specific foraging mode and prey selection.

8.1.7 Reptiles

A wide variety of reptilian species utilize the Bonnet Carré Spillway. These species utilize open water, a variety of wetland (*e.g.*, swamps, pond fringes), and bottomland hardwood forest habitats in the spillway. Common species include American alligator, alligator snapping turtle (*Macrochelys temminckii*), Eastern mud turtle (*Kinosternon subrubrum*), Western cottonmouth, Eastern hog-nosed snake (*Heterodon platyrhinos*), and banded water snake. Many other species our common on spillway lands and were provided in Section 3.0. American alligator is the focus species for management within this guild of species. They are abundant on spillway lands and can be found in most waterbodies within the spillway.

8.2 FISH AND WILDLIFE MANAGEMENT GUIDELINES

A number of techniques or tools are available which enable resource managers to manipulate habitat to meet the needs of fish and wildlife species. With the use of these tools the needs of a certain population of fish and wildlife species at a given location for a specific period of time can be met. Techniques available are discussed in this section as are guidelines for their utilization. The theory behind the various management techniques, as well as guidelines for their use, also are included in this section.

Management techniques that emphasize the habitat requirements of featured guild species are stressed. Nonstructural management techniques generally are initially less expensive, and require no outlay of continuing maintenance funds. In contrast, structural management techniques, such as subimpoundments, may be expensive to build and maintain, particularly if pumps are installed.

8.2.1 Freshwater Crustacean Management

The primary objectives for crawfish management in the Bonnet Carré Spillway will be to enhance areas where water levels can be appropriate and to utilize extensive vegetative management in open and wooded areas of the spillway for crawfish food resources. Subimpoundments and manipulations of existing sand hauling pits and beaver ponds can be used to improve existing crawfish areas or create new areas. Many of the permanent and constructed ponds can be inter-connected and revegetated along their borders naturally with preferred species such as duckweed, duck potato, cattail, smartweed, and submerged aquatics. Dense stands of native wetland plant species can be produced with water depth manipulation and drawdown techniques. Where water control can

be emphasized, such as beaver pond dams, small roads and dikes, culverts or structures, water levels can be manipulated to provide supplemental foods such as Japanese millet (*Enchinochloa crusgalli var. frumenfacee*). Japanese millet can be hand sown on exposed mud bottoms immediately after drawdown in the spring and early summer. A slow, natural drawdown would promote a diversity of native wetland plant species which would be preferred over a quick water level drop and the resulting monotypic vegetative stands. It may become necessary to control undesirable native and non-native vegetation through the use of mechanical, chemical, or prescribed burning methods in the spillway. Burning in the forested areas of the spillway is not a management option.

Crawfish management should be concentrated between the Canadian National Railroad and Kansas City Southern Railroad.

Crawfish management should be concentrated in the area between the Canadian National Railroad and Kansas City Southern Railroad, and the portion of the French Drain between Airline Highway and the existing pipeline rights-of-way (Plate 9). These areas are not as readily affected by tidal influences and allow more options for water manipulation and vegetation control by management personnel.

8.2.2 Freshwater Game Fish Management

Planning for game fish management in the Bonnet Carré Spillway will need to be an evolving effort with the potential development and construction of the Bonnet Carré Freshwater Diversion Project and excavation of clay borrow areas. Following the 2005 Hurricane Season the Bonnet Carré Spillway has been utilized as a source of clay material for HSDRRS levee rebuilding following Hurricanes Katrina and Rita. Numerous waterbodies are being created as a result of clay borrow activities. These waterbodies reach to a depth of 25 feet and provide ideal habitat for gamefish. Clay borrow areas, lakes, ponds, and the Upper and Lower Borrow Canals are designated and managed for gamefishing opportunities (Table 8-1). In a cooperative effort with USFWS, Natchitoches Fish Hatchery, several of the clay borrow areas, lakes, and ponds have been stocked with bluegill, Florida strain largemouth bass, largemouth bass, and hybrid striped bass (Table 8-1) (Photograph 8-1). Stocking efforts of new clay borrow areas will continue as part of the spillway's

Photograph 8-1. Bass stocked in clay borrow pit on project lands

operational plan. The following is a list of recreational fishing areas on spillway lands. The location of these recreational fishing areas can be found on Plate 9.

Table 8-1. Recreational Fishing Opportunites in the Bonnet Carré Spillway

Waterbody	Common Species	Description
Lower Borrow Canal	Freshwater species include crappie, bluegill, and largemouth bass. Saltwater species such as speckled trout, sheepshead, and redfish can occasionally be caught	This large waterbody was constructed in the 1930s as a source of clay for construction of the upper guide levee.
Pleasure Beach at St. Charles Recreation Area	Bluegill, crappie, and Florida strain largemouth bass	This area was re-shaped in the spring of 2007 as sand deposits were removed to repair haul roads on spillway lands. Approximately 500 Florida strain largemouth bass were stocked in this area in the spring of 2007.
Lake Jacob	Hybrid striped bass, bluegill, and Florida strain largemouth bass	Lake Jacob is an 8-acre lake created in 2002. It was stocked with 40 hybrid striped bass and bluegill in 2004 and with 300 Florida strain largemouth bass in the spring of 2005. In the spring of 2007 several hundred more Florida strain largemouth bass were stocked in the lake.
Creek Lake	Bluegill and Florida strain largemouth bass	Creek Lake is a 13-acre clay borrow lake constructed by the excavation of clay to rebuild the Jefferson Parish hurricane protection levee. It was stocked with bluegill in the fall of 2007 and Florida strain largemouth bass in the spring of 2008.
L-shaped Pond	Hybrid striped bass, bluegill, and Florida strain largemouth bass	L-shaped Pond is an 8-acre lake constructed in 2003. It was stocked with 85 hybrid striped bass and bluegill in 2004 and 200 Florida strain largemouth bass in the spring of 2008.
Lake Duhe'	bluegill	Lake Duhe' is a clay borrow lake constructed by the excavation of clay to rebuild the Orleans Parish hurricane protection levee. It was stocked with bluegill in the fall of 2007.
Dog-training Ponds	Bluegill, crappie, largemouth bass	These ponds are slated for improvements as sand from previous spillway openings will be removed. Bluegill will be stocked in the ponds.
Paddlefish Lake	Bluegill, hybrid striped bass, Florida strain largemouth bass, catfish, buffalo, and paddlefish (spoonbill catfish)	Paddlefish Lake is an approximately 8-acre lake constructed in the 1990s. The lake was stocked with 120 hybrid striped bass and bluegill in 2004 and 50 Florida strain largemouth bass in the spring of 2004. The lake receives overflow from the Mississipi River during high water events.

Table 8-1, continued

Waterbody	Common Species	Description
Crappie Lake	Hybrid striped bass, crappie, catfish, and buffalo	Crappie lake is an approximately 4-acre lake constructed in the 1990s. In 2004, 60 hybrid striped bass were stocked in the lake. The lake receives overflow from the Mississipi River during high water events.
Three-oak Lake	Hybrid striped bass, bluegill, catfish, crappie, and buffalo	Three-oak Lake is a 4-acre lake constructed in the 1990s. The lake receives overflow from the Mississippi River during high water events.
Circle Lake	bluegill	Circle Lake is a clay borrow lake constructed by the excavation of clay to rebuild the St. Charles Parish hurricane protection levee. This pond was stocked with bluegill in the fall of 2007.
Keyhole Lake	crappie	This lake is a favored recreational fishing area for crappie.
Oasis Pond	Bluegill and largemouth bass	Oasis pond was stocked with bluegill in the fall of 2006 and bass in the spring of 2007.
Hyacinth Lake Number 1 and Hyacinth Lake Number 2	crappie	These lakes are favored recreational fishing areas for crappie.
Wood Chip Lakes	Hybrid striped bass, bluegill, Florida strain largemouth bass, and largemouth bass	Wood Chip Lakes consists of three clay borrow pits that were constructed prior to, during, and immediately following the 2005 hurricane season. The northernmost lake was stocked with 84 hybrid striped bass, bluegill, and 375 Florida strain largemouth bass. The other two lakes were stocked with bluegill in 2004 and 400 Florida strain largemouth bass in the spring of 2007.
Fremin Ponds	Crappie and catfish	Fremin ponds are shallow water areas that decrease in size during the summer months. During the spring recational users crawfish in these ponds.
40-acre Lake	Hybrid striped bass, bluegill, and Florida strain largemouth bass	40-acre Lake is actually a 16-acre lake constructed in the 1980s. It was stocked with 200 hybrid striped bass and bluegill in 2004 and 400 Florida strain largemouth bass in the spring of 2005.
Cypress Stump Pond	Crappie and largemouth bass	Cypress Pond is only a couple of acres in size; however it is a favored recreational fishing area.
Upper Borrow Canal	Freshwater species include crappie, bluegill, and largemouth bass. Saltwater species such as speckled trout, sheepshead, and redfish can occasionally be caught	This large waterbody was constructed in the 1930s as a source of clay for construction of the upper guide levee.

Table 8-1, continued

Waterbody	Common Species	Description
Lake Ponchartrain	Speckled trout, redfish, Atlantic croaker, sheepshead, ladyfish, needlefish, and striped mullet	Fishing in Lake Ponchartrain can be accessed by either the St. Charles Parish recreation area boat launch, the St. Charles Parish boat launch at the lower guide levee underneath I-10, or the public fishing area at the end of the lower guide levee.
Mississippi River/Forebay Area	Crappie, largemouth bass, catfish, buffalo	Commercial fish species are caught in the Mississippi River and during spring overflow from the river into the forebay area, crappie and bass can be fished from the many ponds in the are.

It is unclear at this time what effect the freshwater diversion project will ultimately have on fish species and populations in this waterway. Irregular banklines and structure, such as fallen trees and brush piles along the bank can be included in management plans for this area under almost any construction scenario. The Upper Borrow Canal is the main waterbody on spillway lands that will be affected by the proposed freshwater diversion project. Continued planning and more detailed management plans for fishing in the Upper Borrow Canal need to continue simultaneously with the refinement of the potential freshwater diversion project.

New borrow pits, lakes and ponds should be designed to provide suitable habitat for gamefish species as well as ease of maintenance. Irregular banklines and structure, such as islands should be included in the design of these waterbodies. Banks should be gently sloped to allow easy access by mowing equipment.

Numerous existing ponds between U.S. 61 and Lake Ponchartrain have been created as a result of past sand hauling activities. Many of these ponds have steep banks that can not be easily maintained by spillway personnel and do not provide suitable habitat for game fish. These ponds should be reworked to establish irregular banklines, structure (*i.e.*, fallen trees), and the banks should be gently sloped to allow easy access for moving equipment.

8.2.3 Small Game Mammal Management

Den trees are an important feature of good squirrel habitat.

Squirrel management in the Bonnet Carré Spillway relies on several forest management procedures. Forest resources should be managed on a 80 to 120-year rotation. If species are selected for management, oaks would be a preferred tree species in the forested areas of the spillway. Diversity of both white and red oak groups in the area would serve to enhance the available acorn crop on a year-to-year basis. During thinning or harvesting operations,

an attempt should be made to protect den trees (two to four den trees per acre is preferred), and to maintain aerial pathways in the forest stand. If clearcuts are utilized as a regeneration method, the clearest area should not exceed 10 to 30 acres and should not be located adjacent to forest stands less than 30 years of age. Additionally, procedures to encourage or increase hard mast species (*i.e.*, oaks and hickory) should be utilized in appropriate areas (*e.g.*, supplemental plantings of openings created by natural events). Any fires, prescribed or otherwise, should be eliminated from the forested areas in the Bonnet Carré Spillway. Burning serves no management purpose on these sites and would be detrimental to squirrel management.

Gray squirrels and fox squirrels use both leaf nests and tree cavities for bedding, nesting, and escape cover. Species recruitment is higher when cavities are utilized. Where the supply of suitable tree cavities is the limiting factor in an area, the installation of nesting structures can increase the carrying capacity of an area. Structures can also be utilized to attract squirrels to specific areas for public observation.

Nest boxes can increase the carrying capacity for squirrels in hardwood forests.

Squirrel nest boxes can be effective within a number of settings. The carrying capacity of even-aged hardwood forests between 30 and 60 years of age can be significantly enhanced for squirrel by using nest boxes. One nest box per 2 to 4 acres is the minimum to provide long-term benefits for squirrel populations. A maximum of three to six nest boxes per acre can be used where squirrel management receives high priority. In most cases, one box per acre is reasonable where squirrel is the featured species. Nest boxes should be placed as high as possible in trees without existing cavities. Maintenance checks should be made at least once every 2 to 3 years.

To be cost effective, pre-constructed boxes should be purchased from a vendor. Installation time averages about 1 man-hour for each nest box. One cleaning and maintenance visit per year/average requires 0.3 to 0.5 man-hours per box. A record-keeping system, including cost, man-hours, location, and utilization, should be developed and maintained along with a field monitoring program.

Rabbits are not a forest game species, but rely on edge habitats. The population density is directly related to soil fertility and good maintenance of edge type habitats. The Bonnet Carré Spillway provides an excellent opportunity to manage for these edge type species with extensive open areas adjacent to mature forest

stands. Vegetative management in the open areas will serve to increase rabbit populations. Timber management activities can enhance habitat for rabbits through the creation of edge habitat and logging slash piles generated during timber harvest activities. Further, clearcut areas provide good food and cover habitat for rabbits.

8.2.4 Furbearer Management

The furbearer species in the Bonnet Carré Spillway are primarily forest dependent and management procedures would be to enhance their available habitat. Den sites will probably be the most limiting factor. Burning is not recommended in the forested areas of the spillway and to improve the furbearer populations, den trees should remain on the order of two to four den trees per acre. Downed trees, brush piles, and logs should be maintained in forest stands.

The American beaver is generally considered a keystone species and its presence in an area will enhance the populations of fish, river otter, wood duck, raccoon, muskrat and nutria. Removal of beaver and their dams because of perceived nuisance problems (flooding and timber damage) should only be considered after evaluating the benefits and costs associated with their activities.

8.2.5 Waterfowl Management

Approximately 30 wood duck boxes are currently maintained on spillway lands.

Resident, migratory, and wintering waterfowl areas need abundant and readily available food in order to be attractive waterfowl species. The presence of preferred foods in adequate quantities can attract and retain species in a particular geographic location. Some species show a wide preference in feeding conditions, whereas others are more restricted in their food uptake and therefore feeding locations. Subimpoundments and manipulations of existing sand hauling pits and beaver ponds can be used to improve existing areas or create new ones. The primary objective is to manipulate water levels to manage for food and cover. Such techniques can be used to attract and hold ducks within the spillway, especially in the non-forested area of the spillway between the structure and U.S. 61 (Plate 9). Some of these improved areas will be located in non-hunting zones to provide resident and wintering birds safe rest areas relatively free from disturbance.

Many of the permanent and constructed ponds can be revegetated naturally with preferred species such as duckweed, duck potato, cattail, smartweed, and submerged aquatics. Where water control can be emphasized, such as beaver pond dams, small roads and

dikes, culverts or other structures, water levels can be manipulated to provide supplemental foods such as Japanese millet. Japanese millet can be hand sown on exposed mud bottoms immediately after drawdown in the spring and early summer. Flooding of these areas in the fall and winter, can create excellent feeding habitat. Water fowl management can occur concurrently with crawfish management techniques in those ponds located in the areas identified for crawfish management in Section 8.2.1.

If natural cavities are a limiting factor for wood ducks, wood ducks will readily nest in boxes provided as substitutes for natural cavities. If nesting boxes are properly placed, maintained, and predator proofed, increases in local populations can be expected. Currently, approximately 30 wood duck boxes are maintained in the spillway. Wood duck boxes will continue to maintained and additional nest boxes will be erected in suitable habitat as part of the OMP. Wood duck boxes should be erected in baldcypress-tupleo gum or bottomland hardwood habitats if they flood when hens are searching for nest cavities. Upland forest areas are also acceptable for boxes however, no upland forest habitat exists within the spillway.

In order to maximize nest box use and minimize nest dumping and predation, nest boxes should be located singely in visually isolated areas (USACE 1994). Nest dumping is the condition where many females lay eggs in a single nest and is greatest where there are high population densities. Hatching success in these nests are usually zero. When placing nest boxes in isolated locations, consider ease of access for monitoring purposes. Nest boxes can be placed on either land or over open water, and should be placed at least 4 feet above the high water level or 10 feet above the ground. The boxes can be mounted on trees, poles, posts, or pipes. Posts, poles, or pipes are usually used to support boxes over open water. Wood ducks prefer boxes located over water and duckling survival increases as the distance they have to travel over land to reach brood-rearing sites decreases. Open water sites are preferred because boxes can be placed where desired, they are easily guarded against climbing predators, and are not subject to fire ant predation. All nest boxes should have predator guards installed to prevent predation.

Wood duck nest boxes should be visually isolated from each other.

In forest stands or along waterways, boxes may be placed in trees. Nest boxes should be placed in areas with relatively open understories where they can be easily seen by wood duck hens. Any overhanging limbs should be removed from the front of the

box. When boxes are placed along waterways, entrances should face toward the water.

The cleaning of boxes and the placement of nesting materials is very important because wood ducks will not carry nest materials to the nest site. Four to 6 inches of nesting material, such as shavings, soft hay, Spanish moss and ground corn cobs, or saw dust used in combination with the former items, should be placed in each box no later that mid-January of each year. When the boxes are cleaned, they should be sprayed with a disinfectant and repaired, as required. A good public relations program may be necessary to explain the objectives of the nest box program to discourage vandalism and disturbance of nests.

Nest box use should be assessed soon after ducklings have left the nest. During this assessment, data should be collected on wood duck use, including number of eggs, number of eggs hatched and use by other species. Boxes not used and box failures should be noted. If possible, the reason for box failure (*e.g.*, abandonment, predation, flooding, human disturbance) should be noted (USACE 1994).

To be cost effective, pre-constructed boxes should be purchased. Installation time is extremely variable, depending upon the accessibility and location of brood habitat, but averages about 1.25 man-hours for each nest box. One cleaning and maintenance visit per year requires 0.3 to 0.5 man-hours per box. Nest boxes should be placed in areas that are readily accessible to maintenance personnel. Some of the existing nest boxes are not readily accessible and are not maintained properly. Nest boxes not readily accessible should be relocated and any future nest boxes should be installed in areas accessible to maintenance personnel.

8.2.6 Wading and Shore Bird Management

Use of wetlands among different wading and shore birds overlaps both temporally and spatially. The distribution and structure of major vegetational zones are critical to the availability of habitats for waterbird guilds. Maintaining a diversity of habitats throughout the year helps to provide food resources for many organisms. Managing a wetland complex to create varying habitats by drawdowns, flooding, and vegetative manipulation increases the diversity of food items available to resident and migratory

waterbirds (Photograph 8-2). When this food diversity occurs in the complex, several waterbird species will begin utilizing the wetland concurrently.

Photograph 8-2. Great egrets foraging following spillway closure in 2008.

Effective management strategies for wading and shore birds must consider potential species utilization and water availability. The area of greatest potential for wading and shore bird management is the non-forested wetland complex between the structure and U.S. 61. This complex consists of many water bodies constructed by sand and clay hauling operations. Each area has specific limitations and a unique potential for management. Recommendations must be considered on a case by case basis. Increasing the availability of invertebrates in these areas is essential. Moving water between water bodies during flooding and after drawdowns ensures conditions that increases the rate of invertebrate colonization. Configuration and alteration of the sand and clay hauling pits both during and after construction can enhance desirable vegetation and the effect of land-water interface on invertebrate populations.

Habitat for waterfowl and shorebirds could be enhanced through a partnership with Ducks Unlimited.

Additionally, the non-forested wetland area between the pipeline ROW and Lake Ponchartrain offers potential for wading and shore bird management (Plate 9). This area has been degraded by past sand excavation activities; however the potential for restoration of at least portions of this area are viable. Land shaping would be required to restore surface grades to allow for the manipulation of water. Further, the northern portion of this area is tidally influenced. All of the historic baldcypress in this area have been killed, likely as a result of increased salinities. The potential to create brackish and freshwater marsh systems in this area should be investigated. If properly designed and manipulated these areas could provide open water, vegetated and mud flat habitat. Partnering with a conservation organization such as Ducks Unlimited could enhance the potential of creating or restoring habitat in this area for wading and shorebirds as well as waterfowl (*e.g.* blue-wing teal).

8.2.7 Big Game Management

White-tailed deer management generally consists of maintaining openings and food plots. Timber stand improvements resulting in

an increase of hard mast producing tree species would also benefit white-tailed deer and hogs. Deer hunting with archery and shotgun is allowed on spillway lands during the regular state hunting season. Hunting of feral hogs is allowed on spillway lands during the season stipulated in the annual Bonnet Carré Spillway Posted Hunting Restrictions.

8.2.8 Reptile Management

Habitat for American alligator is abundant on spillway lands and requires little management. Ponds and waterways should be maintained by removing deposited sand following spillway openings. Population management for American alligator is more of a concern on spillway lands. Alligator hunting is allowed on spillway lands through a tagging system during the regular state alligator hunting season. Annual harvest and alligator populations should be monitored to determine the need to adjust the number of tags issued to hunters annually. Additionally, nuisance alligators will continue to be removed from public use areas.

8.3 VEGETATIVE MANAGEMENT GUIDELINES

Vegetation resource objectives include passive and active management for various resource needs. This involves management and participation in various enhancement projects for resources in the spillway.

8.3.1 Management Principles

A number of techniques are available that enable resource managers to manipulate vegetation to meet resource needs. The use of these techniques can fulfill the needs of a certain situation in a given location for a specific period of time.

Vegetative management strategies should be realized primarily by providing and maintaining a diversity of age-classes and species compositions, and by identifying potential old-growth emphasis areas, environmentally sensitive areas, and habitat restoration sites. Old-growth forest is essential for preserving biological diversity, given that these areas are those in shortest supply and greatest endangerment from development. Old-growth ecosystems with stable species composition and large dominant trees are characterized by particular structural and functional attributes. Habitat elements that contribute most to the value of old-growth forest are large, standing dead trees and fallen decaying logs with tip-up mounds. Large snags provide dens and cavity-nest sites; fallen logs provide resting sites for reptiles and amphibians, and

substrates for insects and larvae. Other old-growth attributes include overstory and understory plant species diversity, vertical foliage-height stratification (associated with bird species diversity), a complex soil/litter continuum (providing substrates for ground-dwelling and burrowing animals, soil microorganisms, and mycorrhizae), hard and soft mast production (wildlife food sources), ground vegetation (herbs, shrubs, and vines for cover and browse), and canopy gaps of various sizes and ages.

8.3.2 Forest Inventory

Inventories of forest resources are needed to measure success of management efforts.

The forested area on spillway lands have not been intensively managed since acquisition by the USACE. Inventory of existing forest resources is the essential first step to initiating any forest management efforts. The spillway manager and resource specialist must know the timber types, volume, and growth of forest resource prior to developing initial management prescriptions and subsequent updates to those prescriptions. Subsequent forest inventories will be required to monitor the success of forest management prescription as well as maintaining an inventory of timber for future sales. The forested area has been delineated into forest compartments for the purpose of forest inventory and management (Plate 10). These compartments can be further divided into cutting units during the development of a timber sale. Initially, a 10 percent timber cruise of each forest compartment should be conducted to obtain the current condition of the existing forest resources on spillway lands. Timber inventories should be conducted using the line-plot cruse method. A 0.01-acre plot should be used for tallying sawtimber and pulpwood and a .001-acre plot should be nested within the 0.10-acre plot for regeration counts. Subsequent timber inventories should be conducted every 20 to 30 years to monitor the growth and health of forest resurces on spillway lands.

8.3.3 Old-growth Restoration Areas

Forest management based on a natural disturbance model must be supplemented by artificial means if a diversity of shade-intolerant, hard-mast producing forest is desired to enhance wildlife habitat values. Forested lands in the spillway will be managed to favor age classes underrepresented in the area, usually mature and overmature (late successional) age classes, in contiguous tracts where possible. The conversion of some younger stands to mature ones will be accelerated by appropriate silvicultural practices, such as improvement cuts to enhance forest structure, timber quality, and species composition; thinning to encourage canopy diversification; supplemental planting of desired species (*e.g.* hard

mast producing species), and partial cutting to create scattered canopy gaps. However, timber harvest may be difficult to market due to the geographic location of the spillway. Any potential harvests would likely have to be at least 100 acres or greater in size to make the harvest economically feasible to a prospective timber buyer. The lack of marketability of timber on spillway lands could limit the management opportunities available. Snags and den trees should be maintained during any timber harvest. Natural gap-phase regeneration supplemented by planned cutting cycles would ensure replacement of hard mast producers in late successional bottomland hardwood stands as they approach overmaturity (higher proportion of dying and damaged trees).

8.3.4 Intermediate Cuttings

Intermediate cuttings consist of selective thinning of forest stands during that portion of the stand existence not included in the regeneration period. These are the various timber cuttings made during development from the reproduction stage to maturity. Cuttings aimed primarily at controlling stand growth by adjusting stand density are called thinnings. Those conducted to regulate composition by species and improve the quality of very young stands are release cuttings. Cuttings made in older stands for the same purpose are called improvement cuttings. Once again, these silviculture techniques may be limited by the geographic location of spillway lands and the feasibility of harvesting timber on spillway lands.

Intermediate timber harvests are used to improve the health and vigor of forests.

Silvicultural theory, and specifically intermediate cutting, proceeds on the basic principle that vegetation on any site tends to extend itself aggressively to occupy the available growing space. Growing space is limited by factors such as available sunlight, water, and inorganic nutrients from the soil. Available land can produce a specific quantity of biomass. By the application of intermediate thinning treatments and silviculture, biomass production is concentrated in specifically selected trees. When managing for wildlife production, forest growth is concentrated in these specifically selected species and individual trees that provide both food and shelter for featured wildlife species. The redistribution of growth potential in forest stands by regulating the distribution of growing space for the advantage of the existing stand is perhaps the most commonly used tool in forest management next to the planting of seedlings.

The history of high grading and agricultural practices has, in many locations, created forest stands of less desirable species. Trees are often poorly positioned within stands and optimum use is not

made of existing growing space. Forest management practices will largely consist of improvement cuts. With 120 to 200 year rotation for most of the bottomland hardwoods, approximately 8 to 15 thinnings/improvement cuts would be made in each stand before areas are possibly regenerated. Long rotations are utilized because many forest dwelling wildlife species utilize tree cavities for nesting and shelter and mast is consumed for food. Natural cavities do not customarily begin forming in hardwoods until they reach an advanced age. Long rotations favor the management of wood ducks, songbirds, raccoons, and squirrels in the bottomland hardwood forest type.

8.3.5 Timber Stand Improvement

Timber stand improvement cuts are utilized to improve the health and species composition of forest stands.

Past high grading and firewood cutting has reduced the amount of hard mast producing species in spillway forests. Currently, baldcypress is the major hard mast producing species on spillway lands. Species composition can be improved through active or a combination of passive and active management. Active management to alter species composition would include a series of clearcuts and selective harves followed by subsequent planting of desirable species. However, the distance of spillway lands to paper and lumber mills decreases the marketability of timber on spillway lands. Therefore, this option may not be feasible on spillway lands and needs to be explored further with timber procurement professionals. If timber harvesting is determined to be feasible, as part of the OMP, 1 to 5 acre clearcuts would be created along ridges and other areas void of baldcypress. The clearcuts should be arranged adjacent to areas of baldcpress and baldcypress/tupelo gum timber types. Further, the harvest areas should be situated to avoid locating harvest areas adjacent to one another. Any baldcypress in the clearcut area or within swells adjacent to clearcut ridges should not be harvested. The ridges would be planted with a mixture of hard mast producing species. Hard mast species should be planted at a rate not to exceed 30 percent of the total forest species composition. Den trees and snags will be maintained within clearcut and selective harvest areas. Den trees should be retained on an average of three to four trees per acre.

If harvesting timber is not an option due to the marketability of timber on spillway lands, underplanting of desirable species in openings created by natural events (*e.g.*, hurricanes) could be an option to alter species composition. This option represents a combination of passive and active management. In 2005 and 2007 the forested area on spillway lands was highly damaged by Hurricanes Katrina, Rita, and Gustav. These hurricanes created

openings in the forested area that could be replanted with desirable species to alter species composition. Potential openings would be treated with a herbicide (e.g. Arsenal™) the summer prior to planting to kill herbaceous growth and prepare the area for planting. Prior to initiation of bud break the second growing season a release application of herbicide should be applied to reduce competition between the seedlings and other vegetation.

Desirable species to be planted under either option would include nuttall oak, overcup oak, water oak, cow oak (*Quercus michauxii*), American beech (*Fagus grandifolia*), green ash, pignut hickory (*Carya glabra*), water hickory (*Carya aquatica*), sweet pecan and persimmon. Seedlings should be planted on a 12-foot x 12-foot or 14-foot x 14-foot spacing from December through March. The establishment of these species would increase hard mast production in forested areas as well as adding some additional soft mast. Manipulation of the species composition would improve the quality of spillway forested areas for wildlife. Hard mast is a vital food source for wildlife species and is further discussed below.

8.3.6 Mast Management

Mast, particularly acorns and nuts, is a high energy source for wildlife species. It is by far the most important source of winter food for squirrels, raccoon, and wood ducks. Population levels, reproductive success, body weight of individuals, and the overall condition of these species are directly related to the annual acorn crop. Mast supplies are variable, but they seldom completely fail.

Mast is an important energy source for many wildlife species.

The primary objective of mast management is to produce enough mast to sustain the desired population of a featured species in a particular area. A combination of hard and soft mast producers should be established and maintained to ensure an even, yearly production of most to the extent possible. Reserve food producers should be established and maintained to provide emergency food supplies when hard mast failures do occur.

Different species of trees and shrubs produce considerably different amounts of mast. Red oaks are the heaviest producers of acorns. White oaks are quite variable in production with many nonbearing trees. Weather and soil factors have an impact upon mast production. Extremes in temperature and rainfall affect yearly production within a particular stand, whereas, aspect, elevation, and soil productivity can cause production to vary from stand to stand. For example, one tree within a stand may be a heavy producer while an adjacent tree has no mast and one stand may have a good crop, whereas an adjacent stand produces little or no crop. Normally, trees on moist, fertile sites and trees with vigorous

expanding crowns produce large crops. Stand densities which allow full crown development favor mast crop production. The initial age for mast production of most tree species is 25 years. Total stand mast production is increased by favoring oaks and hickories in the overstory. Stability of yield results from maintaining a variety of hard mast producing species.

Currently, the forested areas on spillway lands lack a hard mast component. Timber stand improvements mentioned in Section 8.3.5 should be utilized to favor the establishment and growth of hard mast producing species and improve hard mast production on spillway lands.

8.3.7 Management of Openings

Any management plan to benefit wildlife should provide diversity of vegetation types and age classes. Nature provides this diversity through windstorms, catastrophic fires, disease epidemics, and insect infestations. Through proper vegetation management decisions can be made concerning the interspersion of vegetation types. Diversity is enhanced through creation and maintenance of openings in and near forested areas. Openings may be simply an earlier seral stage of surrounding vegetation or they may consist of special vegetation such as agricultural crops. Openings may provide food, breeding habitat, nesting cover, brooding habitat, or escape cover. Wildlife openings can also be used to concentrate populations in a given area in order to promote a more complete utilization of the resource or for public viewing purposes.

Wildlife openings can be used to provide habitat diversity as well as concentrating wildlife for viewing.

The creation and maintenance of openings is a very versatile and frequently used tool in wildlife management. The many techniques available require that a manager have a particular species or species group in mind when the creation of an opening is planned. Several management techniques, such as the planting of power line and pipeline rights-of-way, have good value to most forest dependent wildlife species. A program for managing these areas customarily involves fertilizing, seeding, and mowing or bushhogging. The particular mix of seed and cultural treatment is determined by the featured wildlife species or group. Portions of large pipeline and power line rights-of-way can be planted, mowed, bushhogged, and the remainder allowed to revert to brush and sapling stages. The margins of adjacent forested land should form a scalloped pattern to maximize edge effect. Large ROW can be managed to provide patches of vegetation in various stages of succession. The utilization of these types of areas as permanent openings results in less hard mast and fiber production loss because less land is taken out of forest production. The carrying

capacity can be raised by using these lands that are often neglected or left idle. Maintenance and management of pipeline and power line openings in the Bonnet Carré Spillway will benefit swamp rabbit, white-tailed deer, and various songbird species.

8.3.8 Aesthetic Buffers

The area outside of the lower guide levee between the Canadian National Railroad and the Kansas City Southern Railroad is primarily residential. Heavy equipment associated with sand and clay borrow operations use the main road adjacent to the lower guide levee on spillway land for ingress and egress to sand hauling areas. Heavy equipment travelling the main road creates a substantial amount of dust and noise that could adversely affect adjacent residents. Vegetative plantings between the lower guide levee and parallel north to south trending pipeline would abate dust and noise associated with sand and clay borrow operations on spillway lands (Plate 9). Tree species to be planted would include baldcypress, green ash, and nuttall and water oaks. The trees would be planted on a 10-foot x 10-foot or 12-foot x 12-foot spacing. Herbivore protectors should be placed around the seedlings or saplings to protect the young trees from herbivory.

8.4 WILDLIFE OBSERVATION/PHOTOGRAPHY

Wildlife observation and photography are primarily recreational activities of birders, hikers, photographers, and some campers, boaters, and other day users. A number of management activities and programs could be implemented at the spillway to provide for this type of wildlife use. Incidental wildlife use occurs primarily when visitors observe wildlife while participating in an other recreational activity (*e.g.,* fishing) on spillway lands. A major effort should be made to provide the public with the opportunity to have a quality wildlife recreation experience. Maintained wildlife areas would allow visitors to experience wildlife at their choice, and in an unhurried manner.

The primary method of attracting wildlife observation areas is through the installation of nesting boxes and the supplemental planting of shrubs and trees that provide cover and preferred foods (Photograph 8-3). Many of these planted

Photograph 8-3. Food plot on spillway lands.

species are very attractive and fit well into a landscape planting plan. Native species should be preferred over non-native species. Pipeline and spillway road ROWs can also be planted to support this type of wildlife use. The established artificial cavities and nest boxes is another method to attract animals for viewing purposes. Nest boxes and cavities can be located near public use areas or roads within the spillway where visitors experience the natural environment. The transportation of bulky boxes to remote locations, erection at the site, periodic cleaning and repair, monitoring of use, and record keeping take considerable expenditures of time and money. Thus, the decision to initiate a nest box program should be made after a definite biological need exists, and that the benefits to be gained justify the expenditure. Wood duck nesting boxes are currently maintained in suitable wood duck habitats on spillway lands; however, many of these are not observable for the viewing public.

Where possible, self-interpretive walking or nature trails with trail markers should be constructed to describe some of the natural features in the spillway. Spillway pamphlets, tree and wildflower lists, and other printed material should be developed to interpret spillway resources. A bird list for spillway lands has been developed and is available to the public. These type of items allow visitors to enjoy outdoor activities without being a part of a formal program.

8.5 PUBLIC HUNTING AND FISHING

Authority to permit hunting and fishing on water resource development projects and all lands owned in fee by the Federal Government is found in 36 CFR Section 327.8. This section states "hunting, fishing, and trapping are permitted in accordance with applicable Federal, state, and local laws except in areas designated by the MVN District Engineer." Special regulations promulgated by the District Engineer can be enforced by MVN employees under authority given by Title 36 of the U.S.C. of Federal Regulations. All regulations pertaining to seasons, bag and creel limits, licenses, *etc.*, are enforced by the LDWF. All hunters must have in their possessions a picture ID and valid state hunting license. Bonnet Carré Spillway park rangers only cite the public for Title 36 violations and report other game and fish law violations to appropriate state officials. Louisiana game and fish regulations will be utilized and administered where lands are licensed to LDWF for fish and wildlife management purposes. All State of Louisiana and Federal hunting laws apply on spillway lands.

St. Charles Parish ordinances regarding firearms in the Bonnet Carré Spillway are also applicable:

Hunters must possess a Bonnet Carré Spillway permit to hunt on spillway lands.

1. St. Charles Parish ordinances prohibit bodily possession of, or discharge of any rifle, pistol, or weapon discharing ball ammunition within the boundaries of the Bonnet Carré Spillway. Ball ammunition is defined as a single lead and/or metal projectile, including all rifles, muzzleloaders, shotgun slugs, BB guns, and pellet rifles.
2. Parish ordinances also prohibit the bodily possession of a loaded shotgun or the discharge of any shotgun within 800 feet of the Bonnet Carré Spillway levees from the Mississippi River to Lake Ponchartrain, U.S. 61 (also known as Airline Highway), and SC-12 (also known as Spillway Road).

Hunting and fishing is open to the public, with the exception of alligator, in accordance with the annual posted restrictions developed by MVN. Deer hunting (still hunting only) with shotgun and archery equipment, duck hunting, and rabbit and squirrel hunting is permitted on spillway lands. The no hunting area along the upper guide levees is designated as an archery only area for deer hunting (see Plate 9). The annual hunting restrictions include maps and special regulations. A copy of the draft hunting policy for the spillway is circulated to LDWF prior to the opening of each hunting season. A meeting with the biologists and enforcement personnel is held to work out program implementation prior to each hunting season. Prior to the opening of every hunting season, a news release is prepared in conjunction with the MVN's Public Affairs Office. The release outlines the details of the policy for the upcoming hunting season. Copies of the yearly hunting policy statement is posted at the Bonnet Carré Spillway Office and additional copies are distributed to local sporting goods stores.

Alligator hunting in the Bonnet Carré Spillway is regulated by a tagging program (Photograph 8-4). All persons hunting alligator must possess a State of Louisiana alligator tag in addition to a MVN alligator tag. In 2008, MVN issued 30 tags to alligator hunters. MVN will continue to regulate (30

Photograph 8-4. Alligator harvested on spillway lands.

alligators/annually) alligator hunting on spillway lands and annual takes will be monitored to determine the status of the alligator trapping program. MVN will adjust the number of tags issued based on these monitoring efforts.

SECTION 9.0
PLAN OF DEVELOPMENT AND DESIGN CRITERIA

9.0 PLAN OF DEVELOPMENT AND DESIGN CRITERIA

9.1 CONCEPTUAL PLAN

Implementation of Phase 1 of the 1998 Master Plan has improved visitor safety and reduced user conflicts.

The 1998 Master Plan proposed a three-phased implementation of recreation and NRM activities on spillway lands. The first phase recommended in the plan was the zoning of public uses and improvement of on-site management to enforce the controls and prohibitions required to address safety problems and resource use conflicts that existed on the spillway lands. This first phase of the spillway's NRM program has been accomplished. The zoning of recreational uses, in particular the designation of ATV areas, has directly addressed the most important user conflict issue. The addition of park rangers to the spillway staff and the subsequent enforcement of rules and regulations regarding public use have been effective in reducing many of the safety concerns at the spillway.

This first phase (Phase I) of the spillway's NRM program has markedly increased the recreational and natural resource values of the spillway. As described in Section 4, public visitation to the spillway has increased significantly over the last several years and customer comment surveys provide clear evidence of the visiting public's appreciation for increased safety and recreational opportunities at the spillway.

Implementation of Phase 2 of the spillway's NRM project has increased the recreational and natural resources values on spillway lands.

Natural resource values have also increased with the first phase of the spillway's NRM program. The removal of motorized recreation from most of the spillway's woodlands has reduced the harassment of wildlife; has reduced negative impacts to habitat; planting of supplemental food plots has increased wildlife populations; cooperation with LDWF has resulted in hunting restrictions that have increased visitor safety and resident wildlife populations; and stocking of clay borrow ponds with game fish in cooperation with USFWS has greatly improved fishing opportunities. The populations of white-tailed deer and other wildlife have increased leading to heightened interest and participation from hunters.

The second phase (Phase 2) recommended in the 1998 plan was the implementation of several priority developments, or actions, necessary to restore recreational opportunities which were restricted or prohibited with implementation of Phase 1. These Phase 2 items require non-Federal sponsor(s) to cost-share in the implementation and maintenance costs. The 1998 Master Plan recommended that Phases 1 and 2 should be effectuated simultaneously. In that way, there would be minimal disruption of

recreational activity. Included also in Phase 2 were various fish and wildlife enhancements.

Phase 2 of the 1998 Master Plan has been partially initiated with the successful partnership between MVN and South Louisiana Trailblazers.

To date, the Phase 2 actions presented in the 1998 Master Plan have been partially completed. The most successful Phase 2 action has been the establishment of the ATV use area in a challenge partnership agreement between MVN and the South Louisiana Trailblazers, a non-profit club of off-road enthusiasts. Under this agreement, the Trailblazers have taken responsibility for development and maintenance of trails and associated features within the designated areas. MVN responsibilities have included construction of a parking area and access road, provision of signs, and patrolling by spillway's park rangers.

Finally, the 1998 Master Plan envisioned a third phase (Phase 3) of development consisting of additional recreational developments requiring non-Federal sponsorship. These developments would be enhancements to the current mix of recreation opportunities. None of the anticipated developments have yet been implemented.

The concept adopted for this Master Plan update is to build upon the solid foundation of the spillway's decade-old NRM program. Much has been accomplished since approval of the 1998 Master Plan – a permanent park ranger staff and on-site project manager, visitor assistance and enforcement of rules, establishment of an ATV program in partnership with South Louisiana Trailblazers, improvements in access, and improved stewardship of the spillway's natural resources. This update of the Master Plan provides the opportunity to take stock of the program in order to provide direction for the future. The plan for future management and development of the spillway provided below consists of two parts – improved management of existing uses, and potential facilities/actions for development with non-Federal sponsors.

9.2 IMPROVED ON-SITE MANAGEMENT

The primary responsibility of the spillway's manager and staff is to maintain the spillway's flood control function. In addition, the spillway staff is responsible for stewardship of the spillway's natural resources and environmental values. Finally, the spillway staff is mandated to allow access for the public to enjoy the public lands and waters of the spillway and to provide surveillance and control of public activities in order to protect the spillway's resources and promote visitor safety.

In order to effectively perform these duties, several site improvements are needed (Plate 11). Among these are appropriate office and administrative facilities for the NRM staff, improvements to the spillway's road network, and installation of sanitary restroom facilities. These improvements are necessary for spillway O&M and, therefore, shall be accomplished as expeditiously as possible utilizing O&M funds for 100 percent of the costs.

9.2.1 Administrative Building for Natural Resources Management

With approval of the spillway Master Plan in 1998, MVN has enlarged the on-site spillway staff to augment the pre-existing maintenance personnel. The additional staff includes three permanent park ranger positions, with the potential for additional park rangers, seasonal staff, student workers, and volunteers. The increase in spillway staffing has not been matched with expanded office space – a problem demanding a solution.

The primary function of the spillway's administrative offices is to support the spillway's primary mission of flood control.

The spillway's administrative office was built prior to the 1998 Master Plan and is located adjacent to the downriver end of the control structure, which is the ideal site for its intended use (Plate 1). The building is intended to provide office space for the spillway manager and an administrative assistant, and a multi-purpose conference room for meetings, which also serves as temporary office space during flood events. The building's location and design were specifically developed to accomplish the spillway's primary mission of flood control; it was not designed to support a NRM program at the spillway.

As park ranger personnel were hired to implement the spillway's NRM program, office cubicles were created within the conference space, limiting its functionality. Eventually, these office cubicles were removed from the conference room and temporary office space was provided in the adjacent maintenance yard in a leased trailer. The current NRM office situation is not suitable for long-term success of the NRM program and significantly reduces the effectiveness of the park ranger personnel.

Additional office space is needed to support the enhanced Park Ranger staff.

The spillway needs to accommodate and advance the NRM program by constructing a new administrative building; one that will improve the effectiveness of the spillway's staff and will also better serve the visiting public. After thorough consideration of possible office locations, the optimal site for the NRM office would be along the lower guide levee just south (riverside) of its intersection with U.S. 61 (Plate 11). The exact location of the facility should consider:

- optimal views from the office location into the spillway recreation areas (primarily the St. Charles Parish recreation area and the ATV parking area);
- visibility and accessibility to the visiting public;
- safety of traffic turning off U.S. 61;
- the locations of utilities; and
- the potential for expansion of the office complex, as needed in the future.

The proposed NRM office should be designed to accommodate the visiting public.

The general plan for the new building should be similar in design to the current office building located adjacent to the control structure along the Mississippi River. This design consists of a two-story structure with the first level being utilitarian space placed on the protected side of the levee and the second floor being situated above the elevation of the levee crown, which offers views into the spillway. As with the existing office building, public access should be limited to the second level. Spillway personnel will be able to access the building on the first level from the secured parking and storage yard. Important in the layout of the building is the ability of the park ranger staff to view activity within the spillway from their offices (*i.e*., the offices need to be situated on the second floor).

Layout and design of a paved access road, public parking areas, spillway personnel access areas, and storage facilities are required. The levee crown may need to be widened to accommodate a two-lane access road. Three parking areas would be required; one inside a fenced enclosure on the berm for parking the park ranger vehicles and other Government vehicles for official visitors, another parking area on the berm for public visitors, and one at the elevation of the levee crown for the physically challenged. Public parking areas should be paved and striped, and have adequate room to park 20 vehicles, including three vehicles with boat trailers, three school buses for school group visits, and two spaces for the physically challenged. American Disability Act compliance is mandated for the public portions of the building and parking areas.

The building design should include an outdoor viewing area of approximately 1,500 square feet that will serve as outdoor classroom space during visits by tour groups and will provide space for all-weather information kiosks and interpretive exhibits. The interior of the building should only be open to the public when spillway staff member(s) are present. The public parking and outdoor viewing area will be open during public visitation hours at the spillway.

A separate garage/storage building and yard is needed for the boats, ATVs and materials/equipment required by the park ranger staff. Existing designs can be used although there must be a consistent appearance with the office building, so that it looks like a complex rather than a group of mismatched buildings. The architectural treatment should ensure that the style and materials are appropriate and complementary to the landscape and provide a measure of continuity with the existing office building and garage/shops complex.

A large multi-purpose/conference room should be provided for visits by the general public, official spillway visitors and other visitors. Besides being available as a conference room for MVN personnel, the room would serve as the spillway's visitor center. The visitor center would include a space for educational/interpretive programs, lectures, public meetings and other similar type uses. The room should have a capacity of approximately 60 persons (a large tour bus or several school buses) or 3,000 square feet (1,500 square feet for visitors and 1,500 square feet of floor space for exhibits) and allow for a variety of seating arrangements. The conference room should have two public entrances/exits; one from the reception area and one to an outdoor viewing area. The room should be equipped with a drop-down projection screen with a built-in projector tied to a small audio/visual (A/V) closet. The A/V closet with lockable pocket doors would be open yet out of the way. VHS and DVD equipment as well as a computer should be included to allow for presentation of PowerPoint and other computer-based presentations. The conference room should also be provided with a separate storage room for folding tables and chairs.

The proposed NRM office should provide educational and interpretive facilities.

The park ranger staff will be responsible for administration of the spillway visitor center, which will include appropriate exhibits on topics such as spillway purpose and history, natural resources, and visitor safety. The visitor center will also dispense information, publications and maps to assist visitors in understanding, locating and safely using spillway facilities and natural resources.

9.2.2 Project Road and Access Plan

Maintenance of a year-round road network within the spillway is a challenge. Most roadways are unimproved dirt roads although progress has been made in establishing improved gravel-topped roads in certain reaches. These roads are subject to periodic flooding from a variety of sources (*i.e.,* from high water on the Mississippi River, high tides from Lake Pontchartrain, and heavy rain events). In addition, the roadways experience heavy usage by

dump trucks hauling sand or clay, spillway vehicles, and the visiting public.

A reliable road network is essential for spillway maintenance, surveillance of spillway resources and control of public activities. Spillway maintenance staff must have access to all compartments of the spillway in order to perform vegetation management and respond to emergencies. The park ranger staff needs access to perform their surveillance responsibilities, to respond when visitors need assistance, and to perform their natural resources activities. Well-maintained roads support active patrolling by the spillway's park rangers, other spillway personnel and local law enforcement.

The spillway's roadways also provide access for sand haulers, and clay borrow operators, performing essential flood control mission work for the region. Public use of the spillway's roadways is incidental to the purpose of the roads but nonetheless provides valuable recreational benefits. While providing access for the public to enjoy the spillway's natural resources is consistent with USACE policy, it is also necessary to institute some controls over vehicular access into the spillway. Unrestricted access can result in damage to the spillway's natural resources and makes surveillance of prohibited activities very difficult.

Plate 11 presents a plan for improved roads throughout the spillway. The goal of this plan is to develop a relatively year-round network of roads through drainage improvements and topping with gravel or other hard surfacing materials. The primary purpose of the road plan is to support efficient O&M of the spillway. The plan identifies the roadways that will be open to the public and those roads that will be restricted to spillway personnel. At the terminus of public roads, the plan provides for turnarounds so that the public can turn their vehicles without difficulty. The turnarounds will be wide enough to allow space for the public to park so they can venture further into spillway lands on foot.

9.2.3 Improved Restrooms

USACE guidance on minimum facilities for public health and safety at USACE-operated projects is provided in ER 1165-2-400, appendix C. This guidance states that, "minimum facilities for public health and safety are defined as vault toilets unless a higher grade of facility is required by mandatory state or Federal standards, guardrails, barricades, and a turnaround at road ends existing at the time of construction or provided for project construction or maintenance."

At present, restroom facilities at the spillway consist of portable toilets at numerous sites around the spillway. These basic facilities do not meet the USACE's standards for minimum facilities and should be replaced with vault toilets at strategic locations of high visitor use and access. An example of vault toilets typical of USACE projects and other Federal facilities is illustrated in Photograph 9-1. Vault toilets are built off-site and shipped on-site on flat bed trucks in two pieces – the underground tank and the above ground building.

Photograph 9-1. One of several restroom facilities located at MVN Atchafalaya Basin Floodway System project, St. Martin Parish, Louisiana

The recommended locations of the vault toilets, in order of priority, are listed below (Plate 11):

- Parish Recreation Area at U.S 61 and lower guide levee - adjacent to area leased to St. Charles Parish with potential for upgrade with water and sewer line connections through partnering with non-Federal sponsor.
- ATV Area parking lot – need to resolve flooding problems during leakage events and spillway operations. Possible approach is removing building and sealing underground tank during expected floods. Alternatively, it may be possible to anchor the building so that it will not be subject to movement during floods.
- Jetty/Boat Launch at Lake End of lower guide levee - adjacent to areas leased to St. Charles Parish.
- Spillway Boat Launch at U.S. 61 and upper guide levee
- Along SC-12 near upper guide levee - need to resolve flooding problems during leakage events and spillway operations. Possible approach is removing building and sealing underground tank during expected floods.

Additional bathroom installations may be required as recreational usage increases.

9.2.4 Modifications to Existing Project Activities

In addition to the physical improvements listed above, several changes to existing spillway activities are needed to address the conservation of the spillway's natural resources and fulfill other mission-essential responsibilities. These changes will help the spillway achieve its environmental stewardship responsibilities and ensure consistency with USACE policy and guidance. Therefore, these actions will be implemented without local sponsorship and can be managed by the spillway staff with support from the district office when required.

A real estate leasing program will allow MVN more control over the sand hauling program.

(a) Sand Hauling Permit Program. The informal annual permitting program that has been in place for several decades needs to be replaced with a real estate leasing program that awards sand excavation and hauling privileges through an open and competitive process. The sediment (*i.e.*, sand and silt) that is deposited during flooding events in the spillway are a valuable public resource that has significant commercial value. Because these deposits would reduce floodway capacity over time, these deposits are excess to the spillway and must be removed. USACE guidance provides for a competitive leasing program for the disposal of excess resources on spillway lands that have commercial value.

The initial area identified for enactment of the leasing program is the spillway forebay, the area between the Mississippi River and the control structure (Plate 11). This area was selected because it must be kept clear of flood deposits to ensure readiness of the spillway. Additionally, this area is subject to annual rises in the river that serve to provide a constant restocking of sediments. Once established in the forebay, the program should be expanded, as necessary, to areas within the floodway where sediments have accumulated.

The leasing program must employ reasonable lease conditions that are designed to set high standards for the sand mining activities and define acceptable site conditions at the conclusion of excavation in a permit area. In the past, only minimal standards were imposed and mined areas were often left in poor condition, characterized by irregular and discontinuous borrow pits that had minimal fish and wildlife values and were often inaccessible to spillway maintenance staff and the public. Fish and wildlife values should be maintained and improved through conscious efforts to provide variety along the edges of these water bodies and to connect smaller pits to ensure hydrological flow. Larger pits can remain separate from adjacent waters.

Ideally, any unused or unsuitable material left after pit excavation should be placed back into the pit and shaped so that a 1:5 or 1:10 slope can be achieved at least on one side of the pit. All sides should slope to allow the safe operation of mowing equipment. Abrupt drop-offs on the edge of pits should be prohibited to reduce drowning hazard to the public. Trees and vegetative debris (brush piles) should also be placed back into pits to provide structure or cover for aquatic organisms. Vegetative plantings can be undertaken along the banklines of pits to enhance both aesthetic, and fish and wildlife values.

A landscape plan should be developed to enhance the significant viewpoints of the spillway.

(b) Vegetation Management Activities. One of the primary responsibilities of the spillway's maintenance personnel is to manage the vegetation growth on spillway lands to ensure the spillway's readiness for passing flood flows. This is accomplished by maintaining a major portion of the floodway as open areas free of mature woody vegetation. The lower and upper guide levees must also be kept free of woody vegetation to ensure their structural integrity. Of course, this requires extensive mowing and bush-hogging operations.

Prior to the 1998 Master Plan, the schedule for mowing and bush-hogging the clear areas of the spillway was driven almost exclusively by spillway maintenance concerns. Over the last several years, some of the mowing operations have been curtailed or rescheduled to minimize conflicts with the spillway's natural resources. While this is a good start, an overall vegetation management plan should be developed to balance the various needs and potential benefits of changes in traditional practices.

The clearing of range lines through wooded areas of the spillway are necessary for the proper monitoring of floodwaters during spillway openings. These range lines stretch perpendicularly from the upper to lower guide levees. As presently maintained, these lines provide some value to wildlife by providing diversity of plant species and openings in the forest canopy. These values, however, can be enhanced by increasing scalloping of the edge between forest and clearing. Selective clearing of vegetation can also enhance the natural resource values of these openings.

Natural resource benefits can also be derived from similar efforts along pipeline and powerline corridors. These changes in maintenance can be implemented through coordination with the facility owners and subsequent changes in the outgrant agreements with little or no cost to the outgrantees.

Clay borrow contracts should be written to ensure fisheries habitat is provided.

(c) Clay Borrow Program. As with the sand hauling program, the fisheries value of borrow pits created by clay borrow activity should be enhanced by increasing the diversity of the land/water interface as well as providing structure for aquatic organisms. These borrow pits should also be designed to ensure hydrological connection to adjoining water bodies (especially smaller pits) to avoid the creation of stagnant, lifeless pits. The changes can be effectuated through new borrow area standards in MVN construction contracts that identify Bonnet Carré as the source of clay material. With the increase in clay borrow activity at the spillway in the aftermath of Hurricane Katrina, the spillway staff must remain involved in planning for borrow pits at the spillway and closely monitor borrow operations to ensure adherence to contract requirements.

(d) Interpretive Services and Outreach Program (ISOP). The spillway's ISOP has been effective in educating spillway visitors on the rules and regulations in force at the spillway. Efforts in the areas of water safety education, telling the spillway story, and environmental education should be stepped up in order for the spillway to fulfill the USACE's mission.

An interpretive plan was developed and will be implemented in a phased approach as part of the Master Plan update.

Included in Appendix H is the spillway's interpretive plan for the next 5 years. The interpretive plan provides detailed analysis of the spillway's interpretive resources and identifies and prioritizes methods and approaches for appropriate interpretation.

Of particular importance is to increase the spillway's role in environmental education and outreach and to increase public awareness of the spillway's natural resources and recreation values. Much can be accomplished by full implementation of USACE's ISOP program. In partnership with other Governmental agencies, non-profits and individuals, the spillway is well-positioned to increase public awareness and appreciation for a host of environmental issues in the region.

(e) Landscape Improvements. Aesthetics at the spillway have benefitted greatly from implementation of the NRM program during the last 10 years. Dumping of trash has been greatly reduced and responses to eyesores in the spillway's landscape have been a priority with the spillway staff. There are, however, opportunities for improving the landscape qualities of the various spillway viewpoints. Such improvements would increase public enjoyment of the spillway and would also reflect well on MVN as stewards of the public lands and waters at the spillway.

In order to review the aesthetics of the spillway in a comprehensive manner and develop priorities for implementation, a spillway landscape improvement plan should be developed. This plan would identify the significant viewpoints, the various landscape compartments, the opportunities for improvement, and develop cost-effective actions.

(f) Limited Expansion of ATV Use. A critical first step in the initial implementation of the NRM program after completion of the 1998 Master Plan was to restrict off-road vehicle activity to designated areas. This was a significant challenge after decades of no restrictions and took several years to accomplish. This accomplishment has been critical to the success of most other spillway initiatives.

Limited expansion of ATV use would enhance the recreational use and opportunities for persons with disabilities.

The main exception to this restriction of off-road vehicle activity has been the allowance of limited ATV use by dog trainers under special use permits. In the aftermath of the 2008 spillway operation, the spillway staff provided a limited opportunity for ATV use for access to crawfishing areas. This was essentially an experiment to see if ATV use for fishing or hunting access could be allowed and managed without disrupting the progress that has been made in controlling off-road vehicle use at the spillway. The experiment was successful and opens the door to further limited ATV use outside of the designated ATV areas.

The limited allowance of ATV use outside the designated riding areas should be continued. There is a clear distinction between off-road vehicle recreation where the riding itself is the recreational activity and the use of ATVs to provide access for other activities, like hunting and fishing. This is especially true for persons with disabilities for whom ATVs provide access. This limited expansion of ATV use will have to be carefully managed to ensure it does not lead to abuse and undermine the successful ATV riding area program. Management should include the use of special use permits to ensure appropriate control, limitations on speed and access areas, and the insistence on safety equipment for riders.

(g) Shoreline Management and Stabilization. In the years since purchase of spillway lands in 1929, there has been significant erosion along the shoreline with Lake Pontchartrain. The result has been loss of spillway lands and damage to the wooded wetlands bordering the lake. Over the years, efforts have been made to arrest the erosion with the placement of construction debris and riprap in areas accessible from the upper and lower guide levees.

In fact, the lakefront area adjacent to the lower guide levee has essentially been reclaimed from the lake by years of debris disposal along the shoreline by St. Charles Parish Government forces. This disposal activity on spillway lands has ceased and the parish has added a fishing jetty to the lakefront area and private interests have developed a nature education area just east of spillway lands along the lakefront.

A shoreline management plan is needed to address the problems with erosion along the spillway's lakefront. The plan should evaluate possible solutions, identify funding options, and recommend an overall approach.

(h) Bonnet Carré Freshwater Diversion Project. The construction of this project would directly affect a narrow corridor of spillway lands and waters adjacent to the upper guide levee. Most of the project is situated within the fish and wildlife/vegetative management classification. The purpose of the freshwater diversion project is environmental enhancement in the adjoining Lake Pontchartrain and Mississippi Sound ecosystems. The project has been designed to reduce adverse environmental effects in the spillway. However, more can be done to minimize impacts to the spillway's natural resources and, in fact, actually enhance those values. Additionally, several actions should be implemented to replace impacted recreation access and/or provide safe access to improved recreation opportunities. Six modifications to this project are suggested here.

Modifications to the Bonnet Carré Freshwater Diversion Project would enhance natural resources such as wetlands.

1. Project design should be altered to significantly reduce the clearing of woodlands between the diversion structure and U.S. 61. Although some loss of forested land is required for the channel ROW, the planned disposal areas should be relocated to the adjoining cleared areas within the floodway. This change would save approximately 230 acres of forest lands on the spillway. A similar project design modification for the wooded areas between U.S. 61 and the lake has already preserved 319 acres of forested spillway lands.

2. A second Diversion project modification which would also have significant natural resource value would be to route a portion of the diverted freshwater into wooded wetlands north of U.S. 61. The immediately adjoining wooded areas on either side of the diversion channel would be the best candidates for this action. The effects would be amplified if the freshwater could also be diverted to the wooded areas adjacent to the Lower Borrow Canal. This change would

benefit water quality goals by providing additional filtration of the diverted river waters before they enter Lake Pontchartrain. The wooded areas receiving the waters would also benefit due to improved circulation and deposition of nutrients.

3. Temporary flooding of wetlands from diverted river waters by increasing retention time within the spillway's wetlands can also be compatible with the natural resource objectives of this Master Plan update. Impoundments should be concentrated in the existing forested wetlands and marshes near Lake Pontchartrain and could have significant benefits for migratory waterfowl. This increased return of flood waters, however, should be planned and implemented carefully to ensure minimal damage to the existing vegetation and fish and wildlife populations of the spillway. Excessive depths or durations of ponding could negatively impact existing bottomland forests. The overall planning objective for flow distribution and impoundments should be to maximize benefits to the publicly owned natural resources in the floodway and divert any excess waters to adjoining wetlands.

Freshwater re-routed from the freshwater diversion project would benefit the spillway's wetlands.

4. Another modification with fish and wildlife benefits would be to provide edge diversity along the diversion channel. Currently, the Upper Borrow Canal has irregular banklines which provide a diversity of habitat settings. As presently designed, the project will remove these irregular banklines and replace them with a straight and regular land/water interface. This impact can be avoided by purposely making the banklines irregular to provide a diversity of water depths and bankline configurations.

5. A fourth modification or refinement to the project design should be to design the disposal haul roads north of U.S. Highway 61 to minimize impacts to wooded areas and maximize recreational access after completion of the project. In order to minimize damage to forested areas, the haul roads should be carefully located and designed. Haul roads which could be later utilized for recreational access to the interior diversion canal bankline (especially in the area closer to U.S. 61), should be left in place after construction is complete. Other haul roads corridors should be returned to their pre-construction condition and allowed to naturally re-vegetate or supplemental planting could be undertaken to enhance restoration of the disturbed areas.

7. A final suggested modification is to provide safe fishing access to the tailwater area of the proposed diversion structure. As experience with the Caernarvon Freshwater Diversion Structure demonstrates, the public will be drawn to this area to fish regardless of attempts (*i.e.,* fencing and signs, *etc.*) to keep them away. The best approach is to recognize this situation not as a problem but rather as an opportunity. Minimal facilities for public health and safety should be integrated into the project design. These features may include, but are not limited to, such items as guardrails, stair steps, handrails, life rings, life lines, and hard-surfaced walkways. Sustained public use may later require provisions for a public restroom and potable water supply. The provision of safe access for fishing in the tailwater area of the structure is consistent with the low density recreation classification of this portion of spillway lands.

(i) Potential Railroad Crossing Consolidation. The three railroad trestles crossing the spillway pre-date the purchase of the spillway lands in 1929. Two of the bridges are open deck timber trestles that have a maximum speed limit of 10 mph. The Canadian National Railroad crossing parallel to I-10 along the lakeshore is a timber trestle with some concrete and steel piers and has a speed limit of 40 mph.

An existing proposal would consolidated railroad crossings on spillway lands.

Since 1993, the possibility of consolidating the three crossings into one new, modern steel or concrete bridge on the Kansas City Southern alignment has been under study. This proposal has recently garnered renewed attention during planning and design for a proposed Baton Rouge – New Orleans Intercity Rail project. Discussions with the project manager have begun and the spillway staff should start planning for the eventuality of a new railroad bridge and abandonment/demolition of the three existing trestles. The impacts on the spillway's operation, aesthetic resources, natural resources and recreational activities will have to be evaluated. In addition to impacts; however, such a project will have opportunities that may enhance these concerns. Continued engagement with the railroad design team is recommended.

9.3 FACILITIES / ACTIONS PROPOSED FOR DEVELOPMENT

In addition to actions that should be implemented by MVN with existing spillway funding, there are a number of potential facilities and actions that can be undertaken in partnership with non-Federal sponsors. There are several avenues available for non-Federal

entities to partner with MVN. Many of these program opportunities are described in Engineer Regulation and Pamphlet 1130-2-500. These programs include:

- Cooperating Associations Program – non-profit organizations established to assist USACE projects.
- USACE Volunteer Program – a way for individuals or interest groups to partner with USACE projects.
- Contributions Program – allows contribution of funds or items to projects.
- Challenge Cost-sharing Program – provides a flexible mechanism for sharing costs of implementation and maintenance of improvements that provide environmental and/or recreational benefits to USACE projects.

In addition to these partnering programs, also available is the Recreation Lease program whereby non-Federal entities can lease a portion of spillway lands for the development of recreation facilities to be built, maintained and operated without USACE financial support.

9.3.1 Establishment of 4-WD Truck Area

The 1998 Master Plan provided two designated locations for ATV, motorcycle and go-kart use and a separate, adjoining 4-WD use area. These areas were designed to provide sufficient areas for these off-road activities without impinging on other user activities. Specific designation of spillway lands for the operation of off-road vehicles is required by EO and USACE regulations; all other spillway lands will be closed to the use of off-road vehicles.

After completion of the 1998 Master Plan, ATV and motorcycle enthusiasts formed the South Louisiana Trailblazers in order to partner with MVN in the development of two designated ATV use areas. The two parties entered into a Challenge Partnership agreement and the ATV areas were developed and opened for use. This partnership has been successful. Similar efforts to establish a partnering arrangement between MVN and 4-WD truck enthusiasts were, unfortunately, not successful. As a result, 4-WD truck recreation was prohibited at the spillway.

During preparation of this Master Plan update, meetings with 4-WD enthusiasts resulted in the review of options for establishment of a 4-WD truck recreation area. A proposed 4-WD truck area has been designated (Plate 12) as well as a potential implementation approach.

There are minimal implementation requirements for the proposed 4-WD truck area. These would include the marking of area boundaries with paint and signs, minor grading and bushhogging, and installation of entrance signs and bulletin boards. The suggested approach would be to open the area to 4-WD truck recreation initially through the USACE's special event permit program, wherein the 4-WD enthusiasts would be required to provide insurance, site security and control, and to restore the area to previous conditions. The special event permit would be limited to several days or a weekend. If these initial experiments in 4-WD truck recreation are successful, then both parties would pursue longer term partnering agreements similar to the Challenge Cost-share agreement with the South Louisiana Trailblazers.

A 4-WD truck area will be established on a trial basis through special use permits.

9.3.2 Establishment of Horseback Riding Area

Since completion of the 1998 Master Plan, there has been an increase in horseback riding activity in the spillway. Currently, there are no specially designated use areas or prohibitions on this activity. Some of this activity occurs in small groups, which has posed little problems or concerns. However, large group riding events typically are held at the St. Charles Parish recreation area operated under a recreation lease from MVN, and these events have been problematic at times.

A horseback riding area will reduce conflicts between user groups.

Because the parish recreation area remains open to other users during the horseback riding event, there can be public safety problems with the uncontrolled mix of pedestrians and horses. In order to address this concern, a proposed horse-back riding area has been designated along the upper guide levee between the structure and the first railroad trestle (Plate 12). Similar to the proposed 4-WD truck area, a phased implementation is suggested.

The suggested approach would be to open the designated riding area initially through the USACE's special event permit program, wherein the equestrian clubs would be required to provide insurance, site security and control, and to restore the area to previous conditions. The special event permit would be limited to several days or a weekend. If these events are successful, then both parties could pursue longer term partnering agreements similar to the Challenge Cost-share agreement with the South Louisiana Trailblazers.

There are minimal implementation requirements for the proposed equestrian area. These would include the marking of area boundaries with paint and signs, minor grading and bushhogging,

installation of entrance signs and bulletin boards, and provision of a parking area.

9.3.3 Provide a Safe Channel into Lake Pontchartrain

The I-10 boat launch is utilized primarily by boaters accessing Lake Pontchartrain. These boaters utilize the I-10 access channel located between the east- and west-bound spans of I-10 and then follow a poorly marked and unmaintained channel into the lake (Plate 12). This channel contains numerous underwater obstructions as evidenced by the occurrence of several boating accidents in the area. The clearing, snagging, and proper marking of this channel would remove the safety hazards and, thereby provide a safe channel into Lake Pontchartrain.

9.3.4 Nature Trails along Lower Guide Levee

This proposal consists of various nature trails in the wooded corridor between the lower guide levee and the Lower Borrow Canal (Plate 12). These trails could utilize the existing range line cuttings for initial entry into the woods. Interpretive signs could be posted to identify plant species and different environments.

9.3.5 Bicycle Trail along SC-12

This proposal consists of constructing a bike trail parallel to SC-12. The proposed bike trail would provide a connection of River Road through the spillway. Construction of the bike trail is authorized under Intermodal Surface Transportation Act.

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SECTION 10.0
SPECIAL PROBLEMS AND CONSTRAINTS

10.0 SPECIAL PROBLEMS AND CONSTRAINTS

10.1 PUBLIC HEALTH AND SAFETY CONCERNS

In addition to the safety issues discussed earlier in the Master Plan, several public health and safety concerns deserve attention during implementation of the Bonnet Carré Spillway OMP.

10.1.1 Water Quality Concerns

Water quality standards are defined and based on the designated uses of the specific water body. The designated uses for Bonnet Carré Spillway include primary contact recreation (PCR), secondary contact recreation (SCR) and FWP (LDEQ 2008a). Water quality monitoring is necessary to identify if a stream meets the criteria of the designated uses and to identify potential water quality problems. Analysis of water quality data illustrates that the Bonnet Carré Spillway is not meeting LDEQ numerical criteria for FWP and PCR designated uses. Table 10-1 presents historical water quality data collected at LDEQ monitoring station number 1048 in the Bonnet Carré Spillway.

Table 10-1. LDEQ Water Quality Data at Bonnet Carré Spillway

Water Quality Data at Water Quality Station 1048 (2001 to 2007)						
Constituent	**Average**	**Median**	**Maximum**	**Minimum**	**Unit**	**LDEQ Criteria (1)**
Dissolved Oxygen (DO)	7.16	6.90	13.52	4.13	mg/L	5.00
Turbidity	13.34	9.00	70.00	4.30	NTU	50.00
Fecal Coliform	106.71	30.00	500.00	2.00	Col/100 mL	400 PCR 2000 SCR
Nitrite-Nitrate	0.26	0.05	1.48	0.05	mg/L	NA
Total Dissolved Solids	3,526.00	3,480.00	7,800.00	256.00	mg/L	500.00
Total Suspended Solids	14.76	10.80	54.00	4.50	mg/L	NA
Phosphorus	0.57	0.12	11.00	0.05	mg/L	NA
Kjeldahl Nitrogen	0.70	0.64	1.24	0.33	mg/L	NA
Total Organic Carbon	8.57	8.58	9.55	6.20	mg/L	NA
Sulfate	269.52	266.00	633.50	1.30	mg/L	75.00
Chloride	1,941.25	2,027.50	4,604.00	47.00	mg/L	250.00
Water Temperature	23.20	25.17	32.22	8.79	Centigrade	30.00
pH	7.6	7.6	8.4	6.9	SU	6.0-8.5

Source: LDEQ 2008a

1. Numerical criteria for water pollutants are found in LAC 33: IX. 1123.

NA = Not applicable, LDEQ has not developed specific numerical criteria for these constituents.

The Bonnet Carré Spillway is not meeting criteria of the FWP standards for sulfates, chloride and total dissolved solids. LDEQ (2008) suspects that the loss of wetlands, modification of habitat, hydro-modification of stream systems and the regulation of the Bonnet Carré Spillway hydro-structure are causing the levels of dissolved solids, sulfates, and chlorides to reach concentrations that impair the surface waters for FWP. In addition, the 041101 subwatershed is not meeting PCR standards. The PCR non-attainment status is not the result of elevated coliform levels; however, it is the result of high water temperatures (LDEQ 2008a). As mentioned earlier in Section 3.0, concentrations of coliforms have decreased over the years.

The other spillway waterbody of concern from a water quality standpoint is the lower guide levee drainage canal situated outside the floodway (also known as Engineers Canal). This drainage canal receives effluent from the Norco Sewerage Treatment Plant, discharge of an undetermined nature from the Big Three Industries facility adjacent to the sewerage plant, urban runoff from the Norco area, and is hydrologically connected to heavily polluted Bayou Trepagnier. The recreation use survey performed during the preparation of the previous Master Plan documented bank fishing in this canal as well as boat launching activity.

A comprehensive program of water quality testing of spillway waterways should be implemented as part of the Bonnet Carré Spillway OMP operational plan. The program should focus on public health parameters but also provide information of value in managing the spillway's natural resources. Corrective actions and/or use restrictions should be employed to address any identified problems.

10.1.2 Potential HTRW Concerns

No hazardous, toxic or radioactive wastes (HTRW) or materials problems are presently known to exist on spillway lands or waters. However, several potential concerns have been identified during preparation of this Master Plan update. These concerns center on previous oil and gas exploration activity on spillway lands, and the heavy concentration of petrochemical plants surrounding the spillway.

A total of 23 oil and gas exploration wells have been drilled within the spillway over the last 50 years, including in near-shore waters of Lake Ponchartrain. Five of these were producing gas wells located in the "Norco Oil and Gas Field" within the spillway. Numerous other wells were drilled in areas surrounding the

spillway. No active wells or exploration leases currently exist on the spillway lands. A listing of all wells previously drilled on spillway lands is found in Table 10-2. The locations of the wells can be found in Plate 13. The immediate areas around previous oil and gas wells have the potential to contain HTRW remaining from drilling or producing operations in the soil.

Of more concern is the potential for HTRW problems related to the intensive concentration of petrochemical manufacturing facilities in the surrounding region. There is also the potential for accidental spills along highway, railroad, or pipeline crossings of the floodway due to transportation of HTRW and petroleum products within the industrial corridor (see Plate 4). Table 10-2 contains a listing of all HTRW sites located within 1 mile of the spillway, with potential HTRW hazards identified, as well as recorded releases of HTRW from each site (Environmental Data Resources, Inc. 2008). The Federal and state database records listing for each site is included in Table 10-3 and the definitions of the database acronyms can be found in Appendix J.

The risk of HTRW contamination of spillway lands is increased during an opening.

During the opening of the spillway structure in response to flood events on the Mississippi River, there is a much greater risk of HTRW contamination of spillway lands and waters in the event of a HTRW spill from an adjacent facility, particularly if the facility is located upstream or across the river from the spillway. In that event, a HTRW release into the river would be siphoned into the spillway through the control structure, resulting in potential contamination of the entire floodway. Due to the relatively high flow rates through the control structure during an opening event, control of a HTRW release into the river would not be feasible, and water monitoring should be conducted at the control structure during the event to determine the quantity and content of HTRW that enters the floodway. Sampling of lands and waters should be conducted following control structure closure in the event of a HTRW release when the control structure is open.

Due to the remote and undeveloped nature of some areas of the spillway and the presence of numerous improved and unimproved roads for access, the possibility of intentional dumping of HTRW on spillway lands is a potential threat. Illicit dumping of household and commercial garbage is a major management problem in the spillway, indicating that illegal dumping of more dangerous wastes could also be a problem. No evidence of HTRW spills or dumping was discovered during preparation of this Master Plan.

Table 10-2. Oil and Gas Wells Inventory Within the Bonnet Carré Spillway

Well No.	API Number	Operator	Well Name	Well Depth (feet)	Completion Date (mm/dd/yy)	Well Type	Plug & Abandon Date (mm/dd/yy)
1W	1708920128	Shenandoah	#1 USA	10,189	11-23-70	Dry	11-23-70
2W	1708920022	An Son	#1 USA	9,270	3-3-67	Dry	3-3-67
3W	1708900005	California Company	#2 USA	10,301	4-5-53	Gas	11-8-67
4W	1708900007	California Company	#3 USA	9,200	6-10-53	Gas	7-2-67
5W	1708900006	California Company	#4 USA	10,300	9-1-54	Dry	9-1-54
6W	1708900003	California Company	#1 USA	11,600	11-2-52	Gas	11-8-67
7W	1708920255	MACPET-STUARCO	#1 8400RA SUA; USA	10,330	4-1-75	Gas	Not Found
8W	1708920310	McAlester Fuel	#2 USA ES 12633	10,650	8-26-75	Dry	8-26-75
9W	1708920298	Mullins & Pritchard	#1 USA ES 7440	10,600	12-1-76	Dry	12-1-76
10W	1708920293	Wall & Associates	#1 USA ES 9097	10,126	11-18-74	Dry	11-18-74
11W	1708900011	California Company	#1 BC Spillway Fed Unit	10,435	11-14-63	Dry	11-14-63
12W	1708920161	MCPET	#1 USA	10,209	11-29-71	Dry	11-29-71
13W	1708900675	Coastal States	#1 USA	10,817	1-13-65	Gas	2-4-70
14W	1708920156	MACPET-STUARCO	#1 USA ES 7440	9,800	9-6-71	Dry	9-6-71
15W	1708920290	Wall & Associates	#1 USA ES 12635	10,100	11-3-74	Dry	11-3-74
16W	1708920254	MACPET-STUARCO	#1 USA ES 9099	11,200	4-15-74	Dry	4-15-74
17W	1708920448	James A. Whitson	#1 USA	10,804	12-28-81	Dry	12-28-81
18W	1708920486	Entex	#1 USA ES 23873	17,450	1-8-85	Dry	1-8-85
19W	1708900001	California Company	#1 USA	11,002	10-11-59	Dry	10-11-59
20W	1708900663	California Company	#1 RA USA Monteleone	10,500	4-5-65	Unknown	Not Found
21W	1708900664	Amarillo Oil	#1 SL 3948	10,030	4-30-64	Dry	4-30-64
22W	1708920333	Edwin L. Cox	#1 SL 6922	10,300	10-24-76	Dry	10-24-76
23W	1708900700	Coastal States	#2 USA	10,825	6-24-65	Dry	6-25-65

Table 10-3. Potential Sources of Hazardous, Toxic and Radioactive Waste in Proximity to the Bonnet Carré Spillway

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
1H	Shell Oil Refinery Shell Chemicals Motiva Enterprises Hexion Specialty Chemicals, Inc. Resolution Norco Plant Union Carbide Corporation Cypress Propylene Plant	16122 River Road, Norco	SPILLS ERNS HMIRS FINDS RCRA-LQG TRIS NPDES SWF/LF ICIS FTTS	Crude petroleum Refined petroleum products Hazardous chemicals Ignitable Hazardous Wastes Corrosive Hazardous Wastes Reactive Hazardous Wastes Metals Spent halogenated solvents Spent non-halogenated solvents Hydrocarbon process wastes Benzenes Ketones	Toulene Nitrogen Oxide Allyl Chloride Nitrogen Dioxide Corrosive Liquid Amines Pump Gearbox Oil Alkychloride Propylene Sodium Hydroxide Butylene Glycol Methyl Ethyl Ketone Butyl Alcohol Ethylene Dichloride Chlorine Epichlorohydrin 1,2-Dichloropropane 1,3-Dichloropropene 2 percent Epichlor Hydrochloric Acid Beta Chloro Proylene Ethylene Chlorohydrin Hydrogen Sulfide VOCs Sulfuric Acid Betachloropropene Unknown Acid Monochlorobenzene

Table 10-3, continued

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
2H	Union Carbide Corporation – Taft Site	355 LA Highway 3142	CERC-NFRAP CORRACTS RCRA-TSDF RCRA-LQG ERNS PADS FINDS SWF/LF TRIS UST NPDES FTTS HIST FTTS ICIS	Batteries Pesticides Herbicides Ignitable Hazardous Wastes Corrosive Hazardous Wastes Reactive Hazardous Wastes Metals Chlorinated Hydrocarbons Hazardous chemicals Refined petroleum products Spent halogenated solvents Spent non-halogenated solvents Electroplating treatment sludges	Ethylene Oxide Chlorine Ammonia Nitrogen Naptha
3H	Bayou Steel	138 Highway 3217	CERCLIS RCRA-LQG ERNS FINDS SWF/LF TRIS UST NPDES ICIS SWRCY	Batteries Pesticides Gasoline Metals Furnace sludge	Diesel
4H	RTL Corporation Landfill	573 Good Hope Street, Norco	CERC-NFRAP RCRA-CESQG FINDS SHWS	Ignitable Hazardous Wastes Tetrachloroethylene	None Reported

Table 10-3, continued

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
5H	Portacan of New Orleans CC Sanitation Company, Inc.	1241 River Road, St. Rose	RCRA-LQG UST FINDS	Ignitable Hazardous Wastes Spent halogenated solvents	None Reported
6H	Bonura Martin	1230 River Road, St. Rose	UST ICIS FINDS	Gasoline	None Reported
7H	Schexnayder Marine Service	930 Airline Highway	RCRA-SQG FINDS	Ignitable Hazardous Wastes Lead Spent halogenated solvents Spent Non-halogenated solvents	None Reported
8H	Acadian Head and Block	1539 E. Airline Highway	RCRA-CESQG	Minor hazardous wastes	None Reported
9H	United Coatings, Inc.	1450 E. Airline Highway	RCRA-CESQG	Minor hazardous wastes	None Reported
10H	Head and Engquist Equipment Co.	125 Airline Highway	RCRA-CESQG	Minor hazardous wastes	None Reported
11H	Cembell Industries, Inc.	740 CCC Road	RCRA-CESQG	Minor hazardous wastes	None Reported
12H	Entergy Louisiana, LLC Waterford 1 & 2 Generating Plant (A) Little Gypsy Generating Plant (B)	17705 - 17420 River Road	RCRA-CESQG ERNS FINDS RADINFO UST	Ignitable Hazardous Wastes Corrosive Hazardous Wastes Reactive Hazardous Wastes Metals Benzene 1,4-Dichlorobenzene Methyl Ethyl Ketone Tetrachloroethylene Trichloroethylene Halogenated solvents Radioactive Materials (A)	No. 6 Fuel Oil

Table 10-3, continued

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
13H	Advanced Collision Services, Inc.	856 Apple Street, Norco	RCRA-CESQG FINDS	Vinyl Chloride Spent Non-halogenated solvents	None Reported
14H	Guillory's Body Shop	711 Good Hope Street, Norco	RCRA-CESQG FINDS	Ignitable Hazardous Wastes Chromium Lead Benzene Chloroform Methyl Ethyl Ketone Spent Non-halogenated solvents	None Reported
15H	Shirt Shack	720 Good Hope Street, Norco	RCRA-CESQG FINDS	Lead Benzene Trichloroethylene Tetrachloroethylene	None Reported
16H	Mississippi River Equipment Co.	520 Good Hope Street, Norco	RCRA-CESQG FINDS	Ignitable Hazardous Wastes Tetrachloroethylene	None Reported
17H	Gecko Graphics Speed and Spray Shop	525 Apple Street, Norco	RCRA-CESQG FINDS UST SPILLS	Gasoline Cadmium Lead Benzene Tetrachloroethylene Trichloroethylene	Gasoline
18H	USACE, Bonnet Carré	16302 River Road, Norco	RCRA-CESQG UST FINDS DOD DEBRIS	Ignitable Hazardous Wastes Corrosive Hazardous Wastes Lead	None Reported
19H	Natural Gas Company of Louisiana	101 Apple Street, Norco	RCRA-CESQG FINDS	Ignitable Hazardous Wastes	None Reported
20H	Norco Construction Company, Inc.	820 First Street, Norco	RCRA-CESQG	Ignitable Hazardous Wastes	None Reported

Table 10-3, continued

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
21H	Precision Automotive	402 River Road, Luling	RCRA-CESQG FINDS	Ignitable Hazardous Wastes Benzene Trichloroethylene	None Reported
22H	John Crane, Inc.	16189 River Road	RCRA-CESQG FINDS	Ignitable Hazardous Wastes	None Reported
23H	First Recovery GATX Terminals Dixie Carriers	1601 River Road, Goodhope	RCRA-NonGen ERNS	Petroleum products	Gasoline Light Crude Oil No. 6 Fuel Oil
24H	Union Oil Company – Good Hope Field	Highway 61, 1 mile north of Good Hope	RCRA-NonGen FINDS	Ignitable Hazardous Wastes Corrosive Hazardous Wastes Reactive Hazardous Wastes Methanol	None Reported
25H	A3M Vacuum Service, Inc.	1625 Airline Highway	RCRA-NonGen FINDS	Biological wastes Minor hazardous wastes Metals	None Reported
26H	NEXEN Chemicals USA Occidental Chemical Corp.	266 Highway 3142	RCRA-NonGen RCRA-LQG FINDS PADS TRIS ICIS TSCA ERNS SPILLS CERCLIS RCRA-INFO PCS SSTS UST SWF/LF HIST LUST	Ignitable Hazardous Wastes Corrosive Hazardous Wastes Chromium	Sodium Hydroxide Chlorine Caustic soda

Table 10-3, continued

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
27H	CGB Marine Services	665 Highway 628, Laplace	ERNS	Petroleum products	Diesel Oil Diesel and Motor Oil Fuel Oil Unknown Oil / 3-20-02
28H	CII Carbon Norco Coke Plant	801 Prospect Avenue, Norco	SPILLS FINDS NPDES TRIS ICIS	Petroleum products Corrosive Hazardous Wastes Reactive Hazardous Wastes	Nitrous Oxide
29H	Union Carbide Cypress Propylene Plant Dow Chemical	901 Prospect Avenue, Norco	SWF/LF NPDES RCRA-LQG FINDS TRIS ICIS SPILLS	Batteries Pesticides Ignitable Hazardous Wastes Metals Halogenated hydrocarbons Non-halogenated hydrocarbons Benzenes Petroleum products Phenols Ketones	Titanium Tetrachloride Propylene
30H	Port Arthur Towing Company	1205 River Road, Norco	ERNS	Petroleum products	Jet-A Fuel
31H	Shell Oil Dock	1205 River Road, Norco	ERNS FINDS FTTS HIST FTTS ICIS	Crude oil Petroleum products	Butadiene Naptha Epichlorohydrin Motor Alky Gasoline Sulfur Dioxide Pyrolysis Gas Blend Unknown oil
32H	Dixie Carrier	1205 River Road, Norco	ERNS	Petroleum products	JP-1 Kerosene
33H	Hollywood Marine	1205 River Road, Norco	ERNS	Petroleum products	Unknown Oil Gasoline

Table 10-3, continued

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
34H	German Coast Alterations Center	924 River Road, Norco	DRYCLEANERS	Perchloroethylene	None Reported
35H	Norco Jr. Food Mart	26 Apple Street, Norco	UST	Gasoline, Diesel (closed facility)	None Reported
36H	River Road Food Mart	700 River Road, St. Rose	UST	Gasoline, Diesel (closed facility)	None Reported
37H	Monsanto Chemical Co.	700 South River Road, Luling	ERNS	Corrosive hazardous wastes Ignitable hazardous wastes Reactive hazardous wastes	Anhydrous Ammonia
38H	Shop Yard	819 First Street, Norco	UST	Gasoline (closed facility)	None Reported
39H	Norco Shell Service Station	196 Good Hope Street, Norco	UST	Gasoline (closed facility)	None Reported
40H	Monsanto Agricultural Group	125 River Road, Luling	SPILLS	Corrosive hazardous wastes Ignitable hazardous wastes Reactive hazardous wastes	Chlorine
41H	Shell Chemical	265 River Road, Norco	FINDS ERNS FTTS HIST FTTS	Petroleum products Hazardous chemicals	Condensed light end solids Sodium Hydroxide
42H	Shell Chemical	1536 River Road, Norco	SPILLS	Sulfur Dioxide Nitrogen Oxides Carbon Monoxide	None Reported

Table 10-3, continued

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
43H	Mosaic Fertilizer, LLC IMC Agrico Taft Plant IMC Phosphates MP Taft Plant	17245 River Road, Hahnville	FINDS SWF/LF NPDES ERNS CERC/NFRAP RADINFO RCRA/CESQG UST ICIS	Corrosive Hazardous Wastes Gasoline	Phosphoric Acid
44H	Dow Chemical	1700 River Road, Taft	ERNS SPILLS	Ignitable Hazardous Wastes Corrosive Hazardous Wastes	Ethylene Oxide Butadiene Benzene Hydrocarbons Propane Polyethylene Polyamines Acetone Ethylene Polypropylene Quench oil Ethylene Triamine Vinyl Chloride Dripolene Unknown oil Butyl Acrylate Naptha Diesel Propylene SCE-Blue-32 oil Ethylene Diamine Chloroform Ethylene Dioxide Methane 2-Hydroxy-4-(Methylthio)Butanol Ethane Chlorinated Hydrocarbons Sodium Hydroxide

Table 10-3, continued

Site No.	Facility Name	Facility Location	Database ID	Potential Hazards	Past Releases of Hazardous Materials
44H, continued					Ethylene Glycol Anhydrous Ammonia Tetrahydronapthalene Acrolein Sodium Hypochlorite Lubricating oil Ethyl Acetate Napthalene Ethylene Amine Ammonia Nonyphenol Methanol Acetylene Propiaeiene Propane
45H	LA Resources Company	16363 River Road, Hahnville	FINDS	Minor hazardous wastes	None Reported
46H	Air Liguide	177 Highway 3142, Taft	FINDS	Minor hazardous wastes	None Reported
47H	River Parishes Oil Company	LaPlace Park & Airline Highway, Norco	UST	Gasoline Diesel	None Reported
48H	Bayou Trepagnier	Norco	LDEQ Compliance Action NPDES SHWS	Lead Zinc Chromium Polycyclic Aromatic Hydrocarbons	Lead Zinc Chromium Polycyclic Aromatic Hydrocarbons

Numerous pipelines cross the spillway, transporting crude and refined petroleum products. The locations of these pipelines are shown in Plate 3. In the event of a release of HTRW from one of these pipelines, containment and post-release sampling and monitoring should be conducted to determine the risk for the spillway.

Bayou Trepagnier, located on the south side of the spillway, extends approximately 15,500 feet from the Motiva Enterprises, LLC (Motiva) refinery to Bayou LaBranche near Lake Ponchartrain (LDEQ 2008b). Motiva has owned and operated the refinery since 1998. Shell Petroleum Corporation (Shell) owned and operated the refinery from 1929 to 1998. The upper reaches of Bayou Trepagnier are connected to Engineers Canal which extends along the lower guide levee to the Motiva refinery. Bayou Trepagnier was formerly used to discharge storm water and other wastewater containing HTRW from the refinery and the town of Norco. In 1995, Shell refinery ceased discharge into Bayou Trapagnier. Historical, discharges into Bayou Trepagnier have led to the possible contamination of sediments, dredge spoil, and adjacent soils of Bayou Trepagnier. Contaminants of concern identified for Bayou Trepagnier include lead, individual polycyclic aromatic hydrocarbons, chromium, zinc, and copper. Motiva and LDEQ have entered into a cooperative agreement to implement a clean-up project at Bayou Trepagnier, including remediation of sediments and dredge material in the upper reach of the bayou, and closure of the connection or "cut" between Bayou Trapagnier and Engineers Canal to prevent cross flow of contaminants and brackish water between the two water courses.

Sediment and dredge material at Bayou Trepagnier is being remdiated by Motiva and LDEQ through a cooperative agreement.

An initial HTRW assessment consistent with ER 1165-2-132, the USACE Environmental Review Guide for Operations program, and ASTM standards should be conducted prior to the implementation of project management and prior to excavation work related to the Bonnet Carré Freshwater Diversion project. This assessment would include an exhaustive records search and extensive field investigations to identify any HTRW hazards on spillway lands or waters. If necessary, remedial actions and/or precautions for spillway visitors and spillway personnel will be implemented.

10.2 NATURAL RESOURCES

Numerous natural resource hazards exist on the spillway lands. Although none of these are unusual to the region or peculiar to the Bonnet Carré Spillway, appropriate warnings and advisories should be an integral part of the spillway's public information program.

MVN will develop posters and/or pamphlets, consistent with the spillway's signage plan, identifying natural resource hazards and how to identify and avoid contact with these hazards. The posters and/or pamphlets will be displayed at visitor kiosks, the spillway office, and future NRM Office.

10.2.1 Alligators

The American alligator presently occurs in and adjacent to the Bonnet Carré Spillway. Alligators are a Federally listed threatened by similarity of appearance species to the Endangered Species Act. Feeding and harassment of alligators are prohibited on spillway lands and waters. All waterbodies on spillway lands provide habitat for alligators and it should be assumed alligators are present. Although alligators generally avoid contact with humans, discarded bait and food items at public use areas attract alligators. Alligators can become conditioned to associate humans with food and they eventually become acclimated to humans. Once alligators become acclimated to humans, they frequent public use areas looking for food. This creates a potentially dangerous situation for the visiting public and spillway personnel. To provide a measure of public safety to spillway visitors and access to a renewable, harvestable resource, MVN initiated an alligator trapping program on spillway lands that coincides with the state alligator hunting season. MVN issued 20 and 30 alligator harvest tags in 2007 and 2008, repectively. Additionally, MVN contracts permitted nuisance alligator hunters to remove nuisance alligators from public use areas. In 2008, a 11-foot, 2-inch alligator was removed near the St. Charles Parish recreation area in the spillway by a nuisance alligator hunter.

MVN maintains a nuisance alligator program to ensure public safety.

Additional management efforts to inform the public of the presence of alligators should be inititated on spillway lands. Alligator warning signs, consistent with the signage plan, should be developed and erected at public use areas near waterbodies on spillway lands as part of the OMP.

10.2.2 Poisonous Snakes

Several species of poisonous snakes including the western cottonmouth, copperhead, and timber rattlesnake can be expected to occur on spillway lands. These animals are recognized as integral components of the natural ecosystems of the region and are beneficial in several respects. Visitors should be discouraged from handling or harming any snakes.

10.2.3 Fire Ants

Fire ants (*Solenopsis invicta spp.*) occur throughout the region and may cause two types of problems. First, these insects are a health and safety hazard to visitors and employees. Secondly, the mounds can cause problems for mowing equipment. Fire ants have painful bites resulting in sores that last several days. Multiple bites can be very dangerous to small children and allergic adults. Information on control should be obtained from the Louisiana Department of Agriculture and Forestry and incorporated into the OMP for the spillway.

10.2.4 Mosquitoes

Mosquitoes can be disease vectors as well as pests. Mechanical or biological controls should be emphasized if needed.

10.2.5 Poison Ivy

Poisoning is well known for its irritating oils. The species occurs in the study area and if located near areas of intense human activity should be eliminated by chemical or mechanical means.

10.2.6 Honey locust

The honey locust (*Gleditsia triacanthos*) tree is common on spillway lands. The long, stout thorns on the trunks of these trees are very serious safety hazards, especially for small children. In high use recreation areas, these trees should be removed.

SECTION 11.0
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11.0 REFERENCES CITED

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