

CONTINUING AUTHORITIES PROGRAM
SECTION 1135 OF THE WATER RESOURCES
DEVELOPMENT ACT OF 1986
ECOSYSTEM RESTORATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

SPUNKY BOTTOMS ECOSYSTEM RESTORATION



SEPTEMBER 2013



**US Army Corps
of Engineers**®
St. Louis District

**ILLINOIS RIVER
MILES 75.0 THROUGH 78.3
BROWN COUNTY, ILLINOIS**

**CONTINUING AUTHORITIES PROGRAM
SECTION 1135 OF THE WATER RESOURCES
DEVELOPMENT ACT OF 1986
ECOSYSTEM RESTORATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT**

SPUNKY BOTTOMS ECOSYSTEM RESTORATION

**ILLINOIS RIVER MILES 75.0 THROUGH 78.3
BROWN COUNTY, ILLINOIS**

EXECUTIVE SUMMARY

Purpose. This Ecosystem Restoration Report with integrated Environmental Assessment is prepared under the authority of Section 1135 of the Water Resources Development Act (WRDA) of 1986, as amended, in response to a request for Federal assistance from The Nature Conservancy (TNC) for an ecosystem restoration project.

Project Location. The Spunky Bottoms Preserve covers approximately 1,195 acres of primarily river bottomlands owned and managed by TNC. The preserve is situated approximately 103 miles north of St. Louis, Missouri, and 60 miles west of Springfield, Illinois. The site is located across the river from the U.S. Fish and Wildlife Service Meredosia National Wildlife Refuge and is approximately one and one-half miles downstream of the U.S. Army Corps of Engineers (USACE) operated La Grange Lock and Dam. Spunky Bottoms is bounded by County Road 500 to the north and a channel of Camp Creek to the south. County Highway 12 delineates the western edge of the southern two-thirds of the property, while the Illinois River (between river mile 75.0 and river mile 78.3) delineates the eastern boundary of the area. The Spunky Bottoms Section 1135 Ecosystem Restoration Project is comprised of approximately 917 acres of the total 1,195-acre Spunky Bottoms Preserve. The project area also lies within the Little Creek Drainage and Levee District (D&LD).

Background. The USACE constructed the Little Creek D&LD's riverfront levee in the 1930s to provide flood risk management for approximately 1,600 acres of river floodplain. The levee district's interior was subsequently ditched and drained for farming. In 1997, TNC purchased 1,157 acres of the district for the purpose of restoring the area's wetland functions. In 2002, TNC purchased an additional 38 acres in the southern area of the district. The primary resource problems within the project area are lack of floodplain connectivity and altered hydrology. The lack of connectivity to the river coupled with an altered hydrology has degraded ecosystem structure and function at Spunky Bottoms.

The ecosystem restoration project was initiated in 2000, with study revisions incorporated due to the additional 2002 acquisition. In addition, before the draft report was completed, the Section 1135 study authority was questioned. It was questioned as most of the protected area under the study authority is proposed for ecosystem restoration, which was considered to potentially change the purpose of the original flood control project. The original flood risk management project was authorized by Section 5 of the Flood Control Action of June 22, 1936 (49 Stat.

1583). Through review by the U.S. Army Corps of Engineers Headquarters (HQUSACE), it was determined that the proposed ecosystem project would, in fact, change the purpose of the original flood control project. Because Section 1135 projects cannot change the original project purpose, the proposed project could not be implemented under the current Section 1135 authority. Following this decision, TNC sought and obtained legislative action in WRDA 2007 that added ecosystem restoration to the purpose of the project, allowing the project to remain under the Section 1135 authority without changing the original purpose of the project (flood control) with no impact to the eligibility of the project for emergency repair assistance under 33 U.S.C 701n (commonly referred to as Public Law (PL) 84-99). This does not guarantee emergency assistance under PL 84-99. A positive benefit-cost ratio is required for emergency assistance. If the levee requires repairs and does not meet the requirements for PL 84-99 assistance, the Little Creek D&LD would be required to make the appropriate repairs without Federal assistance.

Project Goals and Objectives. The overall projects goals are to restore the quality and diversity of backwater wetland habitat along the Illinois River by restoring native wetland species of the Illinois River floodplain; and to restore productive backwater habitat by reconnecting the floodplain to the Illinois River. These goals would be achieved by the following objectives:

- Restoring a more natural hydrograph
- Restoring native aquatic habitat and ecological processes
- Increasing the presence of reliable food source and quality habitat for wetland species
- Improving aquatic habitat conditions of the project area
- Restoring hydrologic river floodplain connectivity
- Increasing quality fish spawning and nursery habitats within the Illinois River
- Export biological productivity to the river
- Maximize sustainability of aquatic habitat

Alternatives Considered. Besides the no-action alternative, three alternatives were considered in detail to meet the project goals and objectives. The considered action alternatives all address reconnecting the floodplain behind the levee to the Illinois River, and improve interior water level management to varying degrees. The benefits of the alternatives were evaluated using the Wildlife Habitat Appraisal Guide (WHAG) and Aquatic Habitat Appraisal Guide (AHAG). Ecosystem benefits and projects costs were then processed through Cost Effectiveness and Incremental Cost Analysis using the USACE Institute of Water Resources Plan. This analysis resulted in all considered action alternatives being considered “Best Buy” Alternatives. These alternatives were then evaluated on their ability to meet project objectives and to achieve the four Principles and Guidelines evaluation criteria of acceptability, completeness, effectiveness, and efficiency.

Tentatively Selected Plan. The Tentatively Selected Plan (TSP) consists of construction of a reconnection structure that would allow fish passage and controlled interior water level management up to elevation 432 feet NGVD while still maintaining the flood risk management integrity of the mainline levee. A 2,400 linear foot south berm to protect the district’s southernmost landowner would be constructed along with a catchment area and provision for pumping. This catchment area would also allow for fine-scale water level management throughout the project through use of a small, portable pump. County Road 500 between the TNC and IDNR property would be raised to 434 feet NGVD. This would preserve access for

property owners along the levee and provide construction access. Approximately 3,350 linear feet of riprap would be placed on the lower section of County Highway 12 to prevent damage, while managing water level at elevation 432 feet. In addition, a second portable, diesel-powered pump would be used in the project area to assist with water level management. Figure ES-1 shows the TSP features.

Project Costs. Cost estimates were developed for the considered alternatives which included Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R) costs. Combined first costs for the considered action alternatives ranged from \$4,110,000 to \$8,985,000. Average OMRR&R costs range from \$41,120 to \$57,482. The Total Project Cost estimate for the tentatively selected plan is \$9,082,770 which includes \$3,425,000 in LERRD costs. OMRR&R costs are estimated at \$57,482 and are not cost-shared, but 100% responsibility of the non-Federal sponsor. The total project cost would be cost-shared 75/25, Federal/non-Federal including monitoring and adaptive management costs estimated at \$682,520. The Federal share is \$6,812,080 and the non-Federal share is \$2,270,690. The full implementation of this project would generate 479 average annual habitat units over the baseline condition at \$710 per unit. Although the total Federal cost is higher than traditional Section 1135 projects, WRDA 2007 legislation increased the Federal cost share limit specifically for the Spunky Bottoms project to \$7,500,000.

Findings and Conclusions. Implementation of the Section 1135 Ecosystem Restoration Project proposed at the Spunky Bottoms project would result in positive benefits to the environment by restoring ecosystem structure and function through 1) increasing floodplain connectivity between the Illinois River and the backwater lakes that once existed prior to the levee construction; and 2) restoring a more natural hydrologic regime through improved water level management capabilities.

Spunky Bottoms Project
Continuing Authorities Program - Section 1135

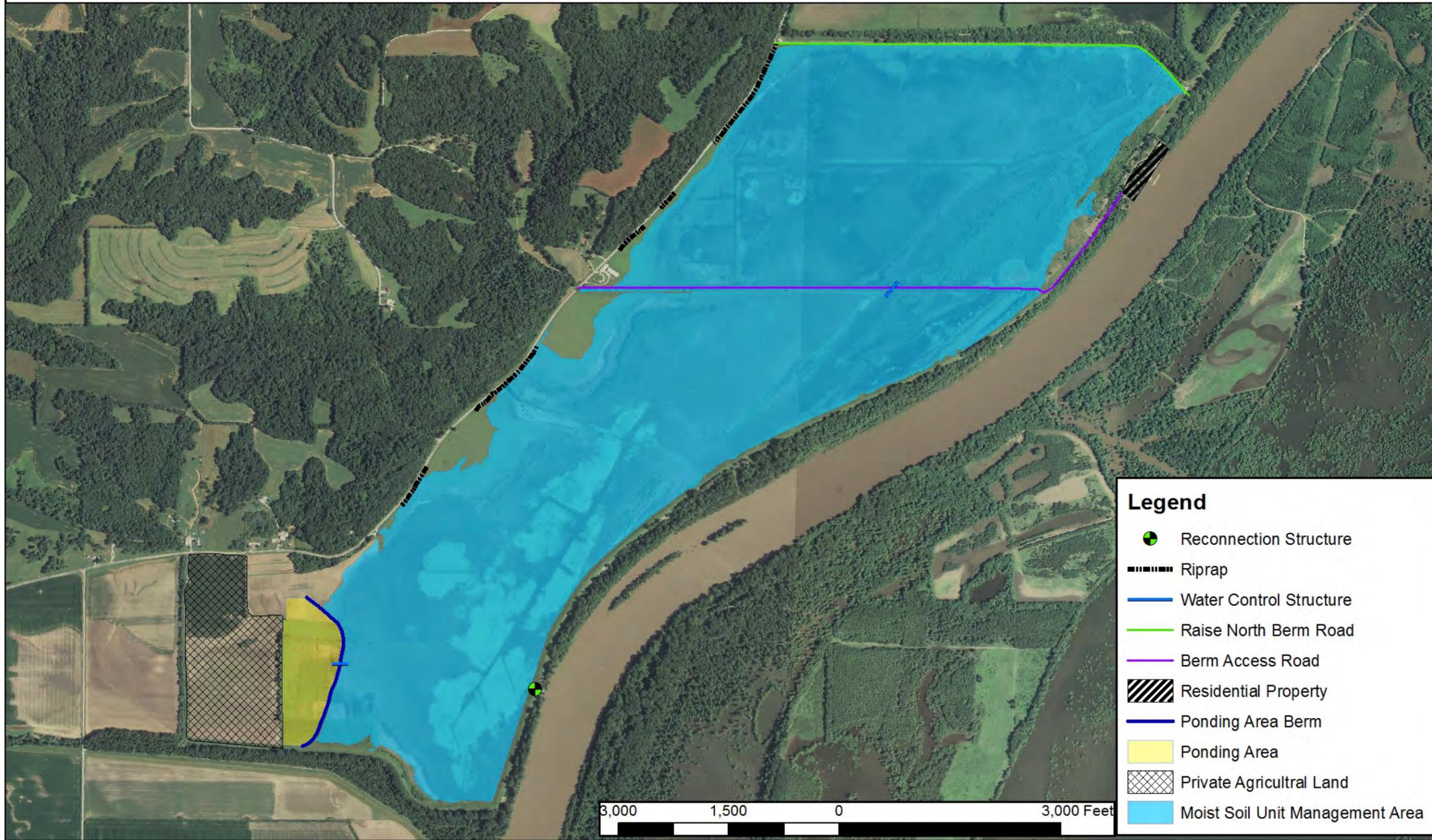


Figure ES-1. Spunky Bottoms Ecosystem Restoration Project (917 acres) tentatively selected plan features. Portable pumps not shown.

**CONTINUING AUTHORITIES PROGRAM
SECTION 1135 OF THE WATER RESOURCES
DEVELOPMENT ACT OF 1986
ECOSYSTEM RESTORATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT**

SPUNKY BOTTOMS ECOSYSTEM RESTORATION

**ILLINOIS RIVER MILES 75.0 THROUGH 78.3
BROWN COUNTY, ILLINOIS**

TABLE OF CONTENTS
(* required by NEPA)

EXECUTIVE SUMMARY	I
1. Introduction*	1
1.1. Location.....	1
1.2. Purpose.....	1
1.3. Project Selection.....	1
1.4. Scope of Study.....	2
1.5. Format of Report.....	2
1.6. Authority.....	4
2. Assessment of Existing Resources*	6
2.1. Existing Flood Risk Management Features	6
2.1.1. Recent Inspection.....	6
2.2. Historic and Cultural Resources.....	10
2.2.1. Surveys.....	11
2.3. Natural Resources.....	14
2.3.1. Floodplain Habitat.....	20
2.3.2. Wetlands Reserve Program.....	23
2.3.3. Geology and Soils.....	26
2.3.4. Wildlife.....	26
2.3.5. Aquatic Resources.....	28
2.3.6. Water Quality.....	31
2.3.7. Fisheries.....	31
2.4. Hazardous, Toxic and Radioactive Waste.....	32
2.5. Socioeconomic Resources and Human Use.....	33
2.5.1. Public Access.....	34
3. Problems and Objectives*	34
3.1. Problem Identification.....	34

Spunky Bottoms Ecosystem Restoration

3.2. Opportunities	37
3.3. Goals and Objectives.....	37
3.4. Planning Constraints.	38
3.5. Future Without Project	38
4. Potential Project Features*	40
4.1. Value Analysis Study.	40
4.2. Project Features Found to be Not Feasible.....	41
4.3. Potential Feasible Project Features.	42
4.4. Plan Formulation	50
5. Evaluation of Feasible Project Features *	51
5.1. Environmental Outputs	51
5.2. Cost Effective and Incremental Cost Analysis of Alternatives.....	53
5.3 CE/ICA Summary	56
5.4. National Ecosystem Restoration Plan	61
5.5. Tentatively Selected Plan (TSP)	61
5.6. Consistency with USACE Campaign Plan.....	61
5.7. Consistency with USACE Environmental Operating Principles	63
6. TENTATIVELY SELECTED PLAN: DESIGN, CONSTRUCTION, OMRR&R CONSIDERATIONS*	63
6.1. Design Considerations.....	65
6.1.1. Hydrologic/Hydraulic Considerations.	65
6.1.2. Geotechnical Considerations.	69
6.1.3. Civil Design Considerations.	70
6.1.4. Structural Design Considerations	71
6.2. Construction Considerations.....	72
6.3. Operation, Maintenance, Repair, Rehabilitation, and Replacement Cost Considerations.....	72
6.4. Real Estate Considerations	73
6.5. Operational Considerations.	74
6.5.1. Portable Pump.....	75
6.5.2. Water Control Structures	75
6.6. Maintenance Considerations.	75
7. SCHEDULE FOR DESIGN AND CONSTRUCTION	76
8. COST ESTIMATES	77
8.1 Cost-Sharing and Implementation Considerations.....	78

9. Environmental Effects*	79
9.1. Physiography-Topography	79
9.2. Aesthetics	79
9.3. Traffic/Transportation Patterns	80
9.4. Air Quality.....	81
9.5. Noise.....	81
9.6. Safety.....	81
9.7. Existing and Potential Water Supplies; Water Conservation; Water Related.....	81
9.8. Water Quality.	82
9.9. Suspended Particulates & Turbidity.....	82
9.10. Storm, Wave, and Erosion Buffers.....	82
9.11. Normal Water Level Fluctuations (tides, river stages, etc.).....	83
9.12. Erosion and Accretion Patterns	84
9.13. Currents, Circulation, or Drainage Patterns	84
9.14. Flood Control Functions.....	84
9.15. Socioeconomic Resources.....	85
9.16. Recreation.....	85
9.17. Commercial Navigation	85
9.18. Recreational and Commercial Fisheries.....	86
9.19. Parks, National and Historic Monuments, National Seashores, Wild and Scenic Rivers, Wilderness Areas, Research Sites, Etc.....	86
9.20. Prime and Unique Farmland.	86
9.21. Habitat for Wildlife, Fish, and Other Aquatic Organisms.	86
9.22. Wildlife Resources.	87
9.23. Fishery Resources.	87
9.24. Special Aquatic Sites (sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, riffle and pool complexes).....	88
9.25. Threatened and Endangered Species Biological Assessment.....	88
9.25.1. Indiana Bat.....	89
9.25.2. Bald Eagle.....	90
9.25.3. Decurrent False Aster	91
9.25.4. Henslow’s Sparrow.....	91
9.26. Cultural Resources.	92
9.27. Environmental Effects of Proposed Action.....	93
9.28. Hazardous and Toxic Wastes.	94
9.30. Cumulative Impacts.....	94
9.31. Probable Adverse Impacts Which Cannot Be Avoided.	94

Spunky Bottoms Ecosystem Restoration

9.32. Relevant Laws and Regulations.	94
9.32.1. Floodplain Management, Executive Order 11988.	94
9.32.2. Protection of Wetlands, Executive Order 11990.	94
9.32.3. Rivers and Harbors Act.	95
9.32.4. Clean Water Act, as amended.	95
9.32.5. Air and Water Pollution Prevention and Control, Executive Order 11282.	95
9.32.6. Clean Air Act, as amended.	96
9.32.7. Invasive Species, Executive Order 13112.	96
9.32.8. Migratory Bird Treaty Act of 1918, as amended.	96
9.32.9. Bald and Golden Eagle Protection Act of 1940.	96
9.32.10. Fish and Wildlife Coordination Act, as amended.	97
9.32.11. Protection of Environmental Quality, Executive Order 11991.	97
9.32.12. Farmland Protection Policy Act, as amended.	97
9.32.13. Environmental Justice, Executive Order 12898.	98
9.32.14. Noise Control and Quiet Communities Acts.	98
9.32.15. National Environmental Policy Act, as amended.	99
9.32.16. Compliance with Environmental Quality Statutes.	99
9.33. Short-Term versus Long-Term Productivity.	99
9.34. Irreversible Resource Commitments.	100
9.35. Relationship of the Proposed Project to Other Planning Efforts.	100
10. PROJECT PERFORMANCE ASSESSMENT MONITORING	100
11. REAL ESTATE REQUIREMENTS.....	101
12. FEDERAL RESPONSIBILITIES.....	101
13. NON-FEDERAL RESPONSIBILITIES.....	102
14. IMPLEMENTATION RESPONSIBILITIES.....	105
15. COORDINATION, PUBLIC VIEWS, AND COMMENTS*	106
16. CONCLUSIONS	107
17. REFERENCES.....	108
RECOMMENDATIONS.....	110
FINDING OF NO SIGNIFICANT IMPACT*	111

Figures

Figure ES-1. Spunky Bottoms Ecosystem Restoration Project (917 acres) tentatively selected plan features. Portable pumps not shown..... IV

Figure 1-1. Spunky Bottoms Project and Little Creek Levee.....3

Figure 2-1. Spunky Bottoms Project and other protected areas in the vicinity.....12

Figure 2-2. Contour map of Little Creek D&LD.....13

Figure 2-3. October 1998 aerial photo of Spunky Bottoms project area.....14

Figure 2-4. May 2003 aerial photo of Spunky Bottoms project area.....15

Figure 2-5. National Land Cover Database 2006 for spunky Bottoms Project Area.....18

Figure 2-6. Approximate acreages of habitat types for Spunky Bottoms Project Area...19

Figure 2-7. LiDAR elevations for Spunky Bottoms Project.....21

Figure 2-8. Approximate location of the 972 acres of WRP Easement at Spunky Bottoms.25

Figure 2-9. Soils data for Spunky Bottoms Project from the Natural Resources Conservation Service Soil Survey geographic database.27

Figure 2-10. Historic water bodies within and adjacent to the Spunky Bottoms project area.30

Figure 4-1. Elevation 430' Water Management Features.45

Figure 4-2. Elevation 432' Water Management Features.46

Figure 4-3. Elevation 435' Water Management Features.47

Figure 4-4. Typical Section of Proximity of Water to County Road 12 at Water Level Management of Elevation 432'.....48

Figure 4-5. Typical Section of Proximity of Water to County Road 12 at Water Level Management of Elevation 435'.....49

Figure 5-1. Cost Effective Alternatives55

Figure 5-2. Best Buy Plan Alternatives56

Figure 5-3. The features required for the tentatively selected plan. Portable pumps not shown.62

Figure 6-1. Required Lands for Implementation of the TSP. Acreages are approximate64

Figure 6-2. Model representation of Water Level Management Cycle.....72

Tables

Table 2-1. Rating Comparison of 2010 Periodic Inspection and 2012 Routine Inspection for Little Creek D&LD – General Items.....	7
Table 2-2. Rating Comparison of 2010 Periodic Inspection and 2012 Routine Inspect for Little Creek D&LD – Levee Embankment Items	8
Table 2-3. Rating Comparison of 2010 Periodic Inspection and 2012 Routine Inspection for Little Creek D&LD – Pump Station Items.....	9
Table 2-4. Summary of acreages of habitats present within Spunky Bottoms area from 2006 National Land Cover database.....	15
Table 2-5. Summary of 2011 acreages of habitats present within Spunky Bottoms area.....	16
Table 2-6. Summary of Institutional, public and technical significance of the Illinois River Basin.	17
Table 2-7. Plants listed on the Illinois Natural Heritage Program (INHP) 2011 Species of Conservation Concern for Brown County.....	22
Table 2-8. Animals listed on the Illinois Natural Heritage Program 2010 Checklist of Endangered and Threatened Animals and Plants of Illinois and Illinois Wildlife Action Plan.....	28
Table 2-9. The fish listed on the Illinois Natural Heritage Program (INHP) 2011 Species of Conservation Concern List.....	31
Table 3-1. Goal, objectives and potential measures for the Spunky Bottoms Project.	38
Table 4-1. Value Analysis Recommendations and Disposition.....	40
Table 5-1. Average Annual Habitat Units (Future With and Without Project)	52
Table 5-2. Project Costs by Alternative	53
Table 5-3. Cost Per Habitat Unit.....	54
Table 5-4. Incremental Cost Per Habitat Unit.....	56
Table 5-5. Planning Evaluation Criteria and Objective Ratings per Alternative.	59
Table 7-1. The tentative schedule for the project and necessary completion steps.....	76
Table 7-2. Construction requirement schedule.	76
Table 8-1. Spunky Bottoms Project Construction Cost, derived from Planning Level Cost Estimate	77
Table 8-2. Current and estimated average annual OMRR&R costs.	77
Table 8-3. Estimated post construction annual monitoring costs.....	78
Table 8-4. Federal and non-Federal cost of total project.	78
Table 9-1. Endangered, Threatened and Protected Species	89
Table 9-2. Environmental Effects of Proposed Action	93
Table 9-3. Summary of the Project’s compliance status with respect to applicable statutes and laws.	100

Table 15-1. Study Team Members* 107

APPENDICES

- A Preliminary Civil Engineering Report (With Plates)
- B Preliminary Structural Engineering Report (With Plate)
- C Hydrologic/Hydraulic Analysis and Design
- D Preliminary Geotechnical Report
- E Habitat Benefit Analysis
- F This Appendix Has Been Removed
- G Letters of Correspondence
- H Hazardous, Toxic, and Radioactive Waste
- I This Appendix Has Been Removed
- J Preliminary Mechanical Engineering Report
- K Adaptive Management / Monitoring Plan
- L Draft Real Estate Plan

**CONTINUING AUTHORITIES PROGRAM
SECTION 1135 OF THE WATER RESOURCES
DEVELOPMENT ACT OF 1986
ECOSYSTEM RESTORATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT**

SPUNKY BOTTOMS ECOSYSTEM RESTORATION

**ILLINOIS RIVER MILES 75.0 THROUGH 78.3
BROWN COUNTY, ILLINOIS**

1. INTRODUCTION*

1.1. Location. The Spunky Bottoms Preserve covers approximately 1,195 acres of primarily river bottomlands owned and managed by TNC. The Spunky Bottoms Preserve is located in the Alton Pool of the Illinois River along on the right descending bank (RM 75.0 – 78.3), approximately 103 miles north of St. Louis, Missouri and 60 miles west of Springfield, Illinois in Brown County, Illinois. The site is across the river from the U.S. Fish and Wildlife Service (USFWS) Meredosia National Wildlife Refuge and is about one and one-half miles downstream of the U.S. Army Corps of Engineers (USACE) operated La Grange Lock and Dam. Spunky Bottoms is bounded by County Road 500 to the north and a channel of Camp Creek to the south. County Highway 12 delineates the western edge of the southern two-thirds of the property, while the Illinois River (between river mile 75.0 and river mile 78.3) delineates the eastern boundary of the area. The Spunky Bottoms Section 1135 Ecosystem Restoration Project study area is comprised of approximately 1,195-acres (Fig. 1-1). The project area is solely on non-Federal owned lands. The project area also lies within the Little Creek Drainage and Levee District (D&LD). The Little Creek Levee provides protection along Little Creek, the Illinois River and Camp Creek. In 1997, TNC purchased 1,157 acres of the district for the purpose of restoring the area's wetland functions. In 2002, TNC purchased an additional 38 acres in the southern area of the district. (Fig. 1-1, 2-1). In addition, a large portion of the project area has been placed in the Natural Resource Conservation Service's (NRCS) Wetlands Reserve Program. These areas shall be maintained in accordance with NRCS protocol and all project features would be coordinated with NRCS for compliance.

1.2. Purpose. The purpose of this Ecosystem Restoration Report (ERR) with integrated Environmental Assessment (EA) is to consider a proposal for the restoration of aquatic ecosystem structure and function to more closely resemble historic conditions at the Illinois River Spunky Bottoms project area. This document presents the findings of the feasibility phase ecosystem restoration study conducted for Spunky Bottoms. Current and future ecosystem conditions were evaluated and plans developed to meet those needs. The study was conducted with sufficient detail to select a tentatively selected plan and to determine Federal and non-Federal responsibilities. An incremental cost analysis was performed to aid in final plan selection.

1.3. Project Selection. TNC submitted a request letter for the Spunky Bottoms project identifying a unique aquatic problem for inclusion in the St. Louis District's Continuing

Spunky Bottoms Ecosystem Restoration

Authorities Program (CAP) under Section 1135. Once appropriated, the Spunky Bottoms project began work under CAP Section 1135 as it met the needs of the required authority and would provide opportunities for significant ecosystem benefits; and the problems identified were considered to be within USACE's ecosystem restoration mission. Development of this report was actively coordinated with the project sponsor.

1.4. Scope of Study. The ERR investigation was based on the results of on-site inspections and engineering and environmental analyses. This study has concentrated on a manageable wetland complex with structural modifications at the Little Creek D&LD project area. The project is consistent with TNC, Section 1135 authority, and the USACE – St. Louis District (MVS) management goals.

Aerial photography, topographic surveys, bathymetric surveys, fisheries surveys, and habitat quantification procedures were completed to support the planning and assessment of proposed project alternatives. Soil borings were taken to determine soil properties such as gradation, permeability, stability, and consolidation, which are required for the design of water control features.

TNC, and other resource agencies have made fish and wildlife observations within the project area. These observations, along with future studies and monitoring, will assist in evaluating project performance.

This feasibility study includes a monitoring and adaptive management plan including a description of monitoring activities, success criteria and estimated costs of monitoring. More information can be found in Section 12 and Appendix K. The authorized cost share is 75% Federal and 25% non-Federal for total project costs up to \$10,000,000. Costs over \$10,000,000 are the responsibility of the non-federal sponsor

1.5. Format of Report. The ERR is organized to follow a general problem-solving format. All National Environmental Policy Act (NEPA) compliance sections are marked in the table of contents with an asterisk. A draft Finding of No Significant Impact and draft recommendation by the district commander follow. Figures, plates and appendices have been furnished to provide sufficient detail to allow review of the existing features and the tentatively selected plan.

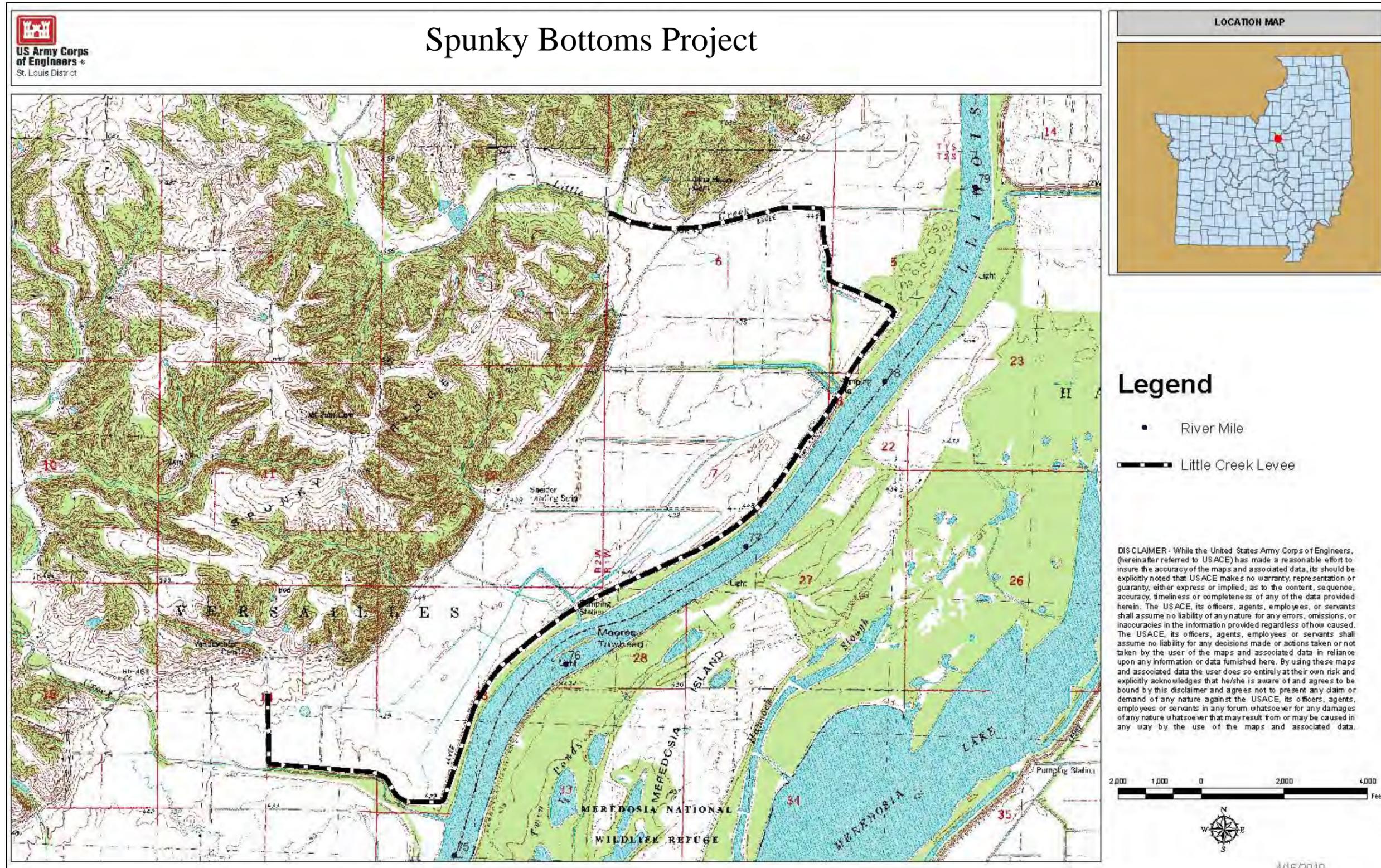


Figure 1-1. Spunky Bottoms Project and Little Creek Levee.

Spunky Bottoms Ecosystem Restoration

1.6. Authority. The Continuing Authorities Program (CAP) is currently a partnership between Federal and local interests designed to provide assistance in developing and implementing solutions to water resources problems. The WRDA of 1986 (P.L. 99-662) states:

The Secretary of the Army is authorized to modify the structures and operations of water resources projects constructed by the Corps to improve the quality of the environment consistent with authorized purposes; and to undertake measures for restoration of environmental quality where the construction or operation of a water resources project built by the Corps has contributed to the degradation of the quality of the environment and such measures do not conflict with the authorized project purposes (Section 1135).

The project modifications contained in this report were initiated under the authority of Section 1135 of the WRDA of 1986 (as amended). Levee improvement work on the original project was initiated with the Flood Control Act of 1936. The objective of Section 1135 is to make modifications to the structure and/or operation of existing water resources projects. Such modifications to improve the quality of the environment must be feasible and consistent with authorized project purpose(s). The original purpose of the Little Creek D&LD was for agricultural flood risk reduction. The proposed project modification is designed to provide for fish and wildlife habitat improvement, while at the same time eliminating adverse water related impacts on adjacent farm properties. In a memorandum dated 11 September 2003, the U.S. Army Corps of Engineers Headquarters determined that "...Section 1135 of the Water Resources Development Act (WRDA) of 1986 (33 U.S.C. 2903a) does not authorize the replacement of a specifically authorized flood control project as an ecosystem restoration project." Based on this, the proposed project was deemed to be inconsistent with the original project purpose and placed on a temporary hold to await new legislation. Following this decision, TNC sought legislative action in WRDA 2007 that would allow the project to remain under the Section 1135 authority without changing the original purpose of the project (flood risk reduction) with no impact to the eligibility of the project for emergency repair assistance under 33 U.S.C 701n (commonly referred to as PL 84-99). Section 1135 study efforts were continued under new legislation for Section 3064 of the Water Resources Development Act (WRDA) of 2007. Section 3064 states:

(a) PROJECT PURPOSE.-The project for flood control, Spunky Bottoms, Illinois, authorized by section 5 of the Flood Control Act of June 22, 1936 (49 Stat. 1583), is modified to add environmental restoration as a project purpose.

(b) MAXIMUM AMOUNT.-The maximum amount of Federal funds that may be expended for the project for improvement of the quality of the environment, Spunky Bottoms, Illinois, being carried out under section 1135 of the Water Resources Development Act of 1986 (33 U.S.C. 2309a), shall be \$7,500,000.

(c) LIMITATION.-Nothing in this section shall affect the eligibility of the project for emergency repair assistance under section 5 of the Act entitled "An Act authorizing the construction of certain public works on rivers and harbors for flood control, and for other purposes", approved August 18, 1941 (33 U.S.c. 701n).

Spunky Bottoms Ecosystem Restoration

(d) POST CONSTRUCTION MONITORING AND MANAGEMENT.-Of the Federal funds expended under subsection (b), not less than \$500,000 shall remain available for a period of 5 years after the date of completion of construction of the modifications for use in carrying out post construction monitoring and adaptive management.

In addition to Subsection (d) of Section 3064 of WRDA 2007, Section 3029 of WRDA 2007 states:

(a) In General- In conducting a feasibility study for a project (or a component of a project) for ecosystem restoration, the Secretary shall ensure that the recommended project includes, as an integral part of the project, a plan for monitoring the success of the ecosystem restoration.

(b) Monitoring Plan- The monitoring plan shall--

- (1) include a description of the monitoring activities to be carried out, the criteria for ecosystem restoration success, and the estimated cost and duration of the monitoring; and***
- (2) specify that the monitoring shall continue until such time as the Secretary determines that the criteria for ecosystem restoration success will be met.***

(c) Cost Share- For a period of 10 years from completion of construction of a project (or a component of a project) for ecosystem restoration, the Secretary shall consider the cost of carrying out the monitoring as a project cost. If the monitoring plan under subsection

(d) requires monitoring beyond the 10-year period, the cost of monitoring shall be a non-Federal responsibility.

2. ASSESSMENT OF EXISTING RESOURCES*

This chapter assesses the existing conditions of the current flood risk management system and the resources within the project area and is organized by resource topic. This is not a comprehensive discussion of every resource within the study area, but rather focuses on those aspects of the environment that were identified as relevant issues during scoping or may be affected by the considered action alternatives. The environmental consequences on these resources are described in chapter 9.

2.1. Existing Flood Risk Management Features. The Little Creek D&LD was organized in 1922; however the original project completion date is unknown but believed to have been completed in the 1930s. The Little Creek D&LD is a federally constructed and non-federally operated and maintained flood risk management system. The flood risk management system was authorized by the Flood Control Act of June 22, 1936 and modified by the Flood Control Act of 1965. The Little Creek D&LD system is a Federal Agricultural Flood Control Work that protects primarily agricultural lands and conservation areas and was designed to provide protection from an 8.3% chance of exceedance with 2 foot freeboard and 10 feet of average crown width. Under existing conditions, however, the average crown width of the levee is still 10 feet. Topographic data collected within and near the project area show that the levee crest elevation varies widely. Elevations as high as approximately 447.0 feet NGVD and as low as approximately 435.5 feet NGVD exist along the levee. Based upon the crest elevations along the levee, the level of protection provided by the levee is less than a 50% chance of exceedance.

The Little Creek system consists of approximately 3.1 miles of riverfront levee, 2.9 miles of flank levee, one active pumping station, and one decommissioned pumping station. There are no gravity drains in the system. The pumping station is the only outlet for interior drainage. There are no floodwalls or closure structures associated with this flood risk management system. The system reduces flood risk for approximately 1,650 acres. Nearly all of the land within the D&LD is owned by TNC or the Illinois Department of Natural Resources (IDNR). Those two agencies cooperate to maintain the levee system. Their lands are being developed as wetland restoration areas, but some areas are still being farmed through a lease for habitat management. In addition to the conservation and agricultural areas, there are several small, privately owned residential tracts along the levee near the old LaGrange Lock facility. An additional 60 acre plot is located at the south end of the D&LD and is privately owned and used for agricultural use. The area protected by the Little Creek D&LD flood risk management system is currently not in the National Flood Insurance Program.

The Little Creek system is sponsored by the Little Creek D&LD, formed by mutual agreement between IDNR and TNC. The manager of the Little Creek D&LD is TNC; however, commissioners for the D&LD are comprised of both TNC and IDNR individuals. Since TNC is the manager of the Little Creek D&LD, TNC provides maintenance to the levee system and operates the pumps when necessary.

2.1.1. Recent Inspection. The most recent routine inspection was completed in August 2012 and the periodic inspection was completed in November 2010. These reports are located in the St. Louis District office. The following summary tables (Tables 2-1 to 2-3) list the levee

Spunky Bottoms Ecosystem Restoration

components and inspected items, along with the ratings that were assigned to those items for the 2010 periodic inspection and the 2012 routine inspection:

Table 2-1. Rating Comparison of 2010 Periodic Inspection and 2012 Routine Inspection for Little Creek D&LD – General Items

General Items		
Rated Item	2010 Periodic Inspection Rating	2012 Routine Inspection Rating
Operations and Maintenance Manuals	Unacceptable	Acceptable
Emergency Supplies and Equipment	Acceptable	Acceptable
Flood Preparedness and Training	Minimally Acceptable	Acceptable

In 2010, the levee district lacked levee and pump station operation and maintenance manuals; however, they did maintain a supply of emergency flood fighting materials. While not immediately critical to the safe operation of the flood risk management system in a flood event, a lack of planning and the absence of written system information and procedures would threaten the continued integrity of the system and was listed as a concern.

By 2012, levee owner’s manual, operation and maintenance manuals, and manufacturer’s operating instructions were present. The sponsor maintained a stockpile of sandbags, shovels, and other flood fight supplies which would adequately supply all needs for the initial days of a flood fight. Also, the sponsor had in place a written system-specific flood response plan and a solid understanding of how to operate, maintain, and staff the system during a flood. The sponsor also maintains a list of emergency contact information for appropriate personnel and other emergency response agencies.

Spunky Bottoms Ecosystem Restoration

Table 2-2. Rating Comparison of 2010 Periodic Inspection and 2012 Routine Inspect for Little Creek D&LD – Levee Embankment Items

Levee Embankment Items		
Rated Item	2010 Periodic Inspection Rating	2012 Routine Inspection Rating
Unwanted Vegetation Growth	Unacceptable	Unacceptable
Sod Cover	Acceptable	Acceptable
Encroachments	Unacceptable	Unacceptable
Closure Structures	Not Applicable	Not Applicable
Slope Stability	Acceptable	Acceptable
Erosion/Bank Caving	Unacceptable	Unacceptable
Settlement	Acceptable	Acceptable
Depressions/Rutting	Unacceptable	Acceptable
Cracking	Acceptable	Acceptable
Animal Control	Unacceptable	Acceptable
Culverts/Discharge Pipes	Not Applicable	Not Applicable
Riprap Revetments	Not Applicable	Not Applicable
Revetments Other Than Riprap	Not Applicable	Not Applicable
Underseepage Relief Wells, etc.	Not Applicable	Not Applicable
Seepage	Acceptable	Acceptable

During the 2010 periodic inspection and remaining in the 2012 routine inspection, erosion of the stream bank on the river side slope between Stations 21+00 and 53+00 along the north flank levee and erosion of the land side slope between Stations 172+00 and 184+50 and between Stations 221+50 and 260+00 were the primary deficiencies observed. The stream bank erosion has not progressed enough to undercut the river side slope. However, repair of these areas will need to be completed in order to prevent damage to the levee embankment from further erosion. The erosion of the interior slopes is generally due to wave action on large submerged areas within the protected area that formerly drained to the decommissioned pumping station. Repair of these areas and installation of some erosion control measures is necessary to prevent further damage to the levee embankment if these areas are to remain submerged. Underseepage will be made more difficult to detect if the areas are to remain submerged. These areas will be of particular concern when the area is submerged and the Illinois River is at flood stage. This is of similar concern with levees with interior drainage ditches adjacent to the levee where water flowing can be hard to detect. Another concern for levee failure in this area is from sand boils. These would still be detectable within the submerged areas. Routine levee inspections would still be completed to note deficient areas that would have to be addressed by the Drainage and Levee District in order to maintain the integrity of the levee. These inspections should be coordinated in conjunction with lower water elevations inside the project area to detect all possible deficiencies.

In addition to unwanted vegetation along the submerged areas, an unmaintained area was encountered west of County Highway 12. Trees and brush on this 1,800 ft long section of levee were too dense to permit inspection of the levee. According to the levee sponsor, the area was not maintained by previous levee sponsors, presumably because backwater rarely if ever extends west of County Highway 12.

During the inspection, several encroachments were noted on the riverside of the levee that appear to be alterations after the completion of the original project. The levee sponsor reported that

Spunky Bottoms Ecosystem Restoration

these alterations were on private property and that the property owners have not cooperated in removal of these encroachments.

The only changes from the 2010 to the 2012 inspection were that animal control and depressions/rutting were considered unacceptable in 2010 and through the D&LD’s work, were acceptable in the 2012 inspection.

Table 2-3. Rating Comparison of 2010 Periodic Inspection and 2012 Routine Inspection for Little Creek D&LD – Pump Station Items

Pump Station Items		
Rated Item	2010 Periodic Inspection Rating	2012 Routine Inspection Rating
Pump Station Operating, Maintenance, Training, & Inspection Records	Unacceptable	Not Evaluated
Pump Stations Operating and Maintenance Equipment Manuals	Unacceptable	Not Evaluated
Safety Compliance	Minimally Acceptable	Not Evaluated
Communication	Acceptable	Not Evaluated
Plant Building	Unacceptable	Not Evaluated
Fencing and Gates	Unacceptable	Not Evaluated
Pumps	Minimally Acceptable	Not Evaluated
Motors, Engines, Fans, Gear Reducers, Back Stop Devices, etc.	Minimally Acceptable	Not Evaluated
Sumps/Wet Well	Unacceptable	Not Evaluated
Mechanical Operating Trash Racks	Not Applicable	Not Evaluated
Non-Mechanical Trash Racks	Unacceptable	Not Evaluated
Fuel System for Pump Engines	Minimally Acceptable	Not Evaluated
Power Source	Unacceptable	Not Evaluated
Electrical Systems	Unacceptable	Not Evaluated
Megger Testing on Pump Motors and Critical Power Cables	Not Applicable	Not Evaluated
Enclosures, Panels, conduit, and Ducts	Unacceptable	Not Evaluated
Intake and Discharge Pipelines	Minimally Acceptable	Not Evaluated
Sluice/Slide Gates	Not Applicable	Not Evaluated
Flap Gates/Flap Valves/Pinch Valves	Not Applicable	Not Evaluated
Cranes	Not Applicable	Not Evaluated
Other Metallic Items (Equipment, Ladders, Platform Anchors, etc.)	Minimally Acceptable	Not Evaluated

There are two pump stations in the Little Creek D&LD system. One has been decommissioned and was not inspected as part of this report. The active pumping station was in very poor condition in 2010. The diesel driven pump is functional; however, the building is severely deteriorated. In addition, the electrical service to the pumping station has been disconnected, so there is currently no provision for lighting or convenience power at the station, and complete replacement of the electrical distribution system is needed to eliminate electrical hazards within the building before electrical service can be restored. When both pump houses were in operation, the drainage ditch that connects the two pump houses was plugged and TNC and IDNR managed both lands separately. It was decided by the levee district to remove the ditch

Spunky Bottoms Ecosystem Restoration

plug, and to remove the newer power unit from the TNC pump house and place it in the IDNR pump house. At about the same time, the pump motor was rehabbed to provide the greatest performance. This removed the need for the second pump house that was decommissioned as both properties could be managed by one pump house.

Development of interior drainage outlet alternatives will require resolution of competing interests between levee integrity and functionality and wetland restoration in the protected area, which promotes long-term ponding against the levee embankment. Existing ponding has resulted in wave wash erosion of the levee embankment. The ponding also makes identification of seepage difficult and may hinder flood fighting activities. Inspections during drawdown periods would enhance the ability to identify deficient areas that may require repair by the D&LD

The pump stations are not evaluated as part of the Routine Inspection at Little Creek D&LD.

As of 2012, the levee had not overtopped due to flood-fighting efforts. If flood fighting efforts had not occurred, it is likely the levee would have overtopped. At an elevation of 430 feet NGVD the interior roadways are partially inundated. The berm road, located at the north between the IDNR and TNC properties, stays dry at 430 feet NGVD; however the water is within 2 feet along the majority of the roadway at this elevation. In a few small areas, the road elevation is 430.5 feet NGVD and may receive some water across the road. To date, there are no records of any repairs completed under PL 84-99. In 2008, Little Creek D&LD requested assistance; however, it was determined that the damages were considered pre-existing.

The private agricultural land located to south of the TNC property protected by the levee floods from backflooding of interior ditches from excessive rainfall. As of 2012, the interior elevation has not risen to 432 feet NGVD, as the D&LD pumps water to make sure to keep this private property as dry as possible through an agreement.

County Highway 12 floods during flash flooding events of Little Creek. County Highway 12 would also flood during high water events on the Illinois River, if the high water events are of lengthy duration that result in the pump station being shutdown causing water to flow backwards through the pump. Backflooding would cause the County Highway 12 to flood along portions adjacent to Spunky Bottoms. The current elevation of County Highway 12 is unknown at this time, but the above descriptions of flooding have been made from previous observations of the area.

2.2. Historic and Cultural Resources. The project area is situated on the floodplain of the Illinois River Valley. Dominant landforms within the area are colluvial slopes (formed by slope wash from immediately adjacent uplands), a series of alternating ridges and swales, and former backwater lakebeds (now partially filled by recent alluvial sediments). Throughout the twentieth century, land use within the area has been agricultural.

Previous limited archaeological investigations within the project area, conducted under the auspices of TNC by archaeologists from the NRCS and Western Illinois University, revealed that artifacts representing the remains of prehistoric occupations were present within the project area. However, based upon investigations of similar landforms in adjacent Illinois River floodplain

Spunky Bottoms Ecosystem Restoration

contexts, the possibility exists that other presently unknown archaeological sites may be deeply buried under recent sediment in the project area.

2.2.1. Surveys. In accordance with the National Historic Preservation Act, during the summer of 1998, preliminary geomorphological investigations including coring, directed by Dr. Ed Hajic at the behest of TNC, were conducted within the area to identify potential locations for such buried remains. While Dr. Hajic's findings did not actually reveal the presence of any such buried archaeological sites, the research demonstrated that the possibility of such to be possible within the project area. This investigation also indicated that the former locations of the backwater lakes had virtually no potential to contain buried archaeological remains.

Archaeological and geomorphological investigations conducted to date have identified two archaeological sites and a continuous scatter of lithic debris in the project area. During the summer of 2001, additional geomorphological fieldwork was conducted throughout the entire project area. The purpose of the work was to research the sedimentary history and to prepare a written "buried archaeological site potential" model and report for the Spunky Bottom Project area.

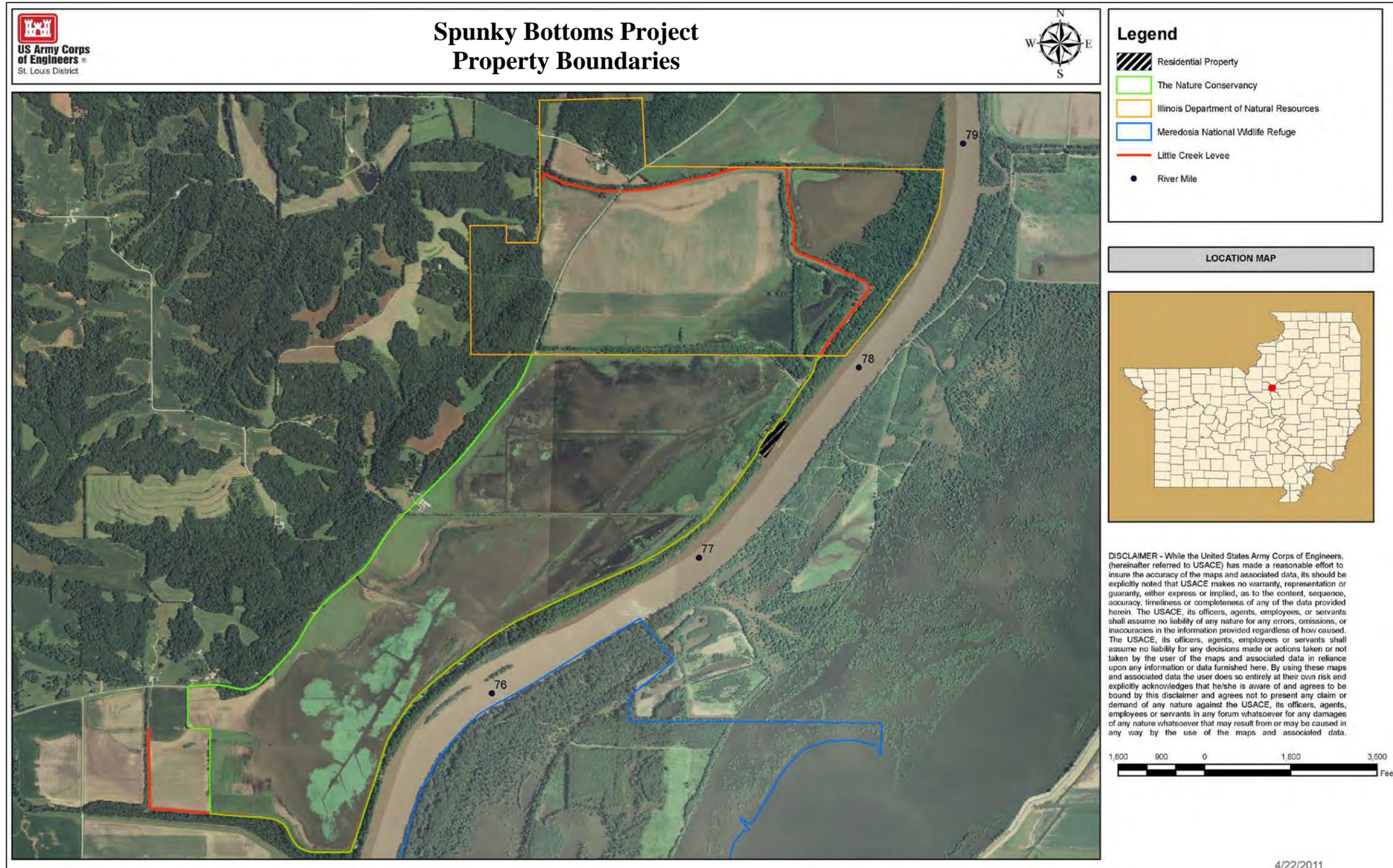


Figure 2-1. Spunky Bottoms Project and other protected areas in the vicinity.

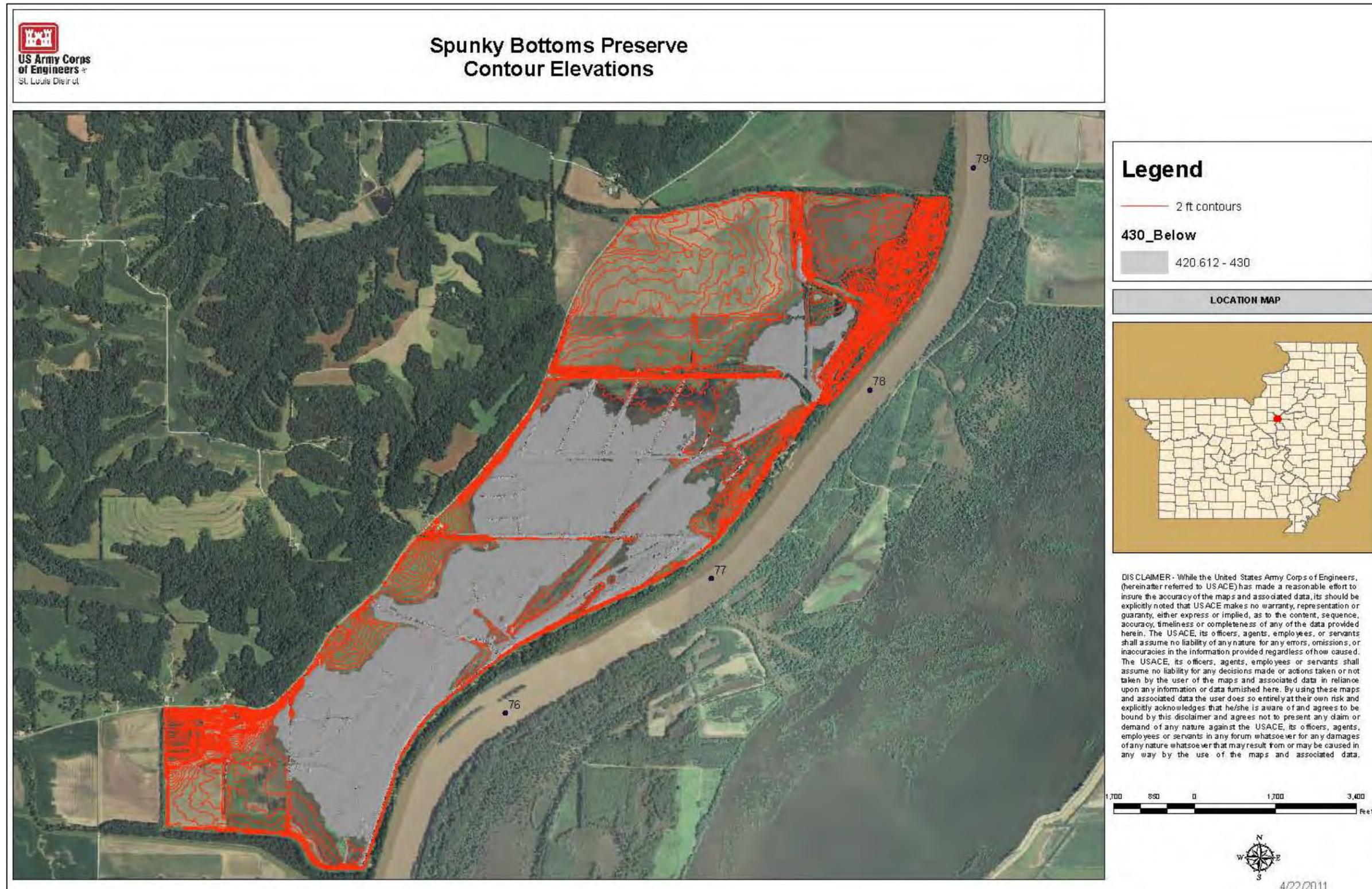


Figure 2-2. Contour map of Little Creek D&LD. All areas in red represent 2' contour lines and are greater than El. 430 and all areas in grey are less than El. 430.

Spunky Bottoms Ecosystem Restoration

2.3. Natural Resources.

Natural Resource History – Although most of the project area was once a thriving backwater, it was drained over the years to allow for agricultural practices. Figure 2-3 below shows the Spunky Bottoms project area in October of 1998 prior to TNC beginning restoration activities. Upon conversion to TNC ownership, restoration practices were started. Restoration on the TNC property of the project has included the reestablishment of wetlands and open water habitats by reducing the amount of water pumped out of the area. TNC planted 110 acres of upland prairie (big bluestem, Indian grass, black-eyed susan, prairie coreopsis) and more than 7,500 hardwood trees. TNC has also planted wetland species including prairie cordgrass, sedges, and thousands of American lotus bloom on the semi-restored wetlands. The replanted species thrived initially, as did other wetland plant species that reemerged from a seedbank. Figure 2-4 shows the early stages of restoration at Spunky Bottoms in May 2003. However, invasive species and sedimentation threaten the wetlands. TNC has applied commercial grade glyphosphate (herbicide) to reduce wetland encroachment of invasive species and aquatic 2, 4-D at a concentration <1 part per million using a boat bailer to combat other invasive species such as Eurasian water milfoil.



Figure 2-3. October 1998 aerial photo of Spunky Bottoms project area.

Spunky Bottoms Ecosystem Restoration



Figure 2-4. May 2003 aerial photo of Spunky Bottoms project area.

Shown in Figure 2-5 below, the 2006 National Land Cover database still shows a large percentage of the area as agricultural land (cultivated crops); however as seen in Figure 2-4 the majority of the project area is no longer in cultivated crops. In addition Figure 2-6, using 2011 imagery and site investigations, the acreages were recalculated for each habitat type. The 2006 National Land Cover database provides a very coarse scale view of the landscape. Although the results are not directly comparable, the approximate acreages for each land cover are shown in Tables 2-4 and 2-5.

Table 2-4. Summary of acreages of habitats present within Spunky Bottoms area from 2006 National Land Cover database.

Habitat Type	Approximate Acres (TNC)
Open Water	132
Developed, Open Space	6
Developed, Low Intensity	23
Deciduous Forest	71
Herbaceous Wetland	3
Pasture/Hay	1
Cultivated Crops	506
Woody Wetlands	118
Emergent Herbaceous Wetlands	268

Spunky Bottoms Ecosystem Restoration

Table 2-5. Summary of 2011 acreages of habitats present within Spunky Bottoms area.

Ownership	Habitat Type	Approximate Acres
TNC	Cropland	25
TNC	Grassland	113
TNC	Non-forested Wetland	817
TNC	Forested Wetland	72

Resource Significance – The Illinois River is part of the Mississippi River system which represents the largest riverine ecosystem in North America and the third largest in the world. The Upper Mississippi River System (UMRS) stretches from St. Paul, Minnesota, to Cairo, Illinois, and encompasses over 2.6 million acres of aquatic, wetland, forest, grassland, and agricultural habitats including the Illinois River. The UMRS supports more than 300 species of birds; 57 species of mammals; 45 species of amphibians and reptiles; 150 species of fish; and nearly 50 species of mussels. More than 40% of North America’s migratory waterfowl and shorebirds depend on the food resources and other life requisites (shelter, nesting habitats, etc.) that the system provides. Sections 2.2.3, 2.2.4, and 2.2.6 discuss specific species of interest of the site. The importance of these resources was recognized by Congress in WRDA 1986 by their declaration of the UMRS as a “nationally significant ecosystem”. Additionally, the National Research Council recognized the ecological significance of large floodplain rivers and identified the Mississippi and Illinois rivers as examples of two such rivers in the United States that could become healthy again with proper management and restoration.

The Illinois River is one of a small number of world-class river floodplain ecosystems; where biological productivity is enhanced by annual flood pulses that advance and retreat over the floodplain and temporarily expand backwaters and floodplain lakes. A 1995 report by the U.S. Department of the Interior lists large streams and rivers as an endangered ecosystem in the United States, with a documented 85-98% decline in this ecosystem since European settlement. The National Research Council considered this ecosystem type to be of the highest priority for aquatic restoration, and went on to name the Illinois River as one of three large river floodplain ecosystems in the United States with sufficient ecological integrity to make them priorities for restoration.

The Illinois Chapter of TNC has been actively working on the Illinois River since 1992, developing an integrated portfolio of conservation sites and recognizing early on that institutional support at the governmental level would be necessary to succeed in conservation at this scale. TNC has been instrumental in the formation of the Illinois River Valley Partnership. The partnership includes representatives from state and federal agencies and business leaders and representative stakeholders from throughout Illinois. In 1995, the partnership recognized 15 Model Projects and Model Approaches to conservation in the Illinois River Valley. Additionally, in 1997, the partnership unveiled the Illinois River Integrated Management Plan (IRIMP), a comprehensive, ecosystem restoration plan developed by nearly 150 watershed residents. The IRIMP provides guidance for where and how groups such as TNC should work in order to conserve the natural environment of the Illinois River Ecosystem. Among TNC's highest priority projects is the Spunky Bottoms Preserve. This parcel is intended to test hypotheses and develop

Spunky Bottoms Ecosystem Restoration

and export best practices for floodplain restoration. This information can be used at similar sites within the river valley.

For years, the State of Illinois and other agencies have been engaged in activities that clearly demonstrate the institutional, public, and technical recognition of the resources of the Illinois River Basin. Table 2-6 summarizes the institutional, public and technical significance of the Illinois River Basin.

Table 2-6. Summary of Institutional, public and technical significance of the Illinois River Basin.

Institutional, Public and Technical Significance	
WRDA 96 declared the Illinois, as part of the Upper Mississippi River as a nationally significant navigation and ecological resource	81% of the fall waterfowl migration in the Mississippi Flyway utilize the Illinois River. 40% of North American migratory birds use the flyway.
National Academy of Science named the Illinois River 1 of 3 rivers with restorable flood pulse and floodplain	Provides water supply to 15% of the Basins population of 12 million people
Department of Interior listed Illinois River type large ecosystems as endanger due to fragmentation (1995)	The Illinois Waterway is one of the National’s busiest inland waterways, that link the Great Lakes to the Gulf of Mexico
The Illinois River remains one of a handful of world class floodplain river ecosystems globally (TNC 1998)	Of the Nation’s 35 RAMSAR Designations, 2 are in the Illinois River Basin. Sue and We Dixon Waterfowl Refuge at Hennepin Hopper Lakes and the Emiquon Complex
The Illinois River Basin supports 115 species of fish, 300 species of birds, 50 mammals, 45 amphibians & reptiles, and 35 mussels including numerous state listed species and 13 Federal threatened and endangered species	Of the 41 sites that are part of the USDA-NRCS Upper Mississippi River Basin Initiative, 3 are in the Illinois River Basin including Vermillion River, Middle Illinois River, and Upper Illinois River.

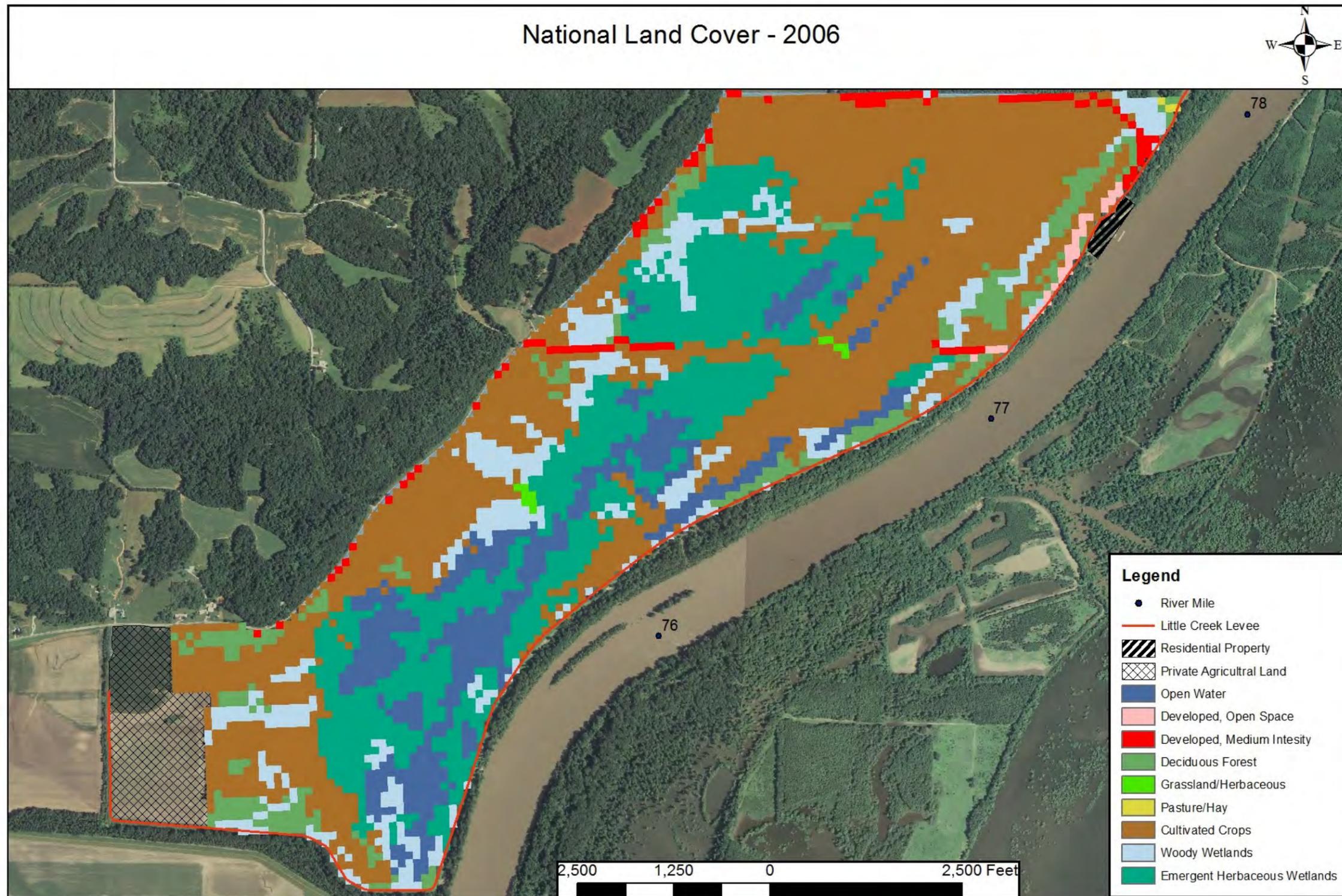


Figure 2-5. National Land Cover Database 2006 for spunky Bottoms Project Area.

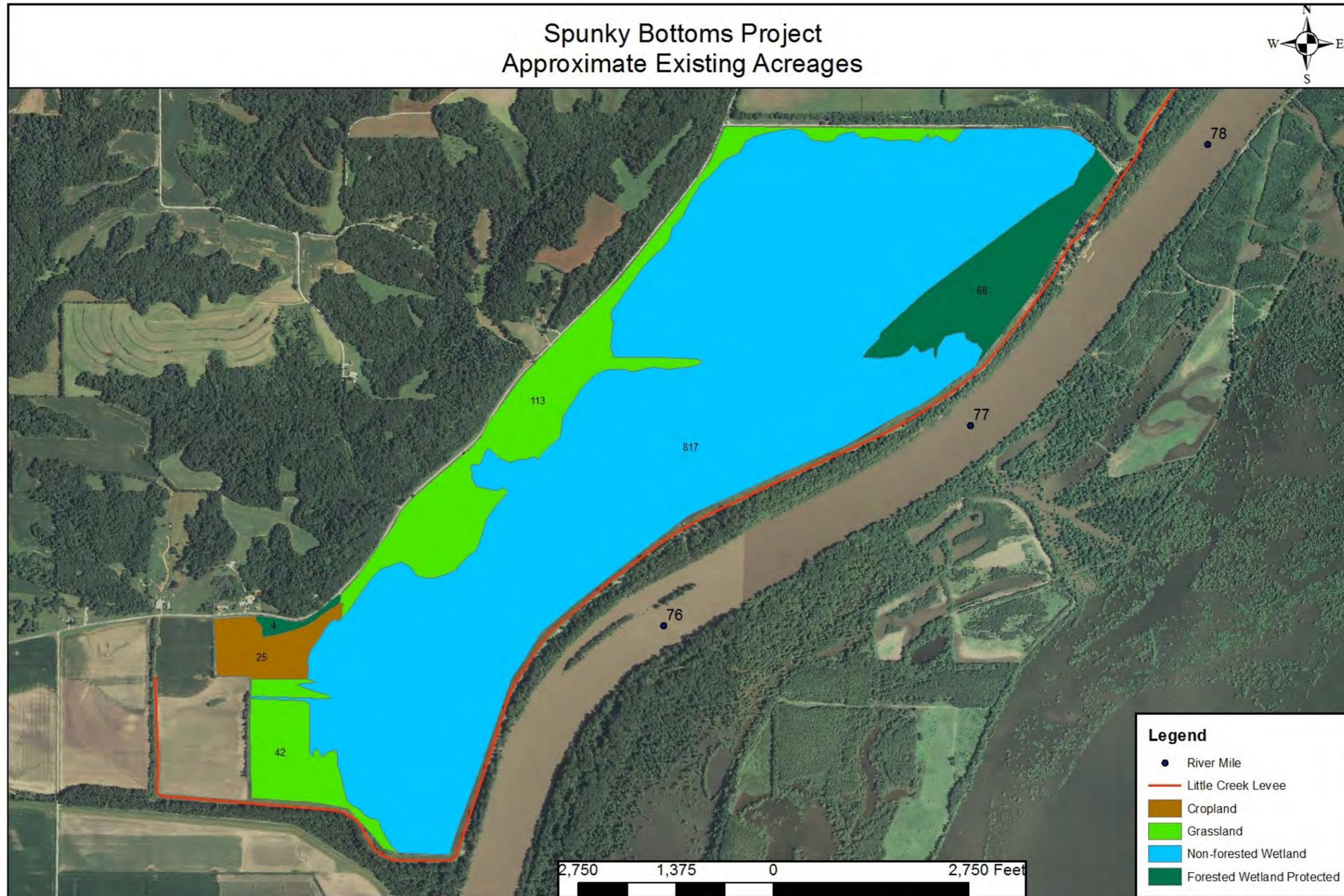


Figure 2-6. Approximate acreages of habitat types for Spunky Bottoms Project Area.

Spunky Bottoms Ecosystem Restoration

2.3.1. Floodplain Habitat. The study site is in the floodplain area of the Illinois River. Vegetation is generally characterized as floodplain forest and a variety of wetlands in areas where historic forest and wetlands have not been converted to agricultural lands. The Illinois River was historically a vast floodplain lowland area dominated by numerous channels, oxbow lakes, marshes, meadows, ephemeral wetlands, and willow and cottonwood stands. Species composition within the project area was dictated by the hydrology and elevation of the area. Bottomland forest was composed of early succession species such as willow, cottonwood, sycamore and silver maple on newly deposited soil surfaces near the Illinois River, Little Creek, and Camp Creek. Floodplain forest consisting predominantly of elm, cottonwood, box elder, oak, and pecan existed on larger areas of higher floodplains.

Floodplain forests are declining in the Mississippi and Illinois River floodplains due to agricultural and urban development, alteration of natural riverine flood pulses, rising water tables, and island loss due to wind and wave action (USGS 1999). The physical processes of the river, which would normally play a major role in shaping floodplain forest composition and diversity, have been altered through navigation improvements and levee construction (UMRCC 2002).

The Illinois River was a highly productive and diverse riparian ecosystem. Levee systems along the river first began in the early 1900s and were followed by the dam system along the Illinois River, which altered the natural hydrologic regime and thereby the riparian vegetation that it sustained. Further draining and clearing of the floodplain wetland areas continued throughout the 1900s and converted to agricultural.

Currently, the vast majority of the floodplain is in agricultural land uses. There are wildlife areas preserved along the Illinois River that are still productive wetlands including the Emiquon Preserve upstream and the Meredosia National Wildlife Refuge just across the river from Spunky Bottoms; however, there are no parks, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, research sites, etc. in the project area.

To aid in understanding the floodplain habitat, Light Detection and Ranging (LiDAR) data were collected to display rough estimates of elevations across the project area. Figure 2-7 below shows the existing elevations of the site. Areas shaded in blue are at an elevation of 430 feet NGVD and below. The portions below 430 feet NGVD on the TNC property are currently being managed at that elevation. The areas below 430 feet NGVD on the IDNR property become inundated from backflooding from the pump or flow from the TNC property.

Spunky Bottoms Elevation

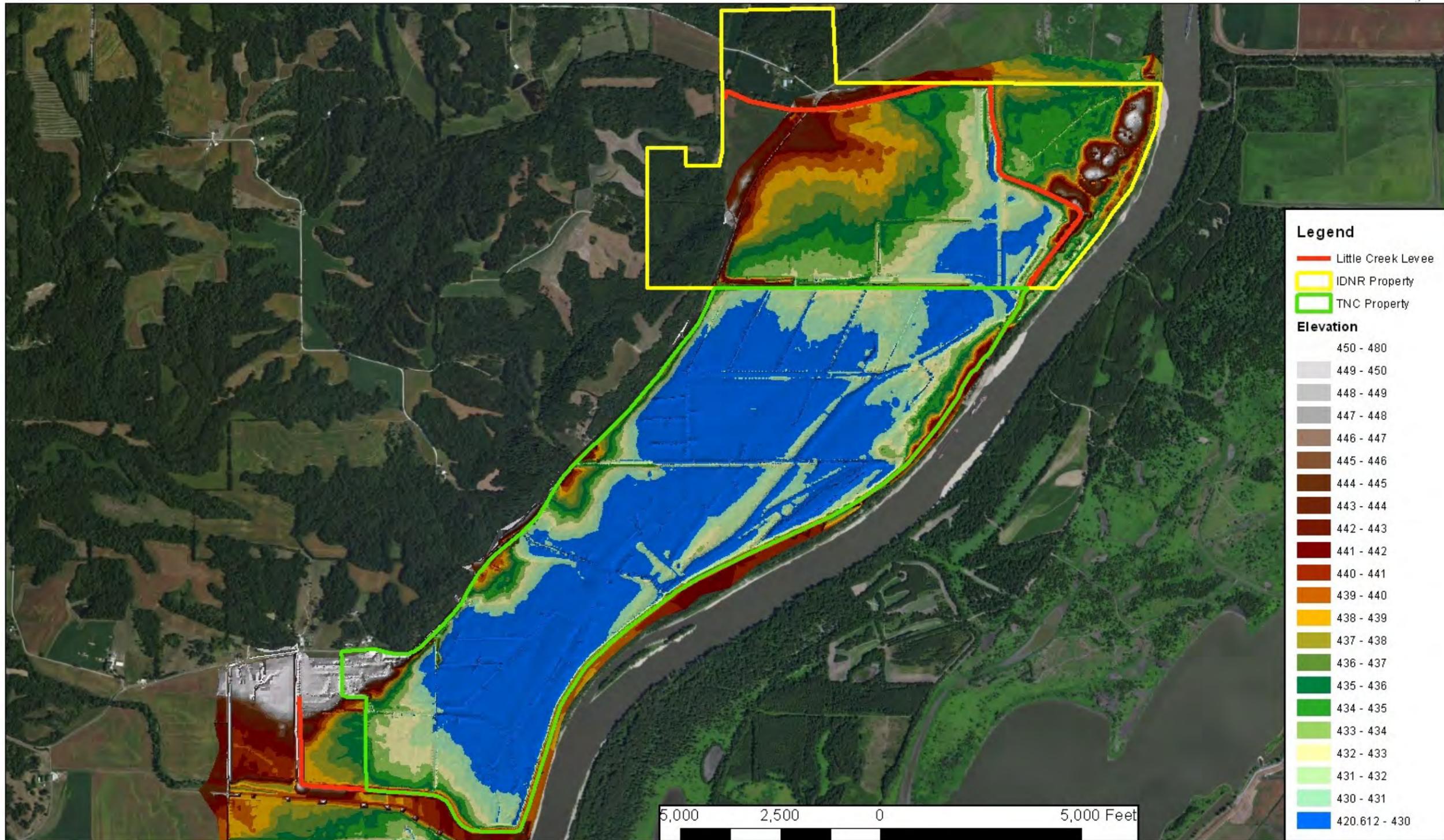


Figure 2-7. LiDAR elevations for Spunky Bottoms Project.

Spunky Bottoms Ecosystem Restoration

Illinois plants of concern – Numerous plant species are on the IDNR’s Checklist of Endangered and Threatened Animals and Plants of Illinois for Brown County as listed by the Illinois Natural Heritage Program (INHP) (Table 2-7). Site managers provided input on species that occurred on the site and could be disturbed. These are discussed below. More specific information about the other listed species can be found on the INHP website (IDNR 2011). Species on the INHP list are classified as State endangered (LE) or listed as State threatened (LT).

Table 2-7. Plants listed on the Illinois Natural Heritage Program (INHP) 2011 Species of Conservation Concern for Brown County.

INHP Code	Federal Status	Common Name	Scientific Name
LT	Threatened	Decurrent False Aster ^{1,2,3}	<i>Boltonia decurrens</i>
LT		Drooping Sedge ³	<i>Carex prasina</i>
LE		Ground Pine ³	<i>Lycopodium dendroideum</i>
LT		Bunchflower ³	<i>Melanthium virginicum</i>
LE		Wolf’s Bluegrass ³	<i>Poa wolfii</i>
LT		Bulrush ³	<i>Scirpus polyphyllus</i>
LT		Buffalo Clover ³	<i>Trifolium reflexum</i>
Not listed	Threatened	Eastern Prairie Fringed Orchid ³	<i>Platanthaera leucophaea</i>
¹ Species that occur or may occur in the project area			
² Species that may be affected by the project			
³ Species listed as potentially occurring in Brown County and of importance by the State of Illinois			

Decurrent False Aster (*Boltonia decurrens*) is presently known from scattered localities on the floodplains of the Illinois River and Mississippi River from its confluence with the Missouri River south to Madison County, Illinois (USFWS 1990). Its natural habitat was lake shores and stream banks. It appears to require abundant light and periodic flooding to remove competitors. Populations presently grow in natural habitat, but are more common in disturbed lowland areas where they appear to be dependent on human activity for survival (USFWS 1990).

Drooping Sedge (*Carex prasina*), a State threatened plant, is found in shaded, seeping ravine bottoms in deciduous or mixed woods. Blooming occurs early May through early June; fruiting occurs early June through early September. The optimal identification period for this species is early June through late July (WiDNR 2009).

Ground Pine (*Lycopodium dendroideum*) is able to tolerate a range of light conditions. Most sites are described as being in non-forested microsites; however, some sites have a significant high shrub cover and have been described as well-shaded. According to Lellinger (1985), the species is easily damaged by physical disturbance. The primary threat to the ground pine includes timber harvest and recreational activities that might lead to trampling (WaDNR 2000).

Bunchflower (*Melanthium virginicum*) has been found in a variety of wet woods, low thickets, meadows, swales, and savannas. The main threat appears to be overshadowing by woody species as a result of succession. In certain states such as Ohio, the recovery potential has been listed as poor due to the limited amount of habitat remaining.

Spunky Bottoms Ecosystem Restoration

Wolf's Bluegrass (*Poa wolfii*), commonly referred to as meadow bluegrass, is a perennial graminoid that currently occurs in woods along streams, rocky wooded slopes, and prairie patches.

Bulrush (*Scirpus polyphyllus*), also commonly known as leafy bulrush or leafy wool grass, is a perennial sedge that occurs in the eastern United States. It is found in floodplain forests, seep springs, swamps, and marshes. It reaches its western range limit in Illinois where it occurs in open forested seeps. Primary threats to this species include woody encroachment in seep springs which reduce the water table and out compete and overshadow herbaceous vegetation (Corbin and White 1978).

Buffalo Clover (*Trifolium reflexum*) is closely related to the Federally protected species Running Buffalo Clover (*Trifolium stoloniferum*). Buffalo clover occurs in rocky open woods and prairies usually associated with acidic soils. Current hazards to buffalo clover include overshadowing as a result of shading and woodland grazing. Recovery of buffalo clover has shown some promise as it responds positively to fire and burning programs may increase populations of buffalo clover (ODNR 1993).

Eastern Prairie Fringed Orchid (*Platanthaera leucophaea*) is presently known to occur in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges and even bogs. It requires full sun for optimum growth and flowering and a grassy habitat with little or no woody encroachment (USFWS 2005). Historic and current declines are primarily due to habitat loss. Historic declines were mainly due to conversion of natural habitats to cropland and pasture and current declines are mainly due to drainage and development of wetlands. Other reasons include succession to woody vegetation, competition from non-native species and over-collection (USFWS 2005).

2.3.2. Wetlands Reserve Program

Most of Spunky Bottoms has been cleared and farmed for at least 60 years and the soils are very poorly to poorly drained as one nears the Illinois River. Soils developed on the natural terraces and alluvial fans are slightly better drained and have a lower clay content. Alluvial fans are wedge-shaped in profile and range up to at least 8 meters thick. They consist of silt and silt loam principally derived from loess re-deposited from upland landscapes.

National Farmland Protection Policy Act requires USACE to identify and consider the effects of USACE programs on the conversion of farmland to non-agriculture uses. Critical factors in the designation of floodplain soils as prime farmland are flood protection and drainage. Many floodplain soils must be artificially drained and protected from flooding before an actual prime farmland designation can be established.

In 1921, the landowners in the bottomlands between Little Creek and Camp Creek formed the Little Creek D&LD. Despite the initial attempts at drainage, the lowland in the District was not successfully drained until the 1960s.

In 1999, the Nature Conservancy has enrolled much of its current land in the Wetlands Reserve Program (WRP). Out of the 1,195 acres that TNC own, 972 acres are enrolled in WRP. The areas excluded from WRP include the 38 acres acquired in 2002, 169.76 acres along the levee,

Spunky Bottoms Ecosystem Restoration

13.85 in rights-of-way, and 1.0 around the pump house. Figure 2-8 below shows the approximate area of the lands enrolled in WRP. The Wetlands Reserve Program is a national, voluntary program that provides technical and financial assistance to help landowners with wetland restoration efforts. Lands generally eligible under WRP include wetlands farmed under natural conditions, farmed wetlands, prior converted cropland and farmed wetland pasture. Lands enrolled in WRP are designed to improve watershed health, vitality of agricultural lands, and the aesthetics and economics of local communities. The WRP is overseen by the Natural Resources Conservation Service (NRCS). The 972 acres enrolled in WRP on the TNC property is under a 30-year easement that was signed into contract in 1999. As of 2013, an additional 16 years remain on the NRCS contract. Specific rights, obligations, and restrictions are outlined in the easement. TNC maintains rights in accordance with quiet enjoyment, control of access, recreational uses, and subsurface resources.

Unless authorized as a compatible use, the following prohibitions are restricted on the easement:

1. haying, mowing or seed harvesting;
2. altering of grassland, woodland, wildlife habitat by burning, digging, plowing, disking, cutting or otherwise destroying vegetative cover;
3. dumping refuse, wastes, sewage or other debris;
4. harvesting wood products;
5. draining, dredging, channeling, filling, leveling, pumping, diking, impounding or related activities as well as altering or tampering with water control structures or devices;
6. diverting or causing or permitting the diversion of surface or underground water into, within or out of the easement area by any means;
7. building or placing buildings or structures on the easement area;
8. planting or harvesting any crop; and,
9. grazing or allowing livestock on the easement area

Any work proposed within the WRP easement area will require coordination with NRCS and a Compatible Use Agreement between the non-Federal sponsor and NRCS. NRCS has provided a letter that is included in Appendix G that states that the potential project features addressed in this report if properly installed, operated and maintained could meet the requirements for an authorized compatible use.

Spunky Bottoms Ecosystem Restoration

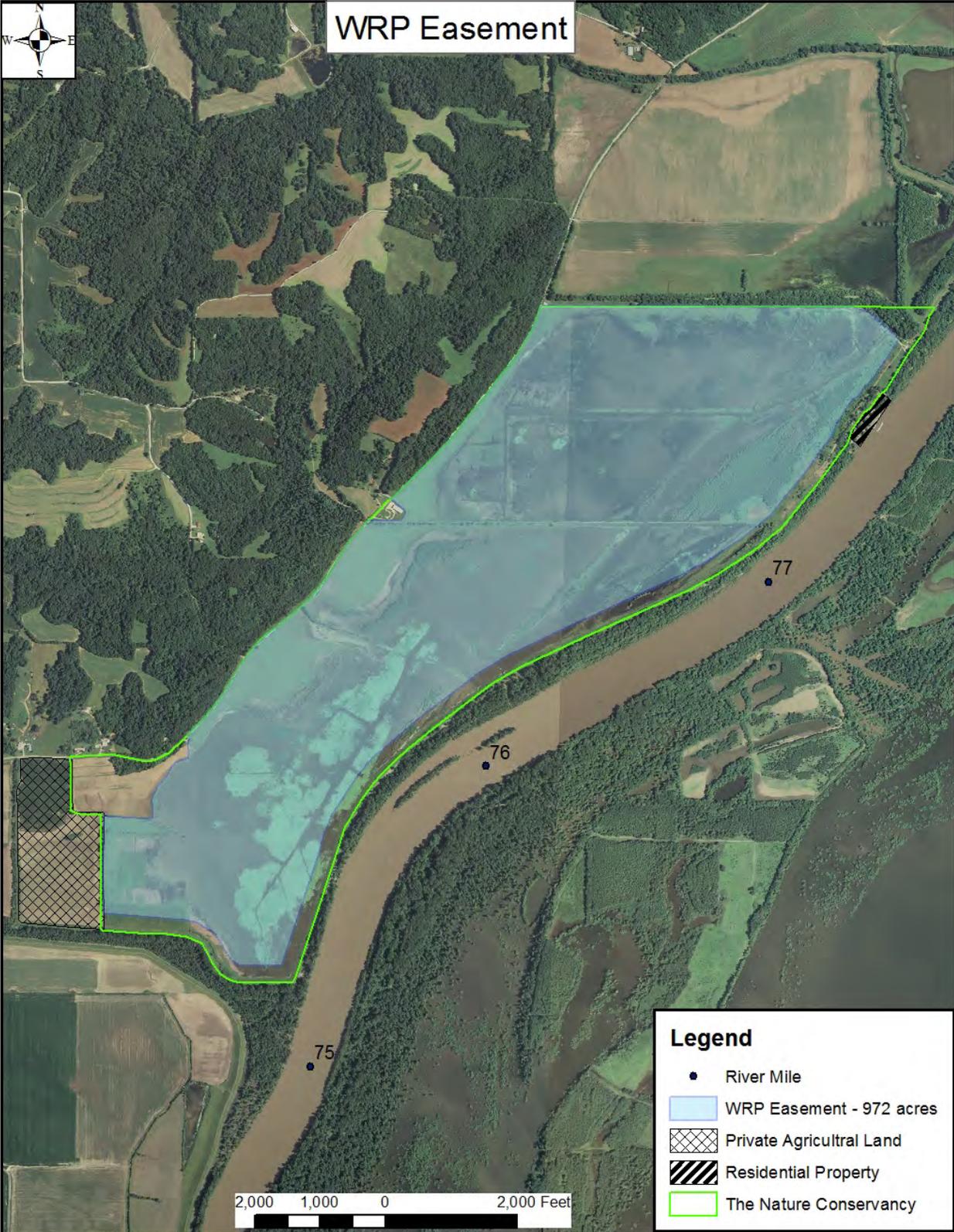


Figure 2-8. Approximate location of the 972 acres of WRP Easement at Spunky Bottoms.

2.3.3. Geology and Soils. Alluvial fans from bluff runoff historically occurred on the north and south portions of the site. The bluff drainage has been intercepted and collected in ditches. The central area of the site is depressed and generally wet. Figure 2-9 shows the current soil data derived from 2006 NRCS data. The soils data would be used in conjunction with any boring data to determine locations of suitable borrow for construction of project features.

Four soil borings were taken along the southern portion of the levee to identify soil stratigraphy and corresponding strengths. The boring logs are included in Appendix D. Bearing capacity is estimated at 1100 pounds per square foot and will be further evaluated upon analysis of unconfined test data. TNC provided logs for shallow borings that had been taken throughout the interior of the levee system. These logs generally indicate twelve to fifteen feet of silty-clays overlying coarse sands, with some encountering refusal at depths as shallow as fifteen to twenty feet.

2.3.4. Wildlife. The Illinois River valley is a major migration corridor for waterfowl. A survey conducted by the Illinois Natural History Survey (INHS) in the fall of 1994 found that 81% of the fall waterfowl migration in the Mississippi flyway used the Illinois River. Many terrestrial species have home ranges that encompass a variety of habitats. Survival of individuals can be affected by their ability to move between habitat types. In many cases, habitat fragmentation has reduced these species' ability to move from one habitat to another. Riparian corridors are vital to the successful migration of Neotropical birds and other organisms. In addition, habitat connectivity helps small populations (such as endangered species) maintain demographic and genetic integrity and reduces habitat fragmentation. A mosaic of habitat types (proposed project restoration plan) provides a richer, more continuous food source for mobile fauna and allows a diversity of organisms representing different trophic levels to coexist in a single site.

The restoration of native plant communities that were characteristic of the Illinois River floodplain would produce the habitat that would in turn allow other endemic species to re-colonize the site. The expectation is that several state-listed endangered or threatened species and other wildlife would use this restored habitat such as the great egret, osprey, Forster's tern, Bewick's wren, upland sandpiper, Henslow's sparrow, American bittern, northern harrier, black tern, little blue heron, least bittern, short-eared owl, common tern, sandhill crane, sharp-shinned hawk, Wilson's phalarope, yellow rail, black rail, yellow-headed blackbird, double-crested cormorant, Pied-billed grebe, brown creeper, veery, common moorhen, bald eagle, black-crowned night heron, and the Indiana bat. The river otter, currently listed as imperiled by the Illinois Wildlife Action Plan, was reintroduced on the La Moine River just north of the project area and could be expected to use the restored wetland on the site (TNC, Illinois Chapter, 1999). The diversity of the project features would restore many of the area's natural floodplain functions and values and also benefits many species of shorebirds, wading birds, raptors, songbirds, mammals, reptiles, amphibians, invertebrates, and fish. The elevation gradient of the project area would produce a diverse mix of native hydrophytic and mesophytic vegetation.

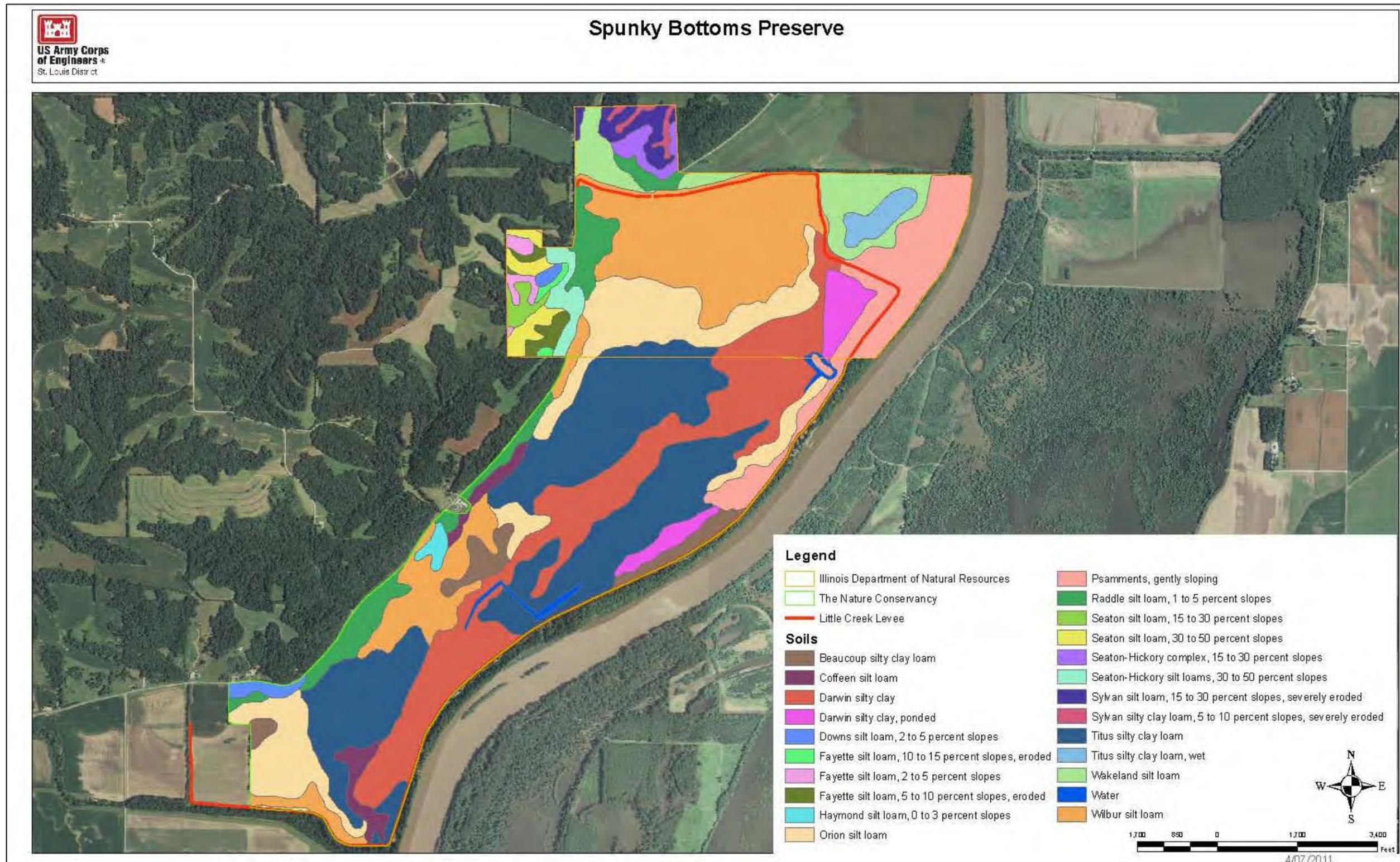


Figure 2-9. Soils data for Spunky Bottoms Project from the Natural Resources Conservation Service Soil Survey geographic database.

Spunky Bottoms Ecosystem Restoration

Illinois Wildlife of Concern - Numerous wildlife species are on the IDNR Checklist of Endangered and Threatened Animals and Plants of Illinois for Brown County (Table 2-8). The non-Federal sponsor has added additional species that are of importance to the area. Species on the Checklist are listed as State endangered (LE) or listed as State threatened (LT). In addition certain species are listed in Illinois Species in Greatest Need of Conservation as listed on the Illinois Department of Natural Resources Wildlife Action Plan. Species from the Wildlife Plan are designated by S1 – Critically Imperiled, S2 – Imperiled, S3 – Vulnerable, S4 – Apparently Secure, and S5 – Secure.

Federally listed species are discussed in the Biological Assessment, Section 9.24. Information about the other species listed below can be found on the Illinois Natural Heritage Program website (INDR 2011).

Table 2-8. Animals listed on the Illinois Natural Heritage Program 2010 Checklist of Endangered and Threatened Animals and Plants of Illinois and Illinois Wildlife Action Plan.

IDNR Checklist Code	Wildlife Action Plan Code	Common Name	Scientific Name
Birds			
LT	S2	Henslow's Sparrow ²	<i>Ammodramus henslowii</i>
LT	S3	Cerulean Warbler	<i>Dendroica cerulean</i>
LT	S2	Bald Eagle ^{1,2}	<i>Haliaeetus leucocephalus</i>
LT	S2	Least Bittern ^{2,3}	<i>Ixobrychus exilis</i>
LE	S2	King Rail ^{2,3}	<i>Rallus elegans</i>
Fishes			
LT	S2	Starhead Topminnow ²	<i>Fundulus dispar</i>

¹ Species are Federally protected

³ Species that may be affected by the project

² Species that occur or may occur in or near the project area

2.3.5. Aquatic Resources. The Illinois River system is home to approximately 115 fish species, 95% of which are native species. Mussel diversity is similarly high, with approximately 35 mussel species, representing 12% of the freshwater mussels found in North America. Many of these species require both riverine and backwater (floodplain) habitat as part of their life cycle. A group of aquatic organisms that is particularly representative of the Illinois River is the "Ancient Fishes" such as paddlefish (*Polyodon spathula*). While few of the ancient fishes found in the Illinois River watershed are threatened or endangered, they do represent several taxonomic families that are of special importance in the context of aquatic conservation. Today, the paddlefish is the sole representative of the family Polyodontidae in North America and is commonly sought after as a sport fish. The gar family (Lepisosteidae) is restricted to North and Central America, while the bowfin family (Amiidae) is represented by only one species, *Amia calva*, a fish which is regularly found in the Illinois River. The majority of these fish are migratory by nature. Paddlefish migrate upstream prior to spawning over gravel beds. Female American eels (*Anguilla rostrata*) migrate to mainland streams, including the Illinois River, from their spawning grounds off the coast of Cuba. They return to tributaries for several years before becoming sexually mature and traveling back to the ocean to spawn. The ancient fish utilize a diversity of river habitats, flowing channel habitats, side channels, and backwater areas.

Spunky Bottoms Ecosystem Restoration

In 2009, the INHS completed a study entitled “Establishment of Historic Fish Communities to Restored Illinois River Floodplain Lakes”. This study included evaluations of specific backwater areas including Spunky Bottoms and conducted specific stockings in an attempt to reintroduce native fishes to these backwaters. INHS initially deemed the area of medium quality habitat and focused on stocking fishes that would survive this habitat and potentially help control the Common carp (*Cyprinus carpio*) population.

A total of 17 species and 2,359 individuals were stocked throughout 2007, 2008, and 2009. During surveys in 2008 and 2009, only four of the initial 17 species were detected. This is likely due to the low numbers that were stocked initially, and would take some time before spawning could occur and higher numbers of individuals could be detected. INHS deemed the stockings a success and with improved water quality and reduced sedimentation by restoring more natural ecological processes and habitats it is likely other populations would begin to improve as well. INHS is currently continuing surveys, but data were not available at the time of this report.

The project area currently contains wetlands, vegetated shallows, and few mud flats. The low water levels generally experienced in midsummer exposes additional mudflats where the soils are stabilized by drying and compaction and colonized by moist soil plants that provide habitat for many wetland species as well as food for migratory wildlife when the area is again flooded during fall migration. The processes of decomposition and nutrient recycling would be accelerated in the moist but well-oxygenated environment of the floodplain, in contrast to the oxygen-depleted sediments of the now permanently flooded areas.

Historically, the Spunky Bottoms project area contained a variety of backwater lakes and sloughs. Currently, no remaining direct connections between the Illinois River and the backwater areas exist within the project area. Water from the Illinois River can only enter the project area via overtopping the levee. Additional water enters the project area from runoff within the watershed. Larger historic water features identifiable from the 1904 Woerman maps within the project area overlaid over current aerial photography are described below and shown in Figure 2-10. The historic water bodies have changed greatly over the years and currently in their place is a larger, shallower wetland/lake complex:

- Long Lake was approximately 30.2 acres with a direct connection to the Illinois River. A similar river connection is sought with the project alternatives.
- Elbow Lake was approximately 22.9 acres and located just north of Long Lake.
- Perkins Lake is the largest within the project area at approximately 156.4 acres. It also contained a direct connection with the Illinois River to allow a smooth transition from the Illinois River to the backwater lake.
- Unnamed Slough #1 was a 4.9 acre narrow, linear waterway that extends from Elbow Lake northward for approximately 4,600 linear feet.
- Unnamed Slough #2 was approximately 3.7 acres and 1,700 linear feet.
- Unnamed Slough #3 was a 3.6 acre backwater slough extending nearly 1,300 linear feet.
- Unnamed Slough #4 was 4.6 acres and extended 2,600 linear feet towards Perkins Lake.

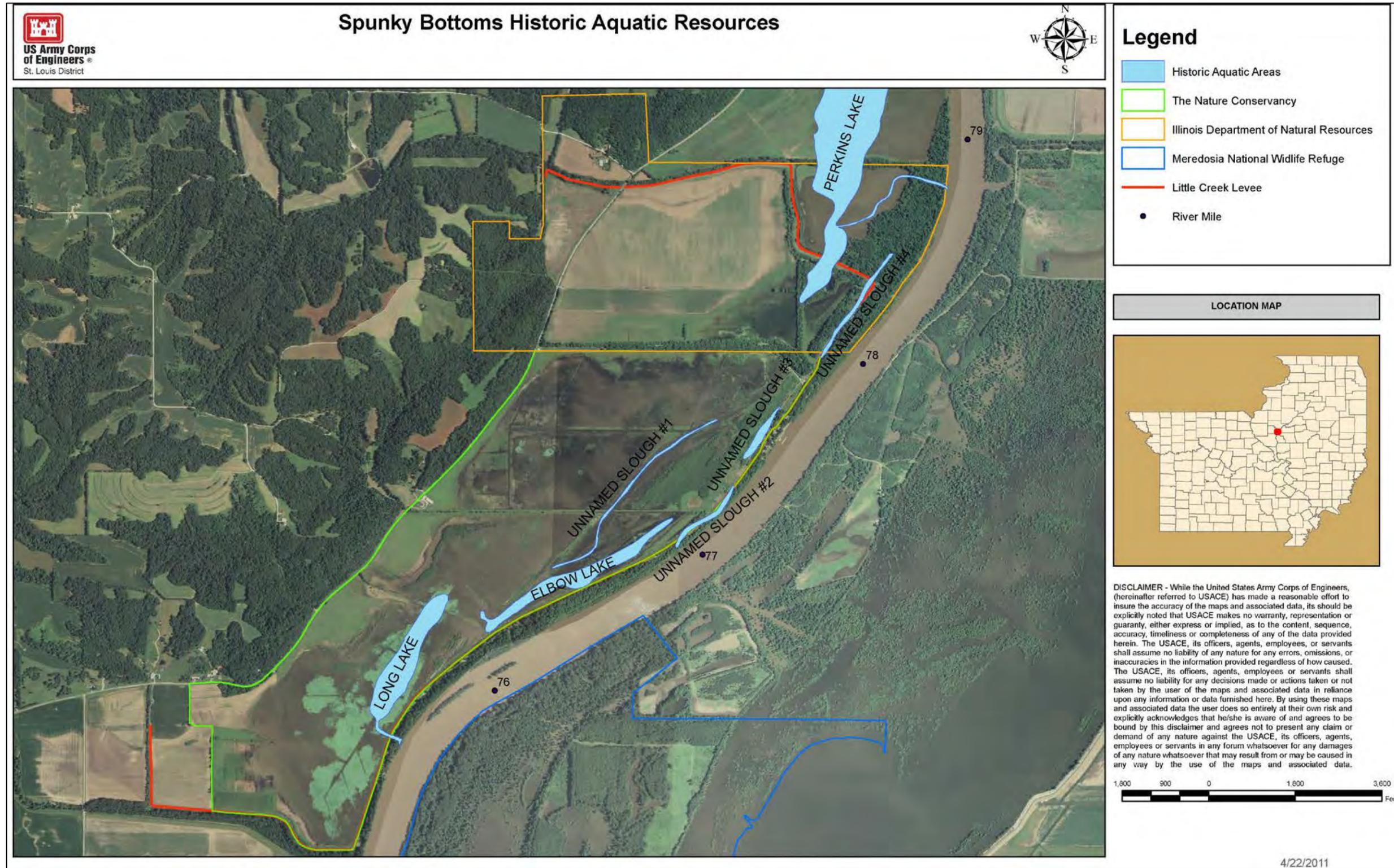


Figure 2-10. Historic water bodies within and adjacent to the Spunky Bottoms project area.

Spunky Bottoms Ecosystem Restoration

2.3.6. Water Quality. The water quality of the Illinois River has been degraded by heavy loads of suspended sediment, and high levels of organic matter that exert a high biological oxygen demand. These conditions lead to periods of low dissolved oxygen in the water. Although water quality has improved along the Illinois River in recent years, most of the river is listed as “Water Quality Impaired” by the Illinois Environmental Protection Agency (Clean Water Act Section 303 (d) List: Illinois’ Submittal for 1998 (April 1,1998)). Water samples taken from the small tributaries that flow into the project area and sample wells indicated a high nitrate concentration. This nitrate concentration detected was likely due to the runoff from a nearby hog farm.

Increased turbidity often smothers fish eggs, larvae, and benthic invertebrates, clogs the gills of delicate fry, and prohibits visual predation, mate location, and parental care. Additionally, the opacity of the water could prevent photosynthesis by submerged aquatic vegetation, resulting in plant death and decreased dissolved oxygen levels, leading to further fish kills. At this time, suspended particulate and turbidity levels within TNC’s open water and wetland project areas are relatively low but have been increasing since restoration began due to lack of connection to the open river. TNC's restoration efforts are improving the wetland complex, but are limited without a reconnection to the river.

2.3.7. Fisheries. The Illinois River and its backwater lakes were once one of the most productive inland, commercial fisheries in the United States (TNC 1999). In 1908, commercial fishing on the river peaked with nearly 25 million pounds of fish harvested from the river. Pollution and loss of essential habitats have greatly reduced the annual commercial fish harvest to only 1 million pounds, although sport fishing has recovered somewhat in recent years (TNC 1999).

Illinois fish of concern – Only one fish is listed on the INHP 2011 Species of Conservation Concern List for Brown County (Table 2-9). TNC and IDNR staff have added additional species that may be impacted by the project, but are not listed for the by the INHP for Brown County, including paddlefish, weed shiner and blacknose shiner. Species on the Checklist are listed as State endangered (LE) or listed as State threatened (LT). The additional species are identified in the Illinois Wildlife Aciton Plan. Species from the Wildlife Plan are designated by S1 – Critically Imperiled, S2 – Imperiled, S3 – Vulnerable, S4 – Apparently Secure, and S5 – Secure.

Species which may be affected by the project are discussed below. Information about the other listed species can be found on the INHP website (IDNR 2011).

Table 2-9. The fish listed on the Illinois Natural Heritage Program (INHP) 2011 Species of Conservation Concern List.

Illinois State Status	Wildlife Plan	Common Name	Scientific Name
LT	S2	Starhead Topminnow ²	<i>Fundulus dispar</i>
	S2	Paddlefish ^{1,2}	<i>Polydon spathula</i>
	S1	Weed Shiner ^{1,2}	<i>Notropis texanus</i>
	S2	Blacknose Shiner ^{1,2}	<i>Notropis heterolepis</i>

¹Species that may be affected by the project

²Species found adjacent to the project area

Spunky Bottoms Ecosystem Restoration

Starhead Topminnow – Extensive drainage of wetlands and alteration of vegetated backwaters have caused declines in the range and abundance of the starhead topminnow (Taylor and Burr 1997). The last observed record of the starhead topminnow in Brown County occurred in 1927. Little research has been conducted on the ecology of the starhead minnow, but it is believed that this species prefers swamps, marshes, well-vegetated ponds and lakes, and small streams (Wiley 1980) and feeds heavily on terrestrial insects at the surface of water (Forbes and Richardson 1920).

Paddlefish – The paddlefish occurs in channels of large rivers, marginal lakes, and bayous. It is evidently strongly migratory with specimens on rare occasions ascending rivers of small to moderate size. According to Forbes and Richardson (1908:17), it prefers pools in the river and backwater areas, where it swims with mouth wide open for a time, moving its head and snout alternately to right and left while engulfing enormous quantities of water. The extensive food studies of Forbes, summarized in Forbes and Richardson (1908), reveal that planktonic organisms comprise virtually the entire diet of the paddlefish. The paddlefish is regularly taken in large rivers of the State but is much less common than formerly. Forbes and Richardson (1908) noted that it was “sparingly” represented in their collections and that it had already become rare in the Illinois River.

Blacknose Shiner – The blacknose shiner is disappearing in many parts of its range. In Illinois it occurs in some of the clear, well-vegetated glacial lakes and in a few of the clear, sand-bottomed streams. Its decimation is primarily due to siltation, and it has been unable to exist in highly turbid waters with silty bottoms and in waters that lack aquatic vegetation. The species formerly occurred throughout the northern two-thirds of the state and was probably common in the prairie swales and natural lakes before they were drained. Outside of the glacial lakes it is extremely sporadic and uncommon.

Weed Shiner – The weed shiner is most common in sand-bottomed creeks with some submerged aquatic vegetation. Outside Illinois it is also known to occupy sloughs and large rivers such as the Mississippi. The weed shiner is extremely rare everywhere in Illinois except in some tributaries of the Kankakee River in Kankakee and Iroquois counties. It was evidently more widespread in northern and central Illinois in the last century but probably never was an abundant minnow in Illinois. The principal likely reasons for its decline are siltation and the general deterioration of water quality.

2.4. Hazardous, Toxic and Radioactive Waste. In accordance with the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), an initial Phase I Environmental Assessment was conducted for the non-Federal sponsor property in 2001 and 2002 with updated survey conducted in 2011 over the entire TNC property. Appendix H contains the initial Phase I Environmental Assessment and the Supplemental that occurred in 2011. Three recognized environmental conditions were found in the initial assessment. Two pump stations and an aboveground storage tank (AST) located at the TNC pump house were identified as recognized environmental conditions.

Spunky Bottoms Ecosystem Restoration

An additional Phase I assessment was performed for the project lands that were acquired in 2002. Five recognized environmental conditions were found during the second assessment including an AST at the IDNR pump house, an underground storage tank (UST) within the IDNR pump house, three 55-gallon and four 30-gallon drums of unknown contents at the metal shed on the TNC site, a railroad tank car at the IDNR pump house, and dispensing of pesticides and/or herbicides within the immediate area of the farm site. The locations of the recognized environmental conditions are outside the project area; however, the non-Federal sponsor would be responsible for removal and remediation according to American Society for Testing and Materials (ASTM) and RCRA standards, as required. No evidence of overstressed vegetation or misuse of pesticides/herbicides was observed or documented for the project area.

An updated Phase I assessment was conducted in May of 2011, and no new sites were located in the survey.

In addition, a Phase II was conducted in 2003 at the two pump stations due to concerns from the Phase I assessment. Chemical analysis revealed low level concentrations of volatile, semi-volatile, pesticide and herbicide compounds, and total metals in the soil. The majority of the detected volatile, semi-volatile, pesticide and herbicide compounds were below the 2003 Tier 1 Tiered Approach Corrective Action Objective (TACO) with the exception of naphthalene, benzo (a) anthracene, benzo (b) flouranthene, benzo (a) pyrene, indeno (1,2,3-cd) pyrene, heptachlor epoxide and dieldrin. The concentrations of detected total metals were considered to be in the range of normal background concentrations with the exception of barium, beryllium, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, thallium, vanadium, and zinc. The Phase II assesment is located at the St. Louis District office.

The two pump stations with associated ASTs and UST pose the most concern and would require remediation by the non-Federal sponsor; however, these pump stations are outside the project area. The Environmental Site Assessments published in 2001, 2003 and 2011 describe these as significant environmental concerns; however, these sites do not pose immediate concerns to human life and health but are of most concern of the recognized environmental conditions.

2.5. Socioeconomic Resources and Human Use.

Brown County, Illinois is primarily rural. Recent population trends show Brown County gaining in population by 28.2% during the period of 1980-2010. For comparison purposes, during the same time period, the statewide growth was 12.3%. The county is becoming relatively more racially diverse with approximately 77% of the population Caucasian and the remaining 23% primarily African American. The population age distribution of Brown County shows that the majority of the population (47%) is in the primary working age class of between 16 and 65 years of age. The size and proportion of this age group decreased during the 1980 -2010 time period while the 5-17 years of age group declined in proportion. 36.7% of the County's population over 25 years of age is composed of high school graduates, down from nearly 70% in 1980.

The county area has experienced a declining unemployment rate from 1980-2010. The percentage of women in the work force has increased from 38.5% in 1980, to 41.8% in 1996, to 59.8% in 2010; conversely, the percentage of men in the work force decreased from 63.4% in 1980 to 58.2% in 1996, to 40.4% in 2010. Money incomes have risen overall (from a median

Spunky Bottoms Ecosystem Restoration

household income of \$11,826 in 1980, to \$26,510 in 1996, to \$42,014 in 2010), and the number of persons with incomes below the poverty level has decreased. The number of persons with incomes below the poverty level is 12.1%.

The percentages of the work force employed in selected industries in 1980 for Brown County were 21% for agriculture, 16.5% for government, 14.5% for manufacturing, 20.1% for wholesale/retail, and 27.9% for other industry and services. In 2010, that distribution had changed significantly: 9% for agriculture, 11.1% for government, 6.8% for manufacturing, 22.8% for wholesale/retail, and 4.2% for other industry and services. Brown County has experienced significant decreases in employment in each of those industries, with the only growing industry being wholesale/retail trade.

The average size of farms has grown over the 1978-1997 period, while the number of farms (531 in 1978 to 377 in 1997) and the amount of acreage devoted to farming (165,000 acres in 1978 to 152,160 acres in 1997) has decreased. The average market value of agricultural products sold per farm has increased from \$42,500 in 1978 to \$69,152 in 1992. The predominant crops cultivated in Brown County are corn and soybeans.

Almost all of the leveed bottomland outside the project area is devoted to intensive row crop agriculture. Cropland north of the Little Creek D&LD is not protected from flooding by levees, while land south of the area is part of the 10,780-acre McGee Creek Drainage and Levee District.

The total number of housing units in the nearby areas has decreased slightly between 1980 (2,385 units), and 1990 (2,357 units), but saw an increase to 2,462 units in 2010. The median value of housing has increased over time, from \$25,500 in 1980, to \$30,600 in 1990, to \$80,000 in 2010; however, it is still low by national standards. Local revenues in Brown County changed from \$3,100,000 in 1976 to \$6,800,000 in 1992.

2.5.1. Public Access. Currently, Spunky Bottoms is open to the public for activities including, but not limited, to canoeing/kayaking, fishing, bird watching, hiking, and limited hunting opportunities. Public waterfowl hunting is allowed on the TNC property as well. No fee is charged for waterfowl hunting; however daily drawings are required to limit the number of hunters present on the site to increase safety and prevent overharvest. Fishing is not allowed during waterfowl hunt hours. Spunky Bottoms is a local attraction for the public to come and view an array of wildlife. Public access will not change into the future under current ownership.

3. PROBLEMS AND OBJECTIVES*

3.1. Problem Identification.

Nearly 50% of the Illinois River's floodplain has been disconnected from the river by levees built to protect farm and urban lands. On the other hand, 50% of the floodplain is still open to the river and the lock and dam system allows for free flow of the river during up to 60% of the year. These two factors have been essential to the survival of a relatively natural flood cycle and is the ultimate potential for recovery of this large river floodplain ecosystem. However, the locks and

Spunky Bottoms Ecosystem Restoration

dams prevent the river from experiencing summer low water that historically occurred prior to the installation of the navigation system.

Sedimentation has been accelerated due to human-made changes to the land such as intensive agricultural development, clearing native woodlands and prairies, draining wetlands, levee construction, channelization, and urban development. Sedimentation in the Illinois River basin has long been associated with agriculture, and many efforts have been made to reduce soil loss from farmland. Channelization and levee construction have also contributed to the sedimentation problem in the river and its backwaters. By disconnecting tributaries from the river's floodplain, a natural means of sediment deposition is lost, thus forcing more soil directly into the river. Similarly, by disconnecting the floodplain from the river, in-river sediment is unable to deposit on the floodplains and instead builds up in the river and remaining connected backwater areas. Sedimentation from urban development occurs in several ways - directly from construction sites that are not managed properly to control erosion, increased stormwater run-off, and decreased stormwater infiltration as a result of additional impervious surfaces. Sedimentation also occurs indirectly through increased hillside erosion caused by the suppression of fire along the bluffs due to increased residential development, agricultural and/or land use practices, and the increase of invasive (non-native) plants in the bluff woodlands.

An accelerated sedimentation process has a negative impact on habitats in several ways. It rapidly degrades aquatic habitats used by fish and other aquatic organisms (e.g., mussels, insects, reptiles, and amphibians), fills in backwater areas at a rate faster than the natural communities can respond, and degrades aquatic habitat conditions.

The altered hydrology of the area refers to the loss of the historic flood pulse regime such that there are more frequent non-spring floods and elimination of historic summer low water. Due to a variety of changes on the land and within the river valley, the rhythmic rise and fall of the Illinois River has been negatively impacted. Instead of a gradual rise through the winter leading to a spring flood followed by a gradual drop in water levels and a summer dry period, the river's flood cycle is now unpredictable and erratic. Major floods occur more often, summer floods are now common, and there is no longer a summer low-flow period when accumulated sediments can consolidate and dry in the sun.

A variety of changes have happened within the Illinois River valley to cause habitat loss. These include changes related to agriculture and urban development. Levees and channelization, as they relate to agriculture and urban development, and locks and dams have also contributed to loss of necessary habitat for many species. The impact of levees results in the loss of the connection between the floodplain and the river. This in turn results in lost floodplain habitat for fish and other aquatic animals, the disappearance of mudflat habitat for rare and endangered species like *Boltonia decurrens*, and lost habitat for floodplain communities. Operation of locks and dams contributes to habitat loss in more subtle, but no less serious ways. It inundates areas during the summer that would naturally be dry and causes fluctuations in water levels during the growing season, thus killing off plant populations before they are able to become well established.

Spunky Bottoms Ecosystem Restoration

The impact of degraded water quality on both the aquatic communities and the human population is well studied and its significance is recognized by the vast majority of people within the Illinois River watershed. Water quality is degraded by a variety of human activities, including agriculture and urban development. Impacts include direct discharge of toxic substances from industrial operations, increased nutrient levels and pesticides from agricultural run-off, and nutrients and toxics from municipal sewage treatment plants. Changes in water quality impact the aquatic community in various ways that lead to extirpation of fish and mussel species and other aquatic organisms from degraded areas.

The project area includes levees, drainage ditches and two pumping stations. The southern pump station is located on TNC property and has been decommissioned. The pump located near the northeast corner of TNC's property on IDNR property is currently operation. The newer power unit from the TNC pump station was transplanted into the IDNR pump house. In addition, the pump unit was recently overhauled to restore the performance of the pump house. When the TNC pump house was decommissioned, a drainage ditch plug was removed to allow water from the TNC property to be pump through the IDNR pump. These features have significantly impacted the distribution of water in time and space across the project area. These same structural features along with the construction of dams and water diversions, land use changes in the basin, and channelization of tributary streams have increased both the quantity of flow and elevation of Illinois River stages. As a result of the combined effects of these alterations, during the last 120 years of record at Valley City, 14 miles downstream of the project, both the minimum daily water surface elevation and the mean daily water elevation have risen 5 feet, and the peak water levels have increased 10 feet.

Prior to agricultural use, seasonal overbank flooding by the Illinois River would have inundated most of the eastern flood basins of the project area. Photographic evidence indicates the local flood basins were fed directly by the tributaries. Water would have been replenished with every substantial storm. Today, the two main tributaries, Little Creek and Camp Creek, are straightened, deepened, and flanked by lateral levees contiguous with the river. Little Creek is located north of the project area, Camp Creek is located at the south end of the project area between the flank levees of Little Creek Levee and McGee Creek Levee. Their alluvial fans no longer serve their natural function of sediment storage; rather, the sediment moves directly to the river. Three intermittent tributaries are channelized through drainage ditches beyond their alluvial fans to join a network of ditches that lead to the pumping station, and consequently the tributaries no longer percolate into the ground at the base of the bluff. The tributaries also no longer receive seasonal Illinois River flood waters. The effects of levee and ditch construction are enormous. Both the small tributary areas and the Illinois River control the elevation of the groundwater and surface water relative to Spunky Bottoms. Possibly more importantly, hydrology is controlled by direct precipitation, inflow from the bluff, and pumping.

Specifically, at Spunky Bottoms, the major resource problems include:

- Lack of floodplain connectivity
- Altered hydrology
- Degraded backwater habitat
- Sedimentation
- Invasive species

Spunky Bottoms Ecosystem Restoration

3.2. Opportunities. Opportunities exist to restore, improve, and increase ecosystem resources before they are lost within the project area. Improving the hydrology of the site will increase the reliability of seasonal food and cover for resident and migratory wetland wildlife as well as restore the site's hydrologic regime to a more natural state. Restoring floodplain connectivity will improve ecosystem structure (e.g., fish access to backwater habitat), and function (e.g., nutrient cycling) within the project area. These physical improvements would in turn restore the quality of the aquatic and wetland ecosystem in the area.

3.3. Goals and Objectives. Early on during the Section 1135 study, District team members met with The Wetlands Initiative, TNC and various agencies to discuss the goals and objectives to be established for the Spunky Bottoms Ecosystem Restoration Project. The output of that meeting was generally consistent with similar parameters established by TNC, INHS, Southern Illinois University and the USFWS. The overall project goals are to restore the quality and diversity of backwater wetland habitat along the Illinois River by restoring native plant and animal communities characteristic of the Illinois River floodplain and to restore floodplain connectivity from the Illinois River to a productive backwater area by reconnecting the river to the floodplain. Reconnection facilitates would restore many of the important ecological processes, especially flooding and drying, and provide access for aquatic organisms.

These goals would be achieved by:

- Restoring a more natural hydrograph of the Spunky Bottoms project area and Illinois River backwater to approximate pre-settlement conditions.
- Restoring native aquatic habitat and ecological processes.
- Increasing the presence of a reliable food source and quality habitat for migratory waterfowl, shorebirds, and other breeding birds.
- Improving water quality of the project area and local impacts to the Illinois River through processing of nutrients and sediments and reducing sediment resuspension.
- Restoring hydrologic river floodplain connectivity.
- Increasing quality fish spawning and nursery habitats within the Illinois River.
- Export biological productivity to river.
- Maximize sustainability of aquatic habitat.

Based on the identified problems, objectives, goals, and potential measures were developed by the interagency planning team during development of this ERR (Table 3-1).

Spunky Bottoms Ecosystem Restoration

Table 3-1. Goal, objectives and potential measures for the Spunky Bottoms Project.

Goals	Objectives	Potential Measures
1) Restore the quality and diversity of backwater wetland habitat along the IL River 2) Restore floodplain connectivity from the IL River to a productive backwater area, which serves as fish spawning grounds and a nutrient recharge to the river	Restore the natural hydrograph of the Spunky Bottoms Project/IL River backwater to approximate pre-settlement conditions	Install structure in levee to reconnect to Illinois River
	Restore native aquatic habitat and ecological processes	Build spillway with water control structure
	Provide substantial food sources and quality habitat for migratory waterfowl, shorebirds, and other breeding birds	Raise/restore berms
	Improve water quality through processing of nutrients and sediments and reducing sediment resuspension	Restore hydrology through wetland management units
	Restore hydrologic river floodplain connectivity	Replace/build new water control structures and use portable pumps
	Restore IL River fish spawning and nursery habitats	Restore prairie through wet meadow plantings
	Export biological productivity to river and maximize sustainability of aquatic habitat	

3.4. Planning Constraints. The following constraints were considered in plan formulation:

- Existing flood control for adjacent landowners must be maintained including private lands.
- Connection to the river must be in a controlled manner to reduce impacts to the existing levee system and other infrastructure.
- Any proposed reconnection structure should be conducive to fish passage to allow backwater use of Spunky Bottoms for Illinois River species.
- Environmental Laws and Regulations – Features would be designed and constructed to be consistent with Federal, state, and local laws.
- Impacts to Flood Heights - Restoration features would not detrimentally increase flood heights and adversely affect private property or infrastructure.

3.5. Future Without Project. Without the project, TNC would continue to manage the project area and the larger Spunky Bottoms Preserve in conjunction with IDNR to the north, as both are part of the Little Creek D&LD. Insufficient wetland management would continue to provide reduced effectiveness in moist soil unit and aquatic vegetation management without reconnection to the Illinois River. The interior of the levee would be cut off from the river. The interior would gain access to needed water and introduction of new species and individuals through high water events that overtop the levee and small amounts of interior drainage from the uplands; similarly transport of primary and secondary production to the river would be minimal. Also, additional costs would have to be spent to maintain the quality of the wetlands through expensive pumping to adequately manage the wetlands and continual herbicide application to reduce

Spunky Bottoms Ecosystem Restoration

invasive species. Additionally, inability to manage water levels across the entire site may favor establishment and spread of invasive species such as reed canary grass resulting in a monoculture that has little benefit for wildlife and preventing trees from naturally establishing in some locations. Due to limited technical capabilities, the non-Federal sponsor would not be able to further restore the Spunky Bottoms area beyond existing conditions. A reconnection structure to the Illinois River would be a large engineering structure outside of TNC's technical capabilities to design and construct.

Without the project, sedimentation would continue to be an issue on the site, especially without a water control structure to consolidate sediments in addition to the lack of trees to limit deposition in wetland areas. Aquatic habitats would remain disconnected from the river, providing limited value to native fish species based on the Aquatic Habitat Appraisal Guide evaluation. Overall, the Spunky Bottoms habitat would degrade in quality and quantity as a result of limited management opportunities present at the Spunky Bottoms project area.

Other assumptions made to determine the future without project conditions include:

- 1) Past land use of the site has detrimentally impacted the native plant communities and these communities have started to recover through plantings from TNC; however, TNC would not be able to further restore the Spunky Bottoms project area.
- 2) The levee would be maintained at its current height by the Little Creek D&LD and flood fighting techniques would be instituted, when necessary, to prevent levee overtopping.
- 3) Current river levels in the Alton Pool of the Illinois River at the site are assumed to be sustained during the 50-year period of project analysis.
- 4) Invasive plant and aquatic species, such as reed canary grass and Asian carp, would be managed by TNC as needed to reduce the encroachment of these species through removal and herbicide application.
- 5) The Little Creek D&LD would continue to utilize the current operational pump station located at the north of the District on IDNR property by continuing maintenance on the pump and motor, but no replacement is expected.
- 6) TNC would maintain all existing lands in the Wetlands Reserve Program through the end of the lease (year 2029) to ensure their compatibility with the program.
- 7) NRCS would continue to work with willing upland landowners in the watershed to reduce upland sedimentation inputs.

Without the project, the potential for having a long-term, self-sustaining, functioning ecosystem at Spunky Bottoms would be lost and rare wetland and bottomland hardwood habitat along the Illinois River would be reduced. The No Action Alternative would not include any USACE project features and no additional costs to the USACE would be generated. No habitat units would be gained or lost from USACE activities. However, TNC continued site management would have some positive effects. TNC would likely continue agricultural leasing of their properties with no current plans for additional water level management or vegetative restoration beyond existing condition thus leading to the continued degradation of ecosystem resources that would likely have a negative effect on the habitat and thus habitat units over time.

Spunky Bottoms Ecosystem Restoration

4. POTENTIAL PROJECT FEATURES*

This section describes the features developed to address the problems and meet the goals of restoring the quality and diversity of backwater wetland habitat along the Illinois River and restoring floodplain connectivity from the Illinois River to a productive backwater area, which serves as fish spawning grounds and a nutrient recharge to the river. The project measures to address the goals and objectives were defined as installing a structure in levee to reconnect to Illinois River, build a spillway with water control structure, raise/restore berms, restore hydrology through wetland management units, replace/build new water control structures and use portable pumps, and restore prairie through wet meadow plantings. While emphasizing structural modifications, the proposed Spunky Bottoms Ecosystem Restoration Project is consistent with a Wetlands Restoration Plan for the Spunky Bottoms Preserve prepared by The Wetlands Initiative in 1999. That plan was developed in cooperation with the USFWS, NRCS, USACE, IDNR, The Wetlands Initiative, and TNC.

4.1. Value Analysis Study.

A Value Analysis Study was conducted 1-2 February 2001. The primary value analysis team's recommendations are presented below in Table 4-1. In addition the value analysis report is on file at the St. Louis District. The Value Analysis Study was conducted to provide an independent value analysis group that can be considered during a point when changes can be made more rapidly and with less redesign costs.. Although the Value Analysis Study was completed in 2001, most information presented is still relevant.

Table 4-1. Value Analysis Recommendations and Disposition.

Recommendations	Disposition
Protect neighbors against flooding	As part of the area protected by the drainage district and to remain within the project's function as a drainage district, suitable alternatives must be evaluated that provide protection from flooding from the project
Overflow function reanalysis	Overflow removed from alternatives due to excessive costs associated with the potential feature and possibility for water control structure to be used to managed overflow
Tributary sediment and water control reanalysis	Removed from alternatives due to previous failure issues within Little Creek
An alternative project design to meet habitat goals	A variety of alternatives were configured in an attempt to meet project goals and objectives; however, the only suitable option is to provide a water control structure through the levee
Reuse existing diesel power plant for powering interior drainage pump at south end of levee district	Due to the existing, state of the pump station and the inability to provide the pumping capabilities, this became not feasible
Use of alternative material for construction of fish passage structure	Alternative materials were incorporated into the fish passage structure to provide a fish friendly structure
Another perspective on fish passage and over-wintering	Concerns were minimal in regards to elevations that might fall below the minimum operation elevation for the control structure for short periods of time, thus resulting in no changes to alternatives being formulated

Spunky Bottoms Ecosystem Restoration

4.2. Project Features Found to be Not Feasible. To meet the goals and objectives listed in Table 3-1, the following potential project features were excluded as they did not meet all or some of these goals and objectives.

Spillway - Hardened overflow section, elevation 445. On the southern end of the project area, at the site of the lowest design elevation, a section of the Little Creek Levee would be armored to provide a hardened overflow section. During flood events when the levee was overtopped, this feature would help minimize damage to the riverside levee. Current minimum levee elevations would be maintained with levee raises along a majority of the levee to ensure the balance of the levee on project lands has a minimum of 1-foot superiority over the hardened location. This feature was eliminated for a number of reasons:

- 1) If the levee were not raised, lowering the protection of the exterior levee by one foot would increase the chance of exceedance from flooding which is unacceptable to the remaining private landowner in the levee district and likely the local government.
- 2) The spillway could potentially promote more frequent flooding throughout the project area, the adjacent IDNR property, and the private landowner. Although this would provide a reconnection to the river, it would be in an unmanaged situation and would likely not reflect historic conditions. To prevent more frequent flooding of IDNR and private lands and maintain the existing level or protection, the Little Creek Levee would be required to be raised. Estimates of a spillway and levee raise on similar projects were in excess of 2 million dollars and would be cost prohibitive.
- 3) Increases in unmanaged flooding of the project area would reduce the ability of the project to meet the objective of restoring native aquatic habitat and ecological processes. More frequent and ill timed flooding would increase stress and mortality of wetland vegetation. Additionally, more frequent flooding outside of a managed condition would promote site conditions contributing to invasive species dominance, such as reed canary grass, which may prevent historic vegetation from being able to exist within the project area.
- 4) The proposed water control structure would have greater capacity to restore historic low water events rather than the spillway. In addition, the proposed water control structure would provide more connectivity throughout the year than a spillway would be able to provide.

Non-structural Measures. A variety of vegetative restoration measures such as wet meadow plantings were evaluated, but found not to be feasible with the study authority for aquatic ecosystem restoration. Both vegetative restoration measures (upland prairie and ephemeral wetland ponds) were removed upon further evaluation of the site. These areas are at much higher elevations than the areas proposed to be inundated and therefore would not have a hydrologic connection needed to support wetland species. This was reaffirmed when hydric soils were evaluated and this area only contains less than 1.0 acres of hydric soils, located at the very south end of the agricultural lands owned by TNC.

Flowage Easements. Flowage easements were considered for water management elevations of 432 feet NGVD and 435 feet NGVD for the private landowner; however, they were not considered to be a viable option. At the greater elevations, the private landowner would have additional water impounded on the property, reducing chances of a successful farming season.

Spunky Bottoms Ecosystem Restoration

As early as 2001, TNC began negotiations in order to acquire neighboring properties within the Little Creek Drainage and Levee District. Acquisition has been and is still being pursued by TNC, but to date, has been unsuccessful. TNC will continue efforts to acquire the subject property from willing sellers at fair market rates. Additionally, TNC does not have condemnation authority and therefore negotiations for a flowage easement could potentially reach an impasse. Flood easements will require the cooperation of subject neighbors and costs would likely exceed benefits.

Road repairs. Road repairs as opposed to rock protection was considered, but removed from further consideration as the road could sustain damage any time the interior elevation was raised. These costs could be exceedingly cost prohibitive and could potentially cause traffic issues along County Highway 12 while repairs were underway.

4.3. Potential Feasible Project Features. The potential feasible features moved forward and evaluated are discussed below.

Water Level Management (Figures 4-1 to 4-5). Three potential interior water management levels were selected for evaluation. Currently, the maximum interior water level is approximately 430 feet NGVD without affecting the private landowner to the south. At this time, the Little Creek D&LD has limited permanent pumping capability. Elevation 430 feet NGVD was selected as a low-end water management level, as that would provide some additional benefits for aquatic resources with a reconnection structure and enhance the capability to drawdown water to more natural low water conditions during the summer; however, little benefits are gained for the wetlands over the existing conditions. Elevation 435 feet NGVD was selected as a practical maximum water management level based on topography. A middle elevation of 432 feet NGVD was selected that would increase wetland acreages and water depth, but not to the extent of 435 feet NGVD. Acreage differences of total inundation between the evaluated elevations are fairly limited. The project is bound on all sides by topographic structures such as the Little Creek Levee, County Highway 12 and interior berms and roadways. The major difference between the elevations would be the depth of inundation which would increase or decrease the size of the restored wetland and aquatic habitat and provide more or less suitable habitat for aquatic resources. Figures 4-1 to 4-3 display the areas that would be inundated at for each elevation. These photos were derived from LiDAR data. At an elevation of 430 feet NGVD, the additional features such as the catchment area and berm raises were not included as the existing condition does not require these measures under the existing condition, TNC is capable of managing to an elevation of 430 feet NGVD.

Reconnection/Fish Passage Structure. A variety of designs were evaluated for a reconnection structure through the mainline levee to reconnect the Spunky Bottoms area to the Illinois River. To accommodate ease of use and the most efficiency, the reconnection structure would be a double box culvert structure with concrete headwalls and sheet pile wingwalls. Two sluice gates would control water at the Illinois River side headwall. Other alternatives included additional box culverts, stop log structures, various combinations of gate designs and trash rack systems for removing debris. These alternatives were screened due to the sponsors not having enough support to operate such structures or the complexity of the structures would be exceedingly cost-

Spunky Bottoms Ecosystem Restoration

prohibitive. In the event that additional drainage is required, a large, portable diesel power pump will be provided to decrease time to lower water elevations in the project area.

Southern berm with small, portable diesel-powered pump and catchment area. A new berm would protect the landowner located south of TNC property from project water levels to allow important fine-scale water level management within the project area. Because construction of the berm would block natural drainage of the neighboring landowner's property into the project area, a catchment area would be constructed. The catchment is labeled as ponding area on all figures. In addition, a small, portable diesel-powered pump will be provided to pump excess runoff into the project area when interior water levels preclude gravity drainage through a gated pipe in the berm. The proposed berm height is two feet above the maximum proposed interior water management level elevation, i.e. 434 feet NGVD for the 432 feet NGVD management level and 437 feet NGVD for the 435 feet NGVD management level. The berm would be approximately 2,400 linear feet as constructed. The southern berm, catchment area, and trash pump would not be required for the 430 feet NGVD elevation.

Rock protection for the County Highway 12 at the base of the bluff. For both 432 feet NGVD and 435 feet NGVD water management options, rock protection is proposed on the east side of County Highway 12 at the maximum water elevation that the project would be managed for. County Highway 12 is maintained by Brown County and would require protection from the increased water elevations possible within the TNC property. The riprap will provide the required protection from wave wash from the increased water elevations. With increased water levels behind the Little Creek Levee, the water elevations would encroach towards County Highway 12 to the toe of the roadway along the portions identified in Figures 4-1 and 4-2. During calm periods, wave wash along County Highway 12 would not be a concern; however during times of storms or increased wind, wave wash could pose a potential problem for erosion along County Highway 12; therefore the rock protection would be added along the roadbed (not the road itself) for approximately 3,350 linear feet to provide the needed protection. Typical section drawings are shown in Appendix A. Figure 4-4 shows the expected proximity of water to County Highway 12 at an Elevation of 432 feet NGVD using LiDAR elevations, in the area where proposed riprap is to be placed. Figure 4-5 shows a typical section at an Elevation of 435 feet NGVD. No riprap would be placed along the roadway at the 430 feet NGVD elevation alternative.

Northern berm. This proposed berm would raise existing County Road 500 that divides the TNC and IDNR properties. The road is approximately 5,900 linear feet. There are seven privately owned cabins and associated buildings that use County Road 500 for access. The road would be raised to continue to provide access to the cabins after final construction with the new water level management. The IDNR and TNC property would remain separated by the berm and the culvert that runs through the road would remain sealed. Figures 4-2 and 4-3 show the inundation maps at the specific water level management levels. During construction, an alternative access road located south of the north road would be rocked to allow access for the private landowners. The alternative access shown on all figures as berm access road would remain intact after completion of the north berm road and would serve as a berm to create two separate management units on the TNC property with a single culvert with a gate in the berm to control water flow between the management units. The length of the berm access road is approximately 8,050 linear feet.

Spunky Bottoms Ecosystem Restoration

Existing electric poles along County Road 500 will require relocation during construction for raising the road. Relocations are anticipated for changes in height of the existing roadway. Proposed berm height is two feet above the maximum proposed interior water management level elevation, i.e. 434 feet NGVD for the 432 feet NGVD management level and 437 feet NGVD for the 435 feet NGVD management level. No changes would be made at the 430 feet NGVD elevation.

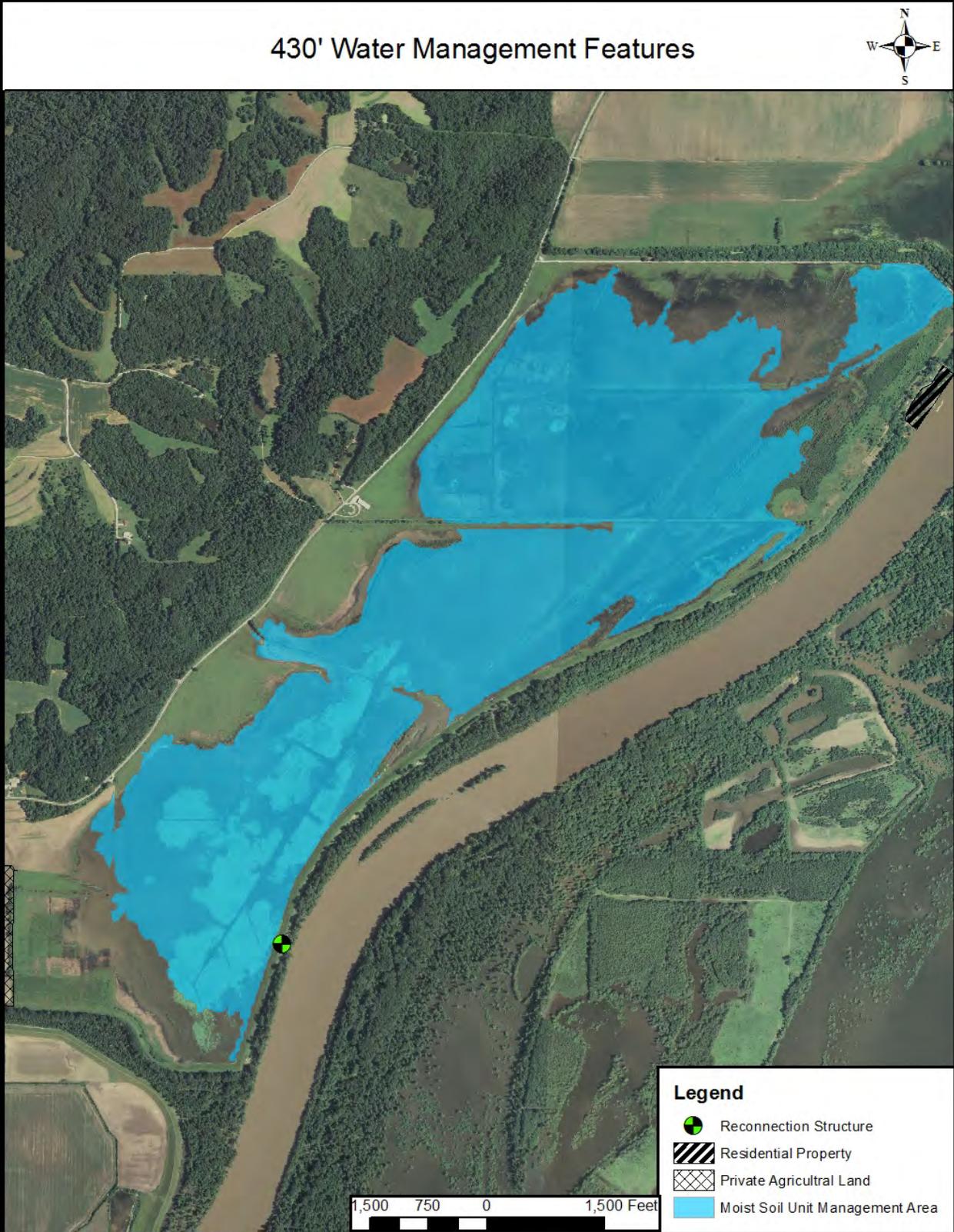


Figure 4-1. Elevation 430' Water Management Features.

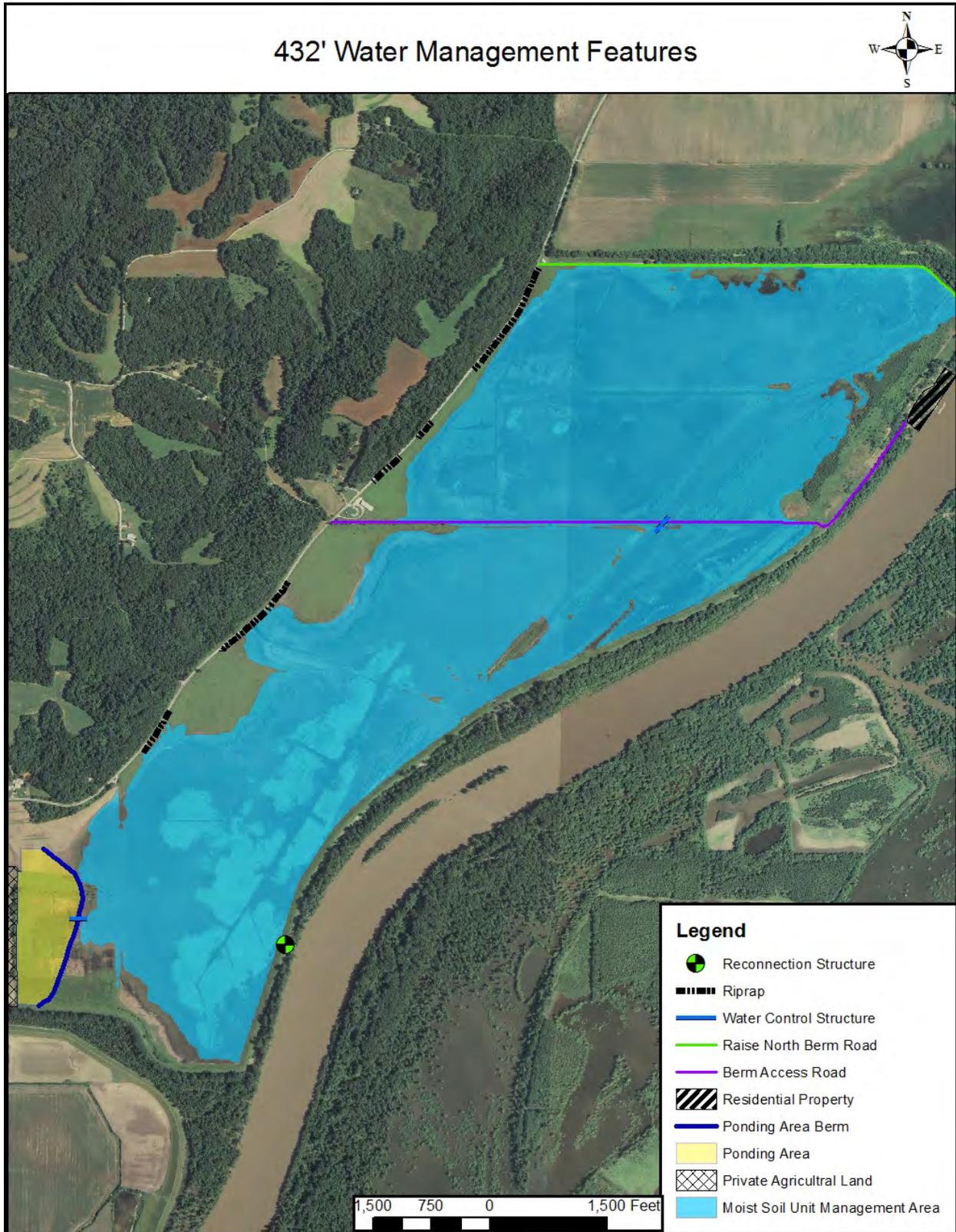


Figure 4-2. Elevation 432' Water Management Features.

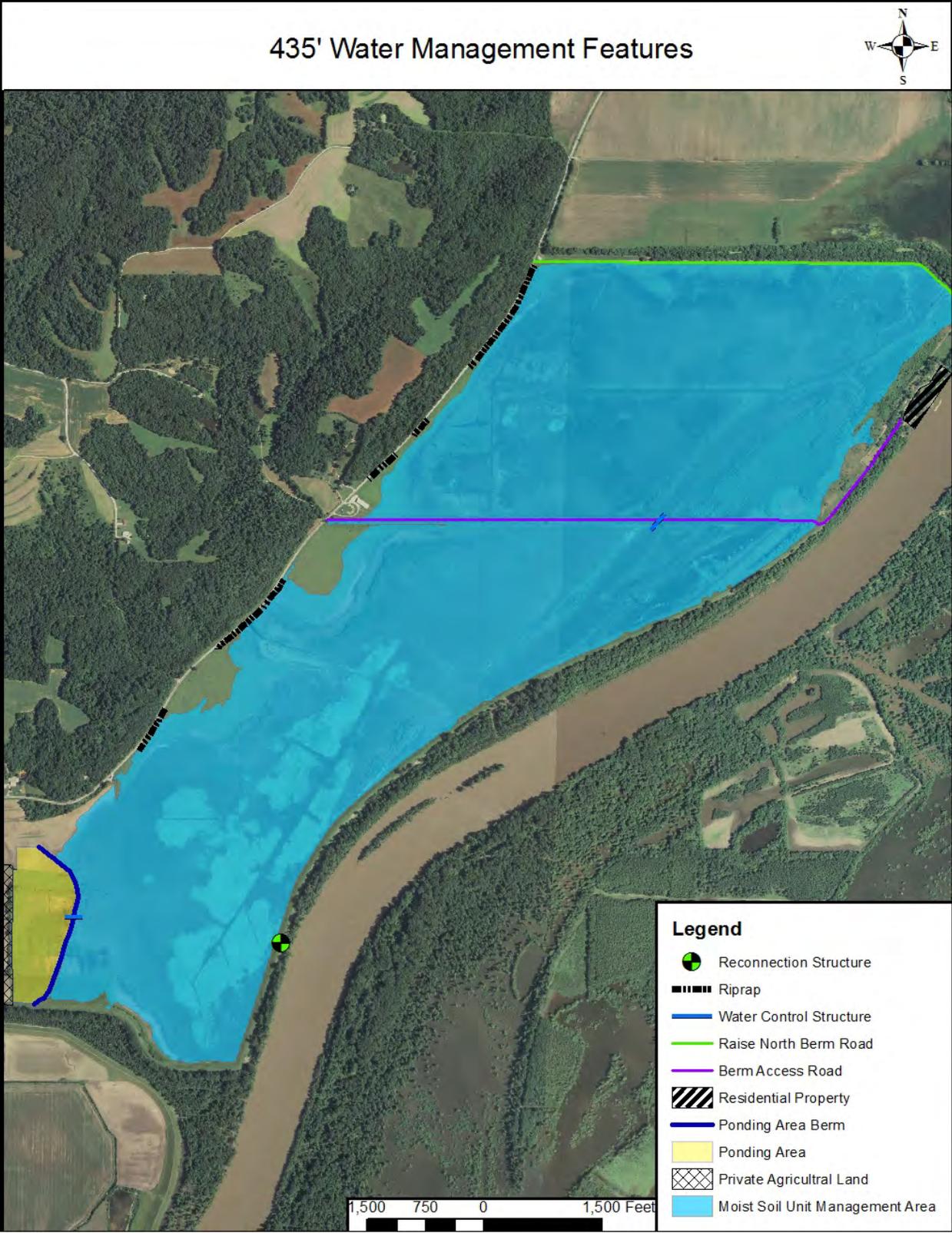


Figure 4-3. Elevation 435' Water Management Features.

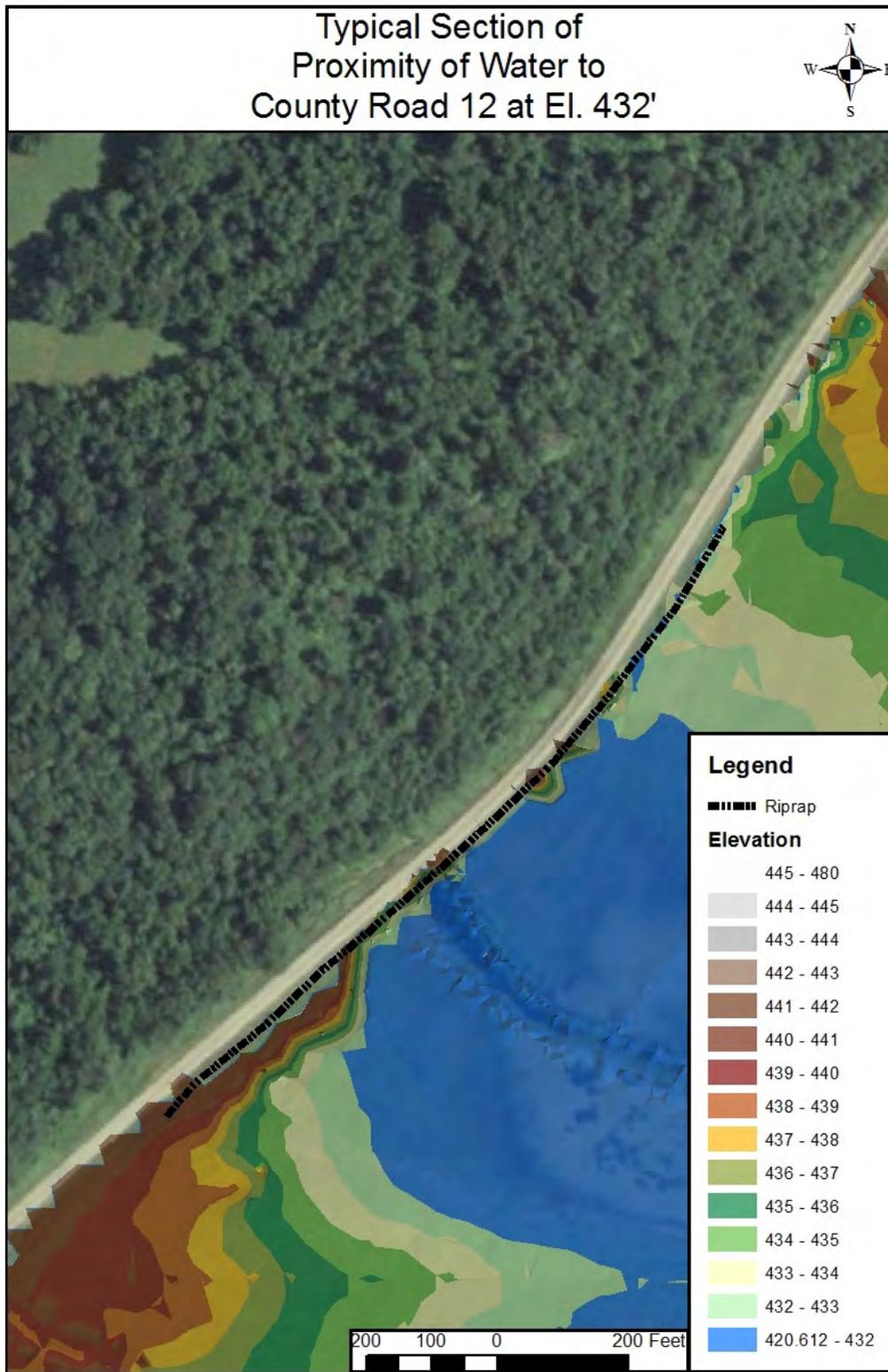


Figure 4-4. Typical Section of Proximity of Water to County Road 12 at Water Level Management of Elevation 432'.

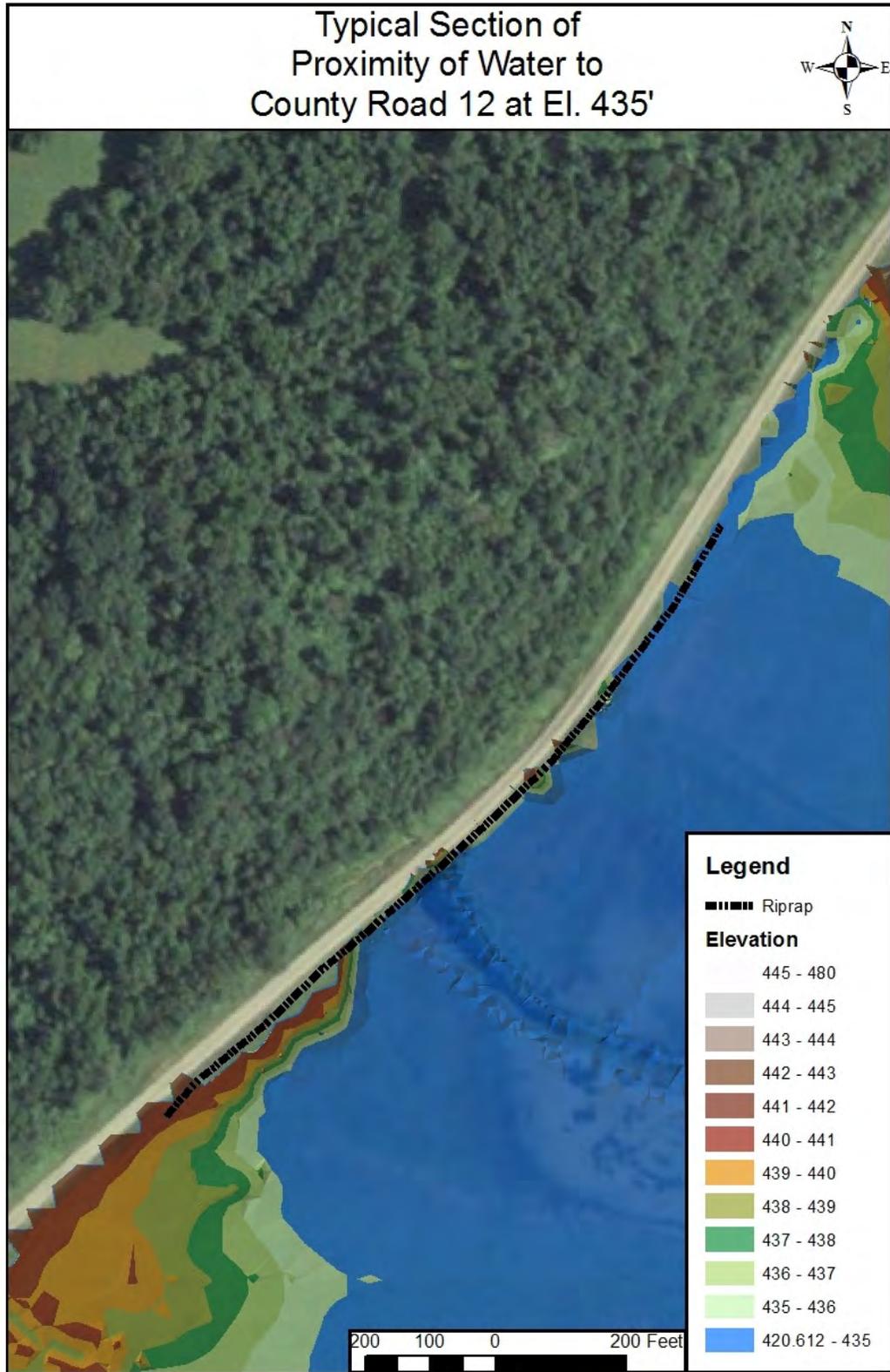


Figure 4-5. Typical Section of Proximity of Water to County Road 12 at Water Level Management of Elevation 435'.

4.4. Plan Formulation

Project alternatives were formulated and evaluated in consideration of four key planning criteria:

Completeness. The extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects.

Effectiveness. The extent to which an alternative plan alleviates the specified problems and achieves the specified objectives.

Efficiency. The extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment.

Acceptability. The workability and viability of the alternative plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations and public policies. Two primary dimensions to acceptability are implementability and satisfaction.

Alternatives were also evaluated based on environmental benefits returned and costs (both first costs and operation, maintenance, repair, rehabilitation, and replacement costs).

An environmental benefits analysis was conducted by a team representing the USACE, TNC, IDNR, and USFWS. Benefits were evaluated for the alternatives based on the Wildlife Habitat Appraisal Guide (WHAG) and the Aquatic Habitat Appraisal Guide (AHAG). While many functions and resulting benefits of wetlands are relatively well understood, the existing WHAG and AHAG habitat evaluation procedures focus on habitat needs of individual animal species. By utilizing multiple species, the benefits to one species may be negated by the impacts to another. Capturing these tradeoffs was an important aspect of alternative evaluation.

The three water level management alternatives (A-C) were evaluated in detail along with the No Action plan.

- A: Reconnection structure to El. 430
- B: Reconnection structure to El. 432
- C: Reconnection structure to El. 435

All three action alternatives (A, B, and C) that were evaluated included specific water control measures that modified the existing federal structure.

All alternatives, other than the no action plan, generally address the need for improved water management within the backwater area and the desired reconnection of the backwater area to the Illinois River and include the feasible features discussed in Section 4.3.

No Action Alternative

The no action alternative would provide habitat value for most species associated with aquatic and wetland habitat. Without modification, however, the area will continue to experience unnatural hydrologic regimes with associated negative impacts on ecosystem resources and will not provide river reconnection benefits to the project area.

Alternatives A, B, and C

Alternatives A, B and C evaluated the four planning criteria in relation to that of no action alternative. All three alternatives would provide greater benefits over the no action alternative. The improved water level management and restored floodplain connectivity of the area would allow for a more natural hydrologic regime thereby restoring ecosystem structure and function. In Section 5, all three alternatives and the no action are described in further detail in comparison to the four planning evaluation criteria and the project goals and objectives.

5. EVALUATION OF FEASIBLE PROJECT ALTERNATIVES *

An environmental benefits analysis was performed on Alternatives A, B and C and the No Action Alternative to determine the magnitude of ecosystem benefits to be expected if implemented. The benefits were then combined with cost estimates to determine the Cost Effectiveness followed by the Incremental Cost Analysis (CE/ICA). A full description of the environmental benefits analysis can be found in Appendix E.

5.1. Environmental Outputs

Habitat conditions are not usually static. Either through natural processes or human activity, habitat generally evolves and may change in quality and/or quantity. Imbedded in each cover type evaluation, change has been taken into account with the model. To assess the change over the period of analysis, target years have been identified. At each target year, a change in the habitat variables may be noticed. Noticeable changes can be characterized by a change in habitat benefit output.

Target years of 0 (baseline conditions), 1, 10, and 50 (future “without-project” and future “with-project” conditions) are sufficient to analyze habitat units and characterize habitat changes over the period of analysis. Detailed discussion and analysis are provided in Appendix E, Habitat Benefit Analysis. Table 5-1 presents the Future With (Alternatives A-C) and Without (No Action) Project Average Annual Habitat Units (AAHUs) generated by the Alternatives as well as the net difference, or increase in AAHUs for each Alternative over the No Action Plan. Plans are shown ranked by net AAHUs.

Spunky Bottoms Ecosystem Restoration

Table 5-1. Average Annual Habitat Units (Future With and Without Project)

Alternative	AAHUs	Net AAHUs	Rank
No Action	755	-	4
A (EL. 430)	1018	263	3
B (EL. 432)	1234	479	2
C (EL. 435)	1299	544	1

Table 5-2 rates the alternative plans against the planning criteria of completeness, effectiveness, efficiency, and acceptability and the project objectives. These criteria are defined as above in Section 4.4. Based on the below criteria, all (action) plans, except the No Action and A, were considered to achieve a high level of acceptability.

Spunky Bottoms Ecosystem Restoration

5.2. Cost Effective and Incremental Cost Analysis of Alternatives. Cost estimates were developed for each alternative, including Operation, Maintenance, Repair, Rehabilitation and Replacement (OMRR&R) costs, to facilitate the CE/ICA and are provided in Table 5-2. A more detailed cost breakdown can be found in Appendix F. Combined first costs for the initially evaluated plans of each area ranged from \$4,110,000 to \$8,985,000, including construction, feasibility, lands, monitoring costs, and lands, easements and rights-of-way. Average annual costs were based on a period of analysis of 50 years. Average annual costs include first costs, operation and maintenance costs, levee and structure maintenance, exotic species control, and planned maintenance and rehabilitation costs . Average OMRR&R costs range from \$41,120 to \$57,482.

Table 5-2. Project Costs by Alternative

	Costs of Plans Considered in Detail (\$1000's)			
	No Action	A (EL 430)	B (EL 432)	C (EL 435)
Construction Cost (with ~25% contingency)	-	1,624	3,345	3,748
Pre-construction Engineering and Design (PED) (15%)	-	243	502	562
Construction Management (10%)	-	162	334	374
Lands, Easements, Rights of Way, Relocations, and Disposal Areas(LERRD)	-	2,080	3,425	4,300
Total First Cost	-	4,110	7,606	8,985
Annual Operation, Maintenance, Repair, Rehabilitation and Replacement Costs	41	42	57	57
Annualized Costs (excluding OMRR&R Costs)	-	183	339	400

INCREMENTAL COST ANALYSIS (ICA)

Important assumptions used in the ICA of potential alternatives for Spunky Bottoms: (1) benefits and costs are expressed in 2013 price levels; (2) the project discount rate for the evaluation of benefits and costs is 3.75%; and (3) the project period of evaluation (life) is established at 50 years, and (4) OMRR&R costs are included. Table 5-4 presents the Average Annual Cost associated with each of the Spunky Bottoms project alternatives.

Spunky Bottoms Ecosystem Restoration

Table 5-1 presents the estimated AAHUs generated by the Alternatives for selected target species. Selected target species are discussed further in Appendix E. The estimated AAHUs displayed in Table 5-1 are computed under both the Future –With Project and -Without Project conditions. The total Habitat Appraisal Guide (HAG) habitat units, average habitat units from WHAG and AHAG, are employed in conducting the ICA.

The average annual costs from Table 5-2 and average annual benefits from Table 5-1 above were used to conduct cost effectiveness and incremental cost analysis (CE/ICA). IWR-PLAN Decision Support software version 3.3 was used for the analyses. IWR-PLAN first builds all possible alternative plan combinations based on the number of individual restoration sites, whether the sites can be combined with each other (i.e., implemented in tandem), and whether any of the sites are dependent on each other. None of the alternatives for the Spunky Bottoms project were combinable or dependent on each other. For that reason, each alternative was examined using the single scenario function.

After inputting the data for all possible alternatives, cost effectiveness analysis was conducted. “Cost effective” means that, for a given level of environmental output (i.e., in this study, habitat units), no other plan costs less. Similarly, no other plan yields more habitat units for less money. Cost effectiveness analysis indicates that, under the habitat assessment, all alternative restoration plans are cost effective. Figure 5-1 displays this information graphically.

After conducting cost effectiveness analysis, ICA examines the changes in costs and changes in environmental outputs (i.e., in this case, habitat units) for each additional increment of output. The first step is, starting from the No Action alternative, to calculate the incremental change in costs and incremental change in outputs moving from the No Action alternative to each of the cost effective plans. The change in costs, divided by the change in outputs, is calculated to generate an average cost per unit of output (average cost per habitat unit) for each of the cost effective plans. Table 5-3 displays this information.

Table 5-3. Cost Per Habitat Unit

Alternative	Total Average Annual Cost	Net AAHUs	Average Annual Cost Per AAHU
No Action	-	-	-
A*	\$183,000	263	\$695
B*	\$339,000	479	\$710
C*	\$400,000	544	\$735

*Best Buy Alternatives

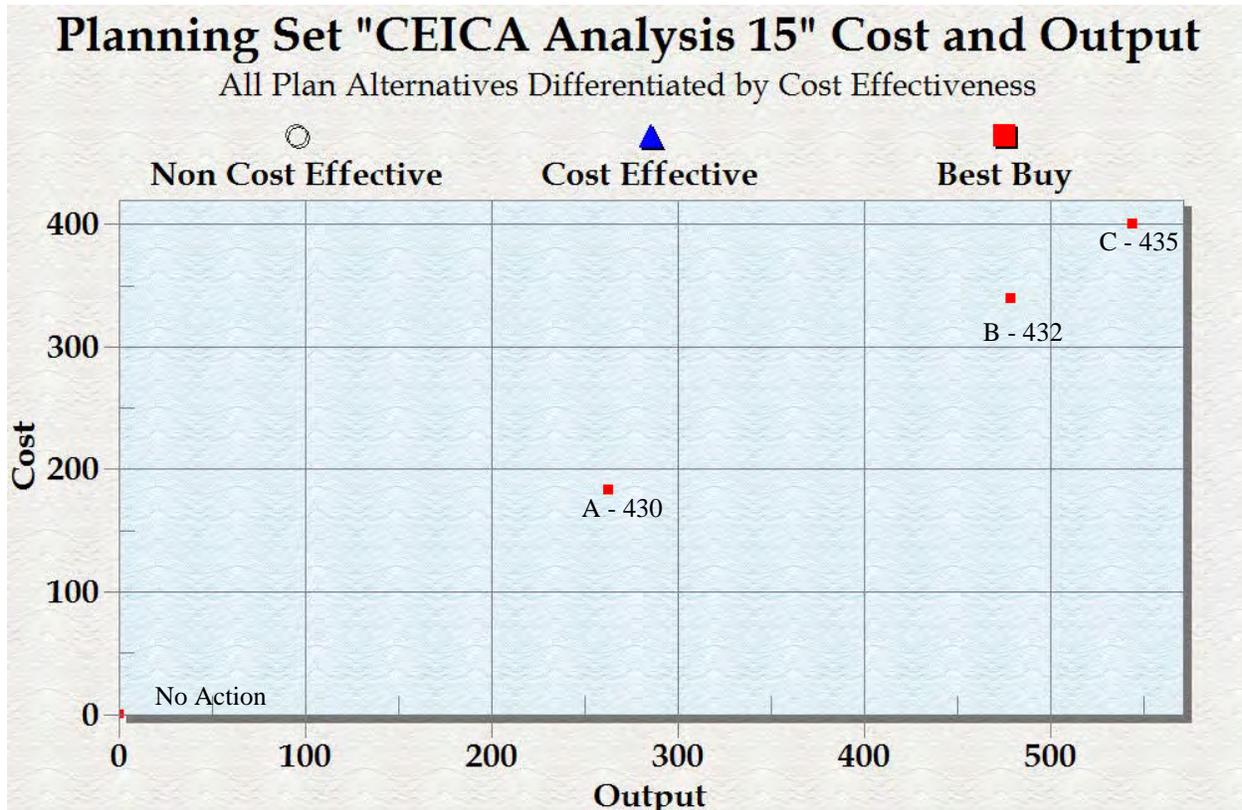


Figure 5-1. Cost Effective Alternatives

Of the three alternatives (including the No Action Alternative), all four alternatives make up the most cost effective, production efficient alternatives known as best buy alternatives. These alternatives can be used to determine the desired project scale for environmental restoration planning. Characteristic of best buy alternatives, the incremental average annual cost per unit increase with successive larger levels of incremental output (Net AAHUs) (Figure 5-2).

The four alternatives that are best buy alternatives were the no action, Alternative A, B and C. The alternative with the lowest overall cost per unit of output is the first “Best Buy” plan. For habitat assessment, the alternative with the lowest overall average cost is alternative A which has an average cost of \$695.00 per habitat unit. After the Best Buy alternative is identified, subsequent incremental analyses calculate the change in costs and change in outputs of moving from the first Best Buy to all remaining and larger cost effective alternatives. Again, changes in costs are divided by changes in outputs for each increment to identify the alternative with the next lowest incremental cost per unit of output. The alternative identified as the second Best Buy plan is Alternative B which has an average cost of \$710.00 per habitat unit. In addition Alternative C at an average cost of \$730.00 per habitat unit and the No Action Alternative are best buy plans. The incremental cost per habitat unit is displayed in Table 5-4. Figure 5-1 displays this information graphically and Figure 5-2 shows the best buy plans and the increase in costs for gains in habitat units.

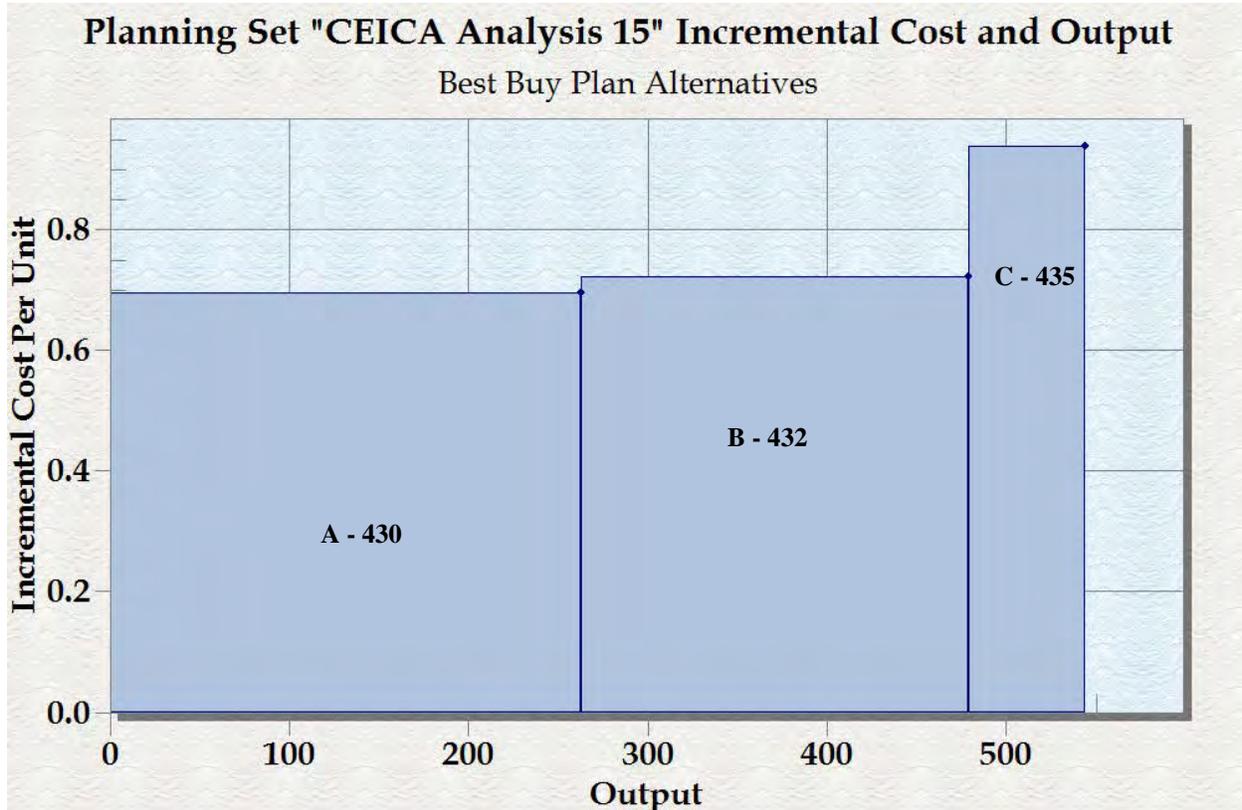


Figure 5-2. Best Buy Plan Alternatives

Table 5-4. Incremental Cost Per Habitat Unit

Alternative	Total Average Annual Cost (\$1000s)	Net AAHUs	AA Cost (\$1000s)/AAHUs	Incremental Cost (\$1000s)	Incremental AAHUs	Incremental Cost Per Output (\$1000s)
No Action	-	-	-	-	-	-
A	\$183	263	.696	183	263	.70
B	\$339	479	.708	156	216	.72
C	\$400	544	.735	61	65	.94

Planning Level Cost Estimates are in 2013 price levels

5.3 CE/ICA Summary. In summary, the results of CE/ICA indicate that the No Action and the three action alternatives are Best Buy plans. As plans increase in output, ultimately the plan with the least change in cost to maximum habitat unit output should be chosen. The Cost Effective and Best Buy graph may offer a logical point at which to ask whether the next increment of output is worth the investment to achieve it.

Alternative C yielded the most benefits; however, the benefits were generated at the greatest cost. At an elevation of 435 feet NGVD (Alternative C), an additional 65 net AAHUs were generated at an additional cost of nearly \$1,500,000 over Alternative B. These additional benefits are offset by the extra protection needed for the private landowner and roadways.

Spunky Bottoms Ecosystem Restoration

The difference between Alternative A and Alternative B is initially more difficult to distinguish. Although, Alternative A produces over half of the net AAHUs (272), Alternative B produces an additional 216 AAHUs over Alternative A at an additional cost; therefore Alternative A and Alternative B were evaluated further to decide which alternative, since both are considered best buys, would provide the greatest benefit to the area and provide maximum sustainability.

Each alternative was compared to the objectives and Principles and Guidelines to determine which alternative provided more benefits to the listed objective. The objectives are broken out below and ranked in Table 5-5.

- 1) Restoring a more natural hydrograph of the Spunky Bottoms project area and Illinois River backwater to approximate pre-settlement conditions.

Under existing conditions, TNC is able to manage water elevations at 430 feet NGVD; however this elevation fails to mimic natural hydrograph of the spring flood, summer drawdown, and minor fall flood across the project area. Elevation 432 feet NGVD would better mimic the natural hydrograph and the coverage of water across the site. Elevation 432 allows the more of the site to have water level management thereby promoting wetland vegetation regeneration and flows similar to historic conditions.

- 2) Restoring native aquatic habitat and ecological processes.

Alternative A would restore approximately 817 acres of the total 1,195 Spunky Bottom Preserve. Alternative B would restore approximately 917 acres of the total Spunky Bottom Preserve. An additional 100 acres would help restore more aquatic and wetland habitat and therefore more ecological processes including, but not limited to, nutrient cycling, sediment consolidation and habitat interactions.

- 3) Increasing the presence of a reliable food source and quality habitat for resident and migratory wetland and aquatic species.

Alternative B would provide approximately 100 more wetland acres than Alternative A and provide more food and quality habitat for wetland and aquatic species. In addition, Alternative B would provide increased depths across the project area which is expected to result in a more diverse suite of wetland and aquatic species using the site.

- 4) Improving water quality of the project area and local impacts to the Illinois River through processing of nutrients and sediments and reducing sediment re-suspension.

Alternative B would have an additional 100 acres over Alternative A to consolidate sediments and allow for nutrient processing by wetland and aquatic species and reduce re-suspension of those sediments.

- 5) Restoring hydrologic river floodplain connectivity.

Both Alternatives A and B would restore connectivity to the river. Alternative B would provide approximately 100 acres of additional area over Alternative A for aquatic and wetland species growth and use within the backwater.

- 6) Increasing quality fish spawning and nursery habitats within the Illinois River.

Spunky Bottoms Ecosystem Restoration

Alternative B would provide greater depths and acres in the area than Alternative A thereby increasing the total available habitat for fish spawning and nursery habitats. The additional area would include both shallow water habitat and deep water allowing for fish spawning, foraging, and nursery habitats to be present within the project area.

7) Export biological productivity to river.

The water control structure for both Alternatives A and B would allow biological productivity occurring within the backwater (i.e. fish spawning) to move from the backwater to the Illinois River. The additional area provided in Alternative B, also represents a greater opportunity for biological input, or flushing, back in to the Illinois River during periods of drawdown. The importance of the increased biological input back into the Illinois River is not captured well by the AAHU evaluations.

8) Maximize sustainability of aquatic habitat.

Alternative B would be more sustainable than Alternative A as greater depths across the project area would allow more consolidation of sediments. Alternative B would also allow more control over invasive species through management of the water control structure.

Spunky Bottoms Ecosystem Restoration

Table 5-5. Planning Evaluation Criteria and Objective Ratings per Alternative.

Alternative		P&G Evaluation Criteria				Restoring hydrograph	Restoring aquatic habitat	Increase food for wildlife	Improve water quality	Restore floodplain connectivity	Export biological productivity to the river	Maximize sustainability of aquatic habitat
		Completeness	Effectiveness	Efficiency	Acceptability							
1	No Action	Low	Low	Low	Low	No	No	Low	Low	No	No	Low
2	A - Elevation 430	High	Med	High	Med	Med	Low	Med	Med	High	Med	Med
3	B - Elevation 432	High	High	Med	High	High	High	High	High	High	High	High
4	C - Elevation 435	High	High	Low	High	High	High	High	High	High	High	High

Spunky Bottoms Ecosystem Restoration

The major difference between Alternative A and B is depth of water across the project area and additional acres inundated. Increased depth will change what aquatic plants will grow and their distribution, and is expected to result in a plant community with more diversity that better restores the historic community. In addition, the area would become more sustainable at an elevation of 432 feet NGVD, because of the increased potential for controlled management. This is most apparent in invasive species management, where a greater area, allowed to be inundated at a greater depth, will reduce the influence of invasive species and the likelihood of woody encroachment on the project site. Currently, TNC is capable of managing at 430 feet NGVD but has to rely heavily on the use herbicides on the area to reduce invasive species. Invasive plant species are a major resource issue at the site. Currently at 430 feet NGVD, herbicide application is required to reduce invasive aquatic plant species. While Alternative A would provide some benefit for invasive species management through water level management, the hydrograph of Alternative B, largely through increased water depth, would represent a substantial increase in the ability to manage invasive species growth and decrease woody encroachment on the site. These differences are not well captured in the AAHU evaluations.

Greater depth would also increase diversity of wildlife and aquatic species. An additional 2 feet across the project area would increase opportunities for migratory diving ducks to use the area as opposed to just primarily dabbling ducks under the existing conditions. In addition, fish species use and response would increase with the increase in water depth. At the shallower water depths of 430 feet NGVD many riverine species could not successfully use most of the area for rearing, growth, and over-wintering. At 430 feet NGVD, shallow water species would be able to use most of the area, and some larger riverine species would be able to use the deeper water areas that would be present near the water control structure; however most of the project would be inhospitable to larger riverine species. The reason for this is that shallow water results in highly fluctuating oxygen levels and subsequent heat stress leading to increased potential for fish kills. Many riverine fishes, while requiring backwaters as part of their life history, are largely adapted to and require deeper, well oxygenated water. An addition of 2 feet would allow more riverine species to use and survive in the area. The areas around the fringe of the project area would still support the shallow water species; however water exchange across the project would increase overall oxygen levels and reduce chances of heat stress for all species. Greater diversity of fish species use, and in particular riverine fish use, is more consistent with the project goals and more indicative of successful large river backwater ecosystem restoration.

An elevation of 432 feet NGVD would more closely resemble the historic condition than 430 feet NGVD. As noted previously, an elevation of 430 feet NGVD would allow for restoration of some fish benefits; however, an elevation of 432 feet NGVD allows for restoration of more ecosystem structure and function benefiting fish (particularly high focus riverine species) and provides an overall greater restoration footprint for other wetland species over what would be provided at 430 feet NGVD. The ability to manage and control invasive species increases greatly at elevation 432 feet NGVD as well, which is expected to be a major component of long term project success. Most of these benefits were not captured well in the AAHU and cost analysis process, but remain key drivers to overall project success and sustainability. In consideration of the incremental cost analysis results, including evaluation of all 3 best buy alternatives, and requirements for the true success of the project, Alternative B is considered to most reasonably

Spunky Bottoms Ecosystem Restoration

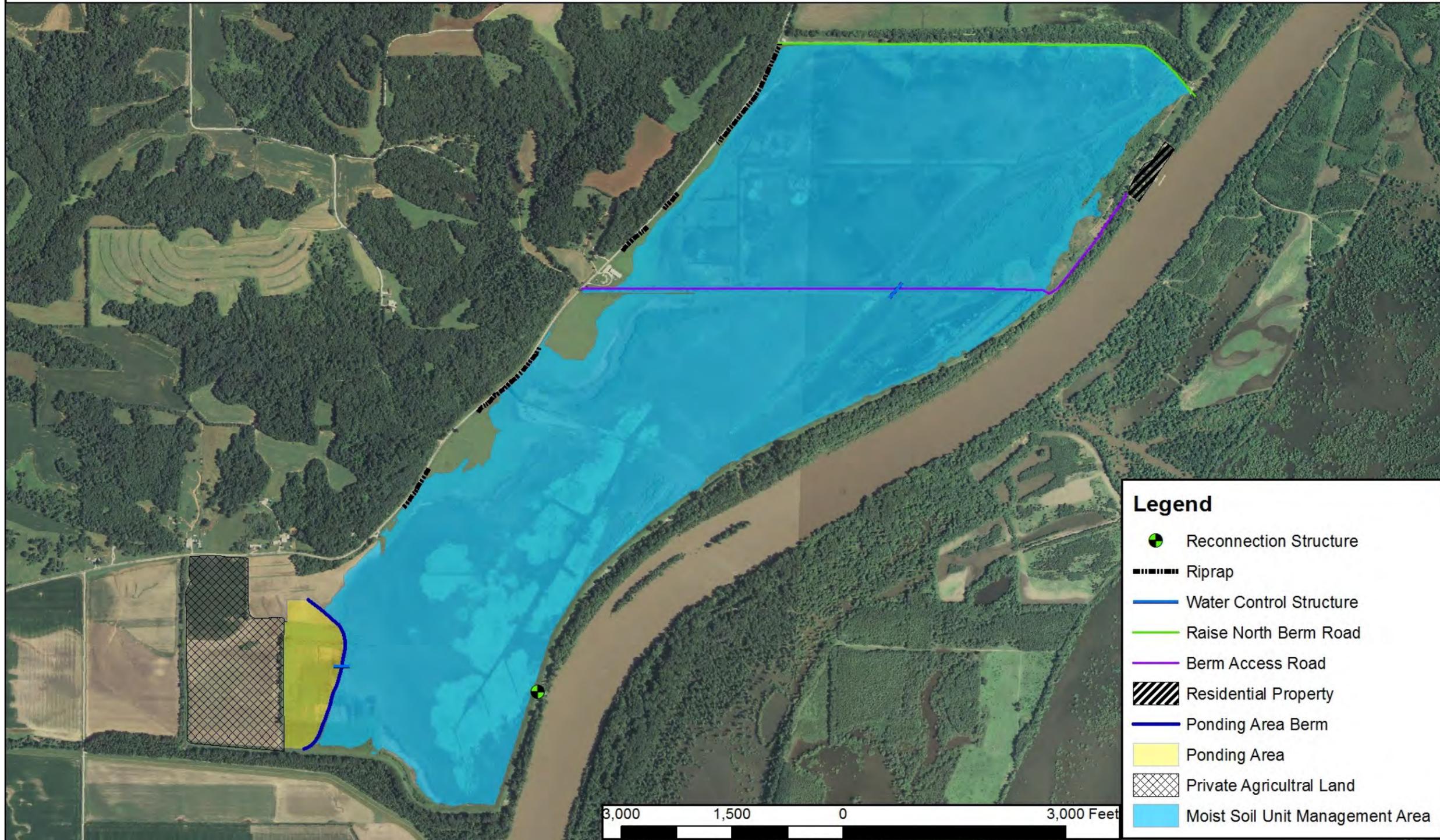
maximize ecosystem restoration benefits compared to costs; therefore, Alternative B is selected as the National Ecosystem Restoration (NER) Plan and as the tentatively selected plan.

5.4. National Ecosystem Restoration Plan. Engineering Regulation 1105-2-100 directs that USACE ecosystem restoration projects should contribute to national ecosystem restoration. The NER plan reasonably maximizes ecosystem restoration benefits compared to costs, considering the cost effectiveness and incremental cost of implementing other restoration options. The AAHUs utilized in the plan formulation process quantify the ecosystem restoration benefits. Refer to Appendix E, Habitat Benefit Analysis, for a detailed description of the habitat analysis process. Alternative B is also the NER Plan. It is a best buy alternative that yields 427 net AAHUs at a cost of \$710.00 per habitat unit. Figure 5-2 and Table 5-5 describe the incremental cost per habitat unit.

5.5. Tentatively Selected Plan (TSP). Alternative B was selected as the TSP (Fig. 5-3). This alternative best meets the project objectives and has the approval of the non-Federal sponsor. The plan improves internal water drainage, management, and supply. It improves aquatic habitat and restores bottomland and floodplain wetlands on the site while considerably increasing the chances for these habitats' survival.

5.6. Consistency with USACE Campaign Plan. The USACE has developed a Campaign Plan with a mission to “provide vital public engineering services in peace and war to strengthen our Nation’s security, energize the economy, and reduce risk from disasters.” This project is consistent with the USACE Campaign Plan. The second goal of the USACE Campaign Plan “Deliver enduring and essential water resource solutions...” is addressed by this project which collaborated with partners to develop a solution to the habitat degradation that has occurred from ponding floodwaters, an elevated water table, and invasive plant colonization. This solution should produce lasting benefits for the nation with the proper OMRR&R. The TSP is also consistent with the third goal “Deliver innovative, resilient, sustainable solutions...”. This project addresses the goal through the application of the planning process to formulate, analyze, and evaluate alternative designs in pursuit of a sustainable, environmentally beneficial, and cost-effective ecosystem restoration design.

Spunky Bottoms Project Continuing Authorities Program - Section 1135



Legend

- Reconnection Structure
- Riprap
- Water Control Structure
- Raise North Berm Road
- Berm Access Road
- ▨ Residential Property
- Ponding Area Berm
- Ponding Area
- ▧ Private Agricultural Land
- Moist Soil Unit Management Area

Figure 5-3. The features required for the tentatively selected plan. Portable pumps not shown.

5.7. Consistency with USACE Environmental Operating Principles. The USACE has reaffirmed its commitment to the environment by formalizing a set of "Environmental Operating Principles" applicable to all its decision-making and programs. The formulation of all alternatives considered for implementation met all of the principles. However, as a function of the entire CAP – Section 1135, the only principle not met fully is EOP #1 – Foster sustainability as a way of life throughout the organization. Sustainability is a goal of any Corps project. This project, as a part of Upper Mississippi – Illinois River restoration, is just one part of many pieces that in their entirety, or cumulatively, leads to a more sustainable end result. Therefore, as a standalone project, in the context of Upper Mississippi – Illinois River restoration, this project arguably falls short of EOP #1 because it does not address the entire system, but when added to other near-term, long-term, and other ongoing efforts such as CAP Section 206: Aquatic Ecosystem Restoration and Section 1135: Environmental Restoration, it provides its share of reaching sustainability.

6. TENTATIVELY SELECTED PLAN: DESIGN, CONSTRUCTION, OMRR&R CONSIDERATIONS*

The tentatively selected plan would consist of construction of a reconnection structure that would allow controlled interior water level management up to 432 feet NGVD with 2 feet of freeboard while still maintaining the flood risk management integrity of the mainline levee. A 2,400 linear foot south berm to protect a private inholding would be constructed along with a catchment area, pumping, and gravity drainage capability through use of a small, portable diesel powered trash pump. In addition to the protection provided by the berm and catchment area, the area could be used to provide fine-scale water level management from the additional storage provide by the catchment area. By increasing water elevations on the TNC property, additional protection will be required for County Highway 12 by adding approximately 3,350 linear feet of riprap along the road, not on the road, to reduce impacts from wave wash as water directly adjacent to the roadway at flat pool. In addition, County Road 500 between the TNC and IDNR property would be raised in order to allow the 432 feet NGVD water level management as well as retain access for property owners along the levee while maintaining the existing 2 feet of freeboard. Exotic vegetation control will be managed through operation of the fish passage structure to reduce encroachment of woody vegetation. An additional portable, diesel-powered pump capable of providing pumping needs throughout the project is included in the TSP to provide the needed fine scale management throughout the project area and remove excess water from the project area when required. Features of the tentatively selected plan are shown in Figure 5-3 above. The required lands needed for the TSP are shown below in Figure 6-1.

Estimated costs for the TSP features are discussed in Section 8. Additional detail can be found in Appendix F: Detailed Project Cost Estimate (with OMRR&R).

Spunky Bottoms Ecosystem Restoration

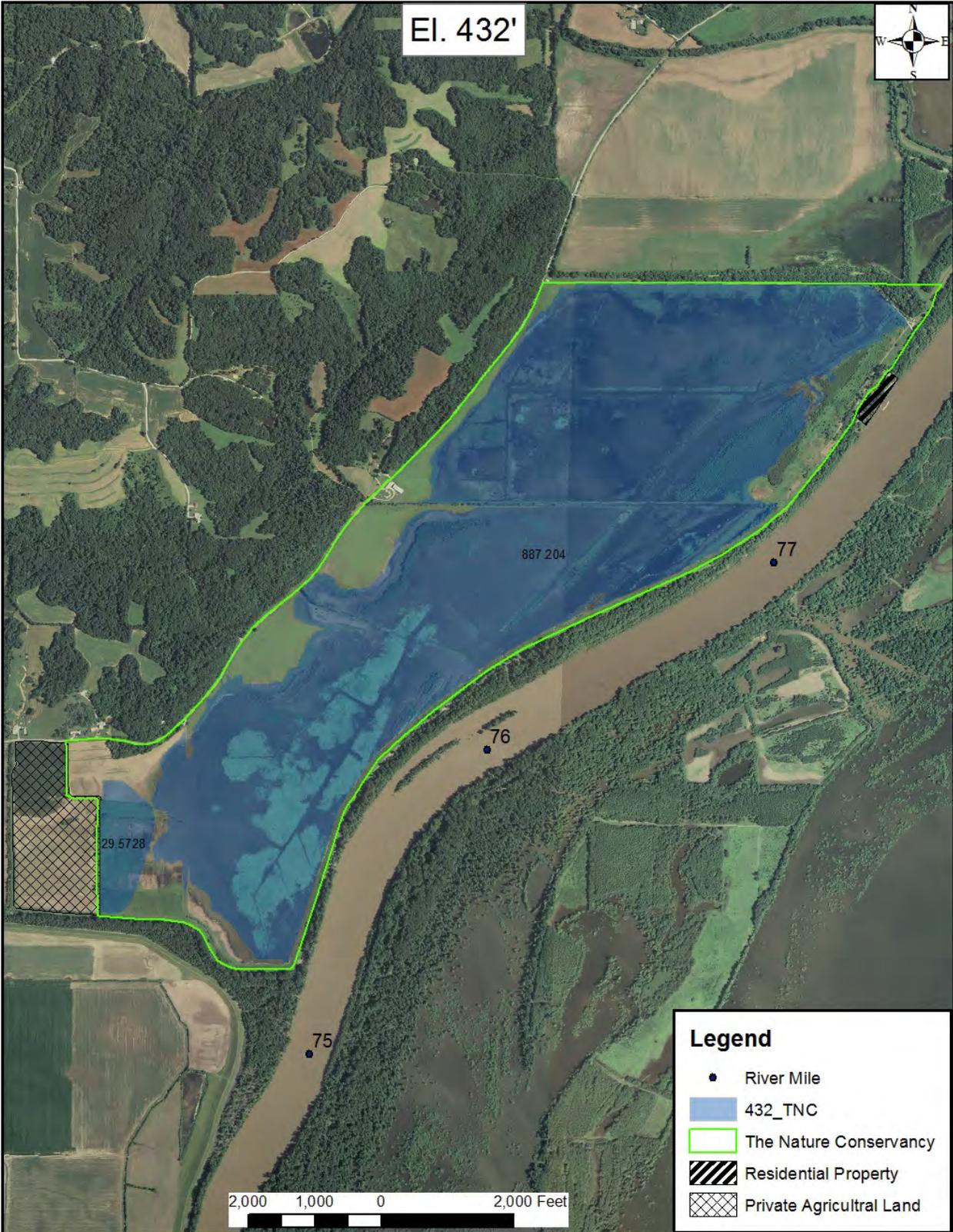


Figure 6-1. Required Lands for Implementation of the TSP. Acreages are approximate

6.1. Design Considerations.

6.1.1. Hydrologic/Hydraulic Considerations.

Factors Evaluated

Key considerations in the hydrologic and hydraulic analysis included the flow of water into and out of the impounded area, the protection of neighboring properties from flooding, the determination of storage and pumping requirements, the sizing and designing of culverts, and the evaluation of the hydraulic properties of other structures. An extensive interior flood hydrology study was also a component of the project. In addition, the project was evaluated in accordance with Division Regulation (DIVR) 1110-2-403 “Mississippi Valley Division/Mississippi River Commission Policy on River Diversions” and DIVR 1110-2-240 “Preparation of Water Control Plans and Manuals”.

Sources of input for the hydrologic analysis included: (1) typical river levels estimated from historical and theoretical stage analyses, (2) interior drainage area computations for Spunky Ridge down to Spunky Bottoms, (3) hypothetical rainfall frequency values for a 100-year frequency storm event of various durations, and (4) estimates of the contribution of hillside drainage to the interior catchment area using the Hydraulic Engineering Center - Hydraulic Modeling System (HEC-HMS) analysis.

Hydraulic Analysis Determinations

The effect upon the TNC wetland of the one-percent-chance exceedance storm was simulated with the HEC-HMS hydrologic model. The results of this analysis are needed from an operational standpoint and for the purpose of assessing induced flooding upon the privately owned agricultural property located within the levee district. For this analysis, two different initial elevations for the wetland were simulated. These elevations are the two possible management levels, 432 and 435 feet NGVD. A management level of 430 feet NGVD was not completed as this was assumed to be the existing condition. In addition, it was assumed that no water was being released from the TNC wetland, and the project water levels were already being held at the highest designed elevation. As the project would seldom be operated at the highest design elevation, and gravity drainage through the new water control structure or pumping could be used to remove water from the project area, the percent chance of exceedance becomes significantly less than one-percent.

If the initial elevation of the TNC wetland is 432 feet NGVD, the simulation showed that the wetland elevation crested at 433.3 feet NGVD. Since the design elevation of the levee between the wetland and the Illinois River is 447 feet NGVD, this levee will adequately contain runoff from this storm.

The results from this analysis can be used as a partial basis for determining the top elevation of the interior berm that will be constructed to protect the private agricultural property. A more detailed analysis than the one discussed here will be necessary to account for the berm and water that will be pumped from the private agricultural property. During the preparation of plans and

specifications (P&S) in the Design & Implementation Phase, a more detailed analysis of the effect of the one-percent-chance exceedance storm upon both the wetland and the private agricultural land will be performed.

Hydraulic Properties of the Tentatively Selected Plan

Fish Passage/Water Control Structure:

It is very important for the success of the project to maintain a clear flow path for water between the Illinois River and the TNC wetland. The key feature for accomplishing this is the Fish Passage and Water Control Structure. Terrain elevations within the TNC wetland were reviewed near the site of the proposed structure, which is located toward the southern end of the wetland, and an invert elevation for the structure of 425 feet NGVD was selected.

Several configurations were investigated for the structure. Both circular and rectangular culverts were considered, as well as single or multiple culverts. A final design of two square culverts, both of which will have dimensions of six feet by six feet, was chosen. Having two culverts rather than one will enable draining or filling of the TNC wetland even if one of the two does not operate properly or if one must be taken out of service for maintenance.

The USACE Hydrologic Engineering Center River Analysis System (HEC-RAS) computer program was used to develop a hydraulic model of water flow from the TNC wetland through the fish passage/water control structure to the Illinois River. Using this hydraulic model, simulations of drainage of the wetland into the Illinois River were performed. Assuming little or no inflow to the wetland as well as a very low level of the Illinois River (i.e., about five feet lower than the invert of the structure), the wetland will be able to be drained from elevation 432 to 425.5 feet NGVD in just over eight days with both culverts fully opened. With one culvert fully opened, the wetland will be able to be drained from elevation 432 to 425.5 feet NGVD in about sixteen days.

As specified in DIVR 1110-1-403, the approval of the President, Mississippi River Commission, and of the Commander, Mississippi Valley Division, will be sought prior to design and construction of the proposed diversion structure. A controlled river diversion (a gated structure) is proposed. The effect of the diversion of water from the Illinois River into the project area upon the Illinois River system has been assessed. In accordance with DIVR 1110-2-240, documentation of the final water control plan will be submitted to MVD for approval before responsibility for operation of the structure is turned over to the sponsor. A portion of the volume of water diverted from the Illinois River into the project area during any given year will be returned to the river at a later time.

In order to initially assess the effect of the diversion of water and sediment from the Illinois River into the project area upon the Illinois River system, the St. Louis District Hydrologic and Hydraulic Branch evaluated the structure and pumps proposed.

The minimum flow on the Illinois River in which water can enter the water control structure is 24,600 cfs. In a worst case scenario of filling the entire project from an elevation of 425 to 432 in a year, the maximum flow into the project is 3.9 cfs (or less than 0.016% of total flow on the Illinois River). The amount of flow being diverted from the Illinois River is negligible. At

Spunky Bottoms Ecosystem Restoration

stages in which flow is being diverted, depths in the navigation channel exceed 20 feet and therefore the navigation channel will not be impacted. In addition to the minimal amount of flow reentering the Illinois River from the project, periods of drawdown occur at stages below flood stage. The diversion of flow into and out of the project will not impact flood risk management features. The total water storage in the project is 0.04% of the lowest annual cumulative flow in the period of record. The amount of flow entering or leaving the project will not have a local or system wide geomorphic impact in the short or long time scale.

It is expected that the total suspended sediment being diverted into the project will be proportional to the amount of water diverted. With less than 0.016% of the total flow on the Illinois River being diverted into the project, the amount of suspended sediment diverted will be negligible. The water level management plan is designed to account for and minimize suspended sediment entering the project when the sluice gates are open. Due to the elevation of the water control structure, it is not expected that bedload will enter the project. The timing of the drawdown will insure that these sediments will consolidate and remain in the project and not reenter the Illinois River. No river engineering structures have been constructed on the Illinois River. Regionally, the Illinois River contributes less than a quarter of the total sediment load to the Mississippi River at Grafton and less than 6% of total sediment load to the Mississippi River at St. Louis. The amount of sediment entering or leaving the project will not have a local or system wide geomorphic impact in the short or long time scale.

As noted above, it is anticipated that the proposed diversion of water from the Illinois River into the project area will have negligible impact upon water and sediment of the Illinois River and therefore the Mississippi River. Figure 6-2 shows the conceptual Water Level Management Plan for the Spunky Bottoms project area. In the six-year cycle of the water level management plan, there are only nine periods of planned rising water-surface elevation. These periods have planned gradual increases of the water-surface elevation, with increases of about three feet at most. As noted above, the final water control plan will be submitted to MVD for approval before responsibility for operation of the structure is turned over to the sponsor.

Spunky Bottoms Section 1135

Diagrammatic representation of a water level management cycle

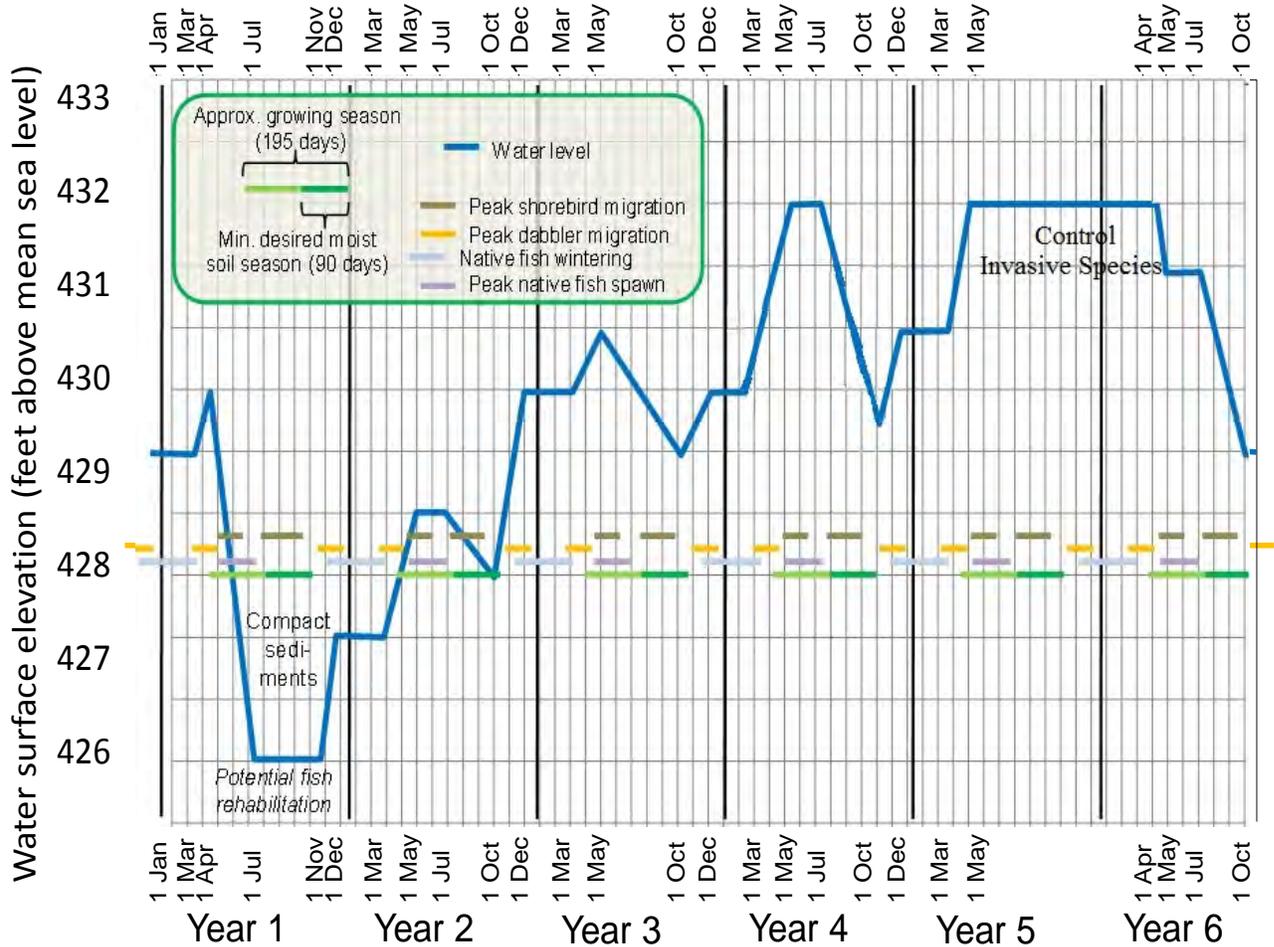


Figure 6-2. Model representation of Water Level Management Cycle.

Berm/Catchment Area:

Two configurations for the interior berm were examined. A pump with a capacity of 20 cubic feet per second (cfs) was used with both interior berm configurations. It is planned that a portable pump will be used to move water from the upstream side of the interior berm to the TNC wetland. A portable pump is preferred to constructing a permanent pumping station since it would be less expensive. The minimum land-surface elevation on the right side (i.e., eastern side) of the private agricultural property is about 434 feet NGVD, so the intent of the berm/pumping system is to maintain the elevation of water ponded on the upstream side of the berm at or below this elevation. Success in doing so will keep ponded water off of the private agricultural property. The design storm is the 100-year event.

Spunky Bottoms Ecosystem Restoration

The hydrologic model described above that was developed with HEC-HMS was modified to include the interior berm (both of its potential configurations) and the pump. The model was executed separately for both of the interior catchment areas to simulate the performance of each one while the 20-cfs pump was used. For option 1 of the internal catchment area, the peak elevation of the catchment area was 434.3 feet NGVD. This water-surface elevation would most likely cause water to flow onto the private agricultural property. For option 2 of the internal catchment area, the peak elevation of the catchment area was 433.9 feet NGVD. Thus, option 2 would likely protect the private inholding from flooding for the 100-year rainfall event.

Options 1 and 2 for the interior berm and catchment area are initial iterations in the design process, as is the 20-cfs pump. These options were only used for hydraulic analysis to determine the best possible catchment area for analysis as an alternative. During the preparation of P&S, it is anticipated that terrain data will be obtained near the private inholding and at the site of the proposed interior berm and catchment area. The design of the interior berm and catchment area, as well as the selection of pump size, will be refined after acquisition of the terrain data.

Gravity Drain:

Since water will be capable of being ponded to elevation 432 feet NGVD in the TNC wetland, a gravity drain will not be useful much of the time. However, at times of TNC wetland drawdown, a gravity drain would be able to drain small storm events without pumping required. Therefore, a single 36-inch corrugated metal pipe was selected as a minimum acceptable pipe size.

6.1.2. Geotechnical Considerations.

Soils Data. As part of this study, four borings were taken near the proposed site of the fish passage/water control structure. The borings were taken to identify the soil stratigraphy and corresponding strengths. The borings were taken along the southeastern end of the existing levee. The boring logs are attached in Appendix D. The borings were taken along a ridge that extended into the protected area. The foundation consists of 17 feet of lean clays over poorly graded, loose to medium dense sands, with bedrock at a depth of 60 feet.

A preliminary evaluation of the bearing capacity of the soil is estimated to be at least 1,000 pounds per square foot for support of the headwall structure, and at least 1,100 pounds per square foot for support of the culverts. The fish passage structure is not anticipated to exceed the current soil loading of the berm which will be replaced by the structure. The foundation requirements for the fish passage structure will be further evaluated with actual structure loadings during the preparation of P&S.

The Sponsor provided shallow borings that had been taken throughout the interior of the berm system. The boring logs generally indicated twelve to fifteen feet of silty-clays overlying coarse sands, with two borings (SPB-03 and SPB-04) encountering refusal at depths of 62.5 feet and 63.1 feet respectively below the existing ground surface; rock cores drilled below these refusal depths for an additional 1 foot indicated that the bedrock is composed of limestone. Soil Conservation Service soils data identified the area as being comprised of alluvial deposits of low plasticity and residual soils of medium to high plasticity. There has been significant disturbance of the soils in the site due to deposition from runoff, ditch spoil, and dredge disposal.

Spunky Bottoms Ecosystem Restoration

a. **Medium to High Plasticity Soils.** These soils comprise roughly two-thirds of the project area. They have low permeabilities and have limited erosion potential. These soils are located in the areas where deep water habitat is proposed. They will prevent loss of pool during low river stages and dry periods.

b. **Low Plasticity Soils.** This group is located primarily next to the bluff line. These materials are the result of run-off from the higher elevations on the bluff. These soils are suspect to erosion and are more permeable than the other soil group.

The materials for construction of additional berms will need to be sampled to determine which class they fall in. Changes in berm geometry could become necessary depending on the soil type.

Site Characteristics. The site has been used for dredge disposal on the northeastern portion of the site. Alluvial fans from bluff runoff historically occurred on the north and south portions of the site. The bluff drainage has been intercepted and collected in ditches. The central area of the site is depressed and generally wet. The ditches, continue to hold water over dry periods, maintaining deep water habitat for fish. Loss of pool has not been an issue during low river stages indicating no direct connection with the aquifer. Sedimentation is noticeably heavy off of the bluff while being diverted into the ditches. A small interior berm would need to be constructed to prevent induced flooding on the adjacent landowner. Depth to sands as indicated on the deep soil borings done by MVS were observed to be in the range of 16-19 feet below the existing ground surface.

Geotechnical Issues.

Fish Passage Structure:

The structure as currently conceived should have a mat foundation. A sheetpile cutoff for scour and undercutting will be used on both the interior and exterior of the structure. Construction will be done using a cofferdam to prevent flooding of the construction site. A sump area & pumps should be adequate for dewatering.

Interior Berms:

Interior berms will be constructed of local materials. The existing slopes are 1V:3H and will be further evaluated upon receipt of the soils test data from the borrow pits.

6.1.3. Civil Design Considerations.

Water Control/Fish Passage Structure:

The structure will be constructed within the footprint of the existing levee. The structure will be constructed before the channel to the river so a minimal cofferdam will be required due to high riverside dredge fill. Cofferdams will be required on the interior due to the impracticality of draining the entire management area.

Spunky Bottoms Ecosystem Restoration

The previously excavated levee will be replaced and drainage ditch excavated after completion of the structure. The final earth slopes and all excavation slopes will be 1V on 3H in all locations. For temporary structural excavations the slopes shall be 1V on 1.5 H.

Road Raise:

The township road will be raised to an elevation of 434.0. The additional roadway embankment will be placed on the south side of the existing road to avoid impacting trees to the north. Adjacent utility poles must be relocated to accommodate the additional road embankment.

The crown width will match the width of the existing county road. A 12-inch thick crushed stone surface will be provided. Side slopes will be 1V on 3H to facilitate mowing. Required earth materials will be obtained from a borrow area.

During construction, access to the private cabin area will be provided by placing crushed stone and a 48-inch culvert on the historical access road across the middle of the site. This temporary access can be accessed from County Road 12, with the entrance located behind the TNC maintenance shed. Upon completion of the north township road raise, the temporary access will be closed to local traffic and maintained by the non-Federal sponsor. The management of the historic road access also provides the ability for two separate management units within the moist soil unit management area.

18 inches of 90 lb riprap with 6 inches of 3-inch bedding material will be placed along the project side of the County Road 12 embankment to protect it during periods when water is impounded in the management area. The length of rock protection would be approximately 3,350 linear feet. The riprap will provide needed protection from wavewash action when the water elevation is at the highest designed elevation to prevent scouring of County Road 12.

Berm/Catchment Area:

The berm will be built to elevation 434.0. The berm will be constructed with a 10-foot crown and 1V on 3H side slopes. The berm will be approximately 2,400 linear feet, as constructed. A 12-inch thick crushed stone road on the top of this berm will provide the primary access from County Road 12 to the fish passage/water control structure. The material for the berm will be obtained from a local borrow area.

A 36-inch diameter culvert with a flap gate will be provided to permit gravity drainage flow from the private properties on the south. A catchment area and portable trash pump will store and pump surface water from the protected private property when the project water level is too high to permit gravity flow.

6.1.4. Structural Design Considerations. The box culverts were founded on a two foot layer of bedding stone with two biaxial geogrid layers within. These were considered to reduce bearing pressures and alleviate any potential differential settlement of the structure. However, due to the structure being built within the existing levee footprint, large settlements are not

Spunky Bottoms Ecosystem Restoration

anticipated. In addition, the box culverts have the potential to be either precast or cast-in-place to provide the most cost-effective solution during the time of construction.

The steel walkway and platform shall be hot-dip galvanized to prevent excessive corrosion of the steel over the life of the structure. A588 weathering steel may be used in lieu of hot-dip galvanizing.

Wingwalls were designed for a single case with a combination of sand and clay layers. The Illinois River side wingwalls were analyzed as both cantilever and anchored retaining walls. Due to the channel embankment and concrete slab on the Illinois River side, which provide additional support to the sheet pile walls, a cantilever system was adequate for the outermost portions of the wingwalls. An anchor system was necessary on the interior portion of the wingwalls due to excessive deflections. A basic steel tie-rod, double channel waler, and concrete deadman system was assumed for a preliminary anchor design.

Due to the build-up of sand and soil on the Illinois River side, an excavation will be required to create the inlet channel with a bottom elevation at or below 424.

Sheet pile cutoff walls will be necessary under the headwalls at both ends of the structure. A 20 ft depth was assumed for the preliminary design. A seepage analysis will be necessary to determine final depths of any cutoff walls.

The headwall and concrete slab are reinforced and monolithically poured in order to act as a gravity retaining wall system capable of resisting the lateral loadings.

6.2. Construction Considerations. The portable trash pump and gravity drain for the south end berm and catchment area should be tested and inspected during their first operation. Endangered species conditions and cultural resources conditions need to be complied with before the construction period. Section 401 Water Quality Certification and Section 404 compliance is needed prior to the initiation of construction activities.

6.3. Operation, Maintenance, Repair, Rehabilitation, and Replacement Cost

Considerations. After construction, the operation and maintenance of the project features will be the responsibility of the local sponsor. Responsibilities for site management include pump operation, reconnection structure, patrolling, and general site administration. Maintenance work includes the operated structures plus the levee and berms, access road, and maintenance of vegetation. Wetland vegetation in the moist soil unit management areas will be controlled through operation of the water control structure. If additional weed control is required, it will be the sole responsibility of the non-Federal sponsor as part of the OMRR&R. Management activities must respect adjacent landowners. Information on OMRR&R activities and costs will be tracked from the project's inception.

It will be important to pay close attention to the water entering and leaving the wetland in order to assure large flood flows of sediment are prevented from entering the wetland area. This sediment has the potential to block the reconnection control structure. Periodic inspection will be needed to verify that water and aquatic life are flowing through freely.

6.4. Real Estate Considerations. A draft Real Estate plan is included for the TSP modifications as Appendix L. That work is limited to the assessment of Lands, Easements, Rights of Way (LER) credits for the project. While there are some cabins located along the levee on the northeast portion of the TNC property, no real estate adjustments for these are needed as they are outside the scope of the project.

Lands, Easements, Right-Of-Way (LER) Required for Construction

The land requirements of this project are all presently owned by the non-Federal sponsor, TNC. Figure 6-1 above shows the required lands for the TSP.

Existing Federal Project within the LER Required for the Project

This project is on a previous Federal project – Little Creek Levee. There is not another federal project within the LER required for this project. However, the project is situated adjacent to the Illinois River and the LaGrange Lock and Dam is situated about one and one half mile upstream of the project.

Federally Owned Land Requirements for the Project

The project will not involve property presently owned by the federal government.

Navigational Servitude

Navigational Servitude is not a factor in this project.

Possibility of Induced Flooding

Flooding will be induced by the construction and OMRR&R of this project. A reconnection structure will be constructed to facilitate flooding. Neighboring landowners will be protected by the South Berm.

Baseline Cost Estimate

As noted above, the land required for this project is currently owned by the non-Federal sponsor. Therefore, with the exception of providing the USACE a Right of Entry for Construction, there are no additional real estate requirements for this project. An estimate of LER is included in the Real Estate Plan in Appendix L.

Relocation Assistance Benefits under Public Law 91-646

No persons, farms, or businesses will be displaced by this project.

Mineral Activity in Project Area

This area does not currently have any active mineral extraction occurring. Therefore, mineral interest in this area is not considered to be a factor for this project.

Sponsor Legal and Professional Capability to Acquire LER

As noted above the real estate requirements for this project are already owned by the non-Federal sponsors. TNC does not have the power of eminent domain. This project does not require acquisition of property; TNC is fully capable of providing the necessary LER. It is key to note that TNC does not have condemnation authority. If any lands are required during the Plans and

Spunky Bottoms Ecosystem Restoration

Specifications stage, such as borrow areas, that are outside of TNC's ownership, the St. Louis District Real Estate Branch will work with the landowners and Mississippi Valley Division to acquire those lands or easements upon those lands.

Zoning Ordinances Proposed

The project is located in Brown County, Illinois. Brown County is a small rural county, which presently has no countywide zoning ordinance. There will be no zoning ordinances enacted to facilitate acquisition of land for this project.

Schedule of Land Acquisition Milestones

The contract for this project is scheduled for award in Fiscal Year 2014 to Fiscal Year 2018. The District Real Estate Staff will secure a Right of Entry for Construction prior to award of the contract.

Facility or Utility Relocations/Alterations

There are utilities located within the project limits along the northern berm road and along the landside of the levee that lead to the existing pump stations. These utilities would need relocated during construction.

Impacts of Suspected or Known Contaminants

The Phase 1 HTRW report for this area identified three medium to high risk situations associated with the operation of the existing pump stations. These situations are outside the project area and will not be impacted by the project.

Landowner Support or Opposition to the Project

The surrounding landowners consist of TNC, IDNR, USFWS, USACE, and private landowners. The State and Federal agencies are in favor of the project. Additional private landowners in the surrounding area have expressed favor for the project for the ecosystem benefits. Additional input will be sought from private landowners during the public review.

Other Real Estate Issues Relevant to the Project

NRCS, agent of USDA and holder of the WRP easements, has expressed concern that the Ecosystem Restoration project is proposed over an area that currently holds a WRP easement. In the letter from NRCS shown in Appendix G, NRCS states that the Spunky Bottoms Ecosystem Restoration Project proposal, if properly installed, operated and maintained, could meet the requirements for an authorized compatible use. The remaining time on the 30-year WRP easement is approximately 16 years. USACE, in conjunction with TNC, will work with NRCS to obtain a compatible use agreement during the Plans and Specifications stage.

TNC traditionally utilizes its lands as a revenue source. As this project is federally funded, exclusive use will not be permitted.

6.5. Operational Considerations. A detailed operation description would be provided in the OMR&R manual after construction completion.

Spunky Bottoms Ecosystem Restoration

6.5.1. Portable Pump. There is a single 45 cfs diesel engine driven pump in the proposed plan that would be trailerable to allow management at the southern catchment area and provide pumping capabilities when required. A smaller 20 cfs portable trash pump would be used in addition to the larger pump to keep the catchment area, dry and allow maximum storage capacity. Existing site staff would be required to fuel and operate these pumps.

6.5.2. Water Control Structures. A large water control structure is part of the TSP. This structure includes two passages through the levee to control water movement by slide gate structures. An operator would be required to manage the gates to achieve the water level management desired. This allows a multiple scale approach to water level management.

6.6. Maintenance Considerations. Routine maintenance would include periodic inspection and lubrication of the pumps and water control structures. Additional activities would include inspecting shorelines and berms, adding/moving rip rap, mowing, burning, and planting. The estimated annual maintenance costs are presented in Table 8-2. These quantities and costs may change during final design.

Maintenance after a flood would be more intensive. The trailer mounted diesel pump engines and fuel tanks should be removed before a flood occurs. After a flood, all features must be inspected for erosion and structural damage. Water control structures must also be inspected to determine if gates seal tightly and operators are functional.

Spunky Bottoms Ecosystem Restoration

7. SCHEDULE FOR DESIGN AND CONSTRUCTION

The tentative schedule provided below in Table 7-1 follows the assumption that no major problems are encountered throughout the project review process. Currently, no known issues exist and all dates and milestones should be achievable. These assumptions provide that full funding occurs at the specific milestones.

Table 7-1. The tentative schedule for the project and necessary completion steps.

Requirement	Scheduled Date
Distribute Draft ERR	11 July 2011
Complete Agency Technical Review of Draft ERR	18 Aug 2011
AFB Memo	Sep 2013
Submit ERR for Public and Agency Review	Sep 2013
Submit Final ERR to Mississippi Valley Division	Sep 2013
Initiate Design and Implementation	Phased, 14 Jan 2014-2016
Submit Plans and Specifications for Agency Technical Review	Phased, 14 April 2014-2016
Complete Plans And Specifications	Phased, 13 May 2014-2016
Advertise Contract	Phased, 23 May 2014-2018
Award Contract	Phased, 1 Jul 2014-2018
Complete Construction	Phased, 1 Aug 2015-2018
Prepare OMRR&R Manual	Phased, 1 Aug 2015-2021

Construction will take place in four phases over a four-year period as shown in the construction requirement schedule in Table 7-2. In order to develop a project schedule it is assumed that the project will be approved for construction in FY 2014 in time to allow for construction activities. The four phases are as follows: Phase 1: Construct Southern Access and County Road Riprap; Phase 2: Construct North Access Road Raise, Power Line Relocations, and Southern Catchment Area with Berm; and Phase 3: Fish Passage Structure,. The Southern Catchment Area and Berm that provides protection to the private landowner will be in place prior to the construction of the fish passage structure that will increase internal water elevations and ensured to be functioning properly; thereby eliminating flooding risks to the private landowner. The construction schedule will be revisited during final design.

Table 7-2. Construction requirement schedule.

Construction Requirement	Scheduled Date
Begin PED	FY 14
Finish PED, Construct Southern Access (Temp Access), and County Road Rip Rap	FY 15
Construct North Access Road Raise, Power Line Relocations, Southern Catchment Area	FY 16
Fish Passage Structure	FY 17

Spunky Bottoms Ecosystem Restoration

8. COST ESTIMATES

Table 8-1 displays costs for the current working estimate (CWE) derived from the Planning Level Cost Estimate. A Micro-Computer Aided Cost Estimating System (MCACES) level cost estimate will be updated for final report submittal. Appendix F provides these detailed cost estimates of the proposed project features for the TSP.

Table 8-1. Spunky Bottoms Project Construction Cost, derived from Planning Level Cost Estimate

Features	Current Working Estimate
Berm Access Road	\$1,223,000
South Catchment Area – Berm	\$331,000
County Road – Rip Rap	\$167,000
Fish Passage Structure	\$1,624,000
Pre-Construction Engineering and Design	\$501,750
Construction Management	\$334,500
Feasibility Study	\$794,000
Monitoring	\$682,520
Lands, Easements, Right-of-Ways, and Relocations	\$3,425,000
Estimated Total Project Cost	\$9,082,770

*The North Road Access Raise at a cost of \$892,000 is included in the Lands, Easements, Right-of-Ways, and Relocations based upon determinations by the St. Louis District Real Estate Branch.

A detailed estimate of OMRR&R costs for current and with the TSP are presented in Table 8-2. Table 8-3 and Appendix K present the annual monitoring costs. Quantities and costs may vary during final design. The CWE is calculated using present worth (July 2013) and does not include future escalation.

Table 8-2. Current and estimated average annual OMRR&R costs.

Item	Current Annual Cost	Estimated Annual Cost
Operation	\$16,400	\$16,550
Maintenance	\$13,730	\$21,940
Repair & Rehabilitation	\$4,510	7,222
Replacement	\$6,480	\$11,770
Total Cost	\$41,120	\$51,597

Spunky Bottoms Ecosystem Restoration

Table 8-3. Estimated post construction annual monitoring costs.

Item	Post-Construction Monitoring (Annual)	5 Year Total
Develop and Maintain Monitoring Plan and Schedule	\$5,000	\$25,000
Document Annual Water Level Decisions	\$1,134	\$5,670
Vegetation Surveys (Transect, aerial surveys, LTRMP sampling)	\$31,000	\$155,000
Aquatic Processes Monitoring	\$5,000	\$25,000
Fisheries and Mussel Monitoring	\$11,000	\$55,000
Waterfowl Surveys and Monitoring	\$15,000	\$75,000
Water Quality Monitoring (Grab samples)	\$3,600	\$18,000
Water Quality Monitoring (Continuous monitoring)	\$13,500	\$67,500
Database development, management, and maintenance, Communication efforts (i.e. meetings, webpage, conferences)	\$51,270	\$256,350
TOTAL	\$136,504	\$682,520

8.1 Cost-Sharing and Implementation Considerations. Preliminary total project costs include the feasibility phase as well as design and implementation and are presented in Table 8-4. The preliminary estimate of total feasibility costs is approximately \$794,000. The preliminary estimate of design and construction costs is approximately \$4,181,250. These costs will be refined in the design and implementation phase. Total LERRD are shown in Table 8-4 as well. The excess LERRD identified below the LER is the excess LERRD above 25% of the total project cost. The non-Federal sponsor has voluntarily waived excess LERRDs in accordance with Engineer Regulation 1105-2-100, Appendix F. The sponsor letter is provided in Appendix G. The total LERRD is used in calculating total project cost; however, the excess LERRD cannot be used by the non-Federal sponsor towards their contributions.

Table 8-4. Federal and non-Federal cost of total project.

	Federal Cost	Non-Federal Cost	Total Cost
Feasibility Costs	\$794,000 ¹	-	\$794,000
Design & Construction Costs	\$4,181,250	-	\$4,181,250
Monitoring Costs	\$682,520	-	\$682,520
LERRD	-	\$3,425,000	\$2,310,000
Excess LERRD	1,154,310	(1,154,310)	
Total Project Cost	\$6,812,080	\$2,270,690	\$9,082,770

¹Per ER 1105-2-100, Appendix F, feasibility costs were completed at 100% Federal funding but will be included in total project costs at execution of the Project Partnership Agreement and follow the 75/25 cost share.

Spunky Bottoms Ecosystem Restoration

The non-federal sponsor is aware of their responsibilities. The non-federal sponsor is responsible for 25% of the total project costs under the Section 1135 program. Project costs exceeding the federal program limit will be the non-federal sponsor's responsibility. The non-Federal sponsor is responsible for 100% of OMRR&R and relocations. The non-federal sponsor is responsible for providing all LERRD, the value of which will be applied towards their 25% share of the total project costs. Up to 50% of the non federal sponsor share can be provided as in-kind services. The remaining non-federal share is provided in cash after credit is applied for LERRD and in-kind services. Potential in-kind services will be outlined and agreed upon prior to signature of the Project Partnership Agreement. As of current, no in-kind services have been discussed with USACE.

9. ENVIRONMENTAL EFFECTS*

Site visits were conducted and reference material consulted in order to evaluate environmental resources and determine potential impacts that may result from the proposed project.

The TSP would result in positive long-term benefits to wetland and aquatic habitats located in and around the Spunky Bottoms Project. The project would result in some conversions of cover types, but the resulting changes would provide habitat to a greater diversity of species. No Federally protected species would be negatively affected. Due to construction, the project would result in short-term decreases in water quality, noise, air quality, and aesthetics and disturb area wildlife and public use. Long-term benefits to area habitats would far outweigh the short-term impacts. No significant negative social or economic impacts would result. No impacts to historic properties are anticipated.

The No Action alternative was evaluated separately for all areas of concern through Section 9. Section 9 has been expanded beyond Section 2 Existing Resources to capture all areas of interest within the project area. Section 2 describes all existing conditions for those factors listed under Section 2. All action alternatives were also evaluated separately, but had similar results, therefore they are summarized as future with project. Alternatives that provide a different impact than other alternatives are explained for each resource topic.

9.1. Physiography-Topography.

No Action

The No Action alternative would result in no noticeable changes to physiography and topography.

Future With Project

The future with project would result in the construction/alteration of two interior berms in order to better manage the water in the floodplain, as well as the elevation of County Road 500. The project would also result in the reconnection of the Illinois River to backwater areas.

9.2. Aesthetics. Aesthetics of the area north of Little Creek consists of little to no agriculture lands on public or private lands to the LaMoine River. It is primarily a mix of private Conservation Reserve Enhancement Program lands, State, private duck clubs, and Federal owned lands. Areas south of Camp Creek are predominantly agriculture. The project area has been

Spunky Bottoms Ecosystem Restoration

drained by a series of ditches, flood protected with a levee system from the Illinois River, and planted in row crops for the past 60 years. The area south of Little Creek in the project area presently supports scenic wetland, prairie, and hardwood areas.

No Action

The No Action alternative would remain consistent. Current agricultural lands would continue to be leased for agricultural use. TNC would continue to manage the wetlands located within Spunky Bottoms to the greatest extent possible; however, sedimentation, without a means to consolidate sediments, would result in shallower, less productive wetlands. This could potentially reduce the aesthetic quality currently provided by project area.

Future With Project

The future with project would restore habitat for fish and other aquatic organisms, plus food and shelter for wildlife, all of which would enhance the aesthetic environment. There would be no detrimental aesthetic effects, other than short-term impacts during construction. Once the project is complete, aesthetic value would increase due to increases in size and quality of restored wetlands and improved management capabilities.

9.3. Traffic/Transportation Patterns. County Highway 12, with an estimated usage of 100-300 vehicles per day, is located along the west boundary of TNC's portion of the project. Access to the TNC property for recreation is allowed on the old pump house road through the middle of the project area. Canoeists and fishermen may launch boats from this area. Fishermen and waterfowl hunters are allowed limited use of the old Snyder landing strip road to access the levee and the eastern portions of the project. Traffic on the landing strip and levee is limited and slight with no more than approximately 50 vehicles per year for access and tours. The old south road along the McKee tract on the TNC property is frequently inundated affording no access to the levees from the south. The flank levees and the main line levee of the Little Creek levee system are drivable, but support little or no vehicle traffic. TNC has provide a parking area and lookout point at the southwest portion of their property along County Highway 12. In addition, IDNR has positioned four parking areas and informational kiosks at the southeast, southwest and northwest corners of their property to the north of the project area. These parking areas are graveled, with a capacity of up to five vehicles each, in support of their public hunting program.

No Action

Traffic would not be impacted. The cabins would still be provided access at the north end of the Spunky Bottoms Project. No additional parking areas are planned.

Future With Project

Traffic/transportation patterns would at times be impacted during construction; however, once the project is complete, traffic patterns would return to normal. Additionally, the proposed raised berm along the southern private inholding and a rocked roadway and levee top would provide a southern access point. The proposed riprap along County Highway 12 would reduce impacts to traffic and transportation patterns. Without the riprap, the erosion from the increased water elevations could cause erosion of County Highway 12 that would require maintenance and potential closures of the roadway to perform the maintenance.

9.4. Air Quality.

No Action

Air quality standards would remain equivalent to existing conditions. Local agricultural practices and local transportation would continue to reduce air quality in the area, but due to the rural nature of the project, no significant impacts are anticipated without the project.

Future With Project

Air quality would be considered good at this site throughout the year due to the location and distance from any large metropolitan area. The construction activities would have minor impacts on air quality within the project area. The contractor would be required to abide by clean air standards in relation to dust control. The emissions from the heavy equipment may cause an increase in carbon monoxide but the effects would be minimal.

9.5. Noise.

No Action

Noise levels are generally low at this site throughout the year due to its location and distance from any large metropolitan area. No changes would occur as a result of the No Action alternative.

Future With Project

Noise level is expected to increase during project construction. The overall long-term noise level would not increase. All other noise levels would return to normal following completion of construction of the project.

9.6. Safety.

No Action

There are no outstanding safety issues at the site at this time, with the exception of those generally associated with natural, rural, or outdoor sites. No negative safety issues are anticipated to occur in the future without the project.

Future With Project

There are no outstanding safety issues at the site at this time, with the exception of those generally associated with natural, rural, or outdoor sites. No negative safety issues are anticipated as a direct result of the project. Project features would follow safety guidelines, rules, and regulations.

9.7. Existing and Potential Water Supplies; Water Conservation; Water Related.

No Action

Areas within the project site generally contain water throughout the year. However, it is not used as a public water supply, or water conservation area. Future without the project would not change. The area would not be used for public water supply.

Future With Project

No adverse long-term impacts to existing and potential water supplies, water conservation, or water related issues are anticipated to occur in the region as a result of the proposed action. The project is not anticipated to be used for public water supply.

9.8. Water Quality.

No Action

Under the No Action alternative, the Spunky Bottoms project area would not contribute to improving the water quality within the area due to no connection with the Illinois River. The project area would slowly accumulate sediment from runoff of lands in the watershed. The protection that the levee provides would also reduce the ability for sediments to leave the system; therefore little benefits to water quality would be gained besides those already completed by TNC through their wetland restoration efforts.

Future With Project

Water quality would be increased by the filtering effect of aquatic plant nutrient retention and consolidation of sediments from operation of the water control structure. Construction activities would have minor impacts on suspended sediments during construction and the effects would be temporary and minimal.

9.9. Suspended Particulates & Turbidity.

No Action

Suspended particulates and turbidity would remain low within the project area under the No Action alternative. As sedimentation increases without consolidation and water levels decrease, suspended particulates and turbidity would increase.

Future With Project

The future with project would allow the water from the Illinois River to be introduced into the project site in a controlled manner. It would be important for staff to pay close attention to the water entering and leaving the wetland in order to assure large flood flows of sediment are prevented from entering the wetland area. The water entering and exiting the project area, would remove excessive fine, lightweight sediments from the project area or become consolidated through water drawdowns.

9.10. Storm, Wave, and Erosion Buffers. The riverside levee currently reduces storm, wave, and erosion damage to the interior property. Currently, the Little Creek D&LD is inactive in the PL 84-99 program. If status is restored in the PL 84-99 program, the interior landowners would continue to receive the full level of protection afforded by the riverside levee. If status remains inactive, the interior landowners would receive reduced protection from the levee system.

No Action

As of current, the Little Creek D&LD is considered inactive in the PL 84-99 program. The Little Creek D&LD will continue to make upgrades as necessary to try and restore active status within

Spunky Bottoms Ecosystem Restoration

the PL 84-99 program. Upon restored status, the Little Creek D&LD would continue to abide by guidelines to remain in the PL 84-99 program and provide protection to interior landowners. The northern access for cabin owners would continue to become inundated on occasion. The use of riprap along the road has reduced impacts from erosion when the road is inundated and will continue to provide protection. The Levee District would attempt to maintain access whenever possible, but may be restricted due to river elevations or excessive rainfall. Available LiDAR data were used to evaluate the elevation of the County Road 500. The lowest elevation along the road was approximately 430.5 feet NGVD. It was estimated that there was approximately a 25% chance of exceedance at these elevations when the LiDAR was taken. The road recently received additional riprap including leveling low lying areas that have become inundated in the existing conditions. Maintenance of the road was expected to continue under the no action.

Future With project

During flood conditions, the reconnection structure would ensure minimal damages to the levees/berms due to flow of water into the interior. Additionally, the reconnection structure would allow flood water to be introduced into the project site in a controlled manner which reduces head pressure, rather than through a sudden levee breach or overtopping. Also, riprap protection would be provided along County Highway 12. This protection is designed to aid against erosion and wave wash resulting from elevated water levels within the project area.

9.11. Normal Water Level Fluctuations (tides, river stages, etc.).

No Action

Presently, the project area contains standing water to approximately 430 feet NGVD. Due to the limited pumping capabilities without a direct connection to the Illinois River, full management of water levels within the project site is not possible at this time. The area is pumped as needed to protect agricultural crops and the County Road 500, but not for natural habitat management. The main practice is to reduce pumping to allow maximum storage capacity without impacts to adjacent landowners. These practices would continue.

Future With Project

Managed reconnection of the Spunky Bottoms project to the river would allow the return of a relatively natural flood cycle to the area and contribute to the recovery of the Illinois River floodplain ecosystem. The riverside reconnection structure would be instrumental in restoring a more natural hydrology to the Spunky Bottoms project area. The provision of the berms and the south end pumping capability would ensure that the impacts of the non-Federal sponsor's management on the adjacent farm would be avoided. The continuation of the PL 84-99 program would ensure that the interior landowners continue to receive the full level of protection afforded by the riverside levee. Assistance under PL84-99 would be provided as long as the Little Creek D&LD is active in the program and a positive benefit/cost ratio is met. If either of the previous statements are not met, the non-Federal sponsor would be responsible for making required repairs to the levee. The 425 feet NGVD sill elevation on the reconnection structure would be sufficient to ensure adequate fish passage during critical times of the year, and would allow for invasive species management.

Spunky Bottoms Ecosystem Restoration

9.12. Erosion and Accretion Patterns. An accelerated erosion and sedimentation process has a negative impact on the targets in several ways. It rapidly degrades aquatic habitats used by fish and other aquatic organisms (e.g., mussels, insects, reptiles, and amphibians), fills in backwater areas at a rate faster than the natural communities can respond, and degrades water quality.

No Action

The project area would still accrue sedimentation from neighboring lands resulting in diminishing wetlands and aquatic habitats without the ability to consolidate sediments. Erosion and accretion may eventually lead to sedimentation of the wetlands and aquatic habitats and therefore loss of habitat.

Future With Project

The future with project would allow the water from the Illinois River to be introduced into the project site in a controlled manner. The water entering and exiting the project area, would consolidate heavy sediments and remove excessive, fine sediments from the project. This connection to the Illinois River and additional protections such as riprap along County Highway 12 would reduce the impacts of erosion and accretion within the project area.

9.13. Currents, Circulation, or Drainage Patterns. At this time, the project area has no current, circulation, or drainage patterns/capabilities other than wind generated waves and limited pumping to protect agricultural crops and County Road 500.

No Action

The No Action alternative would be similar to existing conditions. Since no current, circulation or drainage patterns/capabilities exist within the project area currently, there would be no impact on them.

Future With Project

The future with project would allow water to flow into and out of the site in a controlled manner through the water control structure. This would permit the site to be drained as necessary to facilitate sediment compaction. Without this feature, excess sedimentation and associated problems would result. This project feature would significantly enhance the water quality and aquatic habitat in the project site.

9.14. Flood Control Functions. Presently, the project area is able to provide some support in terms of flood damage reduction, as it usually contains standing water to approximately elevation 430 feet NGVD; however, the levee is maintained to prevent deficiencies, flood-fighting activities are initiated when appropriate, and pumping the interior of the levee occurs to prevent impacts to adjacent landowners. Additionally, the levee would have to be overtopped before floodwater could enter the site as there is no direct connection to the Illinois River.

No Action

The No Action alternative would be similar to the existing conditions and provide limited flood damage reduction. The levee is currently inactive in the PL84-99 program. If status is restored in the PL 84-99 program, the interior landowners would continue to receive the full level of protection afforded by the riverside levee. If status remains inactive, the interior landowners

Spunky Bottoms Ecosystem Restoration

would receive reduced protection from the levee system.

Future With Project

The future with project would allow river water to enter the site in a controlled manner through the reconnection structure, rather than having to breach or overtop the levee in order to gain access to the floodplain. This would ensure minimal damages to the levees/berms due to flow of water into the interior. Additionally, water levels inside the levee would be managed, allowing for more storage capacity of early spring floodwaters prior to fish spawning.

9.15. Socioeconomic Resources.

No Action

The No Action alternative would have no appreciable effect on factors of population, race distribution, age distribution, educational characteristics, civilian work force, employment, housing characteristics, agriculture or local taxes.

Future With Project

The proposed project would have no appreciable effect on factors of population, race distribution, age distribution, educational characteristics, civilian work force, employment, housing characteristics, agriculture or local taxes. The construction activities may provide for temporary employment in the project area.

9.16. Recreation.

No Action

The improvements made upon the Spunky Bottoms project area have already greatly enhanced the recreational opportunities within the project area. These benefits would continue to be maintained through the period of analysis without the project.

Future With Project

The project as a whole coupled with the ability to manipulate water levels would make Spunky Bottoms one of the premier bird watching and waterfowl hunting destinations on the lower Illinois River Valley. Already hunters have called Spunky Bottoms one of the best public waterfowl hunting areas in the State as evidenced by 2003's hunter success rates of 2.34 ducks per hunter day (Lampe, Peoria Journal Star). The implementation of the proposed project would enhance recreational opportunities and is not anticipated to have any negative impacts on recreation. Open public access would be maintained similar to the current conditions and under the no action alternative. No economic gain is expected for TNC.

9.17. Commercial Navigation. The Illinois River is a major navigation route for bulk commodities moving between the Mississippi River and locations north of the project area. The proposed project would have no impacts on commercial navigation.

No Action

The future without the project would have no impacts on commercial navigation.

Future With Project

The future with the project would have no impacts on commercial navigation.

9.18. Recreational and Commercial Fisheries.

No Action

The No Action alternative would have no adverse impacts on recreational or commercial fisheries in or near the project area.

Future With Project

The future with project would have no adverse impacts on recreational or commercial fisheries in or near the project area. Conversely, the project would provide high quality nursery, feeding, and overwintering habitat for fish, which would result in improved fisheries.

9.19. Parks, National and Historic Monuments, National Seashores, Wild and Scenic Rivers, Wilderness Areas, Research Sites, Etc. There are no parks, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, research sites, etc. in the project area.

No Action

The future without project would have no adverse impacts on such areas.

Future With Project

The future with project would have no adverse impacts on such areas.

9.20. Prime and Unique Farmland.

No Action

No prime farmland within the project area would be impacted. Areas already in Wetland Reserve Program (WRP) easement would remain in the program through the life of the easement.

Future With Project

All alternatives would have similar impacts to the No Action alternative. If it is determined that a project feature impacts prime farmland outside of those areas enrolled in the WRP easement, such as borrow areas, these areas would be coordinated with U.S. Department of Agriculture (USDA) and a Farmland Conversion Impact Rating (AD-1006) would be completed.

9.21. Habitat for Wildlife, Fish, and Other Aquatic Organisms.

No Action

Under the No Action alternative, future conditions would be equivalent to existing conditions. No new habitats would be restored and to a minimal level, habitats would enhanced by the project area.

Future With Project

The re-establishment of the historic productivity of the river's floodplain ecosystem (prairie, wooded wetlands, moist soil marsh, and deep water habitat) would provide habitats that are essential to the long-term viability of aquatic and terrestrial species..

The ecological value of riparian habitats depends on their integration as units within the surrounding landscape because of the different and distinct habitats needed by organisms with complex life histories that use wetland sites. Restoration of the project area would provide for greater Illinois River ecosystem functions by increasing the total amount of energy flow into the ecosystem via restoring native aquatic and terrestrial vegetation. The total amount of energy available to the entire food chain is fixed by plants and moves to other trophic levels by consumption and/or predation. Active management would be required to reduce or remove undesirable plant species to allow the desired woody and herbaceous native plant community to regenerate. Overall, all project alternatives with the project would enhance the local habitats and communities.

9.22. Wildlife Resources.

No Action

Existing measures have improved wildlife resources throughout the project area. Due to limited funds, no further measures would be possible in the project area.

Future With Project

Alternatives A, B and C would provide a progressive increase in wildlife resources as more area would be restored through each iteration of water level management. The re-establishment of native plant communities that were characteristic of the Illinois River floodplain would restore the habitat that would in turn allow other endemic species to re-colonize the site. The expectation is that several state-listed endangered or threatened species and other wildlife would use this restored habitat (great egret, osprey, Forster's tern, Bewick's wren, upland sandpiper, Henslow's sparrow, American bittern, northern harrier, black tern, little blue heron, least bittern, short-eared owl, common tern, sandhill crane, sharp-shinned hawk, Wilson's phalarope, yellow rail, black rail, yellow-headed blackbird, double-crested cormorant, Pied-billed grebe, brown creeper, veery, common moorhen, bald eagle, black-crowned night heron, and the Indiana bat). The river otter (reintroduced on the La Moine River just north of the project area) could be expected to use the restored wetland on the site (TNC, Illinois Chapter, 1999). The diversity that the project features produce would restore many of the area's natural floodplain functions and values and also benefits many species of shorebirds, wading birds, raptors, songbirds, mammals, reptiles, amphibians, invertebrates, and fish. The elevation gradient of the project area would restore a diverse mix of native hydrophytic and mesophytic vegetation.

9.23. Fishery Resources.

No Action

Spunky Bottoms Ecosystem Restoration

Under the future without project conditions, the project area would only provide minimal fishery resource benefits. Current fish stockings have had minor success and recreational fishing has also had some successes as well. There is no current connection to the river. This results in reduced function of the aquatic areas as access can only be granted by flooding and overtopping the levee or back flooding from Little Creek.

Future With Project

Reconnecting the river to the floodplain would allow aquatic organisms from the river to use the site for reproduction, feeding, nursery and over-wintering (a critical habitat need on the Illinois River). However, a management regime that regulates river-backwater connectivity to promote native biodiversity in a large floodplain river ecosystem is a relatively new concept. Protecting the restored areas from current threats now associated with the river – especially the high sediment loads, unnaturally fluctuating water levels, and detrimental invasive species such as Asian and European carp, is essential. Because of these factors, the sponsors anticipate a need for adapting their management to changing environmental conditions. There would be a need to monitor fish movements into and out of the unit, as well as fish production, growth, survival, and standing stocks in the unit. Based on this monitoring, management would be adapted to increase the effectiveness of the project's contribution to the conservation of native species. For example, if larval fish are not being swept into the area, it may be appropriate to manage the river connection to maximize inflows to the unit during those times that target larval fish are evident in the main channel border areas. If low numbers of desirable backwater spawners occur in the unit, it might be necessary to adjust connectivity to facilitate movements of such brood stock into the unit. Over time, the responses of aquatic organisms and plant communities in the unit would be modified to changing environmental conditions, and water level and flow manipulations would help to develop an increasingly effective management regime to help guide restoration at this site and management sites elsewhere along the river system.

9.24. Special Aquatic Sites (sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, riffle and pool complexes). The project area currently contains wetlands, vegetated shallows, and few mud flats.

No Action

Existing wetlands would slowly sediment in from lack of additional water supply. This would result in a loss of special aquatic sites.

Future With Project

The low flow of midsummer would expose additional mudflats where the soils would be stabilized by drying and compaction and colonized by moist soil plants that provide habitat for many terrestrial species as well as food for waterfowl when the area is flooded on their fall migration. The processes of decomposition and nutrient recycling would be accelerated in the moist but well-oxygenated environment of the floodplain, in contrast to the oxygen-depleted sediments of the now permanently flooded areas. Existing special aquatic sites would be enhanced by the future with project.

9.25. Threatened and Endangered Species Biological Assessment. In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, MVS requested that the

Spunky Bottoms Ecosystem Restoration

USFWS provide a listing of Federally threatened or endangered species, currently classified or proposed for classification, which may occur in the vicinity of the project. The USFWS (Marion, IL Ecological Services Field Office) stated in a letter dated 23 August 2004, that three federally listed species may be present in the project area (Table 9-1). There is no federally designated critical habitat in the project area.

Additionally, in a letter dated 23 August 2004, the IDNR stated that the Illinois Natural Heritage Database contained recent records of occurrence for two state endangered or threatened species in or near the project area.

Table 9-1. Endangered, Threatened and Protected Species

Common Name	Scientific Name	Status	Habitat
Indiana bat	<i>Myotis sodalis</i>	FE, SE	Caves, mines; small stream corridors with well developed riparian woods; upland and bottomland forests
Bald eagle	<i>Haliaeetus leucocephalus</i>	FP	Breeds and winters along major rivers and large reservoirs
Decurrent false aster	<i>Boltonia decurrens</i>	FT, ST	Disturbed alluvial soils
Henslow's sparrow	<i>Ammodrammus henslowii</i>	SE	Nests, breeds, and feeds in taller, dense grassland mixes during spring through fall. Open grasslands with wet areas favored.

FE – Federally endangered, FT – Federally threatened, SE – State endangered, ST – State threatened, FP – Federally Protected

9.25.1. Indiana Bat. The endangered Indiana bat has been noted as occurring in several Illinois counties. Potential habitat for this species occurs statewide; therefore, Indiana bats are considered to potentially occur in any area with forested habitat. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females. The species or size of tree does not appear to influence whether Indiana bats utilize a tree for roosting, provided the appropriate bark structure is present. However, the use of a particular tree does appear to be influenced by weather conditions, such as temperature and precipitation.

Spunky Bottoms Ecosystem Restoration

During the summer, the Indiana bat frequents the corridors of small streams with well-developed riparian woods, as well as mature upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures.

A recent review of Indiana bat literature and data indicates that the home range of an Indiana bat maternity colony could be as large as approximately 50,000 acres. The amount of habitat needed for any given colony is dependent upon a number of factors, including size of the colony, quality of foraging and roosting habitat, and intra-specific and inter-specific competition. The estimated home range of male Indiana bats is much smaller, but may be as large as approximately 3100 acres. Again the amount of habitat needed would depend upon many factors. To avoid impacting this species, tree clearing activities should not occur during the period of 1 April to 30 September. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing should be prohibited from 1 April to 15 November. If it is necessary to clear trees during this time frame, mist net surveys may be necessary to determine if Indiana bats are present.

No Action

Tree clearing activities would not occur within the project area and no known hibernaculas would be impacted. Without further management measures in the future with project alternatives, the habitat quality would slightly degrade resulting in less habitat suitable for the Indiana bat.

Future With Project

Tree clearing activities are not planned for the future with project; however, if any tree clearing becomes required during the plans and specifications stage, these clearing activities would not occur during the period of 1 April to 30 September. To avoid the potential “take” of endangered Indiana bats, all tree clearing activities would occur outside this time frame. Aside from tree clearing, existing bottomland forest habitat would benefit from wetland management through the levee water control structure which would provide additional summer roosting and foraging habitat. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing would be prohibited from 1 April to 15 November. If it is necessary to clear trees during this time frame, mist net surveys may be necessary to determine if Indiana bats are present. The future with project may effect, but not likely to adversely affect the Indiana Bat.

9.25.2. Bald Eagle. The federally protected bald eagle is listed as breeding and/or wintering in several Illinois counties. During the winter, this species feeds on fish in open water areas including those created by dam tailwaters, the warm water effluents of power plants, municipal and industrial discharges, or in power plant cooling ponds. The more severe the winter and the greater the ice coverage, the more concentrated the eagles become. They perch in large shoreline trees to rest or feed on fish. Bald eagles nest in large trees with an unobstructed view of the surrounding area. Groups of eagles also roost at night in large trees in areas that are protected from harsh winter elements. The eagle may not be harassed, harmed, or disturbed when present nor may nest trees be cleared.

Spunky Bottoms Ecosystem Restoration

No Action

Eagles are commonly seen throughout the site and several nest sites are known within close proximity to the project area. No tree clearing is anticipated for the project area under the no action alternative. The wetland habitat provided by the existing conditions would continue to provide suitable habitat for the Bald Eagle.

Future With Project

Minimal tree clearing is anticipated for the project area. The wetland habitat provided by the future with project conditions would provide additional habitat for the Bald Eagle. The project is not likely to adversely affect the Bald Eagle.

9.25.3. Decurrent False Aster. The decurrent false aster is listed as threatened and is known to occur in several Illinois counties in the floodplain of the Illinois and Mississippi Rivers. It is considered to potentially occur in any county bordering the Illinois River, and in Jersey, Madison, and St. Clair counties bordering the Mississippi River. It occupies disturbed alluvial soils in the floodplains of these rivers. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law.

No Action

No known sites of decurrent false aster are located within the project; therefore, no impacts are anticipated to the species.

Future With Project

No known sites of decurrent false aster are located within the project; therefore, no impacts are anticipated to the species with construction of the project. The area may provide suitable habitat for later introductions and provide a slight benefit to decurrent false aster, therefore the future with project may effect, but not likely to adversely affect decurrent false aster.

9.25.4. Henslow's Sparrow. The grassland ecosystems on which Henslow's sparrow depends are considered among the most endangered ecosystems in North America. Prior to European settlement, Henslow's sparrow (*Ammodramus henslowii*) bred primarily in prairie habitat. With the loss of native prairie to agriculture, the Henslow's sparrow adapted to breeding in secondary grassland habitats, particularly hayfields and pasture. Grasslands which provide Henslow's sparrow breeding habitat are characterized by tall, dense grass with a well-developed litter layer and a relatively high coverage of standing dead vegetation. The grasslands support sparse woody vegetation, but extensive woody invasion preclude use by Henslow's sparrow. Habitat area is considered a limiting factor for Henslow's sparrow; only large grasslands support persistent populations. Winter habitats of Henslow's sparrow are similar to breeding habitats, in that they are dominated by dense groundcover.

Loss and deteriorating quality of grassland habitats is an underlying cause for Henslow's sparrow population declines. The area of native prairie in North America, which historically provided prime Henslow's sparrow breeding habitat, has declined dramatically; some estimates are as high as 99.9%. The availability and quality of secondary agricultural habitat have also declined.

Spunky Bottoms Ecosystem Restoration

Much agricultural land has been lost to development or reverted to forest. In addition, many hayfields and pastures have been converted to row crop production. Disturbances in remaining hayfields have intensified with trends toward earlier and more frequent mowing. There have been large-scale losses of grassland habitats in the winter range of the species, as well as the breeding range. Fire-dependent savannas and prairies of the southeast have been destroyed and continue to be threatened by exclusion or reduction of frequency of fire, drainage, urbanization, and conversion to agriculture or pine plantation. Not only has the overall quantity of habitat declined, but also the average patch size of remaining grassland habitats has declined. The highly fragmented nature of the remaining grassland habitats has serious implications for area-sensitive species such as Henslow's sparrow.

No Action

The Spunky Bottoms project area currently provides little grassland habitat, primarily along County Highway 12, that may be likely unsuitable for the Henslow's sparrow due to the proximity to County Highway 12 and the small area that exists. The grassland would continue to be managed by TNC. Therefore, no impacts are anticipated to the Henslow's sparrow without the project.

Future With Project

Under Alternative A, grassland adjacent to County Highway 12 would continue to exist. Under alternatives B and C, these areas of grassland would be reduced and managed as part of the wetland unit. Although, as water levels increase, available grassland habitat would decrease, no impacts are anticipated to the Henslow's sparrow as the existing grassland is relatively small and likely to be unsuitable for the Henslow's sparrow. The future with project is not likely to adversely affect the Henslow's sparrow.

9.26. Cultural Resources.

No Action

Under the No Action alternative, no archaeological surveys will be conducted. Areas of high significance may not be found and erosion and sedimentation processes may impact these sites.

Future With Project

During the initial plans and specifications phase of this project, intensive archaeological field investigations would be conducted within all construction / staging areas where ground disturbances may occur. If archaeological remains are identified during this process MVS's initial response would be to attempt to modify the project designs to avoid these remains. If this is not feasible, additional archaeological investigations (Phase II testing) would be immediately undertaken after consultation with the District's regulatory counterparts. Should Phase II fieldwork demonstrate that the archaeological site contains potentially significant information, additional coordination and data recovery would be required. Further coordination with the Illinois State Historic Preservation Officer and designated affected Native American groups would also be initiated.

Spunky Bottoms Ecosystem Restoration

9.27. Environmental Effects of Proposed Action. Table 9-2 lists anticipated environmental effects of the proposed Spunky Bottoms Ecosystem Restoration project.

Table 9-2. Environmental Effects of Proposed Action

Environmental Resource	No Action	A	B	C
Physiography-Topography	O	O	O	O
Aesthetics	O	B	B	B
Traffic/Transportation	O	ST	ST	ST
Air Quality	O	O	O	O
Noise	O	O	O	O
Safety	O	O	O	O
Existing & Potential Water Supplies	O	O	O	O
Water Quality	O	B	B	B
Suspended Particulates; Turbidity	O	b	b	b
Storm, Wave, and Erosion Buffers	O	B	B	B
Normal Water Level Fluctuations	A	B	B	B
Erosion and Accretion Patterns	a	B	B	B
Currents, Circulation, or Drainage Patterns	A	B	B	B
Flood Control Functions	a	O	O	b
Socio-Economic Resources	O	O	O	O
Recreation	a	B	B	B
Commercial Navigation	O	O	O	O
Recreational and Commercial Fisheries	A	B	B	B
Parks, Monuments, etc.	O	O	O	O
Prime and Unique Farmland	O	O	O	O
Habitat for Wildlife, Fish, etc.	a	b	B	B
Wildlife Resources	a	b	B	B
Fishery Resources	a	b	B	B
Special Aquatic Sites	a	b	B	B
Threatened and Endangered Species	O	b	B	B
Cultural Resources	O	O	O	O

O = no anticipated impact, A = adverse impact, a = small adverse impact, B = beneficial impact, b = small beneficial impact, ST = short term impact, NA = environmental factor/resource not applicable

9.28. Hazardous and Toxic Wastes.

No Action:

There are no recognized environmental conditions within the project area. The Environmental Site Assessments published in 2001, 2003 and 2011 describe the recognized environmental conditions; however, these sites do not pose immediate concerns to human life and health and are located outside the project area.

Future With Project:

Similar to the No Action alternative, there are no recognized environmental conditions within the project area. The Environmental Site Assessments published in 2001, 2003 and 2011 describe the recognized environmental conditions; however, these sites do not pose immediate concerns to human life and health and are located outside the project area.

9.30. Cumulative Impacts. Cumulative impacts include those impacts on the environment which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Although short-term impacts are likely to occur to local and migratory animals during construction, no adverse cumulative impacts are expected. The project features restore habitat features that would have long-term benefits to the flora and fauna using the site.

9.31. Probable Adverse Impacts Which Cannot Be Avoided. Temporary, unavoidable adverse impacts including increased turbidity, noise, and clearing of vegetation would result from construction activities. Turbidity and noise levels would return to normal when construction is completed and vegetation established. Borrow areas, constructed berms, and any other disturbed areas would be re-vegetated after construction with native vegetation. No acres currently listed as wetlands would be converted to non-wetland. Benefits to floodplain habitat, wildlife, aquatic resources, water quality, fisheries and endangered species would outweigh these unavoidable adverse impacts.

9.32. Relevant Laws and Regulations. The following is a discussion of the additional laws applicable to this project that are not discussed in Sections 9.1 - 9.31.

9.32.1. Floodplain Management, Executive Order 11988. Under this Executive Order, Federal agencies are to "provide leadership and take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains". By constructing a connection structure through the Little Creek Levee, it would help simulate the original, natural benefits of the floodplain and its associated backwaters.

9.32.2. Protection of Wetlands, Executive Order 11990. Under this Executive Order, Federal agencies shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. Existing wetland habitat would be temporarily impacted by construction and no wetlands would be permanently converted to non-wetland. The long-term impact to the approximately 1,195 acres of wetlands within the project area would be restoration.

9.32.3. Rivers and Harbors Act. This Act regulates activities in, under, or over navigable water, such as the Illinois River. The Section 404 permit process would address issues that could be regulated by this Act. Completing the Section 404 permit process would result in full compliance with Section 10 of the Rivers and Harbors Act. This project would likely be covered under a Nationwide Permit and therefore be in compliance with Section 10 of the Rivers and Harbors Act.

9.32.4. Clean Water Act, as amended. Clean Water Act Section 401 - Section 401 requires the state to set water quality standards including designating water use and pollutant levels. The program is administered by the State of Illinois which reviews applications to ensure that the proposed project would not degrade water quality. The Section 401 water quality certification review process will begin when the Public Interest Review is begun. A Section 401 water quality certificate from the State of Illinois will be included in the final submission of this report.

Clean Water Act Section 402 - Land disturbances of greater than 1 acre associated with this project require a National Pollutant Discharge Elimination System (NPDES) permit, or Section 402, for storm water discharges. This permit would be acquired prior to construction initiation.

Clean Water Act Section 404 - Section 404 of the Clean Water Act regulates the placement of fill, such as rock, in waters of the United States. Section 404 of the Clean Water Act assigns responsibility to the Secretary of the Army to administer a permit program to regulate the placement of dredged or fill material into waters of the United States. The placement of any dredged or fill material into waters of the United States below ordinary high water elevation, or in wetlands adjacent to these waters, must be authorized by a Section 404 permit. The proposed project would involve the placement of dredged and fill materials into waters of the United States. Such discharges are regulated under Section 404 of the Clean Water Act. Section 401 Water Quality Certification and Section 404 compliance are needed prior to the initiation of construction activities. Public review and an application for water quality certification from the State of Illinois, as required by Section 404 and 401 of the Clean Water Act, will be issued and applied for during the public review of this document. A National Pollutant Discharge Elimination System (NPDES or Section 402) permit for storm water discharge will be acquired prior to initiation of construction.

The proposed work will likely be covered by a nationwide Section 404 permit or permits. An individual Section 404 permit should not be required as the impacts appear to be minimal and less than 1/2 an acre. Potential borrow sites should be located outside jurisdictional wetland areas. Therefore a 404(b)1 evaluation will not be completed for this project.

9.32.5. Air and Water Pollution Prevention and Control, Executive Order 11282. Under this Executive Order, Federal agencies shall ensure that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency. HTRW would be resolved prior to any construction activities so that all areas meet air quality standards, project construction activities are not expected to significantly contribute to air and water pollution. The project would result in dust and exhaust from equipment and slight increases in turbidity within the adjacent waters.

Spunky Bottoms Ecosystem Restoration

Therefore, a minor short-term reduction in air and water quality would occur. The portable pump's diesel engines would be a permanent addition to the project area. The new pump engines would run cleaner than the existing stations. Thus, diesel emissions should be reduced overall.

9.32.6. Clean Air Act, as amended. The Clean Air Act sets standards requiring the U.S. Environmental Protection Agency (EPA) to designate measurable targets for various air pollutants: National Ambient Air Quality Standards (NAAQS). They have identified standards for seven pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, particulate matter less than 10 microns in diameter, and particulate matter less than 2.5 microns. Brown County, Illinois is in attainment for all EPA air quality standards under the Clean Air Act Conformity Rule. No aspect of the proposed project has been identified that would result in violations of air quality standards.

9.32.7. Invasive Species, Executive Order 13112. This executive order aims “to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause”. All alternatives improve site managers' ability to control invasives, such as reed canary grass, through operation of the water control structure. Additionally, construction best management practices, such as cleaning equipment, shall be in place and enforced to prevent the introduction of additional species to and transfer from the project site.

9.32.8. Migratory Bird Treaty Act of 1918, as amended. Under this law, Federal agencies shall not take, kill or possess migratory birds. Migratory birds are recognized as being of great ecological and economic value. Millions of Americans study, watch, feed, or hunt migratory birds throughout the United States. The proposed project area is along the Mississippi Flyway, a major migratory path for millions of birds. Construction equipment and activities would cause temporary noise affecting and potentially disrupting birds near the proposed project area. Additionally, any tree removal activities have the potential to negatively impact nesting birds. Tree removal would not occur between April 1 to September 30 to avoid impacts to Indiana Bat; this would also prevent impacts to nesting birds. The impact from noise would be temporary and cease following construction completion. In the long term, the proposed project would restore and enhance forested and emergent wetland habitat benefiting numerous species of migratory birds.

9.32.9. Bald and Golden Eagle Protection Act of 1940. Bald Eagles (*Haliaeetus leucocephalus*) range over most of North America. They build large nests in the tops of large trees near rivers, lakes, marshes, or other aquatic areas. The staple food of most bald eagle diets is fish, but they will also feed on waterfowl, rabbits, snakes, turtles, other small animals, and carrion. In winter, eagles that nest in northern areas migrate south and gather in large numbers near open water areas where fish or other prey are plentiful (USFWS 2006).

On August 9, 2007, the bald eagle was removed from the Federal list of threatened and endangered species. It remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The Bald and Golden Eagle Protection Act prohibits unregulated take of bald eagles. The USFWS recently finalized a rule defining “take” that includes “disturb.” “Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to

Spunky Bottoms Ecosystem Restoration

cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior” (USFWS 2007). Based on this rule, the USFWS developed the National Bald Eagle Management Guidelines in 2007. These guidelines indicate that in undisturbed areas no construction activities should occur within 660 ft. of a visible eagle’s nest and 330 ft. of a non-visible nest during breeding season.

There are no known active nests within the project area that eagles could utilize. Because new nests may be built or old nests abandoned, consultation with the USFWS will continue throughout the design and construction phase to ensure no eagles are impacted. During each design phase, site managers will be consulted and if necessary, site visits conducted, to determine the location of all nests and determine if they are active as defined in the USFWS guidelines (USFWS 2007). The plans and specs would delineate the 660 ft. area and include timelines (December - Aug.) to avoid all active nests. The contractor will be notified of these restrictions.

9.32.10. Fish and Wildlife Coordination Act, as amended. Project plans have been coordinated with the TNC, IDNR and USFWS. An initial draft Coordination Act Report (CAR) was initiated in early 2001, but due to the project being temporarily placed on hold, an official draft CAR was not received. Coordination has begun again and USFWS has shown their support for the project. The TNC, IDNR and USFWS comments have been considered with great weight. Their comments were in support of the project and discuss the importance of the connection structure to the Illinois River in the recommended plan. Compliance will be achieved after both agencies have reviewed this document and a final CAR is received.

9.32.11. Protection of Environmental Quality, Executive Order 11991. Under this Executive Order, Federal agencies shall take action to provide leadership in protecting and enhancing the quality of the Nation’s environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals.” The proposed project is designed to restore and enhance the habitat within Spunky Bottoms. Thus, the project would protect and enhance the Nation’s environment.

9.32.12. Farmland Protection Policy Act, as amended. The proposed action would not result in the conversion of any prime, unique state or locally important farmland to non-agricultural uses. Under the Council on Environmental Quality Memorandum (11 Aug 80), prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Unique farmland is defined as land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as, citrus, tree nuts, olives, cranberries, fruits, and vegetables (7 U.S.C. 4201(c)(1)(A) & (B)).

There is a high natural bluff along the county road that is classified as prime farmland (NRCS 2006). The remainder of the project area, excluding water bodies, is classified as prime farmland if drained or prime farmland if drained and protected (NRCS 2006). The only area that is

Spunky Bottoms Ecosystem Restoration

considered not prime farmland is directly adjacent to the Illinois River. A large portion of the Spunky Bottoms project is no longer farmed and has been enrolled in the NRCS WRP. Additionally, the southern landowner protected by the district plants his entire property in corn and soybeans annually. With the project, the no areas in existing cropland would be converted and would still remain available for crop production. The southern landowner would still continue to plant row crops.

9.32.13. Environmental Justice, Executive Order 12898. Under this Executive Order, a Federal agency “shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States.” The standard unit of analysis for environmental justice is the census-designated Block Group. The project area is contained within one Block Group. Due to the rural nature of the area, the Block Group is approximately 17.2 square miles. The Block Group encompasses the project area, surrounding farmland, uplands, and the town of Versailles. The population within the Block Group is approximately 99.5% caucasian and from 2000 to 2005 the population decreased by approximately 1%. According to the 2000 Census, the town of Versailles is only 567. For Brown County, Illinois 80% is caucasian with a population of 6950 individuals. No differential impacts to minority or low income populations are expected. Short-term increases in employment could be realized during construction. Additionally economic benefits could be realized from increased commercial and recreational fishing and hunting due to the project’s anticipated habitat restoration. Project managers estimate that hunting use within the area may increase with the project.

9.32.14. Noise Control and Quiet Communities Acts. Noise is usually defined as “unwanted sound”, and is recognized as an environmental pollutant that can interfere with communication, work, rest, recreation, and sleep. Sound is represented on a logarithmic scale with a unit called the decibel (dB). The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB. A-weighted decibels (dBA) are used to express the relative loudness of sounds as perceived by the human ear because the human ear is less sensitive at low frequencies than high (Generac Power Systems, Inc. 2004). A 24-hour average of 55 dBA was identified by USEPA as a level below which there are effectively no adverse impacts (USEPA 1974).

Noise levels surrounding the project area are varied depending on the time of day and climatic conditions. The current human activities causing elevated noise levels include running diesel powered generators, trucks, farming equipment, and hunting.

Project construction would generate a temporary increase in noise levels. Construction would occur during daylight hours. Noise levels would not be altered at night. Common construction equipment for this project generate noise levels of approximately 65 - 95 dBA. Attenuation from 90 dBA to 55 dBA occurs at a distance of approximately 2,600 ft. depending on climatic conditions, topography, vegetation, and man-made barriers (Generac Power Systems, Inc. 2004). Due to the rural nature of the project area, there are no homes or buildings within one mile of the project area. Increased noise may lead to temporary displacement of wildlife species. After construction completion, noise levels would return to current conditions.

9.32.15. National Environmental Policy Act, as amended. The completion of the EA and signing of the Finding of No Significant Impact (FONSI) would fulfill NEPA compliance. The EA is integrated into this ERR in Sections 1 - 5, and 9. A draft version of the unsigned FONSI is provided at the end of this document. The FONSI will be finalized and signed into effect only after having carefully considered all comments on the environmental effects of this project. The FONSI will be signed prior to approval of this feasibility document (irreversible and irretrievable commitment of resources).

9.32.16. Compliance with Environmental Quality Statutes. The alternatives within this review were subject to compliance review with all applicable environmental regulations and guidelines (Table 9-3).

9.33. Short-Term versus Long-Term Productivity. Construction activities (land clearing, dredging, excavation, equipment movement) would temporarily disrupt fish, wildlife, and human recreational use in the immediate vicinity of the project area. Construction activities would likely provide positive, short-term economic opportunities and a few jobs for the surrounding communities. In the long-term, the 917 acres of project area that would be enhanced through wetland management; thus, resulting in restored habitat function and ecosystem production. Overall, the long-term health and productivity of the project area's ecosystem is anticipated to increase with the project. Additionally, the ecosystem benefits served by the project would increase. Therefore, short-term human use impacts would be offset by long-term increases in productivity.

Table 9-3. Summary of the Project’s compliance status with respect to applicable statutes and laws.

Federal Policy	Compliance Status
National Environmental Policy Act, 42 USC 4321-4347	Partial ¹
Water Resources Development Acts of 1986, 1990, 2000 and 2007	Full
Migratory Bird Treaty Act of 1918, 16 USC 703-712	Full
Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601-9675	Full
Resource Conservation and Recovery Act, 42 USC 6901-6987	Full
Farmland Protection Policy Act, 7 USC 4201-4208	Full
Endangered Species Act, 16 USC 1531-1543	Partial ²
National Historic Preservation Act, 16 USC 470 et seq.	Partial ²
Noise Control Act, 42 USC 7591-7642	Full
Clean Air Act, 42 USC 7401-7542	Full
Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities (EO 11282 as amended by EO’s 11288 and 11507)	Full
Protection and Enhancement of the Cultural Environment (EO 11593)	Partial ²
Floodplain Management (EO 11988 as amended by EO 12148)	Full
Protection of Wetlands (EO 11990 as amended by EO 12608)	Full
Protection and Enhancement of Environmental Quality (EO 11991)	Full
Invasive Species, EO 13112	Full
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898)	Full
Bald and Golden Eagle Protection Act, 42 USC 4151-4157	Full
Clean Water Act, 33 USC 1251-1375	Partial ²
Rivers and Harbors Act, 33 USC 401-413	Partial ²
Fish and Wildlife Coordination Act, 16 USC 661-666c	Partial ²
Division Regulation 1110-1-403 Mississippi Valley Division/Mississippi River Commission Policy on River Diversions	Partial ³

1 Full compliance after submission for public comment and signing of FONSI

2 Full compliance to be achieved upon receipt of documentation from the appropriate agency

3 Full compliance to be achieved upon signing of this document by the MVD commander and MRC president

9.34. Irreversible Resource Commitments. This proposed project is in the planning stage. Money has been expended to complete this planning document, test soil borings, and conduct pre-project monitoring. No construction dollars, which are considered irreversible, have been expended for the project.

9.35. Relationship of the Proposed Project to Other Planning Efforts. The proposed project is not in conflict with any other planning efforts in the project area.

10. PROJECT PERFORMANCE ASSESSMENT MONITORING

Spunky Bottoms Ecosystem Restoration

This section summarizes the monitoring and data collection aspects of the project. The monitoring plan was developed with input from state and Federal resource agencies and is detailed in Appendix K. Performance indicators were developed to measure the success of project objectives. They were developed to be specific, measurable, attainable, realistic and timely.

Section 2039 of the 2007 WRDA states when conducting a feasibility study for a project or component of a project for ecosystem restoration, the recommended Project includes a plan for monitoring the success of the ecosystem restoration. The implementation guidance for Section 2039, in the form of a CECW-PB Memo dated 31 August 2009, also requires the U.S. Army Corps of Engineers, St. Louis District (District) to develop an adaptive management plan for all of their ecosystem restoration projects. In accordance with Section 2039 of WRDA 2007, monitoring would be cost-shared at 75/25 up to 10 years unless ecological success is achieved sooner. Any monitoring beyond 10 years would be the responsibility of the non-Federal sponsor. In addition, Section 3064(d) of 2007 WRDA states that not less than \$500,000 shall remain available for a period of 5 years after the date of completion of construction of the modifications for use in carrying out post construction monitoring and adaptive management of Spunky Bottoms. A detailed monitoring and adaptive management plan is included in Appendix K.

To ensure that water level management is properly maintained throughout the project area following construction of all project features, a water control plan would be developed by the USACE and coordinated with the non-Federal sponsor in order to achieve maximum habitat units and provide protection, where required, for the current inholding located south of the TNC property. Appendix K provides a simple diagram of a general water level management plan that would be utilized at the site.

11. REAL ESTATE REQUIREMENTS

The Spunky Bottoms project would be constructed on land owned by a non-Federal agency with management responsibility provided by the TNC. The Real Estate Branch is currently developing a real estate plan and will address any real estate requirements. A Draft Real Estate Plan is located in Appendix L.

12. FEDERAL RESPONSIBILITIES

Section 1135 of WRDA 1986, as amended, provides for project modifications for improvement of the environment. Project implementation under this authority includes requirements for the Federal government and the non-Federal sponsor. Federal responsibilities for the selected plan include project planning, design and construction.

The authorized cost share is 75% Federal and 25% non-Federal for total project costs up to \$10,000,000. Costs over \$10,000,000 are the responsibility of the non-federal sponsors. Table 8-4 above shows the cost breakout of Federal and non-Federal costs.

13. NON-FEDERAL RESPONSIBILITIES

The non-Federal sponsor shall, prior to implementation, agree to perform all of the local cooperation requirements and non-Federal obligations. Local cooperation requirements are detailed below. The authorized cost share is 75% Federal and 25% non-Federal for total project costs. OMRR&R costs shall be 100% non-Federal responsibility.

Federal implementation of the recommended plan would be subject to the sponsor agreeing to comply with applicable Federal laws and policies, including but not limited to:

- a. The non-Federal sponsor shall not use funds from other Federal programs, including any non-Federal contribution required as matching share therefore, to meet any of the non-Federal construction obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized.
- b. The non-Federal sponsor shall prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function.
- c. The non-Federal sponsor shall not use the project or lands, easements, and rights-of-way required for the project as a wetlands bank or mitigation credit for any other project.
- d. The non-Federal sponsor shall comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.
- e. For so long as the project remains authorized, the non-Federal sponsor shall operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, shall be performed at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government.
- f. The non-Federal sponsor shall give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project.
- g. The non-Federal sponsor shall hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and

Spunky Bottoms Ecosystem Restoration

- replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors.
- h. The non-Federal sponsor shall maintain and keep books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;
 - i. The non-Federal sponsor shall comply with all applicable Federal and State laws and regulations including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*), and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq.*);
 - j. The non-Federal sponsor shall perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601- 9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction.
 - k. The non-Federal sponsor shall assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project.
 - l. The non-Federal sponsor shall agree, as between the Federal Government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA.
 - m. The non-Federal sponsor shall comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the

Spunky Bottoms Ecosystem Restoration

construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

In addition to the items of local cooperation listed above, the following shall apply:

The feasibility phase study and plans and specifications costs shall be included as part of the total project modification costs to be shared 75% Federal and 25% non-Federal. As required by Section 1135(b) of Public Law 99-662, as amended, the non-Federal share of the costs of the modification shall be 25%.

In meeting this responsibility, the non-Federal sponsor shall provide all lands, easements, rights-of-way, relocations, and suitable borrow and dredged or excavated material disposal areas (LERRD) required for the project modification which are not otherwise available due to the construction of the existing project.

Further, the non-Federal sponsor shall accomplish, or arrange for accomplishment at no cost to the Government, all relocations determined by the Government to be necessary for implementation of the project modification.

If the value of the LER plus work-in-kind does not equal or exceed 25% of the project cost, the sponsor must pay in cash or provide work in kind contributions equal to the additional amount necessary so the sponsor's total contribution equals 25% of the project cost and any additional costs over \$10,000,000. All work in kind will be in accordance with ED 1165-2-208. Only in-kind contributions determined to be integral to the project will be considered eligible for credit. This determination will be completed prior to review and approval of the Project Partnership Agreement. At this time, no cash requirement from the sponsor is anticipated due to the projected LER value.

If the value of the LERRD contributions alone exceeds 25% of the total project modification costs, the Major Subordinate Command (MSC), must evaluate the project formulation to ensure that the project properly utilizes USACE expertise and is not land intensive. As part of its evaluation, the MSC must ensure that the project plan requires only the lands necessary to implement the project and to reasonably assure that the benefits sufficient to justify the project are achieved. In addition, the non-Federal sponsor will provide a letter of intent to voluntarily waive reimbursement for the value of LER that exceeds the non-Federal sponsor's percentage share of total project costs. If the non-Federal sponsor does not voluntarily waive reimbursement for the value of LER that exceeds its percentage share of total project costs, any further efforts on the project could be suspended.

The non-Federal sponsor shall not receive any credit for LER previously provided as an item of cooperation for another Federal project. The non-Federal sponsor also shall not receive credit of the value of LER or other items to the extent that they are provided using Federal funds unless the Federal granting agency verifies in writing that such credit is expressly authorized by statute.

Spunky Bottoms Ecosystem Restoration

- Work-in-kind is limited to 80% of the non-Federal share and may be accepted as long as it does not result in any reimbursement of the non-Federal sponsor. The work-in-kind when combined with the non-Federal provision of LER cannot exceed 25% of project costs.
- Work-in-kind must be provided by the non-Federal project sponsor and can be accomplished by the staff of the non-Federal sponsor or by contract administered by the non-Federal sponsor.
- Items eligible for work-in-kind as part of the non-Federal sponsor's share include post-feasibility phase design, including plans and specifications, provision of materials, and project construction.
- With regard to work-in-kind, the non-Federal sponsor will comply with applicable Federal and state laws and regulations, including the requirements to secure competitive bids for all work to be performed by contract. Efforts credited as work-in-kind will be subject to audit.

Program funds will not be provided to local interests or be used to reimburse local interests for conducting studies or constructing projects nor shall contributions be made for features or benefits of projects constructed by another agency or by local interests. Local interests will not be reimbursed for work undertaken by them on an approved project except as approved by inclusion in the Project Partnership Agreement.

PROJECT PARTNERSHIP AGREEMENT

The project sponsor is TNC. A Section 1135 model Project Partnership Agreement (PPA) will be pursued for this project. A draft PPA will be prepared and coordinated with the project sponsors. If work in-kind contributions are considered and are integral to the project in accordance with EC 1165-2-208, the PPA will outline these contributions. The work in-kind contribution, if necessary, will be determined if they are integral to the project prior to review and approval of the PPA. The PPA will be signed and executed prior to project implementation. A letter of support from TNC is included in Appendix G. A local government consent memo from Brown County for Non-Governmental Organization sponsorship will be provided. In addition, a letter from the NRCS stating that the Section 1135 project at Spunky Bottoms is capable of being compatible with WRP lands is included in Appendix G. Prior to construction, a compatible use agreement will be required between NRCS and the non-Federal sponsor. To obtain a compatible use agreement, specific plans and specifications are required.

14. IMPLEMENTATION RESPONSIBILITIES

U.S. Army Corps of Engineers, St. Louis District. The USACE is responsible for project management and coordination with the TNC, and other affected agencies. The USACE will submit this ERR; administer program funds; finalize plans and specifications; complete all NEPA requirements; advertise and award a construction contract; and perform construction contract supervision and administration. Section 1135 study efforts were continued under new

Spunky Bottoms Ecosystem Restoration

legislation for Section 3064 of the WRDA of 2007 that included environmental restoration as a project purpose and allows for continued eligibility for emergency assistance under PL 84-99 as determined in accordance with ER 500-1-1. This does not guarantee emergency assistance under PL 84-99. A positive benefit-cost ratio is required for emergency assistance. If the levee requires repairs and does not meet the requirements for PL 84-99 assistance, the Little Creek D&LD would be required to make the appropriate repairs without Federal assistance.

The proposed project would be funded and constructed under Section 3064 of the WRDA of 2007. The authorized cost share is 75% Federal and 25% non-Federal for total project costs. The USACE has agreed to support this CAP Section 1135 project's monitoring and data collection needs as outlined in Appendix K.

U.S. Fish and Wildlife Service. The USFWS is currently in coordination and will provide a final CAR for this project.

Non-Federal Sponsor (TNC). The non-Federal sponsor has provided technical and other advisory assistance during all phases of the project and will continue to provide assistance during project implementation. The non-Federal sponsor has agreed to support this CAP Section 1135 project's monitoring and data collection needs as outlined in Appendix K.

15. COORDINATION, PUBLIC VIEWS, AND COMMENTS*

Coordination has been made throughout the planning and design process with the following State and Federal agencies. These agencies have expressed their support of the project.

The Nature Conservancy (TNC)
Illinois Department of Natural Resources (IDNR)
U.S. Fish and Wildlife Service (USFWS)

Coordination was conducted with TNC, IDNR, and the USFWS during this study effort. Additional coordination will be done with the USFWS to obtain a draft Coordination Act Report. That report will be included in the draft ERR with integrated Environmental Assessment released for public review. Federal agency responses to the draft report will be included in the final ecosystem restoration report.

Meetings with the non-Federal sponsor and local constituents were held during the preparation of this ecosystem restoration report. These meetings proved helpful to determine the desires of the sponsor. Coordination was conducted with the State Historic Preservation Officer. Comments received on the draft Ecosystem Restoration Report, Environmental Analysis and Finding of No Significant Impact will be included in the final report.

Table 15-1. Study Team Members*

Discipline	Study Team
Civil	John Osterhage
Cost Estimates	Jerry McClintock, Greg Dyn
Cultural	Lara Anderson
Economics	Dan Linkowski
Environmental/Plan Formulation	Teri Allen, Brandon Schneider
Geotechnical	Martin Hamm
Hydraulics	John Boeckmann, Ray Kopksy
Legal	Jeff Asbed, Heather Asunskis
Mechanical	Steve Kamadulski
Regulatory	Keith McMullen
Structural	Clint Dougherty
Project Management	Donovan Henry, Ashley Rasnic
Real Estate	Jim Lovelace, Tim Kennedy
Value Engineering	Eugene Degenhardt
Water Quality	Kevin Slattery, Rick Archeski
Sponsor's Primary Team Members	
Doug Blodgett	The Nature Conservancy
Tharran Hobson	The Nature Conservancy

16. CONCLUSIONS

Implementation of the proposed plan at the Spunky Bottoms project would result in positive benefits by providing reconnection between the Illinois River and the backwater lakes that once existed prior to the levee construction. Providing water level management capability will allow the area to experience a more natural hydraulic regime than is currently possible since the construction of the levee and locks and dams. Due to guidance from HQUSACE, the project was on hold due to current Section 1135 authority. Under Section 3064 of WRDA 2007, the project is now authorized to include environmental restoration as a project purpose.

The project is consistent with and fully supports the overall goals and objectives of the Upper Mississippi River System-Continuing Authorities Program Section 1135. For proposed recommendations, see Tentative Recommendations section below.

17. REFERENCES

- Corbin, Calvin C. and John White. 1978. Technical Report: Illinois Natural Areas Inventory. Available online at <http://www.archive.org/details/technicalreporti12univ> (Accessed January 4, 2011).
- Council on Environmental Quality (CEQ). 1997. Considering Cumulative Effects Under the National Environmental Policy Act.
- Forbes, S. A., and R. E. Richardson. 1908. The fishes of Illinois. Illinois State Laboratory of Natural History. cxxxi + 357 p. plus separate atlas containing 102 maps.
- Forbes, S. A., and R. E. Richardson. 1920 The Fishes of Illinois, 2nd ed. Illinois Natural History Survey. Bull. 3:1-357.
- Generac Power Systems, Inc. 2004. Technical Perspective: Sound Measurement and Attenuation. Bulletin 0170310SBY. Waukesha, Wisconsin
- Hajic, Edward R. 2000. Landform Sediment Assemblage (LSA) Units in the Illinois River Valley and the Lower Des Plaines River Valley, United States Army Corps of Engineers, Rock Island District, Volume 1. *Illinois State Museum Research and Collections Center, Quaternary Studies Program, Technical Report No. 99-1255-16*, Springfield, IL.
- Havera, S.P. 1985. Waterfowl of Illinois: status and management. Final Federal Aid Performance Report, 1980-1985. Cooperative Water-fowl Research W-88-R. Submitted by Illinois Natural History Survey to Illinois Department of Conservation 785pp.
- IDNR (Illinois Department of Natural Resources). 2011. Illinois Natural Heritage Database. Available online at <http://dnr.state.il.us/conservation/naturalheritage/inhd.htm>. (Accessed January 4, 2011).
- Illinois Natural History Survey. 2009. Establishment of Historic Fish Communities to Restored Illinois River Floodplain Lakes
- Illinois River Integrated Management Plan. 1997. Illinois River Strategy Team. Available online at <http://ilrdss.sws.uiuc.edu/pubs/ILRiv-IMP-updated.pdf>. (Accessed January 6, 2011).
- Jin, G., Ellits, K., Kelley, T.R. and J.W. Webb. 2009. Preliminary water quality assessment of Spunky Bottoms restored wetland. *Journal of Environmental Science and Health*. 15:44 (3): 235-43.
- Lellinger, D.B. 1985. A field manual of the ferns and fern-allies of the United States and Canada. Washington, DC: Smithsonian Institution Press. 389 p.
- NRCS (Natural Resources Conservation Service) 2006. United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database, Brown, County, IL. Available online at <http://soildatamart.nrcs.usda.gov> (Accessed January 6, 2011).
- ODNR (Ohio Department of Natural Resources) 1993. Buffalo Clover. Available online at http://www.dnr.state.oh.us/Portals/3/Abstracts/Abstract_pdf/T/Trifolium_reflexum.pdf) (Accessed January 4, 2011).
- Taylor, C. A., and B. M. Burr. 1997. Reproductive biology of the northern starhead topminnow, *Fundulus dispar* (Osteichthyes: Fundulidae), with a review of data for freshwater members of the genus. *American Midland Naturalist* 137(1):151-164.
- TNC (The Nature Conservancy). 1999. Conserving the Illinois River: a 20-yr Action Plan – Plan Summary. The Nature Conservancy of Illinois, Peoria, Illinois, 6 pp.
- UMRCC (Upper Mississippi River Conservation Committee). 2002. Upper Mississippi and Illinois River Floodplain Forests: Desired Future and Recommended Actions. 40 pp.’
- USACE (United States Army Corps of Engineers). 1995. Evaluation of Environmental Investments Procedures Manual, Interim: Cost Effectiveness and Incremental Cost Analyses #95-R-1. Institute of Water Resources.
- USACE (U.S. Army Corps of Engineers). 2006. Value engineering study: Function analysis workshop. U.S. Army Corps of Engineers, St. Louis, MO.
- USEPA (U.S Environmental Protection Agency). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Report 550/9-47-004.
- USFWS (U.S. Fish and Wildlife Service). 1990. Decurrent false aster recovery plan. U.S. Fish and Wildlife Service. Twin Cities, MN. 26 pp.

Spunky Bottoms Ecosystem Restoration

- USFWS (U.S. Fish and Wildlife Service). 2005. Eastern Prairie Fringed Orchid Fact Sheet. Available online at <http://www.fws.gov/midwest/endangered/plants/epfo.html>. (Accessed January 4, 2011).
- USFWS (U.S. Fish and Wildlife Service). 2006. Species Profile: Bald Eagle (*Haliaeetus leucocephalus*). Available at online at <http://ecos.fws.gov/speciesProfile/SpeciesReport.do?spcode=B008> (Accessed January 4, 2011).
- USFWS (U.S. Fish and Wildlife Service). 2007. National Bald Eagle management guidelines. Online at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>.
- USGS (U.S. Geological Survey). 1999. Ecological status and trends of the Upper Mississippi River System 1998: A report of the Long Term Resource Monitoring Program. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. April 1999. LTRMP 99-T001. 236 pp.
- WaDNR (Washington Department of Natural Resources). 2000. *Lycopodium dendroideum*. Available online at <http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/lyde.pdf>. (Accessed January 4, 2011).
- WiDNR (Wisconsin Department of Natural Resources). 2009. Drooping Sedge. Endangered Resources Program Species Information. Available online at <http://www.dnr.state.wi.us/org/land/er/biodiversity/index.asp?mode=info&Grp=20&SpecCode=PMCY03B10>. (Accessed January 4, 2011).
- Wiley, E. O. 1980. *Fundulus dispar* (Agassiz), northern starhead topminnow. pp. 514 in D. S. Lee, et al. Atlas of North American Freshwater Fishes. N. C. State Mus. Nat. Hist., Raleigh, 854 pp.

**CONTINUING AUTHORITIES PROGRAM
SECTION 1135 OF THE WATER RESOURCES
DEVELOPMENT ACT OF 1986
ECOSYSTEM RESTORATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT**

SPUNKY BOTTOMS ECOSYSTEM RESTORATION

**ILLINOIS RIVER MILES 75.0 THROUGH 78.3
BROWN COUNTY, ILLINOIS**

TENTATIVE RECOMMENDATIONS

I have weighed the outputs to be obtained from the full implementation of this aquatic ecosystem restoration project against its estimated cost and have considered the various alternatives proposed, impacts identified, and overall scope. In my judgment, this project, as proposed, justifies expenditure of Federal funds. I recommend that the Mississippi Valley Division Engineer approve the proposed project to include: installation of water supply and control facilities for restoration of approximately 917 acres of wetland habitat of the total 1,195 acres of TNC property in the project area and reconnecting the Illinois River to the Spunky Bottoms project backwater through a reconnection structure within the Little Creek Levee. The wetland restoration facilities would include a reconnection structure through the Little Creek Levee to allow controlled water management within the levee district and provide backwater access to many native Illinois River fishes, two portable, diesel-powered pumps and a 2,400 linear foot berm to provide an adequate catchment area to protect local agriculture and for additional water level management, and 3,350 linear feet of protection along County Road 12 to reduce erosional impacts of a higher level water level management.

Lands, easements and right-of-ways account for approximately \$3,425,000 resulting in a total project cost of \$9,082,770 at an annual cost of \$339,000. The cost share requirement for the project is 75/25. The Total Project Cost estimate for the tentatively selected plan is \$9,082,770 which includes LERRD costs. OMRR&R costs are estimated at \$57,482 and are not cost-shared, but 100% responsibility of the non-Federal sponsor. The total project cost would be cost-shared 75/25, Federal/non-Federal including monitoring and adaptive management costs estimated at \$682,520. The Federal share is \$6,812,080 and the non-Federal share is \$2,270,690. The full implementation of this project would generate 479 average annual habitat units over the baseline condition at \$710.00 per unit. Although the total Federal cost is higher than traditional Section 1135 projects, WRDA 2007 legislation increased the Federal cost share limit specifically for the Spunky Bottoms project to \$7,500,000.

Date:

Christopher G. Hall
Colonel, U.S. Army
District Commander

**CONTINUING AUTHORITIES PROGRAM
SECTION 1135 OF THE WATER RESOURCES
DEVELOPMENT ACT OF 1986
ECOSYSTEM RESTORATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT**

SPUNKY BOTTOMS ECOSYSTEM RESTORATION

**ILLINOIS RIVER MILES 75.0 THROUGH 78.3
BROWN COUNTY, ILLINOIS**

FINDING OF NO SIGNIFICANT IMPACT*

I have reviewed the information provided by this Environmental Assessment, along with data obtained from Federal and State agencies having jurisdiction by law or special expertise, and from the interested public. I find that the Tentatively Selected Plan for the proposed ecosystem restoration project at the Spunky Bottoms project, Brown County, Illinois, would not significantly affect the quality of the human environment. Therefore, it is my determination that an Environmental Impact Statement is not required. This determination may be reevaluated if warranted by further developments.

The primary habitat problem in the area is a lack of connection between the Illinois River and its associated backwaters and increased sedimentation. Additionally aquatic habitat is impacted by non-native species, sedimentation, and lack of depth diversity. This is limiting ecological health and altering the character of this unique floodplain area. Restoration of the project area is particularly important because floodplain habitat along the Illinois River has been highly altered. Large portions have been converted to agriculture and sectioned off from the Illinois River by a series of levees, and remaining natural habitat is invaded by non-native species such as Asian and Common Carp and Reed Canary Grass and degraded by the altered hydrology of the Illinois River. Much of the critical spawning, nursery, and overwintering areas for fish, habitat for migratory birds and aquatic plant communities have been lost. An opportunity exists to restore the degraded Spunky Bottoms project and its associated backwater habitats. The project would restore moist soil plant abundance, and enhance aquatic habitat. Implementation of the Tentatively Selected Plan would restore the quality and quantity of wildlife habitat and meet the life requisites for a large variety of native floodplain and large river species.

The Spunky Bottoms Project is authorized by Section 1135 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662), as amended. The proposed project would be funded and constructed under this authorization.

The alternatives for this project contain many of the same features with additional protection measures utilized for high water level managements. As part of this evaluation, I have considered the following alternatives:

- A: Reconnection structure to El. 430
- B: Reconnection structure to El. 432
- C: Reconnection structure to El. 435

The tentatively selected plan includes the construction of a reconnection structure that would allow fish passage and controlled interior water level management up to 432 feet NGVD while still keeping the flood risk management integrity of the mainline levee. A 2,400 linear foot south berm to protect the district's southernmost landowner would be constructed along with a catchment area and provision for pumping. This catchment area would also allow for fine-scale water level management throughout the project area through use of a small, portable trash pump. A township road between The Nature Conservancy and Illinois Department of Natural Resources property would be raised in order to allow the 432 feet NGVD water level management and retain access for property owners along the levee and provide construction access. Approximately 3,350 linear feet of riprap would be placed on lower section of County Road 12 to prevent damage from maintaining a water level managed at 432 feet NGVD. A single portable, diesel-powered pump, in addition to the smaller pump to be used at the catchment area, will be used throughout the project area for additional water level management.

The possible consequences of these alternatives have been studied for physical, environmental, cultural, social and economic effects, and engineering feasibility. Significant factors evaluated as part of my review included:

The project would not impact existing and potential water supplies, water conservation, currents, circulation, special aquatic sites, drainage patterns, commercial fisheries, commercial navigation, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, research sites, etc.

The project is expected to have long-term positive impacts on aquatic resources, terrestrial resources, aquatic and wetland habitat, turbidity, erosion and accretion patterns, recreational resources, recreational fisheries, and aesthetic value.

There would be no long-term adverse impacts to the physical environment (e.g., noise, air quality, and water quality); safety; traffic/transportation patterns; or socio-economic benefits.

The project would not significantly impact agricultural lands.

Federally- and/or state-listed endangered, threatened, or candidate species would not be adversely impacted.

The project is planned to avoid identified cultural resources. Thus, no cultural resource issues are expected.

Several sites or recognized environmental conditions (RECs), such as pump stations and storage tanks were found, which will be properly remediated and closed by the local sponsors prior to project construction and operation.

No adverse significant cumulative impacts are anticipated.

The "No Action" Alternative was evaluated and would be unacceptable to recommend as it does not meet the project goal of rehabilitating and enhancing the quality and diversity of wetland habitat in the project area.

The Clean Water Act Sections 401 and 404 and the Rivers and Harbors Act Section 10 process will be initiated during or just prior to the release of this document for public review. Compliance with Section 106 of the National Historic Preservation Act (NHPA) will be achieved with the State Historic Preservation Officer's concurrence during public review that this project is not likely to impact any historic sites. A Compatible Use Agreement for lands under WRP Easement will be acquired prior to construction. The U.S. Fish and Wildlife Service will review the document during public review to finalize compliance with the Endangered Species Act and Fish and Wildlife Coordination Act. Compliance with the National Environmental Policy Act will be achieved with the signing of this Finding of No Significant Impact. The project is in compliance with all other applicable laws and regulations as documented in Table 9-3 in the Ecosystem Restoration Report.

Coordination has been made throughout the planning and design process with the U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and The Nature Conservancy, and there are no significant unresolved issues. A final Coordination Act Report (CAR) will be coordinated with the U.S. Fish and Wildlife Service following the public review period. The public and agencies will be given a chance to comment on the Ecosystem Restoration Report and Tentatively Selected Plan during the 21-day public review period. Any comments received during this process will be carefully considered. Comments and responses will be incorporated into this document. Based on the disclosure of the Tentatively Selected Plan impacts contained within the Ecosystem Restoration Report, no significant impacts to the environment are anticipated and an Environmental Impact Statement will not be completed.

Date

Christopher G. Hall
Colonel, U.S. Army
District Commander