DRAFT COMPREHENSIVE CONSERVATION PLAN
AND ENVIRONMENTAL ASSESSMENT

FELSENTHAL AND OVERFLOW NATIONAL WILDLIFE REFUGES

Ashley, Bradley, Desha, and Union Counties, Arkansas

U.S. Department of the Interior
Fish and Wildlife Service

Southeast Region
Atlanta, Georgia

May 2010

TABLE OF CONTENTS

SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. BACKGROUND 1

- Introduction 1
- Purpose and Need for the Plan 1
- U.S. Fish and Wildlife Service 1
- National Wildlife Refuge System 2
- Legal and Policy Context 4
- National and International Conservation Plans and Initiatives 5
- Relationship To State Wildlife Agency 6

II. REFUGE OVERVIEW 9

- Introduction 9
- Refuge History and Purpose 12
- Special Designations 14
- Ecosystem Context 16
- Regional Conservation Plans and Initiatives 21
- Ecological Threats and Problems 22
- Physical Resources 26
  - Climate 26
  - Climate Change and Global Warming 26
  - Geology and Topography 28
  - Soils 30
  - Hydrology and Water Quality 31
  - Air Quality 34
- Biological Resources 36
  - Habitat 36
  - Wildlife 43
- Cultural Resources 47
  - Historical Background 47
- Socioeconomic Environment 49
  - Regional Demographics and Economy 49
- Refuge Administration and Management 50
  - Land Protection and Conservation 50
  - Visitor Services 54
  - Personnel, Operations, and Maintenance 61

III. PLAN DEVELOPMENT 63

- Summary of Issues, Concerns, and Opportunities 63
  - Fish and Wildlife Population Management - Felsenthal and Overflow NWRs 64
  - Habitat Management - Felsenthal 65
  - Habitat Management - Overflow 66
  - Resource Protection - Felsenthal and Overflow 66
  - Visitor Services - Felsenthal and Overflow 66
  - Refuge Administration – Felsenthal and Overflow 68

IV. MANAGEMENT DIRECTION 69
Introduction 69
Vision 69
Goals, Objectives, and Strategies 70
Fish and Wildlife Population Management 70
Habitat Management 91
Visitor Services 118
Resource Protection and Refuge Administration 129

V. PLAN IMPLEMENTATION 135
Introduction 135
Proposed Projects 135
Fish And Wildlife Population Management 135
Habitat Management 136
Resource Protection 139
Visitor Services 139
Funding and Personnel 140
Partnership and Volunteer Opportunities 144
Step-down Management Plans 144
Monitoring and Adaptive Management 145
Plan Review and Revision 146

SECTION B. ENVIRONMENTAL ASSESSMENT

I. BACKGROUND 165
Introduction 165
Purpose and Need for Action 165
Decision Framework 166
Planning Study Area 166
Authority, Legal Compliance, and Compatibility 167
Compatibility 167
Public Involvement and the Planning Process 167

II. AFFECTED ENVIRONMENT 169

III. DESCRIPTION OF ALTERNATIVES 171
Formulation of Alternatives 171
Description of Alternatives - Felsenthal NWR 171
Alternative A: Current Management (No Action) 171
Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative) 172
Alternative C: Enhanced Biological Management 173
Features Common to all Felsenthal NWR Alternatives 174
Comparison of Alternatives – Felsenthal NWR 175
Description of Alternatives - Overflow NWR 193
Alternative A: Current Management (No Action) 193
Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative) 194

Alternative C: Enhanced Biological Management 194
Features Common to all Overflow NWR Alternatives 195
Comparison of Alternatives – Overflow NWR 196
Alternatives Considered But Eliminated From Further Analysis 217

IV. ENVIRONMENTAL CONSEQUENCES 219

Overview 219
Effects Common to All Alternatives 219
Environmental Justice 219
Climate Change 219
Other Management 222
Land Acquisition 222
Cultural Resources 223
Refuge Revenue-Sharing 223
Other Effects 223
Summary of Effects by Alternative 224
Alternative A: Current Management (No action) 224
Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative) 227
Alternative C: Enhanced Biological Management 229
Unavoidable Impacts and Mitigation Measures 296
Water Quality from Soil Disturbance and Use of Herbicides 296
Wildlife Disturbance 296
Vegetation Disturbance 297
User Group Conflicts 297
Effects on Adjacent Landowners 297
Land Ownership and Site Development 297
Cumulative Impacts 298
Direct and Indirect Effects or Impacts 298
Short-term Uses versus Long-term Productivity 299

V. CONSULTATION AND COORDINATION 301

Overview 301

APPENDICES

APPENDIX A. GLOSSARY 305

APPENDIX B. REFERENCES AND LITERATURE CITATIONS 315

APPENDIX C. RELEVANT LEGAL MANDATES AND EXECUTIVE ORDERS 323

APPENDIX D. PUBLIC INVOLVEMENT 337

Summary of Public Scoping Comments 337

APPENDIX E. APPROPRIATE USE DETERMINATIONS 343

APPENDIX F. COMPATIBILITY DETERMINATIONS 367

Felsenthal National Wildlife Refuge Compatibility Determinations 367
Overflow National Wildlife Refuge Compatibility Determinations 396

APPENDIX G. INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION 415

APPENDIX H. WILDERNESS REVIEW 419

APPENDIX I. REFUGE BIOTA 421

APPENDIX J. LIST OF PREPARERS 445

LIST OF FIGURES

Figure 1. Location of Felsenthal and Overflow National Wildlife Refuges and the Oakwood Unit. 7
Figure 2. Acquisition boundary of Felsenthal National Wildlife Refuge....10
Figure 3. Acquisition boundary of Overflow National Wildlife Refuge. 11
Figure 4. Acquisition boundary of Oakwood Unit of Overflow National Wildlife Refuge. 15
Figure 5. Lower Mississippi River Ecosystem. 17
Figure 6. USFWS-designated ecosystems in the U.S., showing the Lower Mississippi River Watershed Ecosystem (#27)....20
Figure 7. General habitat types on Felsenthal National Wildlife Refuge. 37
Figure 8. General habitat types on Overflow National Wildlife Refuge. 39
Figure 9. General habitat types on the Oakwood Unit. 44
Figure 10. Locations of public use areas on Felsenthal National Wildlife Refuge. 56
Figure 11. Locations of public use areas on Overflow National Wildlife Refuge. 59
Figure 12. Current organization chart. 141
Figure 13. Proposed organization chart. 142

LIST OF TABLES

Table 1. Climatological normals for the years 1971-2000 from the National Weather Service station at El Dorado Airport (032300).....27
Table 2. Climatological normals for the years 1971-2000 from the National Weather Service station at Crossett (031730).....27
Table 3. Arkansas ambient air monitoring data. 35
Table 4. Felsenthal NWR habitat types and their acreages. 36
Table 5. Overflow NWR habitat types and their acreages.....38
Table 6. Demographics and socioeconomics for the Felsenthal and Overflow NWRs area. 51
Table 7. Felsenthal NWR recreation visits in 2004.....52
Table 8. Felsenthal NWR visitor recreation expenditures in 2004.....52
Table 9. Activities in Arkansas by U.S. residents, 2006. 53
Table 10. Types of hunts provided during the 2007-2008 hunting season at Felsenthal National Wildlife Refuge.....60
Table 11. Summary of projects.....143
Table 12. Additional personnel identified to implement the CCP for the South Arkansas Refuge Complex. 144
Table 13. Refuge step-down management plans related to the goals and objectives of the comprehensive conservation plan. 145
Table 14. Felsenthal NWR – Managing for climate change through habitat and species management.....147
Table 15. Overflow NWR – Managing for climate change through habitat and species management.....156
Table 16. Comparison of alternatives by management issues for Felsenthal National Wildlife Refuge.....176
Table 17. Comparison of alternatives by management issues for Overflow National Wildlife Refuge.....197
Table 18. Summary of environmental effects by alternative, Felsenthal National Wildlife Refuge.....232
Table 19. Summary of environmental effects by alternative, Overflow National Wildlife Refuge.....264

SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. Background

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) has prepared this Draft Comprehensive Conservation Plan and Evironmental Assessment for Felsenthal and Overflow national wildlife refuges to guide their management actions and direction over the next 15 years. Fish and wildlife conservation will receive first priority in refuge management; wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the two refuges or the purposes for which they were established.

A planning team developed a range of alternatives that best meet the goals and objectives of the two refuges and that could be implemented within a 15-year planning period. This draft comprehensive conservation plan and environmental assessment describes the Service's proposed plan, as well as several other alternatives that were considered and their effects on the environment. The draft plan and environmental assessment is being made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from this public review will be considered in the development of the final plan.

PURPOSE AND NEED FOR THE PLAN

The purpose of the plan is to develop a proposed action that best achieves the purposes of the two refuges; attains the vision and goals developed for the refuges; contributes to the mission of the National Wildlife Refuge System; addresses key problems, issues and relevant mandates; and is consistent with sound principles of fish and wildlife management.

Specifically, the plan is needed to:

- provide a clear statement of the refuges' management direction;
- provide refuge neighbors, visitors, and government officials with an understanding of the Service's management actions on and around the refuges;
- ensure that the Service's management actions, including land protection and recreation/education programs, are consistent with the mandates of the National Wildlife Refuge System; and
- provide a basis for the development of budget requests for operations, maintenance, and capital improvement needs.

U.S. FISH AND WILDLIFE SERVICE

The Service traces its roots to 1871 through the establishment of the Commission of Fisheries involved with research and fish culture. The once-independent commission was renamed the Bureau of Fisheries and placed under the Department of Commerce and Labor in 1903.

The Service also traces its roots to 1886 with the establishment of a Division of Economic Ornithology and Mammalogy in the Department of Agriculture. Research on the relationship of birds and animals to agriculture shifted to delineation of the range of plants and animals, so the name was changed to the Division of the Biological Survey in 1896.

The Department of Commerce's Bureau of Fisheries was combined with the Department of Agriculture's Bureau of Biological Survey on June 30, 1940, and transferred to the Department of the Interior as the Fish and Wildlife Service. The name was changed to the Bureau of Sport Fisheries and Wildlife in 1956 and finally to the U.S. Fish and Wildlife Service in 1974.

The U.S. Fish and Wildlife Service, working with others, is responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people through federal programs relating to migratory birds, endangered species, interjurisdictional fish and marine mammals, and inland sport fisheries (142 DM 1.1).

As part of its mission, the Service manages more than 540 national wildlife refuges covering over 95 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands set aside specifically for fish and wildlife. The majority of these lands, 77 million acres, are in Alaska. The remaining acres are spread across the other 49 states and several United States territories. In addition to refuges, the Service manages thousands of small wetlands, national fish hatcheries, 64 fishery resource offices, and 78 ecological services field stations. The Service enforces federal wildlife laws; administers the Endangered Species Act; manages migratory bird populations; restores nationally significant fisheries; conserves and restores wildlife habitat; and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

The mission of the National Wildlife Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997, is:

> *... to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.*

The National Wildlife Refuge System Improvement Act of 1997 established, for the first time, a clear legislative mission of wildlife conservation for the National Wildlife Refuge System. Actions were initiated in 1997 to comply with the direction of this new legislation, including an effort to complete comprehensive conservation plans for all refuges. These plans, which are completed with full public involvement, help guide the future management of refuges by establishing natural resources and recreation/education programs. Consistent with this Act, approved plans will serve as the guidelines for refuge management for the next 15 years. The Act states that each refuge shall be managed to:

- fulfill the mission of the National Wildlife Refuge System;
- fulfill the individual purposes of each refuge;
- consider the needs of wildlife first;
- fulfill requirements of comprehensive conservation plans that are prepared for each unit of the Refuge System;
- maintain the biological integrity, diversity, and environmental health of the Refuge System;
- recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are legitimate and priority public uses; and
- retain the authority of refuge managers to determine compatible public uses.

The following are just a few examples of the Service's national network of conservation lands. Pelican Island National Wildlife Refuge, the first refuge, was established in 1903 for the protection of colonial nesting birds in Florida, such as the snowy egret and the brown pelican. Western refuges were established for American bison (1906), elk (1912), prong-horned antelope (1931), and desert bighorn sheep (1936) after overhunting, competition with cattle, and natural disasters decimated the once-abundant herds. The drought conditions of the Dust Bowl during the 1930s severely depleted breeding populations of ducks and geese. Refuges established during the Depression focused on protecting waterfowl production areas such as the prairie wetlands in America's heartland. The emphasis on waterfowl continues today but also includes protection of wintering habitat in response to a dramatic loss of bottomland hardwoods. By 1973, the Service had begun to focus on establishing refuges for endangered species.

Recreational visits to national wildlife refuges generate substantial economic activity. In fiscal year 2006, 34.8 million people visited refuges in the lower 48 states for recreation. Their spending generated almost $1.7 billion of sales in regional economies. As this spending flowed through the economy, nearly 27,000 people were employed and $542.8 million in employment income was generated.

About 82 percent of total expenditures are generated by nonconsumptive activities on refuges. Fishing accounted for 12 percent and hunting 6 percent. Local residents accounted for 13 percent of expenditures, while visitors coming from outside the local area accounted for 87 percent. In addition, refuge recreational spending generates about $185.3 million in tax revenues at the local, county, state, and federal levels.

Surveys show refuge visitors would have been willing to pay more for their visit than it actually costs them. The difference between what they were willing to pay and what they actually paid is their net economic value or consumer surplus. Visitors enjoyed a consumer surplus of nearly $860 million in 2006. Over $664 million of this amount (77 percent of total net economic value) accrued to nonconsumptive visitors.

The wildlife and habitat vision for national wildlife refuges stresses that wildlife comes first; that ecosystems, biodiversity, and wilderness are vital concepts in refuge management; that refuges must be healthy and growth must be strategic; and that the Refuge System serves as a model for habitat management with broad participation from others.

The National Wildlife Refuge System Improvement Act of 1997 stipulates that comprehensive conservation plans be prepared in consultation with adjoining federal, state, and private landowners and that the Service develop and implement a process to ensure an opportunity for active public involvement in the preparation and revision (every 15 years) of the plans.

All lands of the Refuge System will be managed in accordance with an approved comprehensive conservation plan that will guide management decisions and set forth strategies for achieving refuge unit purposes. The plan will be consistent with sound resource management principles, practices, and legal mandates, including Service compatibility standards and other Service policies, guidelines, and planning documents (602 FW 1.1).

LEGAL AND POLICY CONTEXT

Legal Mandates, Administrative and Policy Guidelines, and Other Special Considerations

Administration of national wildlife refuges is guided by the mission and goals of the National Wildlife Refuge System, congressional legislation, presidential executive orders, and international treaties. Policies for management options of refuges are further refined by administrative guidelines established by the Secretary of the Interior and by policy guidelines established by the Director of the Fish and Wildlife Service. A number of legal treaties and laws relevant to the administration of the National Wildlife Refuge System and management of the Felsenthal and Overflow national wildlife refuges are summarized in Appendix C.

Treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; research and recreation on refuge lands; and provide a framework for cooperation between the Felsenthal and Overflow national wildlife refuges and other partners, such as the Arkansas Game and Fish Commission (AGFC), private landowners, etc.

Lands within the National Wildlife Refuge System are closed to public use unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. All programs and uses must be evaluated based on mandates set forth in the National Wildlife Refuge System Improvement Act. Those mandates are to:

- contribute to ecosystem goals, as well as refuge purposes and goals;
- conserve, manage, and restore fish, wildlife, and plant resources and their habitats;
- monitor the trends of fish, wildlife, and plants;
- manage and ensure appropriate visitor uses as those uses benefit the conservation of fish and wildlife resources and contribute to the enjoyment of the public; and
- ensure that visitor activities are compatible with refuge purposes.

The Improvement Act further identifies six priority wildlife-dependent recreational uses. These uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. As priority public uses of the Refuge System, they receive priority consideration over other public uses in planning and management.

Biological Integrity, Diversity, and Environmental Health Policy

The Improvement Act directs the Service to ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans. The policy is an additional directive for refuge managers to follow while achieving refuge purpose(s) and the Refuge System mission. It provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems. When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuges' contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, knowledge of refuge resources, the refuge's role within an ecosystem, applicable laws, and best available science, including consultation with others both inside and outside the Service.

NATIONAL AND INTERNATIONAL CONSERVATION PLANS AND INITIATIVES

Multiple partnerships have been developed among government and private entities to address the environmental problems affecting regions. A large amount of conservation and protection information defines the role of the refuge at the local, national, international, and ecosystem levels. Conservation initiatives include broad-scale planning and cooperation between affected parties to address declining trends of natural, physical, social, and economic environments. The conservation guidance described below, along with issues, problems, and trends, was reviewed and integrated where appropriate into this draft comprehensive conservation plan.

This draft plan supports, among others, the North American Bird Conservation Initiative, North American Waterfowl Management Plan, Partners in Flight Plan, U.S. Shorebird Conservation Plan, and Northern American Waterbird Conservation Plan.

North American Bird Conservation Initiative. Started in 1999, the North American Bird Conservation Initiative is a coalition of government agencies, private organizations, academic institutions, and private industry leaders in the United States, Canada, and Mexico working to ensure the long-term health of North America's native bird populations by fostering an integrated approach to bird conservation to benefit all birds in all habitats. The four international and national bird initiatives include the North American Waterfowl Management Plan, Partners in Flight, Waterbird Conservation for the Americas, and the U.S. Shorebird Conservation Plan.

North American Waterfowl Management Plan. The North American Waterfowl Management Plan is an international action plan to conserve migratory birds throughout the continent. The plan's goal is to return waterfowl populations to their 1970s' levels by conserving wetland and upland habitats. Canada and the United States signed the plan in 1986 in reaction to critically low numbers of waterfowl. Mexico joined in 1994, making it a truly continental effort. The plan is a partnership of federal, provincial, state, and municipal governments, nongovernmental organizations (NGOs), private companies, and many individuals, all working towards achieving better wetland habitat for the benefit of migratory birds, other wetland-associated species and people. Plan projects are international in scope, but implemented at regional levels. These projects contribute to the protection of habitat and wildlife species across the North American landscape.

Partners in Flight Bird Conservation Plan. Managed as part of the Partners in Flight Plan, the Mississippi Alluvial Valley and the West Gulf Coastal Plan physiographic areas represent scientifically based land bird conservation planning efforts that ensure long-term maintenance of healthy populations of native land birds, primarily nongame land birds. Nongame land birds have been vastly underrepresented in conservation efforts, and many are exhibiting significant declines. This plan is voluntary and nonregulatory, and focuses on relatively common species in areas where conservation actions can be most effective, rather than the frequent local emphasis on rare and peripheral populations.

U.S. Shorebird Conservation Plan. The U.S. Shorebird Conservation Plan is a partnership effort throughout the United States to ensure that stable and self-sustaining populations of shorebird species are restored and protected. The plan was developed by a wide range of agencies, organizations, and shorebird experts for separate regions of the country, and identifies conservation goals, critical habitat conservation needs, key research needs, and proposed education and outreach programs to increase awareness of shorebirds and the threats they face.

Northern American Waterbird Conservation Plan. This plan provides a framework for the conservation and management of 210 species of waterbirds in 29 nations. Threats to waterbird populations include destruction of inland and coastal wetlands; introduced predators and invasive species; pollutants; mortality from fisheries and industries; disturbance; and conflicts arising from abundant species. Particularly important habitats of the southeast region include pelagic areas, marshes, forested wetlands, and barrier and sea island complexes. Fifteen species of waterbirds are federally listed, including breeding populations of wood storks, Mississippi sandhill cranes, whooping cranes, interior least terns, and Gulf Coast populations of brown pelicans. A key objective of this plan is the standardization of data collection efforts to better recommend effective conservation measures.

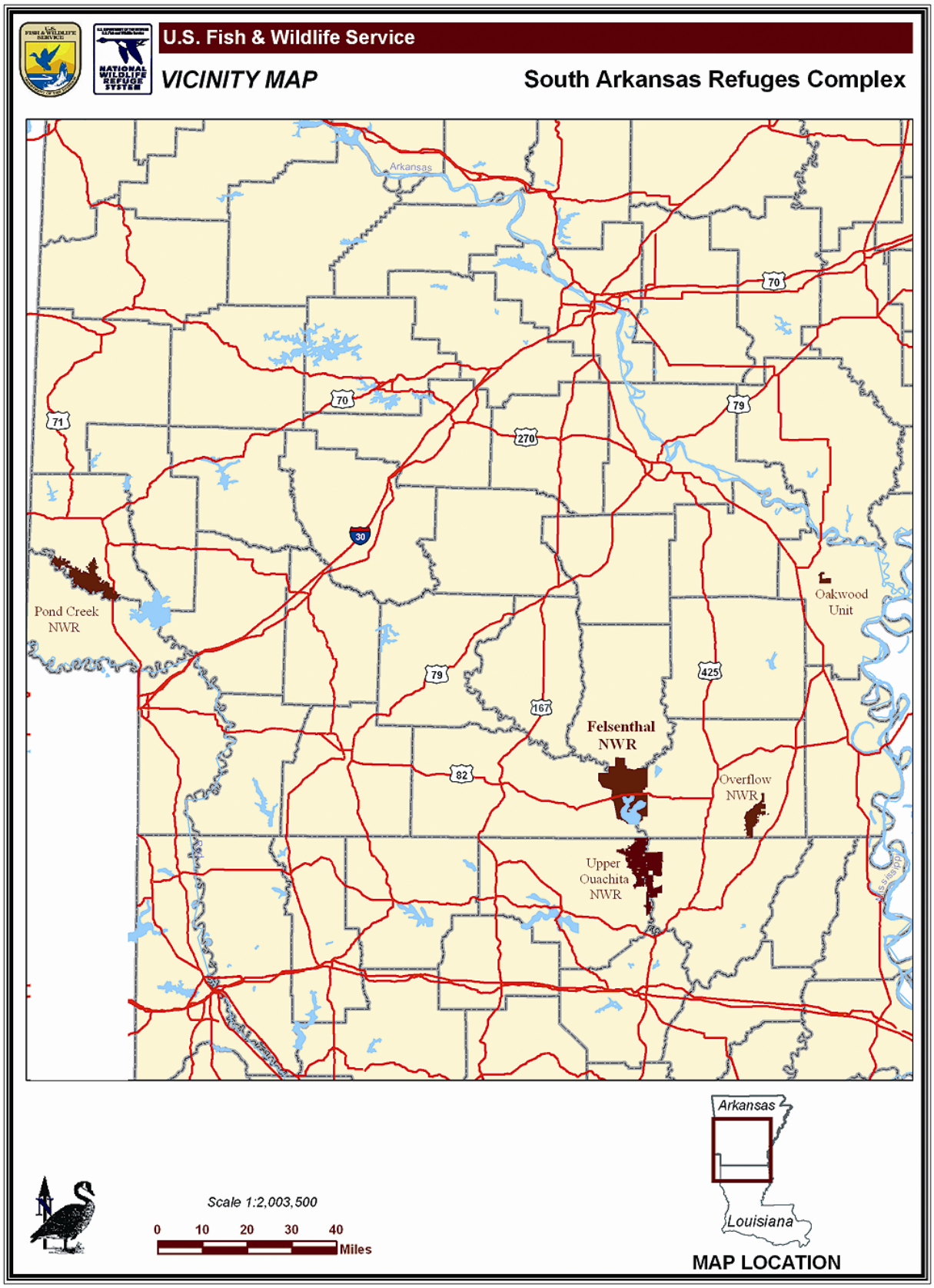
RELATIONSHIP TO STATE WILDLIFE AGENCY

A provision of the National Wildlife Refuge System Improvement Act of 1997, and subsequent agency policy, is that the Service shall ensure timely and effective cooperation and collaboration with other state fish and game agencies and tribal governments during the course of acquiring and managing refuges. State wildlife management areas and national wildlife refuges provide the foundation for the protection of species, and contribute to the overall health and sustainment of fish and wildlife species in the State of Arkansas. Figure 1 displays regional conservation areas in the vicinity of Felsenthal and Overflow NWRs.

The Arkansas Game and Fish Commission (AGFC) is responsible for the control, management, restoration, conservation, and regulation of birds, fish, game and wildlife resources of the state. The mission of AGFC is "… to wisely manage all the fish and wildlife resources of Arkansas while providing maximum enjoyment for the people." The AGFC oversees more than 280,000 acres of state-owned Natural Areas and Wildlife Management Areas, and more than 100 natural and man-made lakes. The agency manages habitat; stocks fish; develops management plans for important wildlife species; and fosters good stewardship through a variety of education programs, information products, and grants for conservation activities.

The AGFC's participation and contribution throughout this planning process will provide for ongoing opportunities and open dialogue to improve the ecological sustainment of fish and wildlife in the State of Arkansas. An essential part of comprehensive conservation planning is the integration of common mission objectives where appropriate.

Figure 1. Location of Felsenthal and Overflow National Wildlife Refuges and the Oakwood Unit.



II. Refuge Overview

INTRODUCTION

FELSENTHAL NATIONAL WILDLIFE REFUGE

Felsenthal National Wildlife Refuge (NWR) is located in Ashley, Bradley, and Union counties, Arkansas, about 5 miles west of Crossett, Arkansas on U.S. Highway 82 (Figure 2). Felsenthal NWR is one of four refuges forming an administrative complex, which also includes Pond Creek National Wildlife Refuge to the northwest, Overflow National Wildlife Refuge to the east, and the Oakwood Unit National Wildlife Refuge to the northeast.

Felsenthal NWR occupies a low-lying area dissected by an intricate system of rivers, creeks, sloughs, buttonbush swamps and lakes throughout a vast bottomland hardwood forest that gradually rises to an upland forest community. Historically, periodic flooding of the "bottoms" (bottomland hardwoods) during winter and spring provide excellent wintering waterfowl habitat. These wetlands, in combination with the pine and upland hardwood forest on the higher ridges, support a wide diversity of native plants and animals, providing habitat for migrant and resident waterfowl, marsh and water birds, and neotropical migratory birds. The refuge has the highest density of endangered red-cockaded woodpeckers in the state and provides habitat and protection for the threatened American alligator. The refuge also contains some of the region's richest cultural resources with more than 200 known archeological (Native American) sites.

OVERFLOW NATIONAL WILDLIFE REFUGE

Overflow NWR is located in Ashley County, Arkansas, five miles west of Wilmot, Arkansas (Figure 3). There is no direct highway access to the refuge, except by Highway 173. From Highway 165 take Highway 173W, to the parking lot at the end of pavement.

The western boundary of the Overflow Refuge follows the 110-foot contour along the Mississippi Alluvial Valley escarpment; an abrupt rise in elevation separates the Mississippi River Delta from the Gulf Coastal Plain. Bottomland hardwood forests, agricultural fields, scrub/shrub wetlands and beaver ponds, and upland pine-hardwood are the principal habitats on the refuge. These habitats provide a diversity of habitat types and protection for migratory waterfowl and other birds, including the American bald eagle.

Few species surveys have been conducted on the refuges. Although actual numbers are hard to accurately quantify, comparisons with other similar refuges with similar habitats envisage that the current wildlife list for Felsenthal and Overflow would contain at least 200 species of birds, 40 species of mammals, 70 species of reptiles and amphibians, and 90 species of fish. The species lists are provided in Appendix I, Refuge Biota.

Figure 2. Acquisition boundary of Felsenthal National Wildlife Refuge.

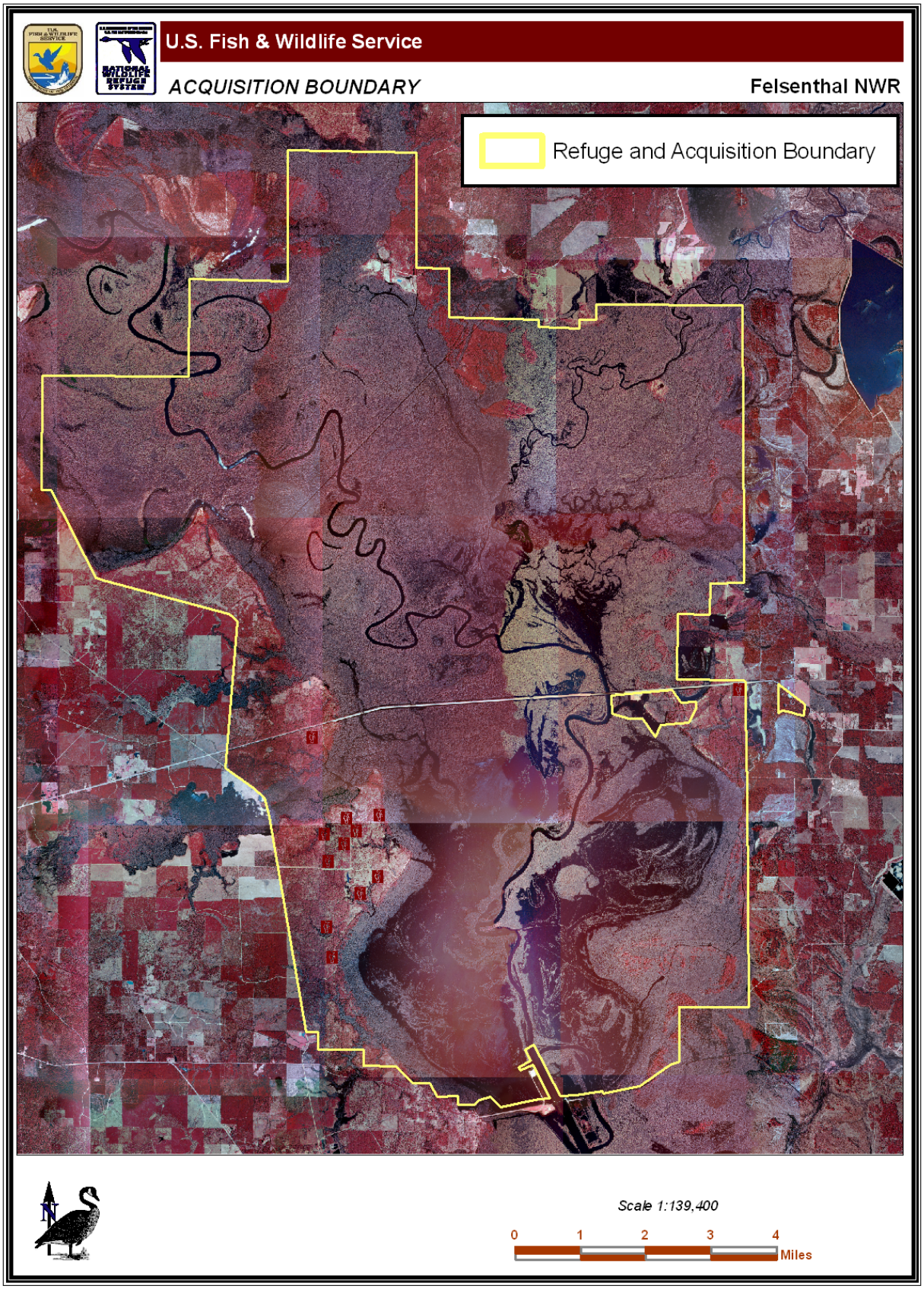
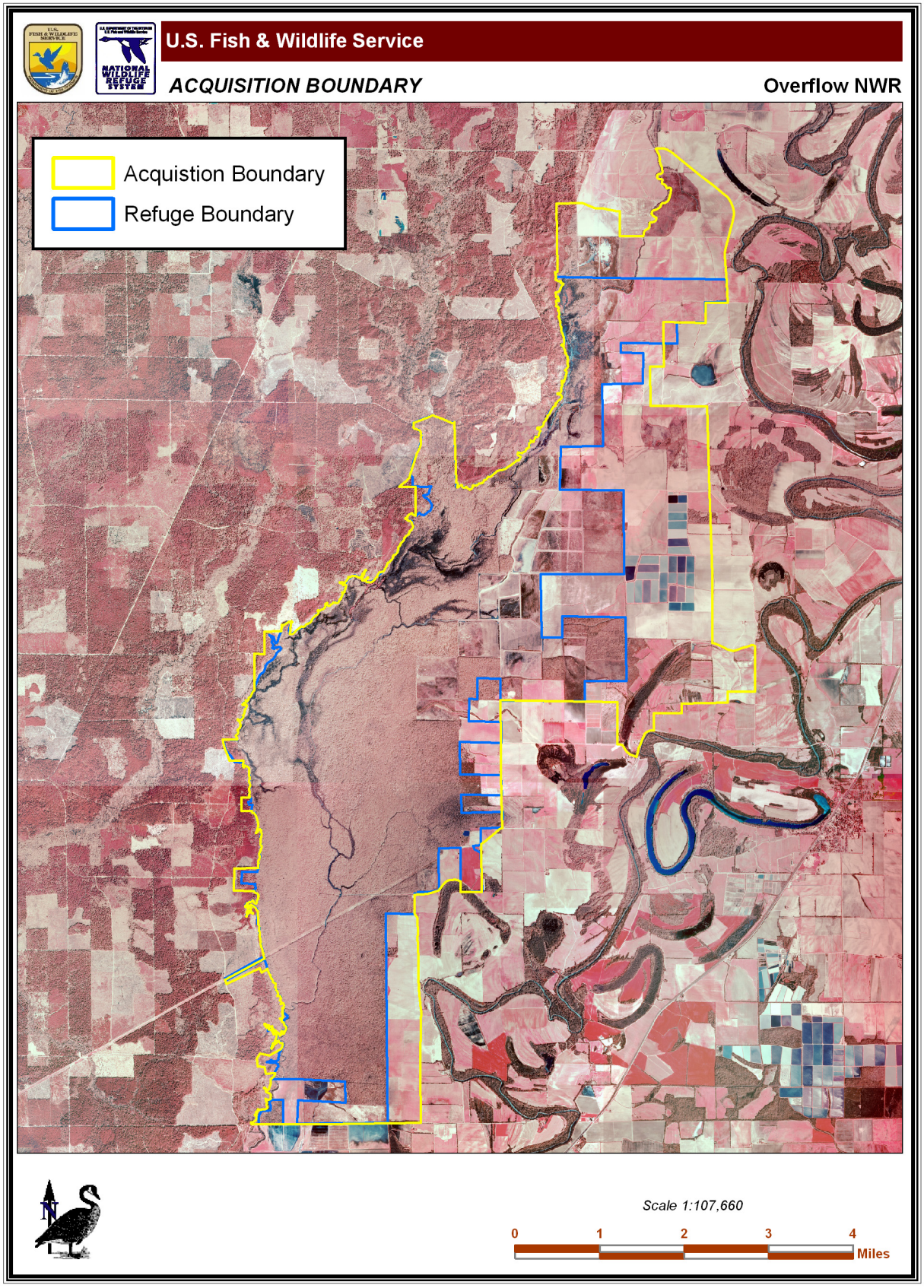


Figure 3. Acquisition boundary of Overflow National Wildlife Refuge.



REFUGE HISTORY AND PURPOSE

HISTORY

Felsenthal National Wildlife Refuge

Established in 1975 as mitigation for the creation of the U.S. Corps of Engineers' (USACE) Ouachita and Black Rivers Navigation Project and Felsenthal Lock and Dam, Felsenthal National Wildlife Refuge (NWR) is located in southeast Arkansas, approximately eight miles west of the town of Crossett. This 65,000-acre refuge is named for the small Felsenthal community located at its southwest corner, and contains an abundance of water resources dominated by the Ouachita and Saline rivers and the Felsenthal Pool.

Geographically, the refuge is located in what is known as the Felsenthal Basin, an extensive natural depression that is laced with a vast complex of sloughs, bayous and lakes (Figure 2). The region's two major rivers, the Saline and Ouachita, flow through the refuge. These wetland areas in combination with the refuge's diverse forest ecosystem of bottomland hardwoods, pine forests and uplands support a wide variety of wildlife and provide excellent fishing, hunting, boating, wildlife observation and environmental education opportunities. This low lying refuge area is dissected by an intricate system of rivers, creeks, sloughs, buttonbush swamps and lakes spread throughout a vast bottomland hardwood forest that gradually rises to an upland forest community. Historically, periodic flooding of the "bottoms" during winter and spring provided excellent wintering waterfowl habitat. These wetlands, in combination with the pine and upland hardwood forest on the higher ridges, support a wide diversity of native plants and animals.

About 60% of the refuge (~40,000 acres) is bottomland hardwood, 25% open water (~15,000 acres), and 15% uplands (~10,000 acres). Felsenthal NWR has the world's largest greentree reservoir consisting of the 15,000-acre Felsenthal Pool that is more than doubled to 36,000 acres during winter flooding.

Overflow National Wildlife Refuge

Overflow National Wildlife Refuge, established in 1980, encompasses 13,973 fee-title acres in Ashley County in southeast Arkansas, about five miles west of Wilmot (Figure 3). It was established to protect one of the remaining bottomland hardwood forests considered vital for maintaining mallard, wood duck, and other waterfowl populations in the Mississippi Flyway. The bottomland hardwood forest consists primarily of willow oak and overcup oak. The willow oaks produce small acorns that are an excellent source of food for the mallards and wood ducks in the winter. Bald cypress and tupelo gum occur along streams, channels and sloughs throughout the refuge. This 13,000+ acre wetland complex consists of seasonally flooded bottomland hardwood forests, impoundments, and croplands. In addition, the Oakwood Unit (an area of 2,263 acres in Desha County transferred from the Farmers Home Administration in 1990) is administered by Overflow NWR. The Oakwood Unit is currently closed to the public and is very passively managed. Where warranted, appropriate information relating to the Oakwood Unit will be included in this CCP.

About 60% of Overflow NWR is bottomland hardwoods (~8,650 acres), about 15% reforested (~2,020 acres), about 15% wetlands and beaver ponds (~1,500 acres), with the remaining acreage in agriculture (~800 acres) and upland pine-hardwoods (200-300 acres). During the winter, a 4,000-acre greentree reservoir is created when the bottomland hardwood forests are

allowed to flood. About 60% of the acreage of the Oakwood Unit is reforested, about 30% is in waterfowl impoundments, and about 10% is bottomland hardwoods.

PURPOSE

Felsenthal National Wildlife Refuge

The purpose and establishing authorities of Felsenthal NWR are:

- 16 U.S.C. § 664 (Fish and Wildlife Coordination Act)
  "... shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon ..."

- 16 U.S.C. § 460k-1
  "... suitable for incidental fish and wildlife-oriented recreational development; the protection of natural resources; and the conservation of endangered species or threatened species ..."

- 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended)
  "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..."

Felsenthal NWR is operated under the following management objectives:

- Provide habitat for migratory waterfowl and other birds;
- Provide habitat and protection for endangered species such as the red-cockaded woodpecker, and the threatened American alligator and the protected bald eagle;
- Provide recreation and environmental education for the public; and
- Protect cultural resources.

Overflow National Wildlife Refuge

The purpose and establishing authorities of Overflow NWR are:

- 16 U.S.C. § 715d (Migratory Bird Conservation Act)
  "…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

- 16 U.S.C. § 460k-1
  "…suitable for incidental fish and wildlife oriented recreational development; the protection of natural resources; and the conservation of endangered species or threatened species…"

- 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended)
  "…the Secretary …may accept and use…real…property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors…"

- 16 U.S.C. § 668dd(a)(2) (National Wildlife Refuge System Administration Act) "…conservation, management, and …restoration of the fish, wildlife, and plant resources and their habitats…for the benefit of present and future generations of Americans…"

On August 8, 1990, the Service received fee title to the 2,263-acre Oakwood Unit from the Farmers Home Administration (FmHA). This transaction represents the largest contiguous tract of land transferred to the Service by the FmHA. There was a long history of court battles and legal maneuvering by the previous landowner and FmHA over this controversial FmHA inventory property. However, the transfer went relatively smoothly with the Service completing habitat restoration in 1996 (Figure 4).

Overflow NWR is operated under the following management objectives:

- Provide a diversity of habitat types for migratory waterfowl and other birds.
- Provide habitat and protection for endangered and threatened.
- Provide opportunities for environmental and ecological research.
- Provide a variety of recreational opportunities consistent with primary wildlife objectives.
- Expand the public's understanding of and appreciation for the environment with special emphasis on natural resources.

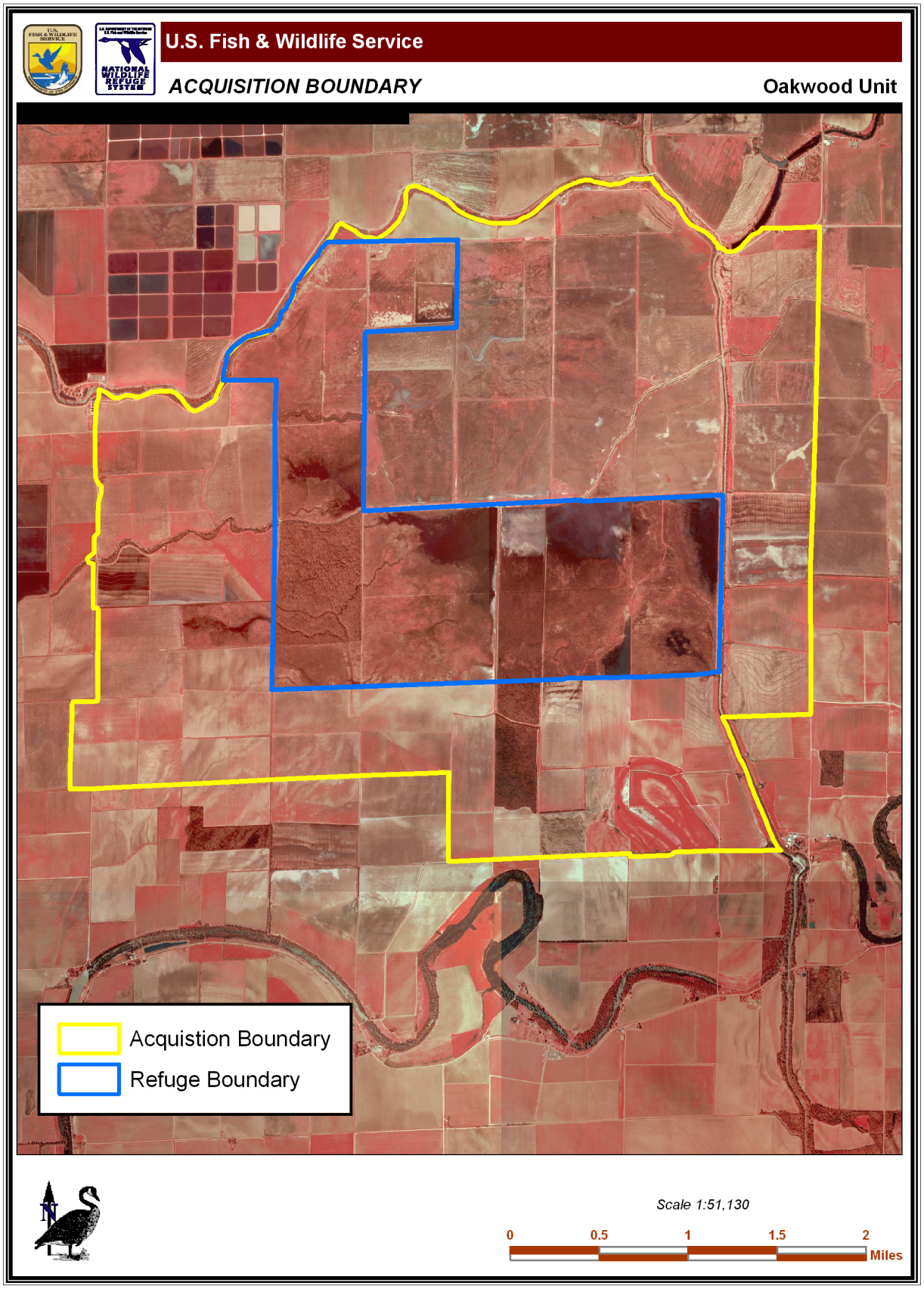
SPECIAL DESIGNATIONS

Felsenthal and Overflow NWRs do not contain any lands under special designation by the federal government, such as federally designated wilderness areas, wild and scenic rivers, demonstration areas, or research natural areas. However, the General Accounting Office's *Report on Oil and Gas on Wildlife Refuges* (GAO-03-517) lists 60 inactive wells and pipelines on Felsenthal NWR and two inactive wells and pipelines on Overflow NWR.

The Saline River, from its confluence with the Ouachita River in Felsenthal NWR, upstream to the Grant/Saline County line in central Arkansas (a distance of 157 miles) has been designated as one of Arkansas' Natural and Scenic Rivers. These rivers are classified as natural, scenic, or pastoral. The criteria involve the stream's length, adjacent forest cover, biological characteristics, water quality, present use, and accessibility. A river or river segment listed in the system is protected from any permanent dam or structure that would impound waters or any channelization or realignment of the principal channel of the stream. Similarly, the Nationwide Rivers Inventory (NRI) also lists the Saline River from its confluence with the Ouachita River, in Felsenthal NWR, upstream to its confluence with Alum Fork and North Fork (a 179-mile segment) as having outstandingly remarkable values of scenery, recreation, fish, wildlife and history. Immediately below Felsenthal NWR, the Ouachita River flows into Louisiana, where it is a state-designated scenic stream.

Both Felsenthal and Overflow NWRs are recognized as important bird areas (IBAs) by Audubon Arkansas.

Figure 4. Acquisition boundary of Oakwood Unit of Overflow National Wildlife Refuge.



ECOSYSTEM CONTEXT

LOWER MISSISSIPPI RIVER ECOSYSTEM

An ecosystem is a geographical area that includes and interconnects all the living (biotic) organisms, their physical (abiotic) surroundings, and the natural cycles that sustain them. All of these elements are interconnected. Managing any one resource affects the others in that ecosystem. Ecosystems can be small (a single stand of aspen) or large (an entire watershed including hundreds of forest stands across many different ownerships).

The Lower Mississippi River Ecosystem includes the alluvial plain of the Mississippi River downstream of its confluence with the Ohio River and the delta plain and associated marshes and swamps created by the meanderings of the Mississippi River and its tributaries (FWS 2002). The drainage basins and tributaries of the Ouachita River, which includes Felsenthal and Overflow NWR's are part of the West Guld Coastal Plain (Felsenthal NWR) and the Mississippi Alluvial Valley (Overflow NWR) sections of the Lower Mississippi River Ecosystem (Figure 5).

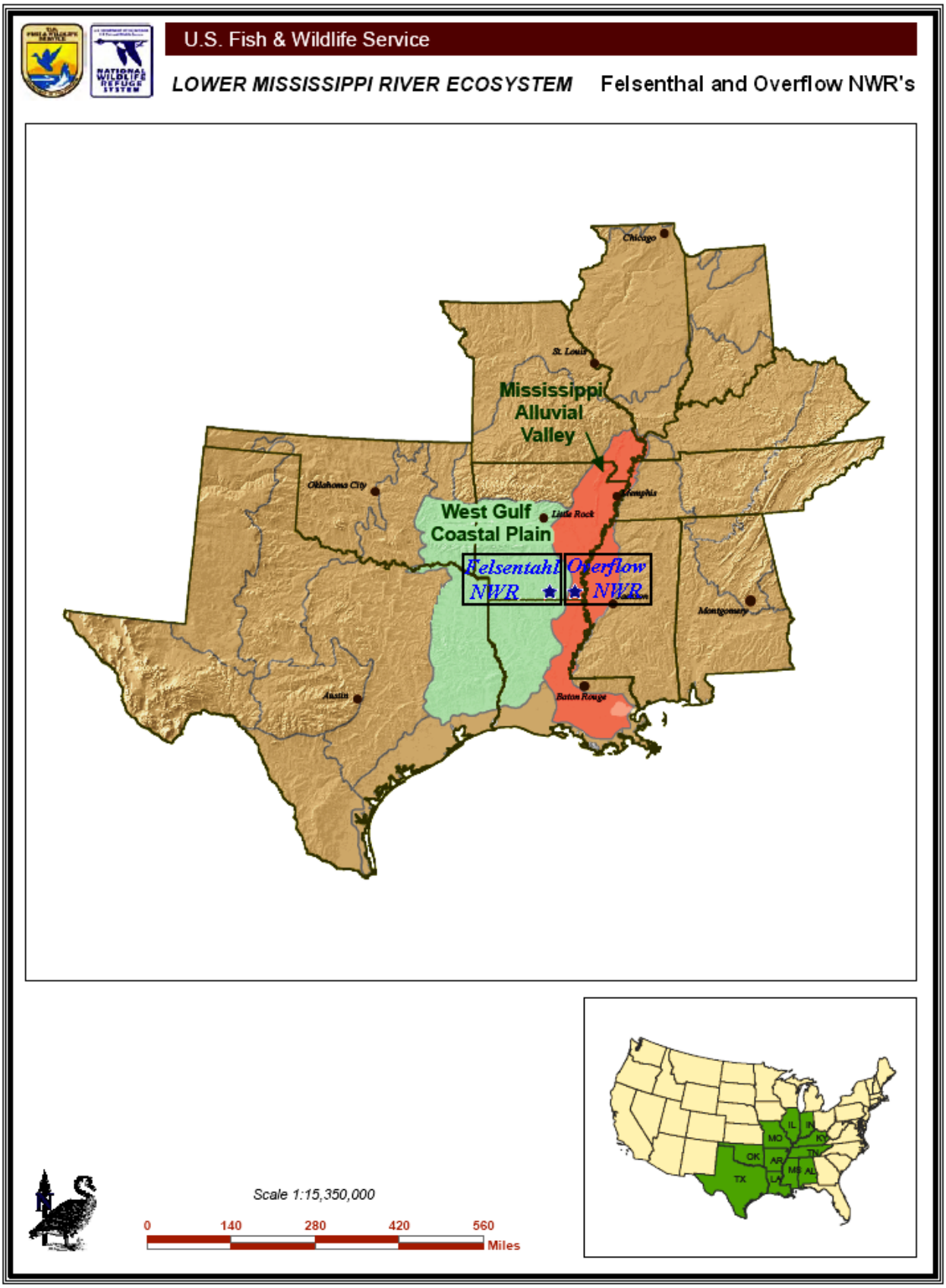
The refuges characterized by bottomland hardwoods and wetlands, are managed for conservation, enhancement, and restoration of bottomland hardwoods; moist soil management; endangered species protection; environmental education; and compatible wildlife-dependent recreation in the Lower Mississippi River Ecosystem. The ecosystem guides Fish and Wildlife Service efforts to enhance, restore, and conserve the natural functional processes and habitat types, while maintaining economic productivity and recreational opportunities.

The ecosystem serves as a primary wintering habitat for mid-continent waterfowl populations, as well as breeding and migration habitat for migratory songbirds. The expansive floodplain forests of the past are now fragmented bottomland hardwood patches due to conversion from agriculture and flood control projects.

The West Gulf Coastal Plain and Felsenthal National Wildlife Refuge

The West Gulf Coastal Plain is composed of rolling plains that are broken by nearly flat fluvial terraces, bottomlands, sandy low hills, and low cuestas; its terrain is unlike the much more rugged Ouachita Mountains to the north or the flatter, less dissected Mississippi Alluvial Valley to the east. Uplands are underlain by poorly-consolidated, Tertiary- through Cretaceous-age, coastal plain deposits and marginal marine sediments (laid down as the Gulf of Mexico opened and North America's southern continental margin subsided). Bottomlands and terraces are veneered with Quaternary alluvium or windblown silt deposits (loess). The lithologic mosaic is distinct from the Paleozoic rocks of the Ouachita Mountains and the strictly Quaternary deposits of the Mississippi Alluvial Valley. Potential natural vegetation is oak–hickory–pine forest on uplands and southern floodplain forest on bottomlands. Today, more than 75% of the ecoregion remains wooded. Extensive commercial loblolly pine–shortleaf pine plantations occur. Lumber and pulpwood production, livestock grazing, and crawfish farming are also major land uses. Cropland usually dominates the drained bottomlands. Fish communities typically have a limited proportion of sensitive species; sunfishes are dominant, and darters and minnows are common.

Figure 5. Lower Mississippi River Ecosystem.



In the immediate vicinity of Felsenthal NWR, the ecosystem is characterized by floodplains and low terraces. It is nearly level, veneered by Holocene alluvium, and contains natural levees, swales, oxbow lakes, and meander scars. Longitudinal channel gradients are low and large parts are frequently flooded. Forested wetlands are characteristic, but pastureland also occurs. Potential natural vegetation is southern floodplain forest as in the Mississippi Alluvial Valley (see below), and cropland is less common.

The Mississippi Alluvial Valley and Overflow National Wildlife Refuge

The Mississippi Alluvial Valley extends along the Mississippi River from the confluence of the Ohio and Mississippi rivers southward to the Gulf of Mexico. The Mississippi Alluvial Valley Plain is a broad, nearly level, agriculturally-dominated alluvial plain. It is veneered by Quaternary alluvium, loess, glacial outwash, and lacustrine deposits. River terraces, swales, and levees provide limited relief, but overall, the Mississippi Alluvial Valley is flatter than the neighboring South Central Plains ecoregions in Arkansas. Nearly flat, clayey, poorly-drained soils are widespread and characteristic. Streams and rivers have very low gradients and fine-grained substrates. Many reaches have ill-defined stream channels. The Mississippi Alluvial Valley provides important habitat for fish and wildlife, and includes the largest continuous system of wetlands in North America. It is also a major bird migration corridor used in fall and spring migrations. Potential natural vegetation is largely southern floodplain forest and is unlike the oak–hickory and oak–hickory–pine forests that dominate uplands to the west. Loblolly pine, so common in the South Central Plains, is not native to most forests in the Arkansas portion of the Mississippi Alluvial Valley. The Mississippi Alluvial Valley has been widely cleared and drained for cultivation; this widespread loss or degradation of forest and wetland habitat has impacted wildlife and reduced bird populations. Fish communities in least altered streams typically have an insignificant proportion of sensitive species; sunfishes are dominant followed by minnows. Man-made flood control levees, in effect, separate the river and its adjoining habitat from the remainder of its natural hydrologic system; in so doing, they interfere with sediment transfer and have reduced available habitat for many species. Earthquakes in the early nineteenth century offset river courses in the Mississippi Alluvial Valley. Small to medium size earthquakes still occur frequently; their shocks are magnified by the alluvial valley's unconsolidated deposits, creating regional land management issues.

In the immediate vicinity of Overflow NWR, the ecosystem is a flat to nearly flat floodplain containing the meander belts of the present and past courses of the lower Arkansas and Ouachita Rivers. Point bars, natural levees, swales, and abandoned channels, marked by meander scars and oxbow lakes, are common and characteristic. Soils on natural levees are relatively coarse-textured, well-drained, and higher than those on levee back slopes and point bars; they grade to heavy, poorly-drained clays in abandoned channels and swales. The area contains small streams flowing in abandoned courses of the Arkansas River. These small streams are usually underfit relative to the older channels, higher than the adjacent Arkansas/Ouachita River Backswamps (see below), and have small watersheds. Bayou Bartholomew inhabits the longest section of abandoned channels. It flows against the edge of and receives drainage from the West Gulf Coastal Plain which lies to the west. Habitat diversity is sufficient for Bayou Bartholomew to be one of the most species-rich streams in North America. Within an abandoned course, bald cypress and water tupelo often grow in the modern stream channel adjacent to a strip of wet bottomland hardwood forest dominated by overcup oak and water hickory. Cropland and pastureland are widespread; soybeans, rice, and wheat are the main crops. The flats, swales, and natural levees of the Arkansas/Ouachita River Backswamps include the slackwater areas, where water often collects into marshes, swamps, oxbow lakes, ponds, and sloughs. This area is widely veneered with natural levee deposits.

Soils derived from these natural levee deposits are coarser and are not as poorly drained as the clayey soils of the Northern Backswamps. As a result, willow oak and water oak are native instead of species adapted to wetter overflow conditions. Drainage canals and ditches are common. This artificial drainage, together with the sandy veneer of natural levee deposits, help explain why the area is easily and widely farmed. Rice, cotton, and soybeans are important crops but forests and forested wetlands also occur.

Both Felsenthal and Overflow NWRs are located in the U.S. Fish and Wildlife Service's Lower Mississippi River Watershed Ecosystem Unit (Figure 6). The Service's ecosystem approach is comprehensive. It is based on all of the biological resources within a watershed and it considers the economic health of communities within that watershed. A watershed is the total land area from which water drains into a single stream, lake, or ocean. The U.S. Fish and Wildlife Service's Lower Mississippi Ecosystem Team has eight goals, as follows:

Resource Goals. The first five goals address the primary living natural resources and their habitats of concern to the Fish and Wildlife Service in the Lower Mississippi River Ecosystem.

1. Conserve, enhance, protect, and monitor migratory bird populations and their habitats in the Lower Mississippi River Ecosystem.

2. Protect, restore, and manage the wetlands of the Lower Mississippi River Ecosystem.

3. Protect and/or restore imperiled habitats and viable populations of all endangered, threatened, and candidate species and species of concern in the Lower Mississippi River Ecosystem.

4. Protect, restore, and manage the fisheries and other aquatic resources historically associated with the wetlands and waters of the Lower Mississippi River Ecosystem.

5. Restore, manage, and protect national wildlife refuges and national fish hatcheries.

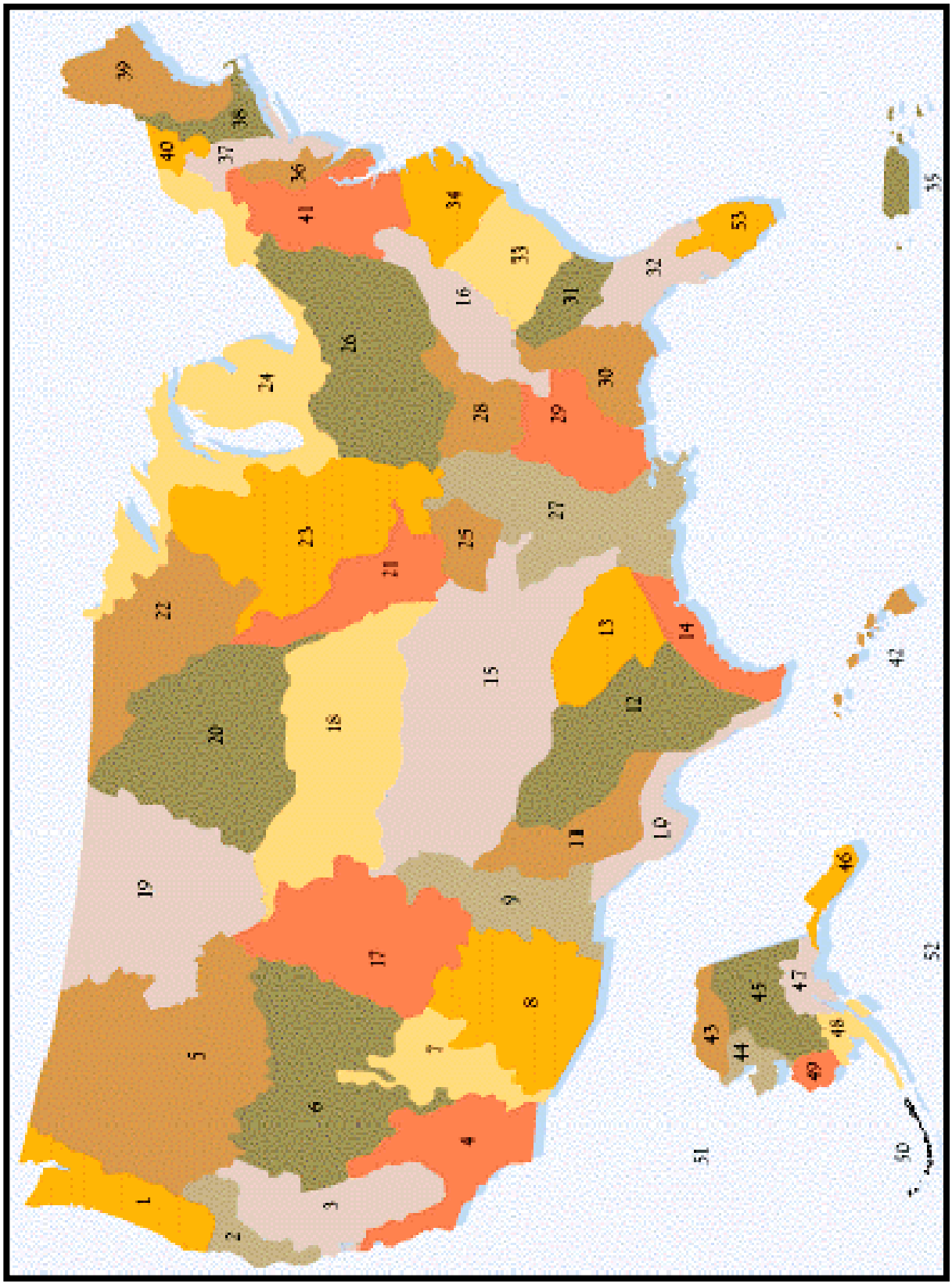
Support Goals. The following goals support the accomplishment of all five goals listed above: wetlands, migratory birds, endangered species, fisheries, and Service lands. The support goals are essential to the overall accomplishment of the Ecosystem mission, but do not fit entirely within any one of the five resource goals.

6. Increase public awareness and support for Lower Mississippi River Ecosystem resources and their management.

7. Enforce natural resource laws.

8. Protect, restore, and enhance water and air quality throughout the Lower Mississippi River Ecosystem.

Figure 6. USFWS-designated ecosystems in the U.S., showing the Lower Mississippi River Watershed Ecosystem (#27).



REGIONAL CONSERVATION PLANS AND INITIATIVES

Comprehensive conservation plans (CCPs) and environmental assessments are being prepared for the ten U.S. Fish and Wildlife refuges in the state of Arkansas. The CCPs will provide the Service's refuge managers with a 15-year strategy and broad direction to conserve fish and wildlife and their habitats; to achieve refuge purposes; and to contribute toward the mission of the National Wildlife Refuge System. In addition, the plans identify wildlife-dependent opportunities available to the public, including opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The Pond Creek NWR CCP was completed in 2000 and CCPs for the remaining nine refuges (Logan Cave, Holla Bend, Cache River, Bald Knob, Big Lake, Wapanocca, Felsenthal, Overflow, and White River) are currently in various stages of preparation.

Many regional conservation plans and initiatives are derivatives of national plans (please refer to Chapter I, Background, National and International Conservation Plans and Initiatives). These regional plans are developed by a variety of cooperating regional organizations and agencies and are being planned and implemented in the southeastern U.S. The more notable which are compatible with the mission and purpose of Felsenthal and Overflow NWRs are:

Arkansas's Comprehensive Wildlife Conservation Strategy (CWCS). Supported by the State Wildlife Grants (SWG) Program, Arkansas's CWCS (also known as the Wildlife Action Plan) identifies the challenges facing Arkansas's diverse wildlife species and devises strategies to conserve those "species with the greatest conservation need," and their habitats. The CWCS is a guide to conserving the species of fish and wildlife that have immediate conservation needs or are key indicators of the diversity and health of the state's wildlife. The CWCS emphasizes a cooperative, proactive approach to conservation, inviting local governments, businesses and conservation-minded organizations and individuals to join in the task of maintaining the fish and wildlife resources. Arkansas's Wildlife Action Plan addresses the conservation needs of 369 species of greatest conservation need in the context of 45 terrestrial habitats and 18 aquatic habitats in the seven ecoregions in the state.

The Red-Cockaded Woodpecker (RCW) Recovery Plan. The ultimate recovery goal is red-cockaded woodpecker (*Picoides borealis*) viability. Once this goal is met the size, number, and distribution of populations will be sufficient to counteract threats of demographic, environmental, genetic, and catastrophic stochastic events, thereby maintaining long-term viability for the species as defined by current understanding of these processes. Also, referred to as the RCW Safe Harbor program, it seeks private cooperators and private lands to facilitate the recovery efforts of the RCW. Regions and habitat types currently occupied by the species will be documented, given habitat limitations.

Southeast Aquatic Resources Partnership (SARP). The Southeast Aquatic Resources Partnership includes fish and wildlife agencies from 14 southeastern states; the Gulf and Atlantic States Marine Fisheries Commissions; the Gulf of Mexico and South Atlantic Fishery Management Councils; the U.S. Fish and Wildlife Service; and the Fisheries Division of the National Oceanic and Atmospheric Administration (NOAA). The SARP focuses on six key issue areas: Aquatic Habitat Conservation; Public Use; Imperiled Fish and Aquatic Species Recovery; Fishery Mitigation; Interjurisdictional Fisheries; and Aquatic Nuisance Species (ANS). These partnering entities work together for the conservation and management of aquatic resources in the Southeast.

The Nature Conservancy's (TNC) Upper West Gulf Coastal Plain Ecoregional Plan. This plan represents the Nature Conservancy's ecoregional conservation planning effort for the Upper West Gulf Coastal Plain. The plan provides a portfolio of conservation areas, including priority or action areas, the data compiled and created during this planning effort, methodology, the data gaps identified, and strategies for plan implementation. It is intended that conservation planners, site-based conservation staff, and TNC partners use this plan to effectively manage the biodiversity of the ecoregion. Successful use requires a commitment of cooperation, resources and time, as well as the sharing of responsibility and effort.

Partners for Fish and Wildlife. The Service's Partners for Fish and Wildlife Program (Partners) is working with landowners to restore, enhance, and protect fish and wildlife habitat on private lands. Through alliances with organizations and individuals, the Partners program is a voluntary partnership whose focus is to restore vegetation and hydrology to historic conditions on private lands.

Northern Bobwhite Conservation Initiative (NCBI). The NBCI's charge is to develop a quantitative habitat-oriented plan to restore bobwhites to the density they enjoyed during the baseline year 1980.

Arkansas Department of Environmental Quality (ADEQ) Strategic Plan (2004-2014). The ten-year strategic plan outlines ADEQ's guiding principles, objectives, and strategies for improving the environment in Arkansas. This strategic plan is built around four environmental goals: (a) Air; (b) Water; (c) Land; and (d) Environmental Management. In accomplishing this plan ADEQ partners with the U.S. Environmental Protection Agency, the Arkansas Pollution Control and Ecology Commission, the Arkansas Natural Resources Commission, the Arkansas Department of Health, the Arkansas Forestry Commission, the Arkansas Geological Commission, the Arkansas Game and Fish Commission, the Arkansas Oil and Gas Commission, and many others.

Mississippi Embayment Regional Aquifer Study. As part of the U.S. Geologic Survey's (USGS) Groundwater Resources Program, a groundwater flow model of the northern Mississippi embayment will be developed using data and knowledge gained from the Gulf Coast Regional Aquifer System Analysis (GCRASA) studies and other more recently completed USGS models to aid in answering questions about groundwater availability. The proposed study area covers portions of seven states, including Arkansas, Louisiana, Mississippi, Tennessee, Alabama, Missouri, and Kentucky. The program's rectangular model grid will cover almost 158,000 square miles, while the active portion to be simulated will cover approximately 70,000 square miles.

Felsenthal National Wildlife Refuge Greentree Reservoir Study. This initiative consists of a study of the survival and growth of trees impacted by greentree reservoir management and the development of a water management plan that minimizes the impacts to the wetland community and provides high quality waterfowl habitat for the long term.

ECOLOGICAL THREATS AND PROBLEMS

FELSENTHAL NATIONAL WILDLIFE REFUGE

Nuisance aquatic vegetation around the Felsenthal NWR region includes fanwort, hydrilla, American lotus, water hyacinth, and giant salvinia. This vegetation covers up to 75% of the water surface by mid-summer. An aquatic vegetation management plan needs to be

developed and implemented. The ramifications of the use of aquatic herbicides and/or the stocking of diploid grass carp to control vegetation need to be carefully considered. The decay of aquatic vegetation in late summer/fall causes oxygen depletion and results in fish die-offs.

A proposed point source wastewater discharge to the Ouachita River 22 river miles upstream of Felsenthal NWR threatens downstream water quality and water use on the refuge. The proposed wastewater outfall would contain the combined effluent from four entities: El Dorado Water Utilities, El Dorado Chemical Company, Great Lakes Chemical Corporation (now Chemtura Chemical Corporation), and Lion Oil Company. The effluent would likely have large amounts and high levels of ammonia, nutrients, and dissolved solids. The total quantity and quality of effluent to be discharged from this proposed collective point source has not been disclosed, but individually these industrial sources have a questionable history of water pollution problems and NPDES permit violations.

Nuisance wildlife species are also an issue on the refuge. Beavers and feral hogs have few natural predators, a prolific reproductive rate, and thousands of acres of prime habitat. Because beavers have the potential to destroy or alter thousands of acres of valuable bottomland hardwood habitat, beaver control is a management priority and a management policy needs to be developed and implemented.

Mercury contamination is currently an environmental concern on the lower Ouachita (and Saline Rivers), including Felsenthal NWR. Human health and fish consumption advisories for mercury have been issued by the State of Arkansas for pregnant women, women who may become pregnant, women who are breast-feeding, and children under the age of seven. Bioaccumulation of methyl mercury in the food chain has resulted in high mercury tissue levels in fish, birds, and mammals that are expected to cause adverse impacts to fish and wildlife and have raised concerns over fish and duck consumption. Commercial fishing for buffalo and channel catfish was reopened by the state in 1999 after having been closed for eight years due to mercury contamination, when sampling analyses revealed mercury levels for buffalo and channel catfish had fallen below the Food and Drug Administration's advisory level.

The numbers of exotic fish species are on the rise and several Asian carp species have successfully invaded and established populations within nearby waters. Silver carp and bighead carp are invasive species known to populate rivers of Arkansas and Louisiana, threatening the biological integrity of native aquatic habitats and having the potential to inhabit and establish populations in Felsenthal and Overflow NWRs.

The overall health of the forest within the greentree reservoir (GTR) is deteriorating because of the current GTR water level management regime. Specifically, the two most desired species of oaks—willow oak and nuttall oak—are decreasing in numbers, and more water-tolerant species such as overcup oak and water hickory are increasing. Additionally, recruitment of new trees into the forest system is not occurring due to high water levels drowning out the seedlings. This constitutes the loss of the most important mast-producing tree species within the GTR. The forest composition is shifting to more water-tolerant species such as overcup oak and water hickory, which have little value for waterfowl. Unless flooding is curtailed during some years, the mass-producing overstory trees will eventually be lost, waterfowl habitat will decrease, and waterfowl hunting opportunities will be lessened. Water level management procedures, including pool elevations/water depth and timing of flooding for Felsenthal GTR, need to be developed, finalized and formally implemented.

In recent years, wintering waterfowl (ducks) numbers have been severely depressed, compared to long-term averages. Similar conditions exist throughout most of east and south Arkansas with bird numbers far below historic levels. The cause of this rapid decline is an important ecological challenge which needs to be investigated and ameliorated.

Oil spills on the refuge, caused by deteriorated lines and storage tanks located at old, existing oil well sites, need to be eliminated. Increased management emphasis and maintenance of old and deteriorating oil equipment and facilities are needed to ensure this threat is addressed. An example of this is found in the Felsenthal National Wildlife Refuge Annual Narrative, 2005, as follows: "*EMCO, owner and operator of the Charivari Creek Oil Field on the refuge, experienced two separate oil spills during the year (also had two during 2004). In both instances, transport lines from the wellhead to the storage tank batteries ruptured and discharged around one barrel of crude. Remediation was performed as directed by ADEQ. Given the deteriorated condition of virtually all transport lines and the tank battery, similar mishaps are sure to occur. Under the conditions of the SUP, the refuge has received monetary damages from EMCO in times past for oil and/or salt water spills. Ecological Services contaminant specialists and refuge staff are aggressively attempting to get EPA involved and continue to request a full-scale inspection of these facilities*."

OVERFLOW NATIONAL WILDLIFE REFUGE

There is practically a complete loss of wetlands and associated vegetation near and adjacent to the Overflow Refuge. Bayou Bartholomew is very close to Overflow Creek in certain areas, but its banks consist of the same alluvial sandy loam characteristic of the banks of the Arkansas River which once occupied the bayou's current channel. This is the favored soil for agriculture; consequently, much of it has been farmed for over 100 years resulting in a loss of vegetative connectivity between the two streams.

The effects of agriculture and timber harvesting practices and hydrologic modifications (ditches, levees, canals, etc.) of surface streams in the coastal plain on the west side have created severe siltation problems. In Flat Slough Ditch (a ditch dug in the 1960s to provide agricultural drainage), water quality is severely impaired due to the volume of runoff associated with agriculture and the affects of Overflow Creek. In addition, impoundment of irrigation runoff by beavers along with siltation has resulted in a significant loss of bottomland hardwoods and prolific weed growth in the Overflow Creek channel. The beaver dams and vegetation have brought drainage to a standstill in several locations.

Feral hogs interact with native species by intensively competing for food, causing major crop damage, and road/levee damage. Hog populations have fluctuated widely over the years primarily in response to acorn availability. However, in recent years, hog hunters have released hogs in areas throughout the southeast to increase hunting opportunities for this species. There is also a free-running hog problem approximately one mile east of the refuge across Bayou Bartholomew. The hogs are highly sought after by hunters and many are caught by farmers who trap adjacent to the refuge in an effort to minimize crop damage. An estimated 500 hogs have been removed by these methods in the last year, but there are still at the very least that many left. They are very prolific, with a sow being capable of having 20 young per year with high survival rates. The young are reproductively mature at an age of six months.

Population control policies and practices need to be developed and implemented to manage overpopulation of raccoons, fox, bobcat, opossum, skunk (and other furbearing mammals). Several species are above carrying capacity and have reached nuisance levels. Canine distemper is common among raccoons when populations are extremely high.

At the present time there is no active Forest Habitat Management Plan in place for Overflow NWR. A management plan needs to be developed and implemented that specifically addresses the following critical issues:

- Aforestation on newly acquired and on higher elevation lands;
- Pine tree intrusion (from windblown seeds growing on the coastal plain) that have been displacing hardwood habitat (much of the pine is of merchantable size for pulpwood);
- Control of beaver populations which have flooded bottomland hardwoods and threaten hardwood forest survival; and
- Policies related to future logging operations and salvage cutting.

The water quality where channelization/dredging have taken place is very turbid and contaminated with residuals of organochlorines and current use pesticides. These chemicals were identified in 2001 as result of a study entitled "Chemical Contamination at National Wildlife Refuges in the Lower Mississippi River Ecosystem." Numerous fish of all species were found to harbor various levels of farm chemicals and other potentially toxic substances when a Level II Contaminant Survey was conducted during the initial acquisition of the refuge. Therefore, a fishing program has never been initiated and fishing is not allowed on Overflow NWR.

OTHER THREATS AND PROBLEMS

Opportunities for environmental education, interpretation, outreach, and visitor services need to be increased. Careful planning (that includes goals, strategies, and evaluation criteria) WILL provide the visiting public with opportunities to enjoy and appreciate the two refuges' fish, wildlife, plants, and other resources. An up-to-date Visitor Services Plan that addresses an environmental education and interpretation program; visitor center maintenance and operation; visitor facility construction projects; volunteer programs; attractive kiosks and signage; use of cutting-edge media to more regionally (not just locally) inform the public of hunting, fishing, and observation/photography opportunities, etc. is critically needed for both the Felsenthal and Overflow NWRs.

Wildfires are a constant threat to the reforested areas. In the last 15 years, three have been documented; two at the Oakwood Unit and one at Overflow.

Issues at the Oakwood Unit include chronic poaching on the edges of the unit; beaver activities interfering with water management by damning waterways, blocking water control structures and causing flooding in undesired locations; groundwater with high concentrations of chloride (3,000 ppm); and extreme soil, bank, and levee erosion at the southeast corner of the unit.

All together, these growing pressures raise concerns for the survival of plants and animals that are dependent on the varied natural landscapes of the refuges. Changes in natural habitats may potentially render these altered habitats unsuitable for wildlife.

PHYSICAL RESOURCES

CLIMATE

The climate of southeast Arkansas can be characterized as humid and subtropical. Monthly mean temperatures are generally around 80° Fahrenheit (F) in the summer. Winter monthly mean temperatures are around 45° F. Winters are short and generally quite mild, but cold periods (below 0° F) of brief duration have occurred. Summers are hot and very humid, with daily highs frequently exceeding 100° F in July and August. In southeast Arkansas, the growing season is very long (over 230 days), encouraging vegetative growth, especially unwanted weeds, in mid to late summer. The southern and eastern areas of Arkansas tend to have extended warm and humid periods; with higher humidity and more cloudiness than the rest of the state.

Annual precipitation totals range roughly from 45 to 55 inches across the state, with totals increasing from northwest to southeast (due to the greater availability of Gulf of Mexico moisture in the southeast). Average annual rainfall in the Felsenthal-Overflow NWR area is between about 54 and 58 inches. Rainfall is generally abundant throughout the year. The driest months tend to be August and September, although these totals for these two months still average more than three inches (Tables 1 and 2). The number of days with measurable precipitation averages about 100 per year. Most of the precipitation falls as rain. Heavy local storms that produce totals of five to ten inches over extensive areas are not uncommon. Snowfall does occur, but is generally light and remains on the ground only briefly. Snowfall accumulation averages only about one and a half inches a year in southern Arkansas. Tornadoes are most frequent from March through May, with about 15 to 20 reported each year. The temperature and precipitation data summarized in Tables 1 and 2 were collected in Crossett and El Dorado from 1971 through 2000.

This annual weather cycle was a driving force in development of the climax forest types until around 1980 when a severe drought forced farmers to irrigate crops to ensure their survival. Afterwards, summer irrigation became a standard agricultural method to ensure crop survival. The surplus irrigation runoff occurring throughout the summer created flows contrary to historic hydrology with corresponding changes in the plant communities from water intolerant to water tolerant plants such as black willow, bald cypress, tupelo, green ash, water hickory, and button bush.

CLIMATE CHANGE AND GLOBAL WARMING

Global climate change poses risks to human health and to terrestrial and aquatic ecosystems. Important economic resources such as agriculture, forestry, fisheries, and water resources also may be affected. Warmer temperatures, more severe droughts and floods, and sea level rise could have a wide range of impacts. All these stresses can add to existing stresses on resources caused by other influences such as population growth, land-use changes, and pollution.

According to data from the National Oceanic and Atmospheric Administration (NOAA) and National Aeronautics and Space Administration (NASA), the Earth's average surface temperature has increased by about 1.2 to 1.4 degrees Fahrenheit since 1900. The ten warmest years in the last century have all occurred within the past 15 years, with the warmest two years being 1998 and 2005. Some climate models, based on emissions of greenhouse gases, primarily carbon dioxide(CO_2), methane, and nitrous oxide, predict that average surface temperatures could increase from 2.5 to 10.4^{o} F by the end of the 21st century.

Table 1. Climatological normals for the years 1971-2000 from the National Weather Service station at El Dorado Airport (032300).

Month	NORMAL				
	Mean (°F)	Minimum (°F)	Maximum (°F)	Rainfall (inches)	Snowfall (inches)
Jan	43.6	32.9	54.3	4.93	1.10
Feb	48.3	36.3	60.3	4.24	0.40
Mar	56.4	43.9	68.8	5.15	0.16
Apr	63.7	51.0	76.4	4.55	0.0
May	71.5	60.1	82.8	5.49	0.0
Jun	78.4	67.4	89.3	5.18	0.0
Jul	82.0	71.2	92.7	4.13	0.0
Aug	81.2	69.8	92.5	3.22	0.0
Sep	75.1	63.5	86.7	3.29	0.0
Oct	64.4	51.6	77.1	4.33	0.0
Nov	53.8	42.2	65.3	4.80	0.01
Dec	46.1	35.3	56.9	4.80	0.31
Annual	63.7	52.1	75.3	54.11	2.00

Table 2. Climatological normals for the years 1971-2000 from the National Weather Service station at Crossett (031730).

Month	NORMAL				
	Mean (°F)	Minimum (°F)	Maximum (°F)	Rainfall (inches)	Snowfall (inches)
Jan	41.3	29.5	53.1	5.81	0.77
Feb	46.0	33.0	58.9	5.27	0.30
Mar	53.7	40.2	67.1	5.95	0.11
Apr	61.0	47.1	74.8	5.61	0.0
May	69.1	56.2	82.0	8.82	0.0
Jun	76.5	64.2	88.8	4.60	0.0
Jul	80.2	68.2	92.1	4.04	0.0
Aug	79.4	66.7	92.1	3.16	0.0
Sep	73.1	59.9	86.3	3.26	0.0
Oct	62.0	47.1	76.9	4.19	0.0
Nov	52.0	39.0	64.9	4.96	0.0
Dec	44.1	32.1	56.0	5.38	0.13
Annual	61.5	48.6	74.4	58.05	0.83

Increases in atmospheric CO_2 are attributed largely to human activities, which have grown rapidly since 1945. The burning of fossil fuels adds 5.6 billion tons of carbon and deforestation contributes another 0.4 to 2.5 billion tons of carbon to the atmosphere each year.

Global warming, attributed to the melting of glaciers and ice sheets, will cause the sea levels to rise. Globally, the sea level has risen 4-10 inches during the past century. NASA estimates that yearly, 50 billion tons of ice is melting from the Greenland ice sheet. NASA aerial surveys show that more than 11 cubic miles of ice is disappearing from the ice sheet annually. Considering that land less than 10 meters above sea level contains 2% of the world's land surface but 10% of its population, major impacts could be felt by large numbers of people living on the low-lying coastlands, particularly along the Gulf and East Coast states.

In addition to the rising seas, the effects of climate change and global warming will be changes in weather/rainfall patterns, decreases in snow and ice cover, and stressed ecosystems. For the southeastern U.S. and the Felsenthal-Overflow region, this can mean extreme precipitation events; greater likelihood of warmer/drier summers and wetter/reduced winter cold; and alterations of ecosystems and habitats due to these changes in weather patterns—to name but a few possibilities. For example, a recent study of the effects of climate change on eastern U.S. bird species concluded that as many as 78 species of birds could decrease by at least 25%, while as many as 33 species could increase in abundance by at least 25% due to climate and habitat changes.

GEOLOGY AND TOPOGRAPHY

There are six major physiographic divisions in Arkansas: the Ozark Mountains, the Arkansas River Valley, the Ouachita Mountains, the West Gulf Coastal Plain, the Mississippi Alluvial Valley, and Crowley's Ridge. The first three divisions are part of a larger region called the Interior Highlands physiographic region of northwest Arkansas, and the latter three are part of the Gulf Coastal Plain physiographic region of southern and eastern Arkansas.

The rock and sediments of the Gulf Coastal Plain are much younger (of Cenozoic age) than those of the Interior Highlands (of Paleozoic age). The Interior Highlands are generally characterized as hilly to mountainous topography on Paleozoic rock substrates dominated by upland hardwood and upland pine-hardwood forests, with extensive prairies. The Gulf Coastal Plain is a belt of land that had been inundated by the Gulf of Mexico at some time since the Jurassic period, generally during the Tertiary period or more recently. The surface geology includes areas of sandstone, limestone, or chalk, but more typically consists of unconsolidated sand, grave, or clay sloping gently from toward the south and east. The surface is underlain by rocks that range from unconsolidated to poorly consolidated clastic rocks. The oldest rocks are Jurassic in age and are deeply buried in the subsurface. The rocks dip gently toward the Gulf of Mexico or toward the Mississippi embayment. Diapiric flowage of salt strata, which is caused by the salt being overloaded by thick accumulations of younger sedimentary strata, has resulted in the formation of salt domes. Typical plant cover is pine forest on sandy hills and bottomland hardwood forest along streams and rivers. The Felsenthal and Overflow refuges lie within this southern and eastern physiographic region. Specifically, Felsenthal NWR lies within the West Gulf Coastal Plain physiographic division; and Overflow NWR lies within the Mississippi Alluvial Valley physiographic division.

Felsenthal National Wildlife Refuge

The surface geology of the West Gulf Coastal Plain in the vicinity of Felsenthal NWR is characterized by unconsolidated deposits of sand, gravel, silt, and clay from the ocean bottom, beaches, and estuaries that have eroded into rolling, sandy hills that were covered with pine forests. The surface geology is characterized by Tertiary and Cretaceous sediments which underlie most of this area. These sedimentary rocks, deposited mostly in a marine environment, were later uplifted and now tilt seaward. The predominant Quaternary units are Pleistocene (Qt) and Holocene (Qal) alluvial deposits. The predominant Tertiary unit, lying mostly to the west of the refuge, is the Claiborne Group (Tc).

The topography of this area can be described as nearly level or gently rolling uplands, terraces, and floodplains. The area is composed of rolling plains that are broken by nearly flat fluvial terraces, bottomlands, sandy low hills, and low cuestas. The terrain is unlike the much more rugged Ouachita Mountains to the north or the flatter, less dissected Mississippi Alluvial Valley to the east. Uplands are underlain by poorly-consolidated, Tertiary- through Cretaceous-age, coastal plain deposits and marginal marine sediments. These sediments were laid down as the Gulf of Mexico opened and North America's southern continental margin subsided. The bottomlands and terraces are veneered with Quaternary alluvium or windblown silt deposits and loess. The lithologic mosaic is distinct from the Paleozoic rocks of the Ouachita Mountains and the strictly Quaternary deposits of the Mississippi Alluvial Plain. The uplands are intricately dissected by streams. Broad floodplains and terraces are along some streams. Elevation typically ranges from about 60 to 90 feet above mean sea level, increasing gradually from southeast to northwest. Local relief is generally less than 10 feet.

Overflow National Wildlife Refuge

The geology of the Mississippi Alluvial Valley in the vicinity of Overflow NWR is bedrock, consisting of Tertiary and Cretaceous sands formed as beach deposits during the retreat of the Cretaceous ocean from the midsection of the U.S. Alluvial deposits from flooding and lateral migration of the Arkansas and Ouachita Rivers typically lie above the bedrock. The area is veneered by Quaternary alluvium, loess, glacial outwash, and lacustrine deposits. The sediments are sandy to clayey fluvial deposits of Holocene (Qcm and Qso) to late Pleistocene (Qt) age and are many meters thick. In some areas late Pleistocene terrace deposits are within several meters of the present surfaces, but they do not crop out.

The landforms in the area are level or depressional to very gently undulating alluvial plains, backswamps, oxbows, natural levees, and terraces. River terraces, swales, and levees provide limited relief. Nearly flat, clayey, poorly-drained soils are widespread and characteristic. Streams and rivers have very low gradients and fine-grained substrates. Many reaches have ill-defined stream channels. Landform shapes range from convex on natural levees and undulating terraces to concave in oxbows. Landform shapes differentiate water-shedding positions from water-receiving positions, both of which affect soil formation and hydrology. Elevations generally vary from 90 to 110 feet above mean sea level. In the hilly areas near Beech Creek, elevations up to 150 feet are common. Maximum local relief is about 10 feet, but relief is considerably lower (slopes less than 1%) in most of the area east of the West Gulf Coastal Plain escarpment.

SOILS

Soils directly influence the kind and amount of vegetation and the amount of water available; in this way they indirectly influence the kind of wildlife that can live in an area. Soils are organized into a taxonomic classification system by the U.S. Department of Agriculture, Natural Resources Conservation Service in which each soil is categorized by order, suborder, great group, subgroup, family, and soil series. Nationwide, there are twelve soil orders, two of which—Alfisols and Inceptisols—are predominantly found on the Felsenthal and Overflow refuges. The soils in the area dominantly have a thermic soil temperature regime, a hydric soil moisture regime, and siliceous or mixed mineralogy. They are very deep, poorly to very poorly drained, and loamy or clayey. Within these two orders there are two dominant soil series found on Felsenthal NWR and four dominant soil series found on Overflow NWR.

Felsenthal National Wildlife Refuge

The primary soil type in Felsenthal NWR is the Guyton series and Una silty clay loam. The Guyton series consists of loamy poorly drained, slowly permeable soils that formed in silty marine sediments. These soils are formed in alluvium with high silt content. These level soils are found on broad uplands flats and flood plains (bottom lands and stream terraces) subject to frequent or occasional flooding. They are often saturated with water in the late winter and spring. The native vegetation found here is mixed hardwoods and pines. Una soil is formed in acid clayey alluvium. These soils are poorly drained, with very slow runoff and permeability and are found on floodplains of streams. During the winter and early spring, these soils are often flooded and the water table is within a foot of the surface. Most areas with this type soil are pasture or forest, with the forested and wooded areas being bottomland hardwoods. The Guyton soil series is found in the Alfisols order, Aqualfs suborder, and the Glossaqualfs great group. The Una soil series is in the Inceptisols order, Aquepts suborder, and Epiaquepts great group.

Overflow National Wildlife Refuge

Where the bottomland hardwoods have not been cleared, the primary soil type is Perry Clay, a hydric soil, highly impervious to water percolation. There are inclusions of silty clays on the higher elevations such as Portland Clay and as elevation increases. Perry and Portland soils are poorly drained soils, respectively. They are found in level, clayey and loamy soils on bottom lands. Perry soils have clay surface texture, and Portland soils have silt loam or silty clay loam surface texture. Hebert silt clay is also prominent. On the highest elevations, Rilla sandy loam is the dominant soil type. Herbert and Rilla soils are somewhat poorly drained and well drained soils, respectively. They are found in level to undulating, loamy soils on bottom lands. The Perry and Portland soil series are both in the Inceptisols order, Aquepts suborder, and Epiaquepts great group. The Rilla soil series is in the Alfisols order, Udalfs suborder, and Hapludalfs great group. The Herbert soil series is in the Alfisols order, the Adalfs suborder, and the Ochraqualfs great group.

The dominant soil series of Desha County, where the Oakwood Unit is located, is Sharkey and Desha clays. The Sharkey soil is poorly drained, and the Desha soil is somewhat poorly drained. When dry, these soils contract and crack, and when wet, they expand and seal over. Runoff is very slow, and wetness is a severe hazard. The Sharkey-Commerce-Coushatta soil association is frequently flooded and is extensive in the eastern part of Desha County. This soil is well suited to hardwood and wildlife habitat and not suitable for cultivation. Sharkey clay occurs primarily in the northern part of the county. It has a high shrink-swell potential, and permeability is very slow except when the soil is cracked.

HYDROLOGY AND WATER QUALITY

Groundwater

Two major aquifer systems provide groundwater in southeastern Arkansas: the Surficial Aquifer System and the Mississippi Embayment Aquifer System (encompassing the Sparta Aquifer). The Surficial Aquifer System is the uppermost aquifer system in the region. It consists of alluvial aquifers and includes one major and three minor aquifers: the Mississippi River Valley aquifer (a highly productive and the most important aquifer); and three minor aquifers (the Arkansas River, the Ouachita-Saline Rivers, and the Red River alluvial aquifers). These surficial aquifers consist of unconsolidated to poorly consolidated Coastal Plain strata of gravel, sand, silt and clay of Holocene age; and are capable of yielding large quantities of water to wells. The Mississippi Embayment Aquifer System is made up of poorly consolidated sedimentary rocks of Late Cretaceous to middle Eocene age, and underlies the Surficial Aquifer System. The Mississippi Embayment Aquifer System is the most widespread system in the Coastal Plain and it thickens with depth as it extends toward the Gulf of Mexico into the deep subsurface.

Groundwater provides over 60% of the total freshwater withdrawn in Arkansas. The majority of groundwater withdrawals in southeastern Arkansas are from the shallower and more transmissive surficial alluvial aquifer because it is more cost effective to pump. However, water-level declines in the alluvial aquifer are causing decreased well yields. Withdrawals of large quantities of groundwater (the majority of which is used for irrigated agriculture like rice and soybeans) have not only lowered water levels, but also decreased the saturated thickness of aquifers, and even altered patterns of regional groundwater flow. Within the Mississippi Embayment Aquifer System, the Sparta aquifer (an aquifer of regional importance in southeastern Arkansas) is increasingly used to supplement supplies needed for crop irrigation. Wells in the Sparta aquifer (excluding those wells located within areas of large drawdowns) generally yield 100 to 500 gallons per minute (gal/min). In 2000, approximately 85 percent of total groundwater use in southeastern Arkansas came from the alluvial aquifer with the remaining 15 percent from the Sparta aquifer. Long-term pumping stresses in the Sparta aquifer have resulted in reduced amounts of water in storage, decreased well yields, regionally extensive water-level declines, and the formation of regional-scale cones of depression such as the cone that has formed between El Dorado, Arkansas, and Monroe, Louisiana. In Union County, the Sparta aquifer has been used increasingly since development began in the early 1920s, resulting in water-level declines of more than 360 feet (ft) in some areas. Cones of depression continue to grow. Extreme drawdowns have resulted in increased chloride concentrations of some Sparta aquifer wells in Union County because of upcoming of brackish water from below. In response to the declining water levels and degraded water quality, the Arkansas Natural Resources Commission designated the Sparta aquifer as a Critical Ground-Water Area in five counties of southern Arkansas in 1996.

The groundwater resources in Overflow NWR are very limited, where needed most, in the waterfowl sanctuary. The alluvial aquifer is approximately 60 to 80 feet deep and there is only enough water to use 15 horsepower electric motors to pump an average of 400 -600 gallons per minute. With a well pumping in this range, the cooperative farmer can only irrigate 40-60 acres of rice at a time. This greatly limits the amount of agricultural crops that are grown and the quality and quantity of moist soil vegetation production. The groundwater can sometimes be supplemented by the small relift pump on Overflow Creek that can be utilized to pump surplus beaver dam water to crops. A portable relift pump can be used to also utilize surface water from Flat Slough Ditch.

Surface Water

The Ouachita-Saline River basin which drains Felsenthal and Overflow NWRs is part of the dynamic Surficial Aquifer and the Mississippi Embayment Aquifer hydrological system that includes interactions between aquifers, streams, reservoirs and wetlands. Many tributary streams receive a substantial contribution of water from groundwater base flow during dry periods and withdrawal of groundwater can, under certain condition, also result in reduction in surface water flow. The Felsenthal and Overflow NWRs lie within the Lower Ouachita River watershed. Located in the Coastal Plain, the Lower Ouachita and the Saline Rivers are the primary sources of surface freshwater for Felsenthal NWR. Located in the southern portion of the Mississippi Alluvial Valley, Overflow Creek (and Bayou Bartholomew) are the primary sources of freshwater for Overflow NWR. These three rivers (Lower Ouachita, Saline and Bayou Bartholomew) and their tributaries drain both the Felsenthal and Overflow NWRs, as well as large portions of southeastern Arkansas. The mean flow of the Ouachita River, the Saline River, and Bayou Bartholomew, respectively, is: 7700 cfs (near Camden), 2600 cfs (near Rye); and 565 cfs at Garrett Bridge. The State of Arkansas has designated the Lower Ouachita River and it tributaries, the Saline River and its tributaries, and Bayou Bartholomew and its tributaries as all suitable for the propagation of fish and wildlife; primary and secondary contact recreation; and public, industrial and agricultural water supplies.

Felsenthal National Wildlife Refuge

The Ouachita River's source is found in the Ouachita Mountains of west central Arkansas near the Oklahoma border and flows south-south east 600 river miles before joining the Black and Red rivers in north-central Louisiana. The Ouachita basin covers over 10,000 square miles of drainage area. The Saline River is about 204 stream miles long and is a tributary to the Ouachita River. It is the last free-flowing river in the Ouachita drainage basin. Its origin is in the Ouachita Mountains in central Arkansas and it flows southward until it flows into the Ouachita River at Felsenthal NWR, forming a delta-type bayou. The Saline River basin covers about 3,350 square miles of drainage area. Lapile Creek, Lapoile Creek, and Caney Bayou (Blue Lake Slough and Deep Slough) drain the western part of the refuge and flow ultimately into the Ouachita River. Eagle (L'Aigle) Creek and Charivari Creek drain the northern portion of the refuge and Big Brushy Creek drains the eastern portion of the refuge. These three drainages flow into the Saline River.

Section 303(d) of the Clean Water Act requires states to assess the water quality and prepare a list of impaired waters. The lower Ouachita River and Saline River, including Felsenthal NWR, have impaired water quality due to mercury contamination and are listed under Section 303(d) of the Clean Water Act. This has resulted in the issuance of fish consumption advisories for about 66 miles of the lower Ouachita River and about 90 miles of the lower Saline River. Historically the oil, brine, and bromine extraction industries have contributed point and nonpoint source contamination (high ammonia, nutrients, and dissolved solids) to waters in the area. Recent management practices have improved water quality for these parameters. In the vicinity of Felsenthal NWR, elevated zinc and copper concentrations in the Ouachita River are limiting aquatic life; and high concentrations of copper, beryllium and dissolved solids in the Saline River are limiting aquatic life and use of the river for drinking water and a source of water for agriculture and industry.

Overflow National Wildlife Refuge

Overflow Creek provides the principal drainage to Overflow NWR. It flows the length of the refuge from north to south and ultimately to its confluence with Bayou Bartholomew, a short distance below the Louisiana state line. Bayou Bartholomew is purportedly the longest bayou in the U.S. and flows into the Ouachita River near Sterlington, Louisiana. It is approximately 359 miles long with a drainage area of about 1,700 square miles. The Overflow Creek watershed encompasses approximately 98 square miles. Beech Creek on the north end, Hill Slough on the south end, and Billotis Slough, Flat Slough, Oxbone Slough and Gaines Slough on the east side are the major tributaries of Overflow Creek within the refuge. Historically, during late summer and early fall, the tributaries and sloughs to Overflow Creek generally become extremely low or dry leaving only a few deep holes and ponds.

Several segments of Overflow Creek have been altered by private landowners. These alterations consist of levees, weirs, road crossings, drainage ditches, channel excavation, and inter-basin transfers to and from Bayou Bartholomew and Bearhouse Creek. Channel excavation of tributary streams has increased the frequency and duration of flooding of Overflow Creek and the refuge woodlands. The construction of catfish ponds and the advent of large scale land leveling on lands east of and adjacent to the refuge has similarly impacted the hydrology of the watershed. On adjacent lands to the west owned by Koch Forestry Products, formerly Plum Creek Timber Co. Inc. (formerly Georgia Pacific), an increase in clearcutting and a shifting to shorter timber management rotations has increased runoff and siltation. Consequently, Overflow Creek has poor water quality due to erosion and siltation/turbidity problems which impair aquatic life in the stream. In addition, the entire stretch of Bayou Bartholomew, which drains the eastern most portion of Overflow NWR, has been assessed as not meeting its aquatic life uses due to siltation and turbidity, from nonpoint pollution generated by row crop agriculture.

Besides Overflow Creek, a major source of water flowing into the refuge comes from Flat Slough Ditch. This ditch was dug in the 1960s to provide agricultural drainage to the surrounding area and continued into the forested area until it reached the confluence of Overflow Creek. At that point, dredging continued down the creek to the levee that creates the greentree reservoir (GTR). At the same time, the landowners dredged a small portion of Overflow Creek upstream from Flat Slough Ditch until the dragline nearly sunk as it approached a deep pool of the creek known as the “grinnel hole”. From this point northward water quality is quite good due to less agricultural runoff and the filtering effect of the beaver dams and aquatic vegetation. In the Flat Slough Ditch, water quality is severely impaired due to the large volume of runoff associated with agriculture and affects Overflow Creek below its connection with Flat Slough Ditch.

Water quality on Overflow NWR is very similar to other streams in the Mississippi Alluvial Valley where channelization/dredging have taken place. The water is very turbid and contaminated with residuals of organochlorines and pesticides. These chemicals were identified in 2001 as results of a study conducted by North Carolina State University using semi permeable membrane devices which trapped chemical residues. Turbidity was measured and documented as well. The study was entitled “Chemical Contamination at National Wildlife Refuges in the Lower Mississippi River Ecosystem.”

Stream gradients in the area are low (approximately 1 foot per mile) and summer flow in many small, tributary streams is limited or nonexistent, but enduring pools may occur. Most of the drainage of Bayou Bartholomew watershed, which is near Overflow NWR, is in cropland and

receives heavy treatments of insecticides and herbicides. Soybeans, cotton, and rice are the major crops, and aquaculture is also important. Agricultural runoff containing fertilizers, herbicides, pesticides, and livestock waste have degraded surficial water quality. Concentrations of total suspended solids, total dissolved solids, total phosphorus, ammonia nitrogen, sulfates, turbidity, biological oxygen demand, chlorophyll a, and fecal coliform are high in the rivers, streams, and ditches. Concentrations are often much greater than elsewhere in Arkansas and are greatest during the spring, high-flow season. Also, mercury contamination of fish impairs about 43 miles of Bayou Bartholomew upstream of Overflow NWR. Under Section 303(d) of the Clean Water Act, the State of Arkansas has listed Overflow Creek as a water quality limited stream due to the adverse effects of siltation and turbidity on aquatic life in the stream. These (and other) water quality considerations have resulted in Overflow NWR being closed to fishing.

AIR QUALITY

The Clean Air Act of 1970 (as amended in 1990 and 1997) requires the U.S. Environmental Protection Agency (EPA) to implement air quality standards to protect public health and welfare. National Ambient Air Quality Standards (NAAQS) were set for six pollutants commonly found throughout the United States: lead, ozone, nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter less than 10 and 2.5 microns in diameter (PM_{10} and $PM_{2.5}$).

The State of Arkansas Department of Environmental Quality (ADEQ), Air Division, conducts monitoring to satisfy Clean Air Act monitoring requirements. The Arkansas Ambient Air Monitoring Network currently collects data at 20 monitoring locations in 15 counties. Arkansas is only one of a handful of states in the country that currently and consistently meets all federal air quality standards for criteria pollutants.

The two nearest air quality monitoring sites in the vicinity of the Felsenthal and Overflow refuges are in El Dorado (Union County) and Crossett (Ashley County). The data is displayed in Table 3 for 2005-2007. Areas that meet the NAAQS standards are designated “attainment areas,” while areas not meeting the standards are termed “nonattainment” areas. The monitoring results indicate that both areas (and assumably the Felsenthal and Overflow NWRs) qualify as attainment areas for all monitored pollutants.

The Air Quality Index (AQI) is a summary index for reporting daily air quality. It tells how clean or polluted the air is, and what the associated health effects of concern might be. The AQI focuses on health effects that may be experienced within a few hours or days after breathing polluted air. The EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. (Because all areas of the United States are currently attaining the NAAQS for lead, the AQI does not specifically address lead.) For each of these pollutants, the EPA has established national air quality standards to protect public health. Based on this index, in 2007, the air quality in the Ashley County area was categorized as "good" 77% of the time and as "moderate" 23% of the time. The Union County area’s air quality was categorized as "good" 92% of the time and as "moderate" 8% of the time. There were no "unhealthy for sensitive groups" reports for either of the monitoring locations.

Table 3. Arkansas ambient air monitoring data.

Air Quality Statistics by County, 2007

State/County		2000 Population	CO 8-hr (ppm)	Pb Qmax ($\mu g/m^3$)	NO_2 AM (ppm)	O_3 1-hr (ppm)	O_3 8-hr (ppm)	PM_{10} 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Wtd AM ($\mu g/m^3$)	$PM_{2.5}$ 24-hr ($\mu g/m^3$)	SO_2 AM (ppm)	SO_2 24-hr (ppm)
AR	Ashley County	24209	ND	ND	ND	ND	ND	ND	12.0	25	ND	ND
AR	Union County	45629	ND	ND	ND	ND	ND	ND	12.6	26	0.003	0.006

Air Quality Statistics by County, 2006

State/County		2000 Population	CO 8-hr (ppm)	Pb Qmax ($\mu g/m^3$)	NO_2 AM (ppm)	O_3 1-hr (ppm)	O_3 8-hr (ppm)	PM_{10} 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Wtd AM ($\mu g/m^3$)	$PM_{2.5}$ 24-hr ($\mu g/m^3$)	SO_2 AM (ppm)	SO_2 24-hr (ppm)
AR	Ashley County	24209	ND	ND	ND	ND	ND	ND	13.6	28	ND	ND
AR	Union County	45629	ND	ND	ND	ND	ND	ND	11.8	25	0.003	0.008

Air Quality Statistics by County, 2005

State/County		2000 Population	CO 8-hr (ppm)	Pb Qmax ($\mu g/m^3$)	NO_2 AM (ppm)	O_3 1-hr (ppm)	O_3 8-hr (ppm)	PM_{10} Wtd AM ($\mu g/m^3$)	PM_{10} 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Wtd AM ($\mu g/m^3$)	$PM_{2.5}$ 24-hr ($\mu g/m^3$)	SO_2 AM (ppm)	SO_2 24-hr (ppm)
AR	Ashley County	24209	ND	ND	ND	ND	ND	ND	ND	IN	IN	ND	ND
AR	Union County	45629	ND	ND	ND	ND	ND	ND	ND	14.9	38	0.002	0.007

BIOLOGICAL RESOURCES

HABITAT

Felsenthal National Wildlife Refuge

Felsenthal NWR is located in an extensive natural depression and low-lying area dissected by an intricate system of rivers, creeks, sloughs, buttonbush swamps and lakes throughout a vast bottomland hardwood forest that gradually rises to an upland forest community (Figure 7). The region's two major rivers, the Saline and Ouachita, flow through the refuge. Historically, periodic flooding of the "bottoms" (bottomland hardwoods) during winter and spring provided excellent wintering waterfowl habitat. These wetlands, in combination with the pine and upland hardwood forests on the higher ridges, support a wide diversity of native plants and animals. The habitat types represented on Felsenthal NWR are shown in Table 4.

Table 4. Felsenthal NWR habitat types and their acreages.

Habitat Types		Acres
Permanent Water		15,000
Forestland		49,383
Pine	9,490	
Pine-Hardwood	705	
Bottomland Hardwood	39,000	
Upland Hardwood	188	
Open Fields, Prairies and Nonproductive Areas		617
TOTAL		**65,000**

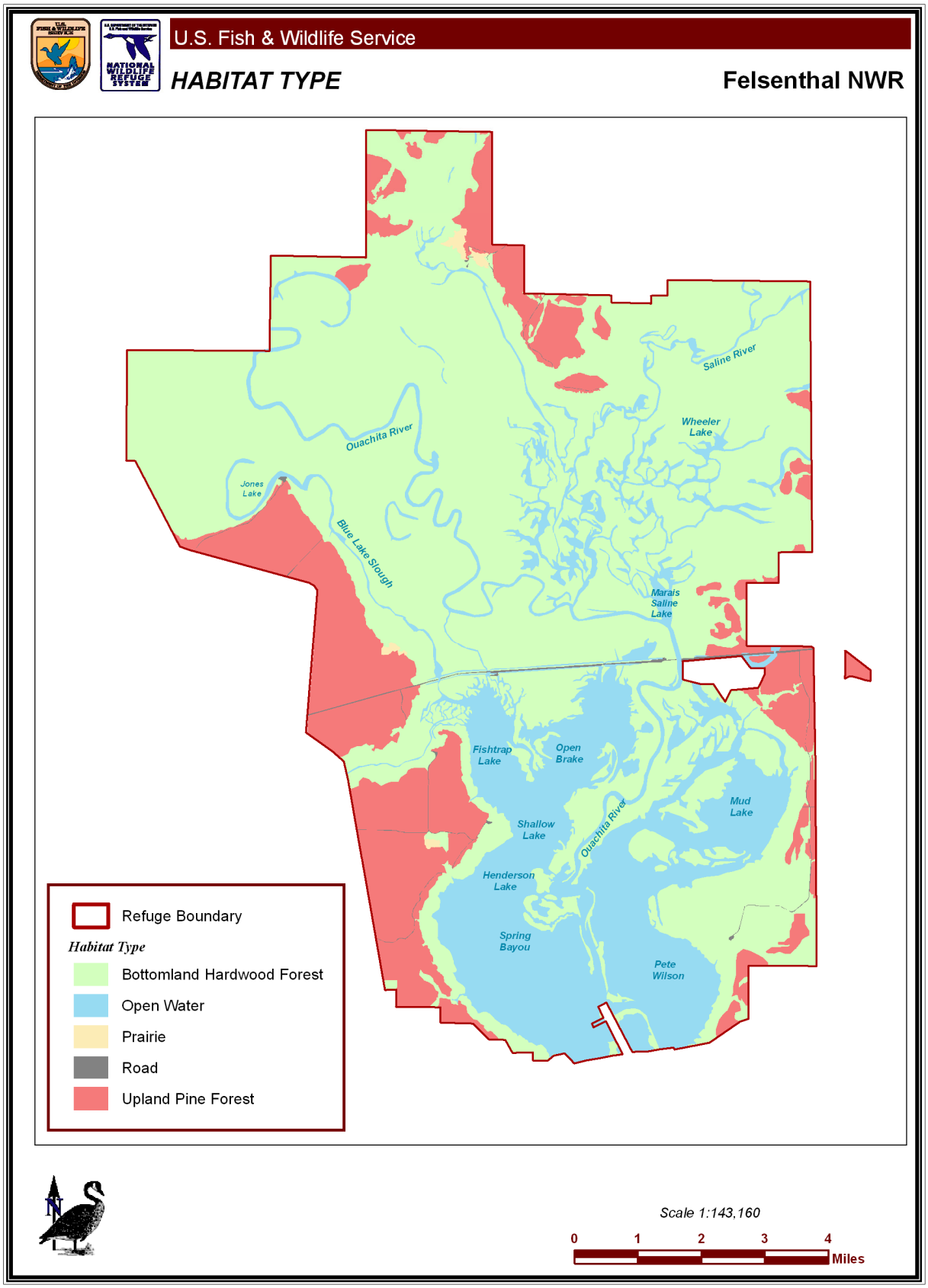
During winter, up to 21,000 acres of the bottomland hardwoods can potentially be flooded to provide wintering waterfowl habitat.

Water Level Management. Carefully timed flooding of hardwood forest communities, commonly referred to as greentree reservoir (GTR) management, provides thousands of acres of habitat for wintering waterfowl. Felsenthal NWR is home to the world's largest GTR consisting of the 15,000-acre Felsenthal Pool that is more than doubled to 36,000 acres during wintertime flooding. The primary forest type in the GTR is overcup oak-water hickory, followed by somewhat less frequently flooded types in which nuttall oak, willow oak, and/or sweetgum predominate. Additional species include persimmon, hawthorns, deciduous holly, swamp privet, water oak and an occasional baldcypress.

Flooding of the GTR usually begins in mid-November with expectations that water levels will reach desired levels by the end of December. Water levels are then allowed to slowly recede until they reach desired draw down levels in the late spring. As part of the process of preparation of this CCP, the water manipulation schedule for the GTR will be reviewed and modified as appropriate to provide flexibility and support restoration of desirable tree species in the GTR. See the discussion on Greentree Reservoir Management in the Ecological Threats and Problems section of Chapter II, Refuge Overview.

Water level management in other impoundments, such as moist soil units, stimulates the growth of native wetland plant species and an abundance of insects, crustaceans and mollusks, all highly favored foods of migratory waterfowl, wading birds and shorebirds.

Figure 7. General habitat types on Felsenthal National Wildlife Refuge.



Forest Land Management. Felsenthal NWR's forest management practices focus on providing excellent conditions for the variety of wildlife living in the forest. Prescribed burning, thinning, regeneration and stand improvement are some of the techniques used to enhance and maintain optimum habitat conditions. In the upland areas, the timber is managed primary for the endangered red-cockaded woodpecker where artificial nest inserts are placed in mature pine trees to supplement suitable cavities. Felsenthal NWR has 49,383 acres of forestland under active management, as shown in Table 4. This long-term program is designed to provide a diversity of habitat conditions to meet the needs of a full spectrum of indigenous wildlife species with the main emphasis on endangered species and waterfowl. Based on the Timber-Wildlife Management Plan (revised in 1995), the refuge uses biologically sound silvicultural practices to provide a diversity of forest habitat. Through commercial forest thinning and improvements cuts, the forest environment is managed to provide habitat for endangered red-cockaded woodpeckers, resident and wintering waterfowl, other migratory birds and numerous species of resident wildlife.

Fire Management. Prescribed fire is a primary habitat management tool on the 9,490 acres of pine forest on Felsenthal NWR. The objectives of the refuge's prescribed burning program are (1) wildlife habitat improvement for the red-cockaded woodpeckers and other species, (2) fuel reduction, (3) site preparation, and (4) understory management. The prescribed burns are managed on a rotationtal basis. The refuge rotates the area burned every year so that all areas included in the burn program are burned once every four years.

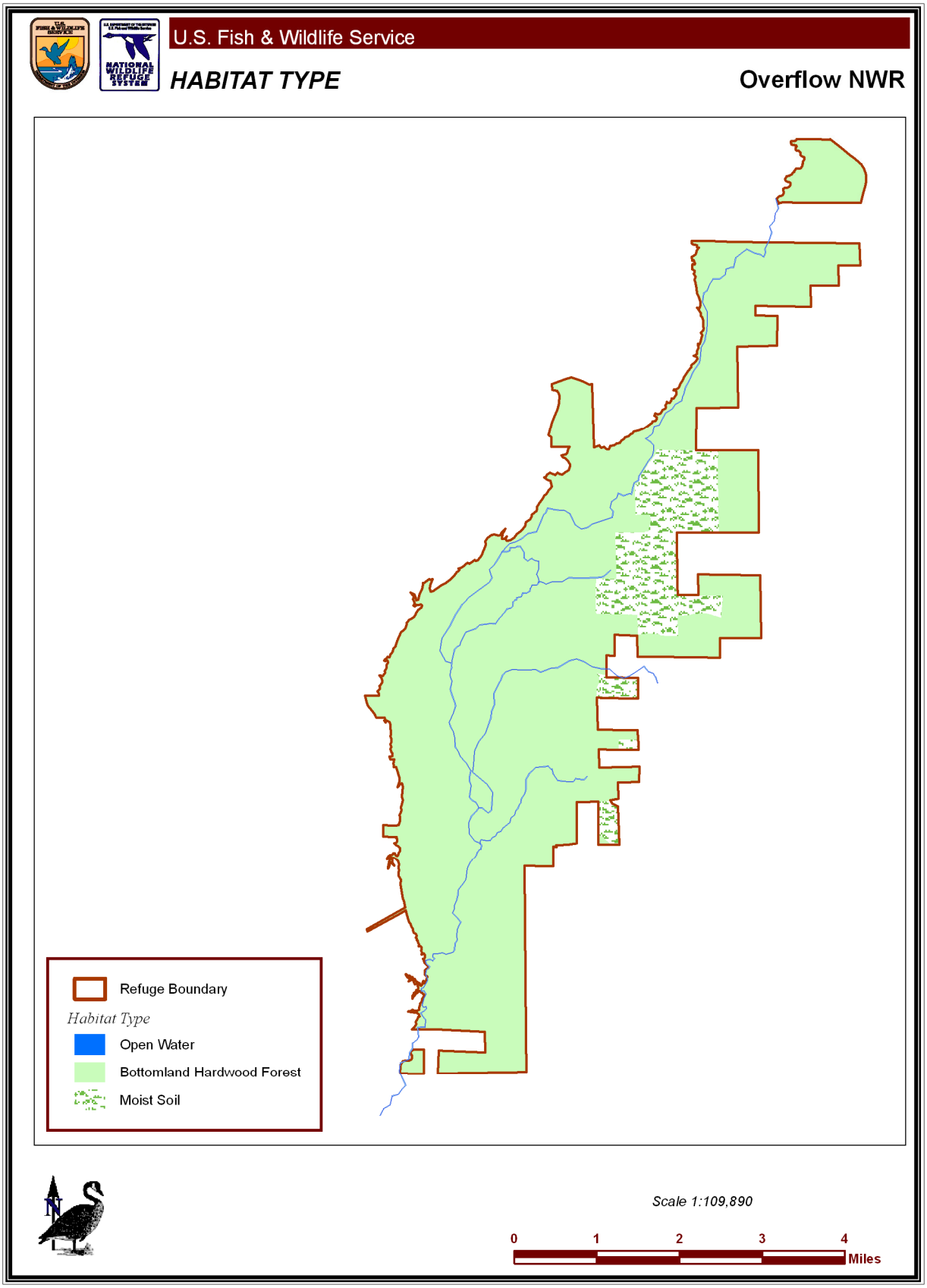
Overflow National Wildlife Refuge

Overflow NWR is a 13,000-acre plus wetland complex consisting of approximately 9,000 acres of seasonally flooded bottomland hardwood forests and 3,600 acres of prior converted agricultural fields, impoundments and croplands (Figure 8). Most of the land within the refuge is classified as stream floodplain. Upland hardwoods and pine occur on the west boundary access points and on a very narrow strip of land along the escarpment which separates the Mississippi Delta from the Coastal Plain. The habitat types represented on Overflow NWR are shown in Table 5.

Table 5. Overflow NWR habitat types and their acreages.

Habitat Types	Acres
Cropland/Moist Soil Rotation	600
Cropland only	245
Grassland Management	35
Moist Soil only	520
Reforested	2,020
Marsh	50
CRP Pine (recent purchase)	179
Beaver Ponds & Scrub/Shrub Wetlands	1,500
Bottomland Hardwood Forest	8,625
Upland Hardwood/Pine	175
Administrative	24
TOTAL	**13,973**

Figure 8. General habitat types on Overflow National Wildlife Refuge.



Water Level Management. Seasonal flooding of the 4,000-acre greentree reservoir (GTR) on Overflow NWR is conducted annually, generally with a target date between December 10 and January 1 to achieve maximum pool level. Drawdown is generally initiated at the end of January if water levels are low enough to access the floodgates. At this time of year, water levels vary over a wide range due to heavy late winter rainfall or occasionally, a scarcity of rainfall. During a dry winter, the structure may not be opened until a later date. Water level management activities are also conducted on croplands and moist soil units to create soil and water conditions conducive for the germination of desirable plants, to control nuisance vegetation, and promote the production of invertebrates. The development of a complex of moist soil management impoundments, agricultural fields and flooded bottomland hardwoods provides a variety of important foods and habitat types for wintering waterfowl, wading birds, shorebirds, and secretive marsh birds.

Overflow NWR has a system of 18 separate units in the north sanctuary and two small units west of the office where water level management takes place. The infrastructure in place for managing water consists of overflow spillways, metal water control structures, numerous levees, ditches and wells, and one stationary and one portable relift pump to utilize surface water. A concrete structure is situated on the Flat Slough Ditch that is capable of flooding much of the sanctuary by backing excess water through water control structures (WCS) in the appropriate fields and then closing off the WCS when the desired water level is reached. Then the Flat Slough structure can be opened with a screw gate or by pulling stoplogs and drained to the desired level. It should be noted that when water is topped out at the Flat Slough structure about 80 acres of private land will be flooded as well. The refuge has an agreement with the neighboring farmer to cooperatively manage this lower 80 acres for moist soil/rice rotation where the Service will not create crop damage while conducting water management. However, the location of this farm greatly impedes the refuge from reaching its full water management potential. At this time the owner is not a willing seller. The refuge also assists adjacent landowners with crop/moist soil rotations on an additional 145 acres. This is all on an advisory basis with no written agreements in place.

The other water control structure is the large concrete structure on Overflow Creek with two lift gates and two slots where stoplogs are utilized for management of the GTR. The four openings are 6 ft. wide x 9 ft. deep. It is more than adequate for proper drainage of the GTR. Before water reaches the top of the structure it begins to flow around the end of the levee. This relief prevents any levee washouts. The levee is one mile long with two concrete overflow spillways.

The water management system at Overflow allows management opportunities for any species of migratory bird using the general area. It is the discretion of the biologist/manager to design and implement the plan for emphasis on the various species in the most advantageous locations. Due to the constraints of weather, written plans have to be modified almost every year in order to achieve desired conditions for selected bird groups in the planned location. Flexibility is essential and the biologist must keep several “Plan B’s” in mind to deal with abnormal or unexpected weather conditions.

Forest Management. The majority of Overflow NWR is bottomland hardwood forest consisting primarily of willow and overcup oak. Other major kinds of trees that grow on the refuge include hickories, elms, and green ash. Bald cypress and tupelo gum can also be seen along streams, channels, and sloughs throughout the refuge. Over time, several segments of Overflow Creek, its tributaries, and adjoining lands have been subject to alterations consisting of land clearing, channel excavation, weirs, earthen dams, road crossings, and levees. These activities, in conjunction with a dense beaver population, have increased the frequency and duration of

flooding in the forested area, resulting in a radically changed streamside habitat along the major waterways. What was once an oak/hickory forest has shifted to a more water-tolerant habitat consisting of buttonbush, swamp privet, water locust, water elm, black willow, green ash, bald cypress, and water tupelo.

Slightly higher elevations are still flood prone, but are not so severely impacted by beaver dams. The primary forest species for these sites are overcup oak, willow oak, delta post oak, cedar elm, green ash and persimmon. Nuttall oaks are noticeably few in number on these sites. The higher ridges adjacent to Oxbone Slough, Billotis Slough, and Beech Creek are dominated by cherrybark oak, shagbark hickory, nutmeg hickory, delta post oak, and cow oak. Loblolly pine and upland hardwoods occupy the higher elevations on the western boundary that abuts the West Gulf Coastal Plain. About 2,000 acres of marginal farmland have been reforested with a variety of hardwood species to closely represent the original forest species composition before the land was cleared.

One of the issues which a Forest Habitat Management Plan needs to address is the removal of invasive pine (pine seeds blowing onto the refuge from the coastal plain and colonizing hardwood reforested habitats). At the present time, there is no active Forest Habitat Management Plan in place for Overflow NWR (please refer to the Ecological Threats and Problems section in Chapter II, Refuge Overview).

Since 1991, there have been three small logging operations. One involved a salvage cut at the base of the escarpment where a tornado damaged approximately 50 acres. Large pine logs were moved up the hill at the Old Bluff Trail Deer Camp with large draft horses and a wagon. A few hardwood logs were also salvaged. This activity generated a great deal of local interest and attracted more visitors per day than any other activities except duck hunting.

Another logging operation took place in 1994 on the east side in an area that was affected by poor water management practices in the late 1980s. The refuge staff noticed many trees with chlorotic leaves. In 1991, the affected area was surveyed and found to be in imminent danger of irreversible damage. A decision was made to have a timber sale hoping the thinning would invigorate the stand and the remaining trees would survive and increase mast production. Most of the trees that were left were willow oaks with a few well formed overcup oak and delta post oak. The area has regenerated quite well and the leave trees developed nice canopies with better acorn production than elsewhere on the refuge.

The third and most recent cutting was in conjunction with the purchase of the Beech Creek Tract on the northwest portion along Franklin Smith Road. The purchase of approximately 200 acres of pristine coastal plain hardwoods also included 67 acres of mixed upland hardwood and pine. The seller (Georgia Pacific) was allowed to cut the large upland pines. This posed no problem to the Service, because the refuge's main interest was the acquisition of the coastal plain bottomlands. Today these bottoms are likely the last undisturbed remnants of such habitat in the county.

Cropland Management. Overflow NWR has approximately 850 acres suitable for reliable crop production. Of this acreage, 600 are in a moist soil rotation with the remaining 250 solely devoted to crop production. The crop acreage is generally planted to rice, corn, soybeans, and sometimes winter wheat and milo. Of the available acreage usually from 300-400 acres are planted annually by the cooperative farmer. In some years, a limited amount of force-account farming is conducted in areas normally devoted solely to moist soil management when ideal conditions occur for refuge personnel to plant a crop (i.e., when free seed, ample surface water, and the staff is available on hand to tend to the crop). Force-account farming is limited to rice because it is the most

productive crop in this part of the state. Using low-input methods, good crops of rice have been grown by the refuge staff using no fertilizer or chemicals to produce sometimes excellent stands. However, the overriding reason for the cooperative farming is to set back plant succession rather than to produce waterfowl foods. This allows the refuge staff to spend less time preparing moist soil seedbeds and more time on paperwork deadlines and essential work activities such as beaver trapping, boundary marking, etc.

The cooperative farming on Overflow NWR is similar to that of other refuges. Some exceptions include the farmer being responsible for all well and irrigation system maintenance, and payment of all utilities and registration of the wells he uses. Three wells have been drilled by the cooperative farmer in the last ten years and donated to the refuge. Overflow NWR is an unfunded station and cannot assist the farmer with many expenses. It is a high-risk farming area that has not and will not be leveled and very flood prone. In some years all crops except rice are lost due to warm season flooding. Extensive damage to crops also results due to depredation from feral hogs, deer, black bears, and to a lesser extent, raccoons, squirrels, and rabbits.

Moist Soil Management. About 2,500 acres of cleared land in the lower elevations of Overflow NWR have been developed into a system of moist soil units that are managed on a rotational basis to accommodate the needs of the various groups of migratory birds consisting of waterfowl, wading birds, shorebirds, and rails. Moist soil management has been practiced on the refuge since the late 1980s when the Service began acquisition of croplands. Planted millet and other cultivated wildlife foods are not considered to be moist soil management in its purest form.

Managing for primarily desirable native plants on hydric sites can be unpredictable at times, but with an average rainfall season and a few years of biological experience on the same sites, one can achieve high seed production on an annual basis. A thorough knowledge of the seed bank, biology of the various plant species, soil types, and hydrology of the sites is essential. Even with passive management (no artificial flooding), good production can and generally will occur with correctly timed soil and water manipulations. The advantages of managing for native plants are that it is relatively inexpensive, beneficial to a large array of nontarget wildlife species, environmentally friendly, and provides essential nutrients (both plant and animal) that positively influence basic physiological life processes such as reproduction, molting and general health of waterfowl and other migratory birds. Without these nutrients, survival and successful reproduction is severely compromised.

Monitoring the sites every few days is mandatory, especially early in the season when there is still time to take management action against an overabundant stand of undesirable vegetation. Monitoring and documenting problems in this fashion will create a huge storehouse of information for the biologist, thus increasing chances for success in the future.

The most common desirable moist soil plant groups in the units at Overflow are smartweeds, wild millets, sprangletop, sedges, and panic grasses. Undesirable plants include high densities of *Sesbania*, cocklebur, beakrush, spikerush, cattails, black willow, sumpweed, woody vines, and alligator weed. Low densities of these plants generally do not cause problems and some in the appropriate coverage can be beneficial. However, monotypic stands should not be allowed to develop.

Oakwood Unit

The Oakwood Unit habitat consists of approximately 800 acres of moist soil units with pockets of scrub-shrub wetlands and approximately 1,200 acres reforested (Figure 9). About 220 acres of mature timber is located on the west side of the unit. An 80-acre parcel was left as a control area with no restoration of any type whatsoever. This parcel is reforesting on its own with light-seeded species such as green ash and cottonwood, which are starting to shade out the abundant *Baccharis halimifolia*, also known as groundsel tree, sea myrtle, or salt bush.

Habitat Management. Management and monitoring activities at the Oakwood Unit consist of disking the moist soil units on a rotational basis, monitoring seedling survival and mortality, bird surveys, and levee and boundary line maintenance. Compared to Overflow NWR, Oakwood is very passively managed. Nevertheless, the unit is extremely productive and is quite similar to the Overflow Refuge in many ways.

WILDLIFE

Felsenthal and Overflow NWRs support a diversity of wildlife common to the Coastal Plain and Mississippi Alluvial Plain of Arkansas. Most of the wildlife that live on the refuges is found typically in bottomland hardwood forests. Few species surveys have been conducted on the two refuges, however. Although actual numbers are hard to accurately quantify, the current wildlife list for Felsenthal and Overflow would contain at least 200 species of birds, 40 species of mammals, 70 species of reptiles and amphibians, and 90 fish species. Each of these individual species would have the same general requirements in that they require food, water, and cover to survive. However, the particular food and cover requirements of a given species are often very specialized. The specific habitat needs of each species vary in some degree from those of every other kind of animal, although many different animals may occupy the same general area. A diversity of habitats tends to encourage and support a diversity of wildlife species.

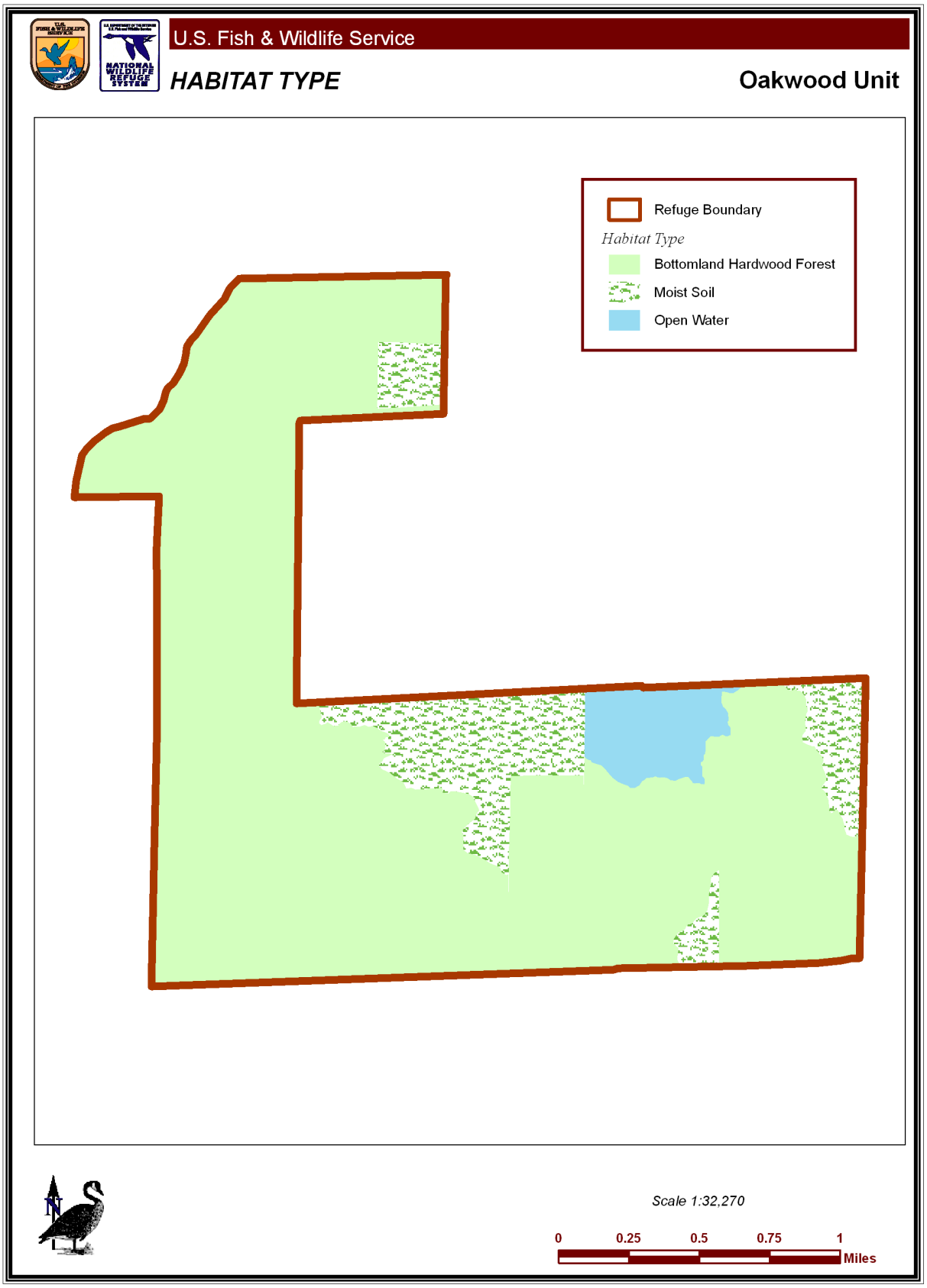
Birds

Felsenthal and Overflow NWRs lie within the Mississippi Flyway—the "highway in the sky" from nesting grounds to wintering areas through middle North America used by vast numbers of migrating waterfowl, shorebirds, neotropical songbirds, and birds of prey. Almost 100 species of birds are known to nest in the area, and over 200 species have been sighted on the refuges.

Waterfowl begin arriving in September with blue-winged teal, mallards, black ducks, gadwall, and ring-necked ducks among the 20 (or more) species that winter on the refuges. The wood duck, a year-round resident, nests in tree cavities and in nest boxes placed throughout the hardwood forests. Duck populations (in general order of abundance) include mallards, green-winged teal, shovellers, pintails, gadwalls, blue-winged teal, wood ducks, and hooded mergansers. In some years, over 100,000 and 300,000 waterfowl have been found on the Overflow and Felsenthal refuges, respectively. However, both Felsenthal and Overflow in recent years continue to experience depressed wintering waterfowl numbers compared to long-term averages.

During the spring, summer and through early fall, Felsenthal and Overflow NWRs are a haven for a variety of other migrant birds. A myriad of songbirds and shorebirds stop briefly in the fall and spring to replenish energy reserves for the long journey to and from wintering areas in Central and South America, while other birds, such as Northern parula, Prothonatary warbler and American redstart utilize the refuges for nesting. Nearly 100 different songbirds have been

Figure 9. General habitat types on the Oakwood Unit.



observed on Overflow during the spring and summer months. Felsenthal remains a "mecca" for great blue herons, green herons, little blue herons, black and yellow-crowned night herons, great egrets, white ibis, wood storks, anhinga, double-crested cormorants and American bitterns. At Overflow NWR, fields managed for secretive marsh birds are inhabited by large numbers of rails as well as some American and least bitterns. A list of species of management concern on the Felsenthal and Overflow refuges is provided in Appendix I, Refuge Biota.

Felsenthal NWR harbors one of the highest-known concentrations (per acre of available habitat) of red-cockaded woodpeckers (RCW) in Arkansas. During 2007, Felsenthal NWR was home to 11 active colonies of red-cockaded woodpeckers, a number that has remained relatively constant (11 to 14 colonies) over the last few years. The red-cockaded woodpecker was listed in the *Federal Register* as endangered in 1970 (35 FR 16047), and received federal protection under the Endangered Species Act of 1973, as amended. Once the RCW was a common bird distributed across the southeastern United States, but by the time of listing, the RCW had declined to fewer than 10,000 individuals. The red-cockaded woodpecker has high priority in refuge management. This woodpecker prefers open, park-like timber stands where it drills nesting cavities in mature pine trees. The RCW prefers mature, older aged, open canopy pine stands with low ground cover of grasses and forbs. Its decline has been traced to the loss of older aged, open pine forests in the south, a fire-dependent ecosystem to which the RCW has adapted. Because fire is a historic disturbance agent that is critical to the continued existence of the RCW's habitat, forest management practices such as selective cutting and intensive prescribed burning are the primary management tools used to improve and maintain a home for this endangered bird. In addition, in upland areas, trees with cavities are marked with white bands to aid identification and protection, and artificial nest inserts are placed in mature pine trees to supplement natural cavity trees and to encourage establishment of new RCW colonies.

Both the Felsenthal and Overflow refuges are also home to bald eagles during the winter as these magnificent birds follow waterfowl down the flyway. The waterfowl impoundments on both refuges have created what appears to be optimum habitat, with one or two pairs of bald eagles nesting on the refuges since the mid-1990s. Other raptors commonly observed are red-shouldered and red-tailed hawks, turkey vulture, black vulture, barred owl, great-horned owl, screech owl, American kestrel, Northern harrier, broad-winged hawk, Cooper's hawk, and sharp-shinned hawk.

Mammals

Temporarily flooded bottomland forests provide ideal habitat for many species of mammals. Food and cover are abundant and diverse, and a variety of mammalian species are present. More than 40 species of mammals are likely to be found on the Felsenthal and Overflow refuges. In addition to the black bear, which is primarily associated with upland forests joined by extensive forested wetland corridors, other forest wetland inhabitants are the white-tailed deer, bobcat, coyote, river otter, raccoon, gray fox, red fox, beaver, mink, swamp rabbit, cottontail rabbit, eastern gray squirrel, fox squirrel, nutria, opossum, muskrat, and skunk. No accurate inventories have been conducted on small mammals, such as mice, voles, or moles; however, a list of species of management concern on the Felsenthal and Overflow refuges is provided in Appendix I, Refuge Biota.

Amphibians and Reptiles

Amphibian management and conservation are of great interest due to apparent global amphibian declines. Habitat loss, fragmentation, and degradation appear to be the primary factors in declines. This group of animals requires quality wetland habitat for their survival and they also serve as

important indicators of environmental health. Numerous species of frogs, snakes, turtles, lizards, skinks, and salamanders have been seen by the refuge staff. Amphibians, particularly frogs, have been intensively studied by staff from the Conway Ecological Services Office. This study, entitled the Malformed Amphibian Study, was led by biologist Lisa Irwin. Samples were collected from several refuges in Arkansas and possibly some adjacent states. Some malformations were detected in frogs at Overflow NWR, but most consisted of missing body parts (legs) due to predation. Although no amphibian and reptile surveys have been conducted on the Felsenthal and Overflow refuges to determine species occurrence or population levels, four species of venomous snakes inhabit the area and hunters have reported seeing alligators on more than one occasion.

Fish

The Felsenthal and Overflow refuges provide habitat for more than 90 species of freshwater fish. Seasonal flooding of wooded areas provides spawning and feeding habitat for numerous sport, commercial, and forage fishes. Important game species found in refuge waters include bluegill; redear sunfish; longear sunfish; white and black crappie; largemouth bass; yellow and white bass; and blue, flathead, and channel catfish. Other species include smallmouth, bigmouth, and black buffalo; freshwater drum; longnose, shortnose, alligator, and spotted gar; bowfin; grass carp, big head carp, and common carp.

Threatened and Endangered Species

There are 30 federally listed threatened and endangered animal and plant species in Arkansas, many of which are aquatic species (24 species) and potentially could be found on Felsenthal and Overflow refuges. The red-cockaded woodpecker and the least tern are the most recognized and well known endangered species that occur on Felsenthal NWR and Overflow NWR, respectively.

In addition, there are numerous species of special concern. Bald eagles breed throughout the United States, and winter throughout the southern portion of its breeding range.

Bald eagles have always used the two refuges during the winter, and are usually seen in open fields every year. Bald eagles feed on fish, waterfowl, coots, muskrats, and nutria. For decades, bald eagles did not nest on the Felsenthal or Overflow refuges; however, in recent years nesting pairs have been observed on both refuges.

Alligator snapping turtles are the largest freshwater turtles in the United States. They are protected from commercial harvest in every state. The commercial harvest of these turtles threatens their population because alligator snapping turtles do not breed until they are approximately 15 years old, and the harvest targets adults. Nest depredation by raccoons, skunks, opossums, and fire ants also harm the population significantly. The refuges have no good estimates of the alligator snapping population, though individual turtles have been seen.

The Rafinesque's big-eared bat is the least studied bat in the eastern United States and is federally designated as a species of special management concern. This bat is associated with bottomland hardwoods, and because this habitat has decreased, many biologists are concerned about its status. Many states consider the Rafinesque's big-eared bat to be either threatened or endangered. The southeastern myotis is another species of bat that is also associated with riparian areas or bottomland hardwoods and is listed as a federal species of special management concern. They are often captured in mist-nets more than big-eared bats, but their populations are thought to be declining as well. Southeastern myotis roost in caves in the northern part of their range, but little is known about their roosting habits in areas where there

are no caves. Therefore, although there are no caves on the Felsenthal and Overflow NWRs, it is still possible that these bats exist on the refuges.

CULTURAL RESOURCES

HISTORICAL BACKGROUND

The area in which Felsenthal NWR and Overflow NWR now occupy is rich in history. Archaeological investigations indicate that the earliest use by man may have occurred about 5,000 years ago when the Caddo Indians occupied the area and hunted, fished and trapped in places that are still popular for these activities today. The area contains farming settlements dating back to the Mississippian Period (AD 900-1600). The archaeological site at Lake Enterprise, near Wilmot, is approximately 3,500 years old. The land was originally settled by the Tunica and Caddo Indians and became part of the Quapaw holdings. Felsenthal NWR is home to some of the most significant and well-preserved archeological resources in the region. Remains of seasonal fishing camps, temple mounds with ceremonial plazas and villages with as many as 200 structures are evidence of once thriving Indian communities. This history is recaptured by displays at the refuge visitor center. Hernando de Soto and his men were the first Europeans to explore the area. In 1541 they encountered the fierce Caddo Indians and subsequently accepted the hospitality of the Quapaws during the fierce winter of 1541-1542, in which 250 of the de Soto party died.

In 1803, the land that is now known as the Louisiana Purchase was acquired from France, and divided into territories. European visitors to the area in the early 1800s reported Native Americans were engaged in limited farming, as well as hunting and gathering. It is believed that the Caddo tribe augmented the natural fire process in the area to clear areas, enhance crops, and flush game. The advent of European settlers into this part of Arkansas decimated the Native Americans through diseases brought by the newcomers. The Indians were moved first into other Caddo territory in northwest Louisiana and finally to the Oklahoma Territory in what is now Ottawa County. It is doubtful that any of these tribes were still living in the area when these Indian holdings were ceded to the U.S. in 1818, marking the real beginning of European settlement.

Two hundred years ago, the Lower Mississippi River Valley contained over 24 million acres of bottomland hardwood and swamp forests. Today, only about 4 million acres of wetland forest remain, most as islands in a sea of agriculture. Agriculture was the primary land use in the years before the Civil War. By the mid-1800s many farms were producing cotton, corn, wheat, potatoes, and live stock on the fertile land. The Civil War curbed the large-scale agricultural development and after the war large plantations were sold off in smaller tracts. Timber abounded, especially hardwood, and as hardwood was cleared for cultivation, pine took over. Timber was rafted down the Saline River and Ouachita River to other settlements. Arkansas's wood products industry saw its beginnings in the 1890s concurrent with the first railroads. Cotton farming grew as more lands were cleared for timber harvesting. By 1925, almost all of the virgin pine had been cut over. Many of the smaller farms were abandoned during the Great Depression of the 1920s and 1930s, and later purchased by the timber industry and the federal government, becoming timber plantations, national forests, wildlife refuges, etc.

Following the decrease in timber production, the 1920s saw the advent of a mini "oil boom," but production declined rapidly in later years due to poor recovery practices and widespread industrial pollution from the oil drilling (saltwater and brine discharges to surface streams and wetlands). As of 1997, about 200 oil and 80 gas fields were in production in Arkansas, producing about 23,500 barrels of oil per day and 586,000 MCF of gas per day.

In the 1950s, bromine concentrations were found to be abnormally high (about 70 times the bromine concentration of normal ocean water) in the salt brine oil field wastes (heretofore considered a worthless by-product of drilling). The first commercial recovery of bromine was in Union County in 1957 and has continued ever since. Arkansas is now the largest producer of bromine in the world, averaging about 40% of the world's total production.

Much of the land near and adjacent to Overflow NWR has been farmed (cotton, rice, and soybeans) for over 100 years, resulting in nearly a complete loss of wetlands and associated vegetation. The upland forests to the west of the refuge resulted in the development of a large lumber industry. Overflow NWR was first established in 1980 with the acquisition of forested bottomland to protect remaining bottomland hardwood forest tracts in the Lower Mississippi River Delta from being drained and cleared for agriculture. Most of the land within the refuge boundary is classified as stream floodplain. Within the Overflow Creek watershed (which drains the refuge), many streams have been altered by private landowners (levees, weirs, road crossings, drainage ditches, channel excavations, construction of catfish ponds, etc.), resulting in an increased frequency and duration of flooding of the refuge woodlands. On adjacent lands to the west, clearcutting and short timber management rotations have increased runoff and siltation. In addition, impoundment of irrigation runoff by beavers along with siltation has resulted in a significant loss of bottomland hardwoods and prolific weed growth in the creek channel. The beaver dams and vegetation have brought drainage to a standstill in several locations.

Cultural Resources Protection

Cultural resources include historic properties as defined in the National Historic Preservation Act (NHPA); cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA); archaeological resources as defined in the Archaeological Resources Protection Act (ARPA); sacred sites as defined in Executive Order 13007, *Protection and Accommodation of Access To "Indian Sacred Sites,"* to which access is provided under the American Indian Religious Freedom Act (AIRFA), and collections. As defined by the NHPA, a historic property or historic resource is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). These include any artifacts, records, and remains that are related to and located in such properties. The term also includes properties of traditional religious and cultural importance (traditional cultural properties), which are eligible for inclusion in the NRHP as a result of their association with the cultural practices or beliefs of an American Indian tribe. Archaeological resources include any material of human life or activities that is at least 100 years old, and that is of archaeological interest.

Both Felsenthal and Overflow NWRs follow these procedures to protect any cultural or historic legacy that may potentially occur on the refuge. Whenever construction work is undertaken that involves any excavation with heavy earth-moving equipment like tractors, graders, and bulldozers, such as for the development of moist soil units, the refuge contracts with a qualified archaeologist or cultural resources expert to conduct an archaeological survey of the subject property. The results of this survey are submitted to the Service's Regional Historic Preservation Officer, as well as the Arkansas Historic Preservation Program (AHPP), which in Arkansas is an agency within the Department of Arkansas Heritage.

The AHPP reviews the surveys and determines whether cultural resources will be impacted, that is, whether any properties listed in or eligible for listing in the NRHP will be affected. If cultural resources are actually encountered during construction activities, the refuge is to notify

the AHPP immediately. Approximately 212 sites have been identified to be of archaeological significance on Felsenthal NWR. To date, three archaeological surveys have been conducted on the refuge. Given the region's settlement during both the prehistoric and historic periods, the likelihood of cultural resources is considered relatively high.

SOCIOECONOMIC ENVIRONMENT

REGIONAL DEMOGRAPHICS AND ECONOMY

Both Felsenthal and Overflow national wildlife refuges are located in southeastern Arkansas and in close proximity to the Arkansas-Louisiana border. Felsenthal NWR is located in Union, Bradley and Ashley counties, while Overflow NWR is located in Ashley County. The Oakwood Unit of Overflow NWR is located about 60 miles to the north in Desha County. Overflow NWR lies approximately 25 miles east of Felsenthal NWR, and a significant number of visitors to both refuges come from Drew County, Arkansas.

This five-county area (Union, Bradley, Ashley, Drew and Desha) had an estimated population of approximately 111,692 in 2006. This five-county area is predominantly rural. The State of Arkansas has only one city with a population greater than 100,000: its capital, Little Rock, with a population of about 184,422. The nearest town with a population greater than 20,000 is El Dorado, about 35 miles west of Felsenthal NWR in Union County. Populations have been declining in the region, with a decrease of about 4.1 percent since 2000. This compares with a 5.1 percent increase for the State of Arkansas, and a 6.4 percent increase for the U.S (Table 6). Per capita income for the five-county area is about the same as the average for the state, $26,681; however, the average unemployment rate (7.6%) and the percentage of individuals living below the poverty level (18.1%) are both well above the rest of the state and the U.S. as a whole. Additional information for nearby Morehouse and Union parishes in Louisiana is also included in Table 6.

Union County is the state's largest county geographically. Ninety percent of the county is forested. Forage and hay are raised for livestock, but no row crops are cultivated. Nearly 25% of the workforce is employed in manufacturing, primarily in petrochemical, poultry processing, and wood products operations. The soils of Ashley County are fertile, allowing the cultivation of the great cash crops of the state: cotton, rice, and soybeans. The western part of the county is largely forested, home to what is billed as "The Forestry Capital of the South." Today, forest products account for 57% of the value of all shipments from Ashley County and are responsible for 26% of the employment. The Great Lakes Chemical Corporation (now Chemture) is the world's largest producer of bromine. With facilities in Union (and Columbia) counties, it contributes significantly to the local economy and employs more than 1,000 people.

Felsenthal National Wildlife Refuge

The Felsenthal Refuge employs a staff of 15 full-time workers. Its 2005 fiscal year budget for management and operations was $1,077,600. The refuge typically averages about 400,000 visitors a year. (Total visits in 2005 were estimated to be in excess of 500,000.) The economic area for Felsenthal NWR is defined as Ashley, Bradley, Drew and Union counties in Arkansas. Tables 7 and 8 summarize recreational visits and visitor expenditures on the refuge in 2004, during which time Felsenthal NWR had 382,459 visitors. The vast majority of the recreation visits, over 188,000, were for freshwater fishing with about 63 percent of recreation visits by area residents. Table 8 shows the visitor recreation expenditures for the refuge in 2004. Total expenditures were $9,761,800 with nonresidents accounting for $7,335,100 (75 percent of total

expenditures). Expenditures on nonconsumptive activities accounted for 3 percent of the total, with hunting accounting for 30 percent and fishing 67 percent.

Overflow National Wildlife Refuge

Overflow NWR has a four-person staff. The refuge has about 15,000 visitors annually (primarily hunters). Overflow's budget for management and operations is included in the Felsenthal NWR budget. Resident and nonresident visitors generated $435,203 in expenditures in fiscal year 2005.

Fishing, Hunting, and Wildlife Watching in Arkansas

Table 9 presents information summarizing the economic value of hunting, fishing, and wildlife watching in Arkansas by U.S. residents, taken from the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. It estimates that over 2 million people participated in fishing, hunting and wildlife watching activities in Arkansas in 2006, with total expenditures exceeding 1.8 billion dollars.

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

Felsenthal National Wildlife Refuge

The 65,000-acre Felsenthal National Wildlife Refuge was established in 1975 to provide habitat for migratory waterfowl and neotropical migrant birds. The refuge provides habitat and protection for the endangered red-cockaded woodpecker and other species of concern such as the American alligator and the bald eagle. Management activities within the refuge are designed to maintain and enhance the natural qualities of the area and provide optimum habitat for wildlife. Carefully timed flooding of hardwood forest communities commonly referred to as green-tree reservoir management, provides thousands of acres of habitat for wintering waterfowl. Felsenthal NWR is home to the world's largest green-tree reservoir consisting of the 15,000 acre Felsenthal Pool that is more than doubled to 36,000 acres during winter-time flooding. Water level management in other impoundments, such as moist soil units, stimulates the growth of native wetland plant species and an abundance of insects, crustaceans and mollusks, all highly favored foods of migratory waterfowl, wading birds and shorebirds.

Felsenthal’s forest management practices focus on providing excellent conditions for the variety of wildlife living in the forest. Prescribed burning, thinning, regeneration, and stand improvement are some of the techniques used to enhance and maintain optimum habitat conditions. In the upland areas, the timber is managed primary for the endangered red-cockaded woodpecker where artificial nest inserts are placed in mature pine trees to supplement suitable cavities.

Table 6. Demographics and socioeconomics for the Felsenthal and Overflow NWRs area.

Characteristic	Union County	Bradley County	Ashley County	Drew County	Desha County	Five County Summary	State of Arkansas	M'house Parish	Union Parish	State of Louisiana	United States
Demographic											
Population (2006 estimate)	44,170	12,111	22,843	18,387	14,181	111,692	2,810,872	29,761	22,964	4,287,768	299,398,484
Percent Change (4/1/00 to 7/1/06)	-3.2%	-3.9%	-5.6%	-1.8%	-7.6%	-4.1%	5.1%	-4.1%	0.7%	-4.1%	6.4%
Total Land Area (sq. miles)	1,038.9	650.6	921.2	828.2	765.0	4,203.9	52,068.2	794.3	877.6	43,561.9	3,537,438.4
Population Density (pop./sq. mile)	43	19	25	22	19	27	54	37	26	98	85
Race/Ethnicity (% of Population)											
White	65.1	71.1	71.5	70.6	51.5	66.2	81.1	53.9	71.9	65.4	80.1
Black/African American	33.0	27.9	27.3	27.8	46.8	32.2	15.7	45.2	27.1	31.7	12.8
Hispanic/Latino (of any race)	1.7	10.7	4.2	2.7	4.0	3.6	5.0	0.9	3.0	2.9	14.8
Asian	0.7	0.1	0.3	0.5	0.5	0.5	1.0	0.2	0.3	1.4	4.4
Education (% of population over 25)											
High School degree, 2000	74.5	66.6	72.5	73.1	65.0	71.8	75.3	66.6	71.7	74.8	80.4
College degree, 2000	14.9	11.9	10.1	17.3	11.1	13.5	16.7	9.7	11.8	18.7	24.4
Economic											
Median Household Income, 2004	$32,721	$27,661	$33,039	$30,282	$25,470	$30,915	$35,295	$26,354	$30,697	$35,216	$44,334
Per capita Income, 2005	$32,467	$22,796	$24,135	$23,610	$21,205	$26,826	$26,681	$21,737	$24,571	$24,664	$34,471
Individuals below poverty level, 2004	17.7%	20.4%	18.0%	18.7%	23.3%	18.1%	15.6%	25.0%	18.7%	19.2%	12.7%
Unemployment Rate, 2006	6.8%	7.3%	7.7%	8.3%	9.5%	7.6%	5.3%	6.0%	3.9%	4.0%	4.6%

[a] *U.S. Census Bureau, Bureau of Economic Analysis, and Bureau of Labor Statistics (April 14, 2008), http://www.fedstats.gov/qf/*

Table 7. Felsenthal NWR recreation visits in 2004.

Activity	Residents	Nonresidents	Total
Nonconsumptive:			
Nature Trails	2,029	676	2,705
Other Recreation	25,473	8,491	33,964
Hunting:			
Big Game	4,815	19,260	24,075
Small Game	8,572	12,858	21,430
Migratory Birds	41,170	27,446	68,616
Fishing:			
Freshwater	131,629	56,413	188,042
Total Visitation	***213,688***	***125,144***	***338,832***
Total Visitors			***382,459***

Table 8. Felsenthal NWR visitor recreation expenditures in 2004.

Activity	Residents	Nonresidents	Total
Nonconsumptive:	$97.4	$183.1	$280.5
Hunting:			
Big Game	$62.8	$617.4	$680.3
Small Game	$48.2	$271.4	$319.6
Migratory Birds	$454.1	$1,466.5	$1,920.5
Total Hunting	$565.1	$2,355.3	$2,920.4
Fishing:			
Freshwater	$1,764.2	$4,796.7	$6,560.9
Total Fishing	$1,764.2	$4,796.7	$6,560.9
Total Expenditures	***$2,426.7***	***$7,335.1***	***$9,761.8***

Table 9. Activities in Arkansas by U.S. residents, 2006.

Fishing	
Anglers	655,000
Days of fishing	10,812,000
Average days per angler	17
Total expenditures	$420,571,000
Trip-related	$272,160,000
Equipment and other	$148,411,000
Average per angler	$639
Average trip expenditure per day	$25
Hunting	
Hunters	354,000
Days of hunting	7,882,000
Average days per hunter	22
Total expenditures	$788,575,000
Trip-related	$182,192,000
Equipment and other	$606,383,000
Average per hunter	$2,108
Average trip expenditure per day	$23
Wildlife Watching	
Total wildlife-watching participants	1,011,000
Nonresidential	435,000
Residential	811,000
Days of Wildlife Watching	4,148,000
Total expenditures	$607,701,000
Trip-related	$114,879,000
Equipment and other	$492,822,000
Average per participant	$591
Average trip expenditure per day	$28

Overflow National Wildlife Refuge

Overflow National Wildlife Refuge was established in1980 to protect bottomland hardwood forest tracts in the Lower Mississippi River Delta. The original land acquisitions were limited to forested bottomlands. Realizing the importance of having a complex of habitat types under Service management and control, the refuge acquisition boundary was expanded an additional 8,000 acres in 1991. The refuge's approved acquisition boundary is now approximately 18,700 acres. The refuge currently includes 13,973 fee-title acres and 84 acres under easement within the proposed 18,700-acre project area.

Management activities within the refuge are conducted to enhance habitat productivity, maintain the natural qualities of the area, and provide optimum habitat for wildlife. Carefully timed flooding of the hardwood forest, commonly referred to as green-tree reservoir management, provides excellent habitat for wintering waterfowl.

Two centuries ago, the Lower Mississippi River Valley contained over 24 million acres of bottomland hardwood and swamp forests. Today, only about 4 million acres of wetland forest remain, most as islands in a sea of agriculture. In order to relink fragmented bottomland hardwood areas and swamp forests and improve habitat, the Overflow Refuge is reforesting some areas. Many agricultural fields on the refuge are being planted with the hardwood trees that once grew here. This reforestation effort is part of a larger effort taking place throughout the Lower Mississippi River Valley. The variety of native trees planted at Overflow National Wildlife Refuge will enhance wildlife diversity and habitat.

Oakwood Unit

At the present time, the Service owns 2,263 acres in fee title at the Oakwood Unit. The Environmental Assessment and Land Protection Plan for the establishment of the Oakwood Unit was approved in 1998. This document establishes an acquisition boundary that includes 5,800 additional acres, potentially creating an 8,000-acre refuge with very manageable and accessible boundaries. Prior to the approval of this document, these FmHA transfer lands were managed as a unit of Overflow. Much of the private land within the unit's acquisition boundary is being precision leveled and all attempts to purchase acreage have been unsuccessful thus far.

On Oakwood and the surrounding area, land clearing and an extensive canal and drainage system constructed by the U.S. Army Corps of Engineering (COE) and local drainage districts have resulted in an almost total loss of wetland characteristics. Habitat management on Oakwood has basically consisted of wetland restoration activities implemented in three phases: (1) restoring hydrology; (2) reestablishment of native vegetation (primarily bottomland hardwoods); and (3) controlling erosion. The goals of these activities have been successfully accomplished. Primary activities now mainly consist of maintaining the infrastructure that is in place and moist soil management in the units developed for that purpose.

VISITOR SERVICES

The National Wildlife Refuge System Improvement Act of 1997 and Executive Order 12996 emphasize the importance of providing compatible wildlife-dependent educational and recreational opportunities on national wildlife refuges. A variety of public use opportunities are available on the Felsenthal and Overflow NWRs. The Oakwood Unit is currently closed to the public. The Felsenthal and Overflow refuge staff manage an extensive visitor services program without any visitor service specialists. Two forestry staff provide excellent support for the visitor services program as a collateral duty. In addition, they manage recreation and education programs, volunteers, the Friends Group, and outreach for both the Felsenthal and Overflow refuges. Visitors to the Felsenthal and Overflow refuges annually average approximately 400,000 and 15,000, respectively.

Felsenthal National Wildlife Refuge

The Felsenthal NWR visitor center is located about 5 miles west of Crossett, Arkansas, on U.S. Highway 82W. It is open from 7:00 a.m. to 3:30 p.m. on weekdays and contains numerous wildlife exhibits. This visitor center is fully functional with staff to greet the public and professional displays that interpret the refuge resources for all ages through visual, hands-on, interactive, and audio displays. The visitor center meets the demands of current group requests. The visitor center is wheelchair accessible. All of the current exhibits are professionally designed and fabricated. The exhibits were designed for a general audience. Facilities near the refuge headquarters and visitor center include a ½-mile accessible trail for visitors with mobile disabilities. Wildlife viewing and auto touring, environmental education programs and group tours, hunting, fishing, and boating are popular activities located about ½ mile from the headquarters. The refuge has an extensive network of all-

terrain vehicle (ATV) trails, 10 primitive camping areas, and 8 boat ramps. These facilities lack restroom facilities but are maintained in conjunction with hunting and fishing programs. The locations of the current public use facilities at Felsenthal NWR are illustrated in Figure 10. The refuge's current public recreational activities and opportunities are summarized below.

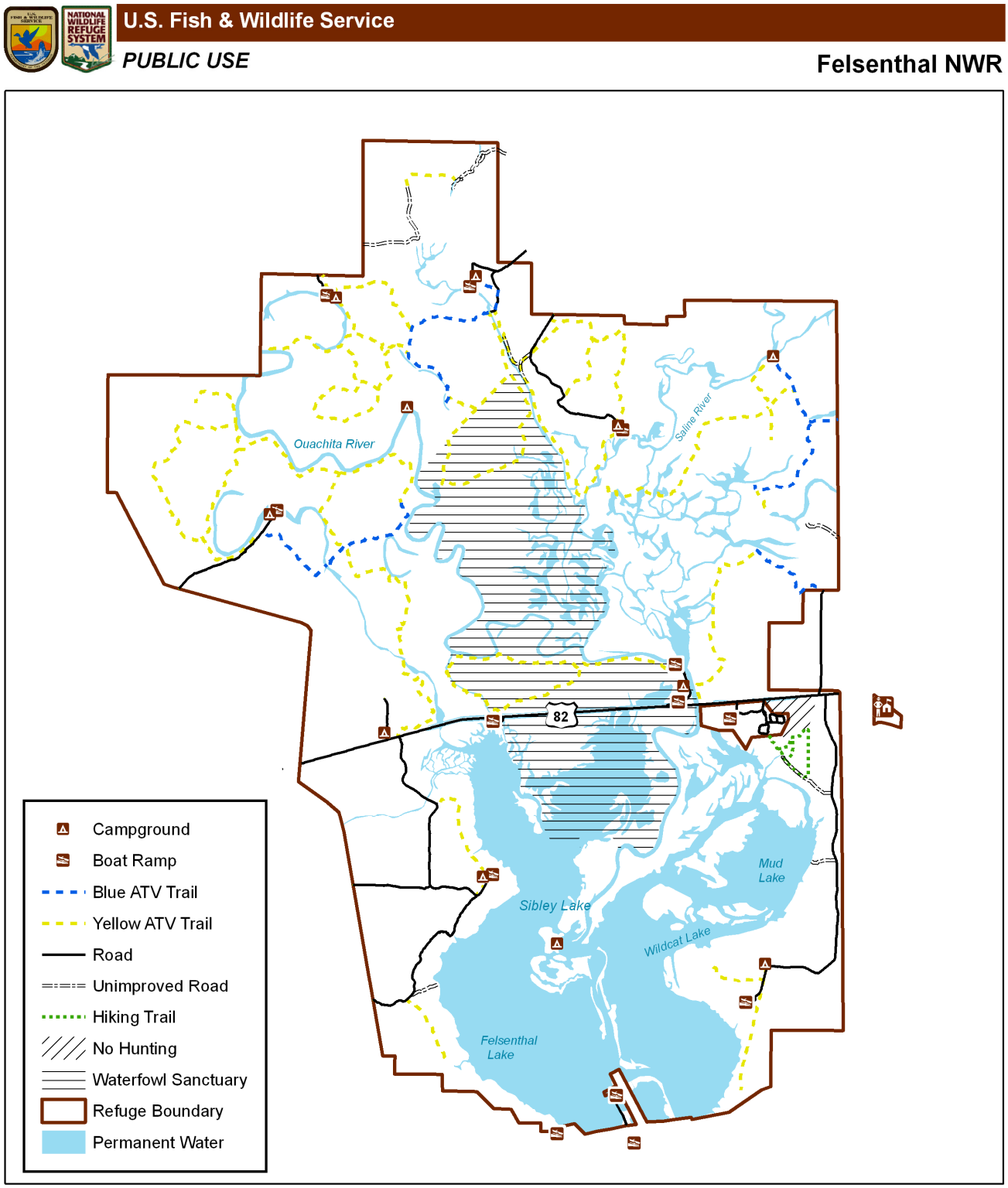
- Hunting and sport fishing and fishing tournaments are the primary visitor activities at Felsenthal NWR.
- Felsenthal NWR receives its highest visitation on weekends.
- The refuge has an extensive network of recreation facilities including 65 miles of ATV trails, 8 boat ramps, 10 primitive campgrounds, and several hiking trails. The campgrounds lack restrooms, potable water, and hardened surfaces for parking and tent camping. Figure 10 shows the locations of these recreational facilities.
- Camping, ATV use, horseback riding, field trials, commercial fishing, fishing tournaments, motorized boating, night fishing, and hunting are allowed on all parts of the refuge. Except for various archeological sites, the majority of the refuge is open to visitors.
- Hiking, wildlife observation, and interpretative trails (Mallard Trail, Sand Prairie Trail, Cripple Lizard, Periwinkle Trail and Bradley Tram) are available in the Crossett Harbor recreation site area and are shown in Figure 10.
- The refuge charges a standard fee for quota hunts, but does not currently charge a standard fee for boat ramps, ATV trails, camping, and fishing tournaments. The refuge charges a nominal fee for fishing tournaments and these funds are deposited in the General Fund account.
- Priority should be given to developing an updated Visitor Services Plan and managing for appropriate uses as an outcome of the comprehensive conservation planning effort.

Hunting. Felsenthal NWR has a hunting management plan that is up to date. Presently, the hunting plan supports simplified seasons and regulations and the hunting program reflects Title 50 of the Code of Federal Regulations (CFR). The hunting program at Felsenthal NWR is managed via quota hunts for white-tailed deer and turkey. The quota hunts restrict the number of hunters that are eligible to participate in these hunts.

Outside sources such as local state agencies have been consulted to develop and update the management decisions of the hunting program. All harvest information is gathered at check stations by the refuge staff, volunteers, or partners. This harvest data, which is used to make decisions regarding regional hunt plans and programs, is shared with local state wildlife agencies, i.e., the Arkansas Game and Fish Commission. Enforcement officers are used to ensure compliance of federal/state hunting regulations and to ensure the safety and protection of refuge visitors and refuge resources. Presently, the station is dependent upon state wildlife officers and neighboring officers from other refuges.

Special conditions of the hunting program presently include the use of all-terrain vehicles (ATVs) along designated trails. Hunters with disabilities are presently allowed to extend their use of ATVs approximately 200 yards off of designated trails. The use of dogs is also approved during waterfowl, squirrel and rabbit, and raccoon and opossum hunts. Presently, field trials with dogs are allowed on the refuge and there is no limit or restrictions regarding the number of participants. Table 10 summarizes the types of scheduled hunts that were provided for the 2007-2008 hunting season on Felsenthal NWR.

Figure 10. Locations of public use areas on Felsenthal National Wildlife Refuge.



Scale 1:118,000

0 1 2 3 4 Miles

Fishing. Sport fishing is the top public use activity on Felsenthal. To the extent possible, the refuge promotes high quality and safe fishing experiences. The fishing program is compatible with Title 50 of the CFR. The fishing program (including frogging and craw fishing) is not managed to control the number of fishermen. About 60 percent of total consumptive public use on the refuge is fishing. The refuge has seven boat launching facilities with parking areas that provide lake and river access. Three additional boat launching facilities with parking areas are available off the refuge. Restroom facilities are only provided by the refuge at the visitor center during open hours. Adequate bank fishing opportunities are available. Anglers with disabilities are currently accommodated with accessible fishing piers. All legal state fishing methods are permitted on the refuge, including night fishing and jug fishing. Camping and ATV access are allowed for fishing. State fisheries biologists conduct occasional surveys within refuge waters to identify fish species diversity and habitat needs. The Felsenthal Refuge's waterways and lakes have historically received substantial fishing pressure; however, during the past 5-10 years fishing activities have declined due to an increase in dense submerged aquatic vegetation, which negatively affects both boat travel and fisheries resources. A Youth/Public Fishing Derby is held by the refuge staff annually at the Locust Ridge site.

Wildlife Observation and Photography. The fishing pier located adjacent to the Felsenthal Lock and Dam is a multipurpose structure used by refuge visitors for wildlife viewing and photography. This facility is well maintained and is accessible to visitors with disabilities. This multipurpose structure is strategically placed so as to allow the refuge visitor an opportunity to view and photograph various wildlife species. The Woodland Trail is a half-mile paved trail adjacent to the refuge headquarters. This small trail is also accessible to refuge visitors with disabilities. The Sand Prairie Trail is approximately a three-mile trail that raverses through an upland red-cockaded woodpecker habitat. The Sand Prairie Trail, however, is not accessible for visitors with disabilties.

Interpretative Programs. The primary themes interpreted on the refuge include the ecology of the area (bottomland hardwoods, wetlands); the native flora and fauna (such as the red-cockaded woodpecker); the mission of the U.S. Fish and Wildlife Service; and how (water and fire management, reforestation) and why the Service manages for fish, wildlife, plants, and their habitats. Felsenthal has two interpretive trails and most interpretation occurs on the refuge, either in or near the visitor center or at other specific refuge field locations. The refuge staff makes time to lead 30-40 guided tours upon request for academic and civic groups (schools, clubs, churches, etc.) each year.

Environmental Education Program. Minimal environmental education is done on the refuge due to the lack of public use staff. The majority of the refuge's existing programs fall under the interpretive program section.

A map of the visitor services opportunities on Felsenthal NWR is displayed in Figure 10.

Overflow National Wildlife Refuge

The Overflow Refuge headquarters office (a converted farmhouse) is located about 5 miles north of Wilmont, Arkansas and can be reached by taking U.S. highway 165 north to State Route 8 and then west on Route 8. Public Use at Overflow NWR has traditionally been and continues to be consumptive in nature, with duck, squirrel, and deer hunters making up the majority of the public users of Overflow (10,000-15,000 annually). Overflow NWR is located in a remote area with small rural communities around it. The refuge has only a three-person staff, whose primary assignment is management of the moist soil units on the refuge. Most of the refuge is a closed waterfowl sanctuary. A new wildlife observation blind near the refuge office has recently increased some nonconsumptive use by photographers and birdwatchers. There is no visitor contact area and no visitor center. The quality of the exhibits, trails, and visitor center at Felsenthal NWR lends itself much better to

interpretive programs than Overflow; however, the waterfowl sanctuary at Overflow is now vehicle-accessible, allowing a great opportunity for wildlife viewing. Since fishing is not allowed on Overflow, public use during the summer months is virtually nonexistent other than a few bird watchers. Like Felsenthal, priority should be given to developing an updated Overflow NWR Visitor Services Plan and managing for appropriate uses as an outcome of the comprehensive conservation planning effort. The locations of the current public use facilities at Overflow NWR are illustrated in Figure 11.

Hunting. Waterfowl hunting is the primary public use of Overflow NWR. Waterfowl can be hunted during the state hunting season, except during the September teal season. Waterfowl hunting is permitted every day of the week until noon only. The hunters are primarily local residents. The refuge's north sanctuary is closed to all waterfowl hunting and only open for other hunts from the opening of squirrel season through October 31. The south sanctuary is closed year-round. Deer hunting opportunities include an archery/crossbow season from October 1 through January 31 with a state bag limit, and first state muzzleloader season for zone 12 with a bag limit of one buck and one doe. Other than the muzzleloader season, there is no gun deer hunting on the refuge. Turkey hunting is limited to archery/crossbow hunting during the state spring season, with a bag limit of two bearded turkeys. Other game animals that can be hunted include woodcock, quail, squirrel, rabbit, raccoon, and opossum. Beaver, nutria, coyote, and feral hogs may be taken during any hunt with weapons legal for that hunt with no bag limits. ATVs are permitted on designated trails from September 8 through January 31 and on unmarked levees and field roads in the North Waterfowl Sanctuary from September 8 through October 31.

Fishing. Studies have shown that the fish population of the Overflow Refuge is contaminated with agricultural and industrial chemicals; therefore, at the present time the refuge is closed to fishing.

Wildlife Observation and Photography. Currently the refuge has one observation/photography blind located near the refuge office. The blind overlooks a moist soil unit that is managed to provide good waterfowl foods. Refuge visitors can utilize the ATV trails for access to good birding.

Interpretative Program. Overflow NWR has no formal interpretation program.

Environmental Education Program. Overflow NWR does not have an official staff educator. However, groups are welcome and arrangements for environmental education programs may be made by contacting the refuge headquarters in advance.

Oakwood Unit

The Oakwood Unit has no developed public access points. Unsupervised public use is not permitted, and the entrances are gated and signed. Because of the unit’s relatively small size and no public access (private land has to be crossed to reach the refuge), there is no hunting program.

Figure 11. Locations of public use areas on Overflow National Wildlife Refuge.

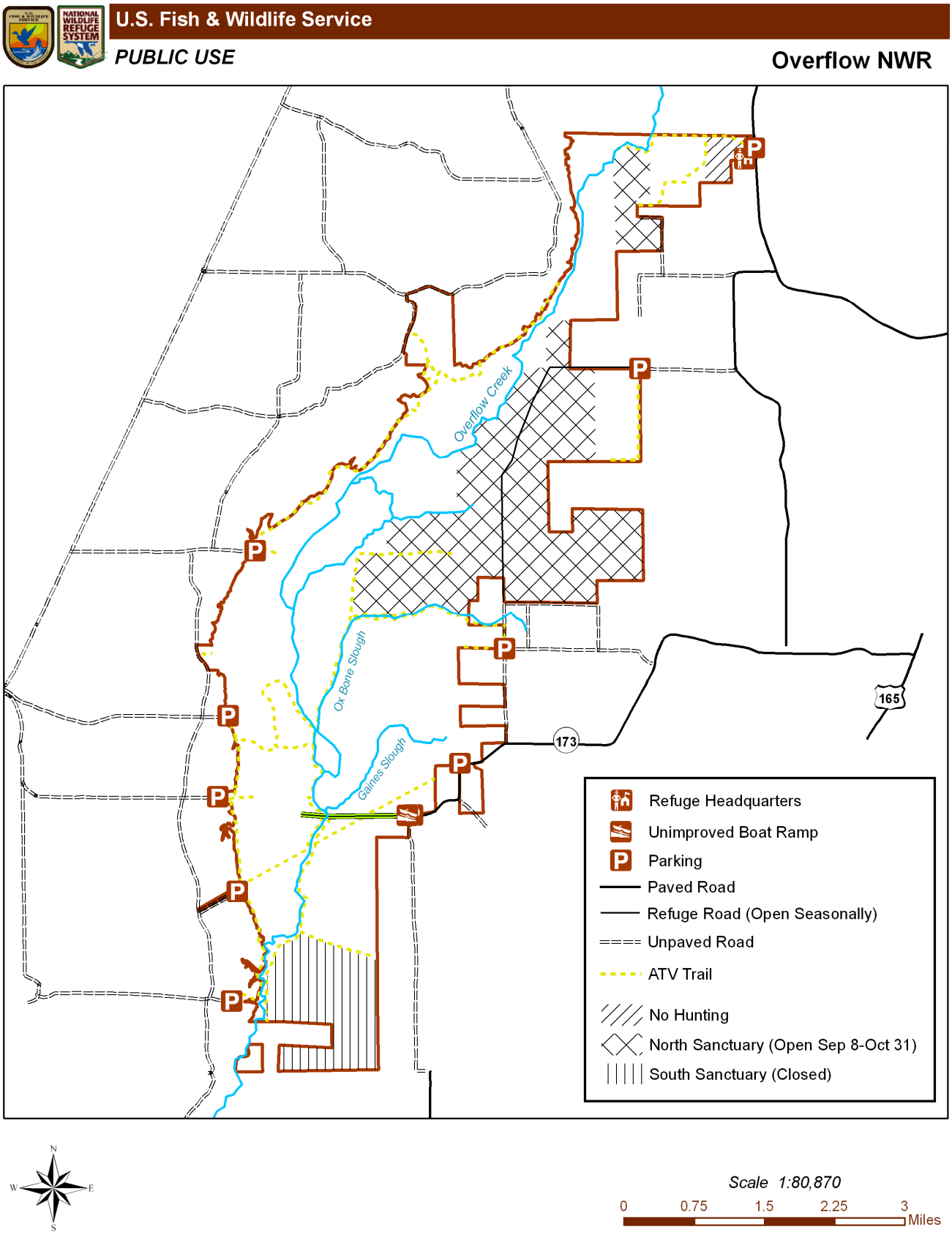


Table 10. Types of hunts provided during the 2007-2008 hunting season at Felsenthal National Wildlife Refuge.

Duck, Goose and Coot	State Duck and Teal Season	Hunting ends at noon each day. Only portable blinds are permitted. All duck hunting equipment, blinds, boats, guns, decoys, etc., must be removed by 1:30 pm each day either to a designated area or from the refuge. Closed during quota deer hunts. Unlawful to discharge or possess more than 25 shotshells per day. September teal season shooting hours are from sunrise until noon.
Woodcock	State Season	Closed during quota deer hunts.
Squirrel and Rabbit	9/8/2007 - 1/31/2008	Dogs allowed December 1, 2007 - January 31, 2008. Closed during quota deer hunts.
Quail	11/1/2007 - 1/31/2008	Closed during quota deer hunts.
Raccoon and Opossum	Sunrise 11/17/2007 - 1/31/2008	Use of dogs required during hours of darkness. Closed during quota deer hunt.
Deer Archery/Crossbow (Zone 220)	10/1/2007 - 1/31/2008	Either sex for entire season, state bag limit applies. Closed during quota deer hunts. See legal buck definition.
Deer (Muzzleloader) (Zone 220)	10/12-13/2007	Quota permit required. **Bag limit: one buck and one doe.** Archery, crossbow and muzzleloader permitted. See legal buck definition.
Deer (Gun) (Zone 220)	11/2-3 and 11/9-10/2007	Quota permit required. **Bag limit: one buck and one doe.** Archery, crossbow and muzzleloader permitted. See legal buck definition.
Turkey (Spring) (Archery/Crossbow) (Zone 220)	Spring State season for Turkey Management Zone 9, 2008	Closed during quota gun turkey hunts. Two bearded turkey. Fall archery season closed.
Turkey (Spring) (Gun) (Zone 220)	3/29-30/2008 (youth hunt) 4/10-12, 4/17-19/2008 (adult hunt)	Quota permit required. Bag limit one bearded turkey. Youth hunt restricted to youths, under 16 years of age (age at opening of state-wide Turkey season 2008) accompanied by one adult. For the other quota turkey hunts, no one may accompany permit holder while hunting. **Turkeys must be checked at designated stations listed in state turkey hunt regulations.**
Trapping	Sunrise 11/17/2007 - 1/31/2008	Special refuge permit required and available at refuge office. Closed during quota deer hunts.
Beaver, Nutria, Feral Hogs, Coyote	Any refuge hunt	May be taken during any daytime refuge hunt with weapons legal for that hunt. No bag limit. Live hogs may not be transported.

PERSONNEL, OPERATIONS, AND MAINTENANCE

Staffing

The Felsenthal NWR staff includes 15 full-time members: the Project Leader; the Deputy Project Leader; one Biologist; one Forester; one Park Ranger (Public Use); one Fire Management Specialist; three Forestry Technicians (Fire); two Law Enforcement Officers; an Administrative Officer; an Administrative Support Assistant; one Equipment Operator; and one Heavy Equipment Mechanic.

Volunteer groups also help the refuge by spending many hours assisting with refuge tasks. The "Arkansas City Gang," in particular, has logged thousands of hours on the refuge during the past few years. The volunteers are recognized for their contributions to the refuge at an annual banquet. Another volunteer support group, called the "Friends of Felsenthal," is also active in raising needed funds for developing facilities and promoting best management practices on the refuge. Some examples of their work include the construction of accessible fishing piers for visitors with disabilities, helping the refuge in its invasive aquatic plant management program, and assisting recovery efforts for the red-cockaded woodpecker.

The Overflow NWR staff includes four full-time members: the Refuge Manager, a Private Lands Biologist, a Biological Science Technician, and an Engineering Equipment Operator. In addition, one part-time Biological Technician is employed. Individual volunteers also provide many valuable services on the Overflow Refuge, such as monitoring the migration of Monarch butterflies, beaver trapping, trail maintenance, conducting waterfowl counts, etc.

Funding

Felsenthal and Overflow NWRs are part of a larger complex of refuges that include Pond Creek NWR in the South Arkansas National Wildlife Refuge Complex. Funding is received as part of the South Arkansas Refuge Complex's funding allocation. In fiscal year 2008, the budget for the Felsenthal and Overflow refuges totaled $2,031,500.00.

Facilities

Felsenthal NWR has a good base of facilities and equipment to support management operations for the 65,000-acre refuge. The facilities include an office and visitor center, shop facility, fire cache, wood shop, and two covered storage buildings for equipment. The refuge has approximately 25 miles of maintained roadways, 8 boat ramps and adjacent parking areas, 10 campgrounds, and a 15,000-acre permanent pool with an adjacent 21,000-acre greentree reservoir.

Overflow NWR has a modest complement of facilities. Facilities on this refuge include an office, shop facility, 7.5 miles of roadway and several adjacent parking areas. The refuge also has 1,170 acres of moist soil units, an annually flooded 4,000-acre greentree reservoir, and approximately 1,464 acres of cropland.

The Overflow Refuge also has the Oakwood Unit under its management. The 2,263-acre Oakwood Unit represents the largest contiguous tract of land transferred to the Service by the FmHA. There are no facilities located on the Oakwood Unit; it has only approximately 4.5 miles of roadway and 800 acres of moist soil units. The remainder of this unit has been reforested back to hardwoods. This unit is closed to public access.

III. Plan Development

INTRODUCTION

Development of the Draft Comprehensive Conservation Plan and Environmental Assessment (CCP/EA) for Felsenthal and Overflow national wildlife refuges was initiated in October 2007 and is scheduled for completion by September 2010. The planning team responsible for the development of the draft was established in January 2008. It includes natural resource management professionals representing both Felsenthal and Overflow NWRs, regional Service staff, and the Arkansas Game and Fish Commission (AGFC) (see Appendix K, List of Preparers). The Service had previously established a biological review team for Overflow NWR with representatives from the same agencies that conducted an onsite evaluation and completed a Biological Review Report. Individual visitor services review teams were established for Felsenthal and Overflow NWRs that presented recommendations to the refuge staff and prepared a Visitor Services Review Report in September 2007 (USFWS 2007). Felsenthal NWR's Biological Review was held in June 2008 and the report was completed in December 2008.

Public input to the development of this draft plan was obtained, in part, through five public scoping meetings held in four different counties, Ashley, Bradley, Desha, and Union counties, Arkansas during June and July 2008. These public scoping meetings were attended by approximately 35 stakeholders. Both written and verbal comments were received from stakeholders. The comments received during the public scoping process are listed in Appendix D, Public Involvement.

In identifying key issues to be addressed during the planning process, the planning team considered recommendations from the biological review and visitor services review reports; comments received through the public scoping meetings; and input from open planning team meetings, comment packets, and personal contacts of planning team members. In addition, the team considered opportunities for coordination with other relevant conservation plans (see Chapter II, Regional Conservation Plans and Initiatives); applicable legal mandates (see Appendix C, Relevant Legal Mandates and Executive Orders); the purposes of Felsenthal and Overflow NWRs as well as the mission, goals, and policies of the National Wildlife Refuge System as a whole; and evaluations and documentation required by the Service's procedures for refuge planning (see Appendix E, Appropriate Use Determinations; Appendix F, Compatibility Determinations; and Appendix H, Wilderness Review).

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

The planning team identified a number of issues, concerns, and opportunities related to fish and wildlife protection, habitat management and restoration, visitor and educational services, and refuge administration. The issues and concerns are based on the professional judgment of the team; on recommendations and discussions with personnel from other conservation agencies and refuges arising out of reviews of both Felsenthal NWR and Overflow NWR biological and visitor services programs; and comments from the five public scoping meetings. The key issues included water management; forestry management; greentree reservoir management; threatened and endangered species management; migratory bird and waterfowl nesting habitats; hunting and fishing program management; invasive species of plants and animals; refuge access; law enforcement; and expanding environmental education and interpretation programs. The planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans.

All public and advisory team comments were considered. However, some issues that are important to the public are beyond the scope of the Service's authority and cannot be addressed within this planning process. The team did consider all issues that were raised throughout the planning process, and has developed a plan that attempts to balance the competing opinions regarding important issues. The team identified the issues that, in its best professional judgment, are most significant to the refuge. The significant issues are summarized below.

FISH AND WILDLIFE POPULATION MANAGEMENT - FELSENTHAL AND OVERFLOW NWRS

Threatened and Endangered Species

The protection of threatened and endangered plants and animals is an important responsibility delegated to the Service and its national wildlife refuges. Federal threatened and endangered species are thought to use, or have the potential to use, Felsenthal and Overflow NWR. These include the red-cockaded woodpecker (RCW) and the least tern. Felsenthal NWR contains one of the highest concentrations (per acre of available habitat) of RCWs in Arkansas. A total of 9,000 acres of suitable habitat is treated specifically for RCW management. There are currently 11 active clusters on the refuge, with an average of 30 young being produced annually. Although monitoring reveals that young RCWs are being produced on the refuge on an annual basis, the increase in population numbers do not seem to be occurring at the rates expected.

Invasive and Nuisance Species

An "invasive species" is defined as a species that is nonnative (or alien) to the ecosystem under consideration, and whose interdiction causes or is likely to cause economic harm, environmental harm, or harm to human health (Executive Order 13112). These species are normally introduced by direct or inadvertent human actions.

Both plant and animal nuisance and invasive species currently occur on the refuges. Animal species such as beaver and feral hogs compete with native species for limited food supplies and can be destructive to habitats. Since beavers can be extremely crippling to aquatic habitats, control is crucial. Removal of both beaver and hogs has been attempted by opportunistic removals by refuge staff and hunting/trapping programs offered to the public. Several comments were received from the public wanting to expand the hog hunting opportunities on both refuges. The refuges also identified the need for more aggressive measures to control both beavers and hogs.

The nuisance and invasive plants found on Felsenthal are primarily aquatic vegetation species and include fanwort, hydrilla, American lotus, water hyacinth, and giant salvinia. This vegetation covers up to 75% of Felsenthal's water surface by mid-summer. Several comments mentioned the need to control aquatic vegetation and the need to study the reduction of native fish species within the refuge area where once viable populations existed. Another issue identified was the need to control pine infiltration from hardwood stands in Overflow NWR. Because of the opportunistic and resilient nature of these invasive plant species, they have thrived.

Resident Wildlife

While the Service's primary goal is the protection of federal trust species, the refuges' purposes include improving natural diversity of resident fish and wildlife species. Therefore, it is the responsibility of the refuges to manage resident wildlife within the refuge boundaries. This management needs to be performed in conjunction with, and not to the detriment of, migratory birds, shorebirds, and wading birds within the refuge. An array of wildlife species indigenous to the

Lower Mississippi River Ecosystem inhabits both Felsenthal and Overflow NWRs. The most widely recognized species include black bear, white-tailed deer, bobcat, coyote, river otter, raccoon, gray fox, red fox, beaver, mink, swamp rabbit, cottontail rabbit, eastern gray squirrel, fox squirrel, opossum, muskrat, and skunk. Resident reptiles and amphibians include alligators, various snakes, frogs, skinks and turtles.

Issues concerning resident wildlife that were identified included the decrease in turkey and quail populations thought to be due to fire ant infestation and nest predation by mammals. Also, the overpopulation of mid-sized mammals such as foxes, bobcats and skunks was seen as an issue.

Migratory Birds

A primary purpose of the refuges is to provide wintering and nesting habitats for migratory and resident waterfowl, wading birds, and migrating song birds. The operation and management of the refuges provide for the basic needs of these species, including feeding, resting, and breeding. Management measures on Overflow NWR include working with cooperative farmers for planting food and the moist soil management of water management units that cater to a variety of different species. Comments from the biological review team and the public expressed a desire to support and expand these efforts. A major issue facing the refuges is the reduction in migrating waterfowl utilizing the refuges. Possible reasons for this could be mild winters in the northern U.S. and/or the reduction in food and critical habitats locally. Several comments were made that the Felsenthal Pool levels should be evaluated and a water management plan developed to improve waterfowl use and diversity on the refuge.

HABITAT MANAGEMENT - FELSENTHAL

Greentree Reservoir

Felsenthal NWR is home to the world's largest greentree reservoir (GTR) consisting of the 15,000-acre Felsenthal Pool that can be more than doubled to 36,000 acres during wintertime flooding. Flooding of the GTR usually begins in late November with expectations that water levels will reach desired levels by the end of December. The water levels are then allowed to slowly recede until they reach desired drawdown levels in the late spring. An issue identified by both the refuge staff and the public was the need to reevaluate the water manipulation schedule for the GTR and modify it as appropriate to provide flexibility and support restoration of desirable tree species in the GTR, control invasive aquatic vegetative species, and accommodate approved visitor service opportunities. A water management plan is needed to support this effort.

Forest Management

Felsenthal NWR has a very active forest management regimen that includes prescribed burning, thinning, regeneration, and stand improvement as some of the techniques used to enhance and maintain optimum habitat conditions. Several issues were brought to light in both the internal and public meetings concerning the current forest habitat management on the refuge. Many local stakeholders would like to see the RCW management practices held to a minimum to provide more hardwood stands and to provide better habitat for resident wildlife and migratory Neotropical birds. The RCW recovery plan currently calls for additional RCW clusters on the refuge. Another issue is the pine infiltration into the hardwood stands.

HABITAT MANAGEMENT - OVERFLOW

Moist Soil Water Management

Moist soil management has been practiced on Overflow NWR since the late 1980s when the Service began acquisition of croplands. Planted millet and other cultivated wildlife foods are not considered to be moist soil management in its purest form. The Oakwood Unit of Overflow also conducts moist soil management activities.

The 15 water management units are managed to control water depths and to cater to resident and migratory waterfowl, shorebirds, and wading birds. Habitat management on the refuge includes planting grasses and trees to provide food and nesting resources, the cooperative farming adjacent to the unit to provide food for waterfowl, and some prescribed burning to control invasive plants and underbrush. One of the major issues with these water management actives is their laborious nature and with limited staff the management is also limited. Water quality issues, primarily due to high chemical concentrations, siltation and beaver dam placement, are a major problem on the refuge and are the primary reasons that fishing has never been allowed.

Forest Management

At this time, there is no active Forest Habitat Management Plan in place for Overflow NWR. In the late 1980s a timber inventory was completed by a group of Service foresters mostly from adjacent states in the region. The forested area was compartmentalized and the resulting data provided a source for the forestry staff at Felsenthal to develop a forestry management plan. This was completed by the administrative forester and will be implemented with the adoption of the CCP.

Since 1991, there have been three small logging operations. This activity induced no small amount of local interest. Issues associated with forest management have been identified as the need to control pine infiltration and the need for a Forest Management Plan, as indicated above.

RESOURCE PROTECTION - FELSENTHAL AND OVERFLOW

In addition to their biological assets, the two refuges have cultural sites relating to human settlement that date back as far as 5,000 years ago when the Caddo Indians occupied the area and hunted, fished and trapped in places that are still popular for these activities today. Several archeological investigations have been performed over the years on refuge lands and have produced artifacts and evidence that range from the Caddo culture habitation to more modern cultures. These resources are not currently featured as public use areas due to the likelihood of theft and other adverse effects. It is unlikely that these areas will be open to the public. However, with the increased demand for public recreation and the economic value of artifacts, it may be necessary to increase the frequency of law enforcement patrols in these areas. Several areas within and adjacent to the refuge(s) boundaries are threatened by illegal and uncontrolled access and wildlife habitat disturbance. This adds a degree of complexity to resource protection. Another issue is the lack of documentation of the resources.

VISITOR SERVICES - FELSENTHAL AND OVERFLOW

Hunting

As expressed in the public scoping meetings, hunting and fishing opportunities on the refuges are of great public interest. The hunting program at Felsenthal National Wildlife Refuge is managed via quota hunts for white-tailed deer and turkey. Quota hunts restrict the number of hunters eligible to

participate in these hunts. Waterfowl hunting is the primary public use of the Overflow Refuge. Waterfowl can be hunted during the state season except during the September teal season.

Public comments expressed interest in expanding hunting opportunities by expanding the quota hunt days from two to three and providing more opportunity for hog hunting. Several comments expressed the need to reevaluate the refuges' hunt management plans, stating hunt start times, bag limits, and hunt durations as issues. Low turkey and quail populations were also considered concerns.

Fishing

Sport fishing is the top public use activity on Felsenthal NWR. To the extent possible, the refuge promotes quality and safe fishing experiences. Overflow NWR, on the other hand, does not allow fishing due to water quality issues like mercury and toxic chemical issues, agricultural runoff and increased turbidity issues. Water quality is also an issue at Felsenthal and primarily stems from industrial pollution and invasive aquatic vegetation. Several stakeholders requested the need to control aquatic vegetation through the introduction of aquatic species to target vegetation. Another option was the periodic drawdown of the Felsenthal Pool to curtail growth of the vegetation. The public also expressed the need to reduce or eliminate fees associated with commercial fishing. The quality of the recreational fishery on the refuge could be enhanced by active management, in cooperation with the U.S. Army Corps of Engineers (USACE), of water level and flow conditions, water quality, and fish community composition.

Wildlife Observation and Photography

The principal opportunities identified to improve wildlife observation and photography for Felsenthal NWR was to develop an auto tour route along an old tram bed in Sand Prairie Trail or along Shallow Lake Road. There also may be opportunities to improve wildlife viewing by selectively managing vegetation and food plots in some areas adjacent to refuge roads.

The principal opportunities identified to improve wildlife observation and photography for Overflow NWR was to open a wildlife drive to cars from April to November and to install two observation towers. There also may be opportunities to improve wildlife viewing by selectively managing vegetation and food plots in some areas adjacent to refuge roads. A stakeholder also expressed the need to eliminate fees for commercial photography conducted on the refuges.

Environmental Education and Interpretation

The refuges do not have a Park Ranger (Visitor Services) position; environmental education and interpretation activities are limited by the workloads of existing staff. However, even with this constraint, the refuges could improve environmental education opportunities by developing a teacher activity kit and a set of self-guided activity lessons for teachers, and by partnering with local schools to involve their students in developing environmental education opportunities.

To the extent possible, the refuges should seek opportunities for involvement with environmental educators from nearby state parks and USACE recreation areas, and should identify community-based outreach activities to enhance communication with offsite audiences.

If sufficient staffing becomes available, it would be beneficial to develop an environmental education center on the refuges, in partnership with stakeholders.

Law Enforcement

The demand for recreation access and poaching and vandalism problems encountered by the refuges have prompted a recommendation for additional law enforcement presence on the refuges.

Staffing Needs

Additional staffing, funding, and facilities are needed to meet the goals and visions for both refuges over the next 15 years. This plan details these needs by establishing goals, objectives, and strategies.

Wilderness Review

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The results of the wilderness review are included in Appendix H.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making. But first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the National Wildlife Refuge System Improvement Act of 1997 is for the Service to maintain the ecological health, diversity, and integrity of refuges. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The Service has identified six priority wildlife-dependent public uses. These uses are hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation.

Described below is the proposed comprehensive conservation plan (CCP) for managing the Felsenthal and Overflow national wildlife refuges over the next 15 years. This proposed management direction contains the goals, objectives, and strategies that will be used to achieve the refuges' vision.

Three alternatives for managing the refuges were considered:

A. Current Management (No Action Alternative)
B. Enhanced Biological and Visitor Services Management (Proposed Alternative)
C. Enhanced Biological Management

Each of these alternatives is described in the Alternatives section of the Environmental Assessment. The Service chose Alternative B, "Enhanced Biological and Visitor Services Management," as the proposed management direction. This alternative best meets the goals, objectives, and strategies expressed by the planning team, the refuge staff, governmental partners, and the public.

Implementing the proposed alternative will result in the restoration and improvement of refuge resources needed for wildlife and habitat management, while providing opportunities for a variety of additional compatible wildlife-dependent recreation, education and interpretive activities. Alternative B aims to increase the knowledge base of the refuges by developing monitoring plans and programs. Additionally, this alternative largely focuses on the needs of threatened and endangered species of concern, and federal trust species. This alternative would also allow the two refuges to provide additional staffing that would provide support for wildlife and habitat management, visitor services and law enforcement protection that adequately meets the demands of the refuges. The proposed alternative also focuses on issues that are detrimental to wildlife and habitats, such as invasive, exotic, and/or nuisance plant and animal species and climate change. Visitor services plans would be developed to expand public use facilities and opportunities on the two refuges.

VISION

The South Arkansas National Wildlife Refuge Complex provides a diversity of habitats for wintering waterfowl, migratory birds, threatened and endangered species, and resident wildlife, and provides enhanced wildlife-dependent public use opportunities. The Complex protects, manages, and restores an intricate system of rivers, creeks, sloughs, buttonbush swamps, and lakes throughout a vast bottomland hardwood forest that gradually rises to an upland forest community.

The Complex will continue to serve the American people by continuing opportunities for compatible, wildlife-dependent recreation such as hunting, fishing, wildlife photography and observation, as well as environmental education and interpretation. In addition, the Complex will seek partnerships that promote environmental stewardship, foster research opportunities to enhance resource management and restoration efforts, and protect historical and cultural resources of the Complex.

GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies presented are the Service's responses to the issues, concerns, and needs expressed by the planning team, the refuge staff and partners, and the public and are presented in hierarchical format. Chapter V, Plan Implementation, identifies the projects associated with the various strategies.

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge System Improvement Act of 1997, the mission of the National Wildlife Refuge System, and the purposes and vision of Felsenthal and Overflow national wildlife refuges. The Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

Goal 1. Protect, maintain, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within southern Arkansas in a manner that supports national and international treaties, plans, and initiatives.

Discussion: Felsenthal and Overflow NWRs support a diversity of wildlife species common to the Coastal Plain and Mississippi Alluvial Plain of Arkansas. Most of the wildlife that live on the refuges is found typically in bottomland hardwood forests. Each individual species would have the same general requirements in that they require food, water, and cover to survive. However, the particular food and cover requirements of a given species are often very specialized. The specific habitat needs of each species vary in some degree, although many different animals may occupy the same general area. A diversity of habitats tends to encourage and support a diversity of wildlife species.

Felsenthal National Wildlife Refuge

Objective 1.1: Threatened and Endangered Species - Red Cockaded Woodpecker: Over the 15-year life of the CCP, continue to support threatened and endangered species through surveys, habitat management, research, and recovery.

Discussion: During 2007, Felsenthal NWR was home to 11 active colonies of red-cockaded woodpeckers (RCWs), a number that has remained relatively constant (11 to 14 colonies) over the last few years. The red-cockaded woodpecker was listed in the *Federal Register* as endangered in 1970 (35 FR 16047), and received federal protection under the Endangered Species Act of 1973, as amended. The red-cockaded woodpecker has high priority in refuge management.

Strategies:

- Reach or exceed 22 active RCW clusters.
- Complete an RCW Management Plan.
- Maintain a wildlife biologist on staff.
- Evaluate whether RCW habitat can be improved through better control of sprouting hardwood rootstocks in suitable nesting and foraging habitat (need fire monitoring plan).

Objective 1.2: Threatened and Endangered Species - Red Cockaded Woodpecker: Resume intensive RCW nest monitoring of all known sites in 2009 to document status of RCW population and continue over the life of the CCP.

Strategies:

- Visit all clusters one time per week to survey for nesting activity beginning April 1-July 15.
- Strive to band 100% of nestlings at 7-10 days old.
- Determine sex of fledglings at 17-20 days in cavity, using tree-top peeper scopes.
- Complete fledge checks at 24-27 days old.
- Quantify the use of mixed pine-hardwood stands by RCWs using GPS-based tracking features, with active tracks uploaded into the refuge GIS system.
- Develop a refugewide RCW nesting database to quantify current-year data.
- Establish a refugewide RCW Population Trends database to quantify long-term data as far back as good data is available.
- Monitoring for potential breeding groups (100%) and cluster activity status (100%) should be conducted annually.

Objective 1.3: Threatened and Endangered Species - Red Cockaded Woodpecker: Within 5 years of completion of the CCP, identify current and desired future conditions in pine types on the refuge, and undertake management activities over the next decade to carry the refuge pine stands from the current condition to the desired future condition.

Discussion: This woodpecker prefers open, park-like timber stands where it drills nesting cavities in mature pine trees. The RCW prefers mature, older age, open canopy pine stands with low ground cover of grasses and forbs. Its decline has been traced to the loss of older age, open pine forest in the South, a fire-dependent ecosystem to which the RCW has adapted. Because fire is a historic disturbance agent and is critical to the continued existence of the RCW's habitat, forest management practices such as selective cutting and intensive prescribed burning are the primary management tools used to improve and maintain a home for this endangered bird. In addition, in upland areas, trees with cavities are marked with white bands to aid identification and protection, and artificial nest inserts are placed in mature pine trees to supplement natural cavity trees and to encourage establishment of new colonies.

Strategies:

- Delineate and assign foraging partitions for each managed cluster, including active, inactive clusters, and recruitment clusters.
- Uniquely identify each managed cluster and GPS all cavity trees.
- Complete spatial analysis to determine location of recruitment clusters and foraging partition for each cluster.

- Identify activities needed to connect suitable habitat for RCW, including analysis of dispersal from suitable stands on the eastern side of the refuge with suitable stands on the western side.
- Survey 1/3 of all upland pine stands on an annual basis for new cavities and clusters.
- Inventory RCW habitat (timber cruise data).

Objective 1.4: Threatened and Endangered Species - Red Cockaded Woodpecker: Over the life of the CCP, establish a RCW translocation program on the refuge to enhance the social structure of 8 active clusters while supporting recovery plan goals.

Strategies:

- Create eight recruitment or reprovisioned active clusters to receive five pairs of translocated RCWs.
- Ensure that RCW habitat is in proper condition to meet requirements necessary to receive translocated RCWs.
- Prior to nesting season, capture and band adult birds in preparation for receiving translocated birds.

Objective 1.5: Threatened and Endangered Species - Red Cockaded Woodpecker: Over the 15-year life of the CCP, continue predator removal programs to reduce the average number of unsuccessful nesting attempts due to predator issues through out the refuge RCW population.

Strategies:

- Remove southern flying squirrels in active cavities and recruitment cavities/clusters prior to nesting season and translocation efforts.
- Retain snags in clusters when possible.
- Monitor the success of predator control efforts.

Objective 1.6: Threatened and Endangered Species - Red Cockaded Woodpecker: Annually coordinate and collaborate with neighboring landowners to stabilize the RCW population in the geographic area.

Strategies:

- Participate in annual Southern Arkansas-Northern Louisiana RCW Stakeholders meetings.
- Develop partnership agreements with adjacent properties to facilitate information exchange and assistance.

Objective 1.7: Landbirds: Expand landbird species monitoring surveys over the 15-year life of the plan to include winter woodcock surveys, late spring neotropical bird surveys, and summer breeding bird surveys to document the presence and absence of known birds species, as well as document new species use on the refuge.

Discussion: Felsenthal NWR has a large and diverse population of songbirds and is a very important stopover and/or wintering site for many species of nongame migratory birds that pass through this area both to and from their breeding grounds. Currently the refuge, with the aid of partners, conducts Christmas bird counts and Neotropical bird point counts annually. The Audubon Society's Christmas bird counts of years past have estimated that approximately 125 species were present on the refuge

during this time of year. Felsenthal NWR also provides important habitat for forest-breeding birds, many of whose populations have been in decline nationwide in recent years. Due to the decrease in migration numbers over the past several years and the destruction of habitat due to natural disasters, it is important to increase monitoring to determine the overall health of the ecosystem. Additional monitoring will help assess the need for habitat recovery, allowing the refuge staff to actively adapt habitat management strategies to focus on critical needs.

In addition to breeding songbirds in forested wetlands, the American woodcock is primarily a winter migrant, with localized breeding confirmed in Arkansas. Preferred woodcock habitats include alluvial floodplain forests and wetlands with well-developed sapling, shrub, vine, and cane understories, mixed with open fields and young forest stands on the uplands. Diurnally, woodcock probe for earthworms and other invertebrates in the moist soils of floodplains and wetlands; while nocturnally using openings, old fields and newly established forest regeneration areas for courting and display. Regarding the latter, such habitats are apparently available on the adjacent uplands on private lands (at least for the time being), and primary focus on managing habitats for breeding songbirds in forested wetlands should also provide excellent habitat conditions for American Woodcock.

Strategies:

- Conduct baseline surveys.
- When forest management decisions are made, establish bird surveys in stands that will be subjected to management in the near-term as well as stands that will not be managed in the near-term to track bird responses.
- Continue Christmas bird counts and point counts.

Objective 1.8: Waterfowl: Within 5 years, determine use of the permanent pool and greentree reservoir (GTR) from waterfowl surveys to determine and validate preferred management strategies.

Discussion: The Lower Mississippi Valley (LMV) ecoregion is an important ecoregion for migrating and wintering waterfowl in North America. Felsenthal NWR provides important foraging and resting (sanctuary) habitats within the LMV for these waterfowl and serves an integral role in a large, cooperative planning and habitat management effort known as the North American Waterfowl Management Plan (NAWMP).

Concern over waterfowl population declines in the 1980s resulted in establishment of the NAWMP, which focuses the attention of federal, state and private conservation groups on critical wintering and breeding areas. The Lower Mississippi Valley Joint Venture (LMVJV), which encompasses Felsenthal NWR, was selected as one of the wintering habitat focus areas. One of the first tasks faced by the LMVJV was to find a model or decision tool for determining how much habitat was needed, and a method for relating this objective to the population goals of the NAWMP. The solution was to consider wintering areas as responsible for contributing to the spring breeding population goals of the NAWMP proportional to the percentage of ducks historically counted in wintering areas (Loesch et al. 1994; Reinecke and Loesch 1996). In order to contribute ducks to spring breeding populations, wintering areas must provide sufficient habitat to ensure adequate winter survival. To quantify winter habitat requirements, the LMVJV had to identify limiting factors and they assumed foraging habitat was most likely to limit waterfowl populations in the LMV (Reinecke et al. 1989). These factors and planning procedures were applied to include the West Gulf Coastal Plain (WGCP) portion of the LMV.

Like many other bottomland areas with historic winter flooding, Felsenthal has a long and rich history of waterfowl use and hunting. With suitable conditions, the refuge overwinters large numbers of waterfowl, with mallards, gadwall, green-winged teal, and ring-necked ducks making up the bulk of the species composition. Felsenthal NWR lies within the Mississippi Flyway, which is one of the largest migratory bird travel routes in North America from the nesting grounds of northern Canada to the wintering grounds of the southern U.S. and Mexico. As previously stated, one of the main goals of Felsenthal NWR is to "provide high-quality wintering and resident waterfowl habitat, as well as quality habitat for other migratory birds." The refuge is especially tailored to meet this goal by being able to flood/manage the world's largest GTR, which consists of a 15,000-acre permanent pool with the ability to flood 21,000 acres above the permanent water, for wintering waterfowl and related wetland species. The refuge is currently performing weekly waterfowl surveys during the fall and winter months, in addition to avian influenza monitoring. Additional monitoring will help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Conduct biweekly waterfowl surveys from mid-November through February.
- Coordinate with the state to conduct aerial waterfowl surveys.
- Conduct avian Influenza monitoring.

Objective 1.9: Waterfowl: Annually conduct wood duck banding and maintain 25 nest boxes to support objectives of the Mississippi Flyway Council.

Discussion: Wood ducks are year-round residents in the forest lands of the southern United States, including Felsenthal NWR. Preferred habitats include forested wetlands, wooded and shrub swamps, tree-lined rivers, streams, sloughs, and beaver ponds. Wood ducks seek food in the form of acorns, other soft and hard mast, weed seeds, and invertebrates found in shallow flooded timber, shrub swamps, and along stream banks. They loaf and roost in more secluded areas and dense shrub swamps.

Wood ducks are cavity nesters, seeking cavities in trees within a mile of water. Brood survival is higher in situations where nests are close to water. Due to conversion of forest lands to urban sprawl, agriculture, some forestry practices, and competition for nest sites from a host of other species, the lack of natural cavities is known to limit reproduction. Nest boxes are commonly used to supplement natural cavities and increase local production of wood ducks. Box programs are not an end to all nesting problems. Wood duck nest boxes should be cleaned and repaired at least annually. Production can be increased by more frequent checks and cleaning of boxes, but this must be weighed with other time constraints. Refuges with active volunteer programs are often best equipped to adequately manage nest-box programs through the use of volunteer man-power.

Because wood ducks are secretive birds, it is extremely difficult to estimate populations and survival rates. Therefore, regional banding quotas, which are stepped down to individual states and stations to distribute banding throughout the range of the wood duck, have been established to determine harvest and survival rates. Felsenthal NWR has an annual preseason banding quota of 63 wood ducks, including 8 adult males, 14 adult females, 17 immature males, and 24 immature females. Importantly, efforts are currently underway to develop a national harvest strategy for wood ducks. Such a strategy requires that adequate preseason banding is conducted, annually, in order to provide crucial information needed to monitor harvest and survival rates. Therefore, it becomes essential that refuges and state agencies continue to meet banding quotas so that this important resource can be properly managed.

Felsenthal NWR supports a large population of resident wood ducks. The GTR, bottomland hardwood forest, and wood duck boxes provide suitable habitat to support a relatively large population of wood ducks. Additional monitoring and banding will help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Strive to meet annual preseason wood duck banding quota (by age and sex).
- Add one additional banding site.
- Annual records of wood duck banding and nesting box use should be maintained.
- All existing and any newly erected nest boxes should be mapped using GPS.

Objective 1.10: Wetland-dependent Birds: Over the 15-year life of CCP, initiate wading bird rookery surveys and general species occurrence surveys for representative managed wetland dependant birds and provide quality breeding and wintering habitat.

Discussion: The refuge boasts large populations of wading and marsh birds. Species such as great blue herons, green herons, little blue herons, great egrets, white ibis, wood storks and others are seen regularly on the refuge. Relatively large flocks of wood storks utilize the refuge during late summer with estimates of peak populations at around 500-700 birds. In addition, numbers of anhingas and double-crested cormorants increase during the fall months. Wading birds utilize the thousands of acres of shallow water in the Felsenthal Pool to forage and raise young. Numerous shorebirds such as greater yellowlegs, killdeer, common snipe and various sandpipers are observed annually. However, numbers of these species seem dependent upon the water levels falling at the appropriate times of year to provide suitable habitat. Currently there is little active management, including monitoring and surveys, taking place on the refuge for wetland-dependent birds. The implementation of monitoring will help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Conduct a vegetation survey to determine occurrence of forested wetlands that match desired forest conditions as defined in the Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group (2007) and how much does not match desired forest conditions.
- Conduct baseline surveys/inventory in these areas to determine species composition and densities before and after restoration.
- Implement surveys to identify long-legged wading bird rookery locations and monitor nesting activities.
- Provide for protective closures when colonially-nesting wading birds are found.
- Annually, conduct a reconnaissance survey of the pool during April or May for any potential emergent wetlands that could provide for nesting pied-billed grebes, king rails, and purple gallinules. If found, then consider these species in future pool management decisions.
- Restore historic range of variation in forest structure, following the requirements of songbirds, bats, and other priority species.

Objective 1.11: Raptors: Over the life of the CCP, coordinate monitoring of active eagle nests with the Arkansas Game and Fish Commission (AGFC) to determine changes in nest productivity throughout the refuge.

Discussion: Raptor species that use the refuge include the turkey vulture, black vulture, barred owl, screech owl, great-horned owl, American kestrel, red-tailed hawk, red-shouldered hawk, broad-winged hawk, northern harrier, Cooper's hawk and sharp-shinned hawk. In addition, ospreys are occasionally sighted and bald eagles have successfully nested for several years on the refuge. Currently the only active raptor monitoring taking place on the refuge is for bald eagle.

Strategies:

- Record any bald eagle nest building activity or established nest sites.
- Protect any nesting bald eagles from disturbance that could lead to nest abandonment.

Objective 1.12: Resident Wildlife: Over the 15-year life of the CCP, enhance habitat quality on 40,000 acres for resident game species to contribute to balanced species diversity and to allow for opportunities for recreational hunting.

Discussion: Many species of resident mammals inhabit the refuge, several of which are game species. These game species include the white-tailed deer, gray and fox squirrels, eastern cottontail and swamp rabbits, and several species of furbearers.

The white-tailed deer is the most pursued game mammal on the refuge. Felsenthal NWR has approximately 50,000 acres of suitable deer habitat to sustain the local deer herd. Most of the refuge is surrounded by commercial timber company lands, and the transitional "edge" habitat is very suitable for deer to move between densely covered pine plantations and the generally more open refuge forests.

Deer browse surveys may be used to monitor the deer herd and evaluate the habitat, and are a useful tool to the manager. Information gathered from browse surveys can indicate herd density and habitat quality. Management decisions may be made based on this information. Other surveys, including annual spotlight surveys and mast production surveys, are considered appropriate to conduct on Felsenthal NWR, as staff time allows. Additional monitoring will help assess the need for herd health management and habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Information collected from hunters is another valuable tool available to managers. Specifically, ages, weights, lactation rates and antler measurements of harvested deer should continue to be recorded to show trends of increasing or decreasing age/weight ratios and antler development. The deer harvest has been holding relatively steady recently at about 400-500 deer per year. Annual harvest is important for maintaining a quality herd and controlling the population. The current level of deer harvest is considered appropriate on Felsenthal NWR unless managers have an indication that the deer herd is negatively impacting the habitat (e.g., limiting hardwood regeneration) or deer herd quality and health deteriorates. Monitoring deer herd health is also important in maintaining a quality herd. Additional monitoring will help assess the need for herd health management and habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Continue to obtain biological data (age, weights, antler development, lactation, etc.) from refuge check stations during all refuge quota hunts.
- A deer herd health check should be conducted at least every 5 years by the Southeastern Cooperative Wildlife Disease Study (SCWDS) or AGFC in coordination with refuge staff. In addition, any sick deer found on the refuge should be reported to the SCWDS or AGFC.
- Set specific harvests objectives, monitor harvest and population trends, and then adjust harvests based on data in concert with AGFC to meet deer herd objectives.
- Use public hunting as the management tool to meet herd objectives.
- Continue to implement the refuge's Forest Habitat Management Plans to enhance forested habitats for deer.

Objective 1.13: Resident Wildlife - Turkey: Annually monitor turkey harvest and adjust as necessary to maintain a stable population on the refuge, in concert with the AGFC.

Discussion: Wild turkeys utilize both the upland pine/hardwood stands and bottomland hardwood areas of Felsenthal NWR. Staff observations, gobble counts, and brood survey data show a relatively stable population of turkeys on the refuge. The edge and mosaic of habitats created by these varying habitat types is ideal for turkey. Another benefit to wild turkeys on the refuge is the prescribed burning activities that are conducted in the upland forested areas. One problem with the management of wild turkeys on the refuge is that their reproductive and nesting success, along with survival, can be greatly affected by rapidly fluctuating spring/early summer flooding. Another issue is nest predation. The continuation of current monitoring and management activities will allow refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Continue to conduct annual turkey population surveys, in partnership with the AGFC.
- Continue to implement an active forest management program on the refuge, with priority species in mind.

Objective 1.14: Resident Wildlife - Black Bear: Over the 15-year life of the CCP, monitor black bears populations to determine if refuge is achieving a self-sustaining population of approximately 50 black bears.

Discussion: Felsenthal NWR and the surrounding lands in the Arkansas Gulf Coastal Plain once supported large numbers of black bears. Unregulated hunting and extensive habitat loss led to the extirpation of bears throughout the area by the early 1900s. Although occasional sightings of solitary bears had been reported in and around the refuge, sightings of females and cubs had not been documented and it seemed that reintroduction was necessary to facilitate the reestablishment of a viable black bear population in the area. Consequently, the Service and the AGFC proposed a project to translocate bears to Felsenthal NWR from White River NWR, where similar habitat and flooding conditions occurred.

Restoration of bears to the Felsenthal area can provide ecological benefits such as linking existing fragmented, isolated bear populations and reestablishment of the native ecosystem. Bear restoration to the refuge will provide benefits to humans such as wildlife viewing, photography, and hunting. Black bears are considered an umbrella species by some and may signal the quantitative health/condition of an ecosystem.

In 1999 and 2000, project cooperators conducted an outreach program to gauge public sentiment about the plan to restock black bears to southern Arkansas. A telephone survey of over 400 citizens living in a nine-county area around Felsenthal NWR showed that 72% of the respondents were favorable to the plan. Project cooperators also conducted six public meetings, where 85% of the attendees were in favor of the plan. Given the positive public support, the project cooperators began translocating bears in the winter and spring of 2000.

Between 2000 and 2007, 55 adult females and 116 cubs were moved to the restocking area. Today, study cooperators estimate that about 50 bears reside in and around Felsenthal NWR. Bait station surveys have been conducted since 2000 to document trends in bear numbers, and the bear visitation rates have been between 2 and 7% for the last 5 years. Bear den surveys to monitor reproduction have been conducted since 2000 and study cooperators have documented 8 litters produced in the release area, including Felsenthal NWR. Data suggest that the bear population is increasing and bears are colonizing southern Arkansas and the adjacent states of Louisiana and Mississippi.

Currently the refuge is doing very little to monitor bear activity on the refuge. The implementation of monitoring will help assess the need for both wildlife management and habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Monitor population trends and productivity through bait-station surveys and den/reproduction surveys until sustainability of populations established, then conduct mark-recapture studies to estimate bear population size.
- Coordinate bear management partnership with the AGFC.

Objective 1.15: Resident Wildlife - Reptiles and Amphibians: Within the 15-year life of the CCP, conduct a complete inventory of reptiles and ampibians, monitor populations, and protect priority species.

Discussion: A diverse array of reptiles and amphibians occurs on Felsenthal NWR, including many different species of frogs, snakes, turtles, and salamanders. This can be attributed to the large acreage of suitable habitat provided by the Felsenthal Pool and bottomland hardwood ecosystem, as well as a result of beaver impoundments and the wet areas that they create.

Alligators are occasionally observed by refuge staff and the public on Felsenthal NWR. Due to the fact that several thousand acres of shallow, brushy, remote wetlands exist on the refuge and are rarely traveled and nearly impossible to survey, there could be a greater number of alligators present on the refuge than the number of sightings supports. Primary limiting factors on this refuge would be seasonal flooding and relatively low temperatures experienced during the winter months, both of which could limit the amount of recruitment of young that occurs each year.

Currently there is little active management, including monitoring and surveys, taking place on the refuge for reptiles and amphibians. The implementation of monitoring will help assess the need for both wildlife population management and habitat improvement, allowing the refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Encourage and support further herpetofaunal surveys and inventories in collaboration with the Arkansas Game and Fish Commission and Arkansas Herpetological Society. Work with partners to conduct a baseline reptile and amphibian survey, targeting various habitat types across refuge lands for a comprehensive inventory.

Objective 1.16: Resident Wildlife: Upon completion of the CCP, coordinate monitoring of resident wildlife species with Arkansas Game and Fish Commission, Natural Heritage Commission, and nongovernmental organizations (NGOs), including the Audubon Society, to contribute to balanced species diversity refugewide.

Discussion: Population and habitat monitoring are an important component of resident wildlife management. Deer browse surveys may be used to monitor the deer herd and evaluate the habitat and are a useful tool to the manager. The information gathered through browse surveys can indicate herd density and habitat quality on which management decisions can be made. Other surveys, including annual spotlight surveys, can also be useful to evaluate deer use of the area. Annual mast surveys are a useful index to habitat condition as it relates to deer and also many other game and nongame species (e.g., deer, turkey, squirrel, black bear, rodents).

Nongame mammals readily seen on Felsenthal NWR (as well as Overflow NWR and the Oakwood Unit) include opossum and armadillo. Other, less readily seen nongame mammals include rodents and bats. Rodent and bat species which would be anticipated on refuge lands may include southern flying squirrel; marsh rice rat; fulvous harvest mouse; eastern harvest mouse; western harvest mouse; southern bog lemming; white-footed mouse; southeastern myotis; eastern pipistrelle; red bat; northern yellow bat; evening bat; and Rafinesque's big-eared bat. Of these, the Rafineque's big-eared bat, southeastern myotis, and eastern harvest mouse are currently recognized as Species of Greatest Conservation Need (Anderson 2006). No nongame mammal surveys have been conducted to date on refuge lands. Currently there is little active management, including monitoring and surveys, taking place on the refuge for nongame resident wildlife. The implementation of monitoring will help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Consider implementing annual hard mast surveys to index annual habitat productivity for a variety of mast-dependent wildlife.
- Monitor beaver populations and maintain, through management control, at population levels below that causing significant habitat damage.
- Conduct bat and small mammal occurrence surveys as feasible, in order to assess occupancy and use of Overflow NWR by priority species.
- Refuge structures/facilities planned for closure or removal should be surveyed for use as a bat roost site before closure/removal.
- Implement the refuge's Forest Habitat Management Plans to enhance forested habitats for resident wildlife.
- Conduct baseline surveys for small mammals.

Objective 1.17: Fish and Aquatic Resources: Over 15-year life of the plan, manage to improve habitat for fish and aquatic resources on the 15,000-acre permanent pool and approximately 3,000 to 4,000 acres of the Ouachita and Saline rivers and their tributaries and associated oxbow lakes.

Discussion: Fishing is Felsenthal NWR's primary public use, in terms of number of refuge visits. The lifeblood of the refuge's fishery production is the annual overflow and dewatering cycle courtesy of the Ouachita River. Overflow occurs during winter and spring, while the forest floor is dewatered during the summer and fall, with the river channel and refuge lakes holding water all year. Major species thriving in this environment are catfish and sunfish. Crappie, largemouth bass, and bluegill are very popular sport fishes. There are major concerns from the public and from AGFC fisheries biologists that the extensive aquatic plant infestation on the refuge is reducing the productivity of the fishery within refuge waters. Dense mats of submerged aquatic vegetation, such as fanwort and coontail, occur in up to 12,000 acres of the 15,000-acre permanent pool. This vegetation makes these areas virtually unusable by the public and devoid of fish during times of peak plant infestations (generally around the end of July). Fish dieoffs associated with oxygen depletion of the remaining habitat are commonly reported during the months of September and October each year, as decaying plant matter absorbs large amounts of available oxygen. Chemically treating aquatic vegetation has proven to be relatively effective; however, cost and logistic limitations of treating such a large area make this treatment option unfeasible. Biological treatments for this problem, such as introducing triploid grass carp, are in the planning stages. Currently most active management of fish and aquatic resources are performed by the Arkansas Game and Fish Commission in coordination with the refuge. Additional monitoring will help assess the need for additional management and habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Strive to maintain coverage of nuisance aquatic vegetation to less than 50% of the reservoir surface area, through triploid grass carp stocking, water level management, and herbicide treatments.
- Develop program to monitor nuisance aquatic vegetation coverage on the reservoir (ex. Semi-annual aerial surveys).
- Survey streams and rivers to identify aquatic "Species of Greatest Conservation Need".
- Survey streams and rivers to obtain baseline inventory data for mussels throughout refuge.

Objective 1.18: Inventory, Monitoring and Research Plan: Over the life of the CCP, conduct inventory, monitoring, and research to assess response to management and to track and assess refuge resource condition.

Discussion: The National Wildlife Refuge System Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife and plants on Felsenthal NWR. The Service's policy is to collect baseline information on key plants, fish, and wildlife, to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and to base management on biologically and statistically sound data derived from such inventory and monitoring (701 FW 2, Inventory and Monitoring of Populations).

The need for significantly increased emphasis on inventory and monitoring is closely linked to the process of adaptive management to better achieve objectives. Adaptive management is a system of adjusting management efforts using the best available knowledge and constantly seeking feedback from frequently monitoring resource response to management actions relative to stated objectives.

The effectiveness of management decisions to meet refuge objectives can be determined via monitoring and subsequent evaluation of results. These processes should be a high priority at the Felsenthal NWR. For these reasons, particular focus should be placed on GTR inundation levels, forested habitat condition, and wintering waterfowl habitat productivity at Felsenthal NWR.

Baseline inventories as a mechanism to understand the components of the refuge ecology are fundamental to developing a framework for an ecosystem approach to management. As cumulative habitat modifications and species declines across North America become more dramatic in the 21st century, it is increasingly important for national wildlife refuges, which often act as habitat anchors for wildlife species, to recognize and assess the status of a diversity of flora and fauna in addition to priority species defined by refuge purposes. Baseline inventory data serve to identify the occurrence and status of at-risk as well as common species on a refuge and as such can create recognition of opportunities for effective management and a point of comparison for future assessments. For these reasons, particular focus should be placed on baseline inventories for fish, mussels, reptiles, amphibians, bats and endemic prairie plants at Felsenthal NWR.

Strategies:

- Within 5 years of completion of the CCP, develop and implement an Inventory and Monitoring Plan.
- Collect and assess inventory and monitoring data which are relevant to and contribute towards assessment and decision-making regarding refuge management.
- Enhance refuge inventory and mapping capabilities through the use of Geographic Information Systems (GIS)—especially use capabilities shared with the Lower Mississippi Joint Venture Office.
- Provide refuge with adequate staff, including a Biological Technician position, equipment, and funding to acquire baseline inventory data on refuge resources and monitor fish, wildlife and plant responses to refuge management.

Objective 1.19: Climate Change: Over the life of the CCP, be responsive to evolving science and technology regarding climate change and implement the Service's climate change policy which will be outlined in a Climate Change Strategic Plan now in draft form.

Discussion: Global climate change poses risks to human health and to terrestrial and aquatic ecosystems. Important economic resources such as agriculture, forestry, fisheries, and water resources also may be affected. Warmer temperatures, more severe droughts and floods, and sea level rise could have a wide range of impacts. All these stresses can add to existing stresses on resources caused by other influences such as population growth, land-use changes, and pollution.

In addition to rising sea levels, the effects of climate change and global warming will be changes in weather/rainfall patterns, decreases in snow and ice cover, and stressed ecosystems. For the southeastern U.S. and the Felsenthal-Overflow region, this can mean extreme precipitation events; greater likelihood of warmer/drier summers and wetter/reduced winter cold; and alterations of ecosystems and habitats due to these changes in weather patterns—to name but a few possibilities. For example, a recent study of the effects of climate change on eastern U.S. bird species concluded that as many as 78 species of birds could decrease by at least 25%; while as many as 33 species could increase in abundance by at least 25% due to climate and habitat changes.

Strategies:

- Work with partners such as other federal, state and tribal agencies, conservation groups, and academic institutions on landscape conservation planning and design.
- Monitor and document changes in abundance and distribution of fish, wildlife, and plant species on the refuge.
- Monitor the refuge's flora and fauna for signs of new and/or increased rate of disease.
- Adapt management as necessary specifically to protect rare, threatened, and endangered plants and animals from the effects of climate change.

Overflow National Wildlife Refuge

Objective 1.1: Threatened and Endangered Species: Upon completion of the CCP, continue to support endangered species through surveys, habitat management, and research.

Discussion: Overflow NWR and the Oakwood Unit are within the historical range of the endangered ivory-billed woodpecker, though there are no recent confirmed reports of this species within this area. Nevertheless, credible reports during the last three years across the ivory-billed woodpecker's historical range (but particularly in Arkansas and Florida) suggests that the Service should consider the possibility that this species may persist in this area of Arkansas.

Although it is unlikely the species persists regularly (if at all) in the vicinity of Overflow NWR due to the historical loss of forested habitats during the mid-1900s, habitat conditions in this area that could support the species if it persists or is returning on refuge lands through a combination of natural and unnatural events (reforestation, forest maturation, hydrologic change and subsequent forest stress). Therefore, the potential exists for natural expansion of the species into this area or intermittent use, perhaps from further north in the heart of the lower White River system. Forest management could affect the productivity of habitat for ivory-billed woodpeckers. It is recommended that forest management plans on Overflow NWR incorporate the potential needs of the ivory-billed woodpecker, in order to best continue to provide potential habitat for the species should it exist in the area currently or have the opportunity to expand onto Overflow NWR.

The interior least tern was listed as an endangered species in the 1985 *Federal Register* in several states, including Arkansas. At the time of listing, census data indicated the interior least tern population at approximately 5,000 individuals. Interior least terns are known to occur along major river systems of the United States. These river systems include the Red, Rio Grande, Arkansas, Missouri, Ohio, and Mississippi river systems. This smallest of the North American terns nests in colonies on dry, exposed river islands and sandbars. Channelization, irrigation, and the construction of reservoirs and pools have contributed to the loss or reduction of much of the tern's nesting habitat in the major river systems throughout its range.

Interior least terns are known to nest on sandbars of the Arkansas River, which is near the Oakwood Unit, but there is no suitable nesting habitat on the refuge. The refuge also does not provide significant foraging habitat; however, interior least terns have been occasionally documented at the Oakwood Unit. No resource management or public use issues are identified for this species and no management strategies are proposed. Currently there is little active management, including monitoring and surveys, taking place on the refuge for threatened and endangered species because no evidence exists that any such species use the refuge. Coordination with partners like the Service's Ecological Services Division and the Arkansas Game and Fish Commission will allow the refuge staff to actively adapt habitat management

strategies to focus on critical needs should it be discovered that any threatened and endangered species use the refuge.

Strategy:

- Begin coordination with the State of Arkansas for state species of concern.

Objective 1.2: Landbirds: Expand landbird species monitoring surveys over the 15-year life of the plan to include winter woodcock surveys, late spring Neotropical bird surveys, and summer breeding bird surveys to document presents and absents of known birds species as well as document new species use on the refuge .

Discussion: Within the Lower Mississippi Valley, the two greatest issues affecting forest-breeding birds are forest fragmentation and poor habitat quality. Forest fragmentation is both a landscape-scale and local-scale issue. The existence of the forested habitats of Overflow NWR stands out at a landscape scale as a significant patch of largely bottomland hardwood habitat within the largely cleared landscape. On the local scale, within Overflow NWR, management since acquisition has emphasized minimizing forest fragmentation through significant reforestation (2,020 acres) of previously cleared areas. Within patches and without perturbation, such as occurs through active silvicultural management or natural disturbances (e.g., tornadoes), mature forests tend to develop closed overstory canopies that impede light penetration into the forest. Limited light penetration results in sparse ground, understory, and midstory vegetation. Many forest birds are dependent on dense understory and ground vegetation for nesting, foraging, and escape cover. Thus, silvicultural harvests that increase light penetration, while maintaining an overstory canopy, are beneficial to many forest bird species of high conservation concern.

Overflow NWR has approximately 11,000 acres of forested habitat, of which 210 acres have been thinned since acquisition of the property (1994). The refuge does not, however, currently have a forest management plan. A high priority for the refuge is to develop and implement a forest management plan. This would require evaluation of forest resources and bird communities by forest inventory and bird monitoring. After such inventories, a forest management plan could be developed in consideration of recent work done by the Lower Mississippi Valley Joint Venture.

Currently the refuge, with the aid of partners, conducts Christmas bird counts and Neotropical bird point counts annually. Due to the decrease in migration numbers over the past several years and the destruction of habitat due to natural disasters, it is important to increase monitoring to determine the overall health of the ecosystem. Additional monitoring will help assess the need for habitat recovery, allowing the refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Conduct baseline surveys
- When forest management decisions are made, establish bird surveys in stands that will be subjected to management in the near-term as well as stands that will not be managed in the near-term to track bird responses.
- Continue Christmas bird counts and point counts.
- Add a Biological Technician position to aid with monitoring.

Objective 1.3: Waterfowl: Within 5 years, determine use of the moist soil units and GTR by waterfowl from waterfowl surveys to determine preferred management strategies.

Discussion: Please refer to the **Felsenthal NWR - Objective 1.8: Waterfowl** discussion for regional details.

Overflow NWR lies within the Mississippi Flyway—the "highway in the sky" from nesting grounds to wintering areas through middle North America used by vast numbers of migrating waterfowl, shorebirds, Neotropical songbirds, and birds of prey. Almost 100 species of birds are known to nest in the area, and over 200 species have been sighted on the refuge.

Waterfowl begin arriving in September with blue-wing teal, mallards, black ducks, gadwall and ring-neck ducks among the 20 (or more) species that winter on the refuge. The wood duck, a year-round resident, nests in tree cavities and in nest boxes placed throughout the hardwood forests. Duck populations (in general order of abundance) include mallards, green-winged teal, shovellers, pintails, gadwalls, blue-winged teal, wood ducks and hooded mergansers. In some years, more than 100,000 and 300,000 waterfowl have been found on Overflow and Felsenthal, respectively. However, Overflow NWR in recent years continues to experience depressed wintering waterfowl numbers compared to long-term averages.

The refuge is currently performing weekly waterfowl surveys during fall and winter months, in addition to avian influenza monitoring. Additional monitoring will help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Conduct biweekly surveys from mid-November through February.
- Coordinate with the state to conduct aerial surveys.
- Conduct avian influenza monitoring.
- Monitor yearly waterfowl numbers, by species, to determine trends and adapt habitat management for target species as practical.

Objective 1.4: Waterfowl: Annually conduct wood duck banding and up to 10 nest boxes to support the objectives of the Mississippi Flyway Council.

Discussion: Wood ducks are year-round residents in the forest lands of the southern United States, including Overflow NWR. Preferred habitats include forested wetlands, wooded and shrub swamps, tree-lined rivers, streams, sloughs, and beaver ponds. Wood ducks forage on acorns, other soft and hard mast, weed seeds, and invertebrates found in shallow flooded timber, shrub swamps, and along stream banks. They loaf and roost in more secluded areas and dense shrub swamps.

Wood ducks are cavity nesters, seeking cavities in trees within a mile of water. Brood survival is dependent upon proximity to water. Due to conversion of forest lands to urban sprawl, agriculture, forestry practices, and competition for nest sites from a host of other species, a lack of natural cavities limits reproduction. Nest boxes are commonly used to supplement natural cavities and increase local production of wood ducks. Box programs are not an end to all nesting problems. They require time to clean and repair at least annually. Production can be increased by more frequent checks and cleaning of boxes, but this must be weighed with other time constraints. Refuges with active volunteer programs are often best equipped to adequately manage nest box programs through

the use of volunteer manpower. The refuge staff must ultimately determine if establishing a wood duck nest box program is feasible.

Because wood ducks are secretive birds, it is extremely difficult to estimate their populations and survival rates. Therefore, regional banding quotas, which are stepped down to individual states and stations to distribute banding throughout the range of the wood duck, have been established to determine harvest and survival rates. Overflow NWR has an annual preseason banding quota of 63 wood ducks, including 8 adult males, 14 adult females, 17 immature males, and 24 immature females. Importantly, efforts are currently underway to develop a national harvest strategy for wood ducks. Such a strategy requires that adequate pre-season banding is conducted, annually, in order to provide crucial information needed to monitor harvest and survival rates. Therefore, it becomes essential that refuges and state agencies continue to meet banding quotas so that this important resource can be properly managed. Additional monitoring and banding will help assess the need for both wildlife management and habitat improvements, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Annual records of wood duck banding and nesting box use should be maintained.
- All existing and any newly erected nest boxes should be mapped using GPS.
- Strive to meet annual preseason wood duck banding quota of 8 adult males, 14 adult females, 17 immature males, and 24 immature females. The quota, by age and sex, should be the goal, not just the total duck (63) quota.
- Hire a Biological Technician.

Objective 1.5: Wetland-dependent Birds: Within 3 years of completion of the CCP, initiate wading bird rookery surveys and general species occurrence surveys for representative managed wetland dependant birds and provide quality breeding and wintering habitat.

Discussion: Loss of freshwater emergent wetlands has occurred throughout the southeast as development pressures have increased. The king rail is thought to have been seriously impacted and there is great concern over inland numbers of this secretive marshbird. The least bittern is also a species of high concern. According to surveys of these birds on Overflow and Oakwood, as well as at other refuges, the Oakwood Unit and some nearby private lands contained the highest populations of king rails in Arkansas. A few king rails were observed at Overflow NWR as well.

Monitoring shorebird responses to habitat management should focus on relating bird use to habitat conditions and will help evaluate underlying assumptions of the regional shorebird conservation plan by helping estimate the number of birds moving through the area and the amount of time spent during migration. Recording water depths, vegetation, and species of shorebirds utilizing various habitats is recommended for making adjustments to future management.

Rookeries containing snowy egret and great blue heron are present on Overflow Creek. Wading birds also take advantage of moist soil units that are not drained in the spring to provide shorebird habitat. Among the priority species occurring at Overflow NWR are the little blue heron, glossy ibis, roseate spoonbill, wood stork, snowy egret, tricolored heron, and black-crowned night heron. The black-crowned night heron is also commonly observed at the Oakwood Unit. Additional monitoring of wetland-dependent birds will help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

At the Oakwood Unit, the capability to intensively manage for all wetland-dependent birds is somewhat reduced due to the lack of complete water management. However, shorebird habitat is provided annually by holding certain water units up until late summer, and allowing evaporation to take place, or initiating a slow drawdown if necessary. Units 5 and 7 are usually managed for mudflat habitat, with approximately 100 acres provided for shorebirds each year. Prominent birders throughout the U.S. have conducted shorebird surveys at Oakwood, and have documented up to 22 species in one day.

Strategies:

- Implement staff/volunteer shorebird monitoring including 2-3 surveys/week during July through September to meet objectives of the Lower Mississippi Valley Joint Venture Shorebird Monitoring program.
- Continue to survey secretive marshbirds using playback calls during May and June.
- Determine affect/results and efficiencies of activities on seed production and percent coverage of moist soil plants (Fredickson estimate using flora structure) to assess success of management treatments and to fine-tune management activities.
- Monitor migratory bird (waterfowl, shorebird, marsh bird, wading bird) use of the different habitats by species and life cycle calendar to determine habitat used/preferred to fine tune habitat planning and management.

Objective 1.6: Raptors: Over the 15-year life of the CCP, coordinate monitoring of active eagle nests with AGFC to determine changes in nest productivity throughout the refuge.

Discussion: Arkansas's nesting bald eagle population declined during the 1960s and 1970s, presumably due to pesticide-induced reproductive failure, habitat loss, and the illegal take of adult birds. The state's nesting population has rebounded since the mid-1970s, thanks in large part to prohibition of DDT use in the United States, increased environmental awareness, and the efforts of state and federal agencies to preserve and restore habitat and to enforce wildlife regulations. Bald eagles were removed from the endangered species list on June 28, 2007. Although recently removed from the endangered species list, they are still protected by the Bald and Golden Eagle Act.

A single active bald eagle nest was identified on Overflow NWR in 2003. This nest has been used by a pair in each year since that time, with a minimum of 5 known fledglings produced (2003: unknown; 2004: unknown; 2005: 2 fledglings; 2006: 1 fledgling; 2007: 2 fledglings). No eagle nests have been identified on the Oakwood Unit to date.

Continued protection of bald eagles and monitoring to determine any potential breeding attempts is essential. The Service should continue to work with the Arkansas Game and Fish Commission for at least 5 years to monitor breeding. The refuge should encourage the public to report bald eagle nests and follow up on reports in conjunction with state agency biologists. If a nesting attempt occurs, appropriate buffer zones should be implemented to prevent any disturbance to the nesting pair. Nest monitoring to determine success of the nest will also be important.

Strategies:

- Record any bald eagle nest building activity or established nest sites.
- Protect any nesting bald eagles from disturbance that could lead to nest abandonment.

Objective 1.7: Resident Wildlife: Upon completion of the CCP, monitoring of resident wildlife species will be conducted by the refuge staff in cooperation with the Arkansas Game and Fish Commission, Natural Heritage Commission, NGOs, and volunteers to contribute to balanced species diversity refugewide.

Discussion: Population and habitat monitoring are an important component of resident wildlife management. Deer browse surveys may be used to monitor the deer herd and evaluate the habitat and are a useful tool to the manager. The information gathered through browse surveys can indicate herd density and habitat quality on which management decisions can be made. Other surveys, including annual spotlight surveys, can also be useful to evaluate deer use of the area. Annual mast surveys are a useful index to habitat condition as it relates to deer and also many other game and nongame species (e.g., deer, turkey, squirrel, black bear, rodents).

Information collected from hunters is another valuable tool. Specifically, the ages, weights and antler measurements of harvested deer should be recorded to show trends of increasing or decreasing age/weight ratios and antler development, although small sample sizes will minimize the effectiveness of this tool. Hunting pressure on Overflow NWR is restricted to primitive weapons (archery and muzzleloader) and annual harvest of deer is low. Managing the harvest is important to maintaining a quality herd and controlling the population, but unless managers have an indication that the deer herd is negatively impacting the habitat (e.g., limiting hardwood regeneration) the current level of hunting is considered appropriate to continue on Overflow NWR. Staff observations on the Oakwood Unit indicate that there is a robust population of deer using the unit, supported by the productive combination of reforestation, bottomland hardwood forest, associated edges and levees in a larger landscape of neighboring agricultural land. As reforested areas move through the current shrub/scrub condition into that of a more open understory, productivity for deer can be expected to decrease and the population may begin to negatively affect regenerating hardwoods. There is currently no hunting on the Oakwood Unit, due to management constraints including the lack of a public right-of-way to the property and limited staff onsite.

Monitoring deer herd health is also important in maintaining a quality herd. Any sick deer found on either unit should be reported to the Arkansas Game and Fish Commission. Refuge personnel should encourage visitors/hunters to report any sightings of sick deer. Additional monitoring will help assess the need for herd health management and habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Nongame mammals readily seen on Overflow NWR and the Oakwood Unit include opossum and armadillo. Other, less readily seen, nongame mammals include rodents and bats. Rodent and bat species which would be anticipated on refuge lands may include southern flying squirrel; marsh rice rat; fulvous harvest mouse; eastern harvest mouse; western harvest mouse; southern bog lemming; white-footed mouse; southeastern myotis; eastern pipistrelle; red bat; northern yellow bat; evening bat; and Rafinesque's big-eared bat. Of these, the Rafineque's big-eared bat, southeastern myotis, and eastern harvest mouse are currently recognized as Species of Greatest Conservation Need (Anderson 2006). No nongame mammal surveys have been conducted to date on refuge lands. Currently there is little active management, including monitoring and surveys, taking place on the refuge for nongame resident wildlife. The implementation of monitoring will help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Consider implementing annual hard mast surveys to index annual habitat productivity for a variety of mast-dependent wildlife.
- Monitor beaver populations and maintain, through management control, at population levels below that causing significant habitat damage.
- Conduct bat and small mammal occurrence surveys as feasible, in order to assess occupancy and use of Overflow NWR by priority species.
- Refuge structures/facilities planned for closure or removal should be surveyed for use as a bat roost site before closure/removal.
- Monitor deer herd health and impact on habitat to assure balance of deer herd and habitat through time.
- Use public hunting as the management tool to meet herd objectives.
- Implement the refuge's Forest Habitat Management Plans to enhance forested habitats for resident wildlife.
- Conduct baseline surveys for small mammals.

Objective 1.8: Resident Wildlife - Black Bear: Over the 15-year life of the CCP, monitor black bear populations to determine if the refuge is achieving a self-sustaining population of black bears.

Discussion: Black bears have been recently reintroduced to southern Arkansas, where they were extirpated by the mid-1900s. The Arkansas Game and Fish Commission has relocated 55 adult female bears along with their cubs (n = 116) from White River NWR (AR) to Felsenthal NWR in southcentral Arkansas in soft-release den releases since 2000. Many of those bears have remained fairly localized in the immediate vicinity of Felsenthal NWR; however, many have also dispersed fairly widely. Several of these adult females have visited the habitats on or immediately adjacent to Overflow NWR. One female, relocated to Felsenthal NWR in 2000, subsequently moved to Overflow NWR and has remained in the area since that time. This animal has denned and raised cubs at Overflow NWR and is now assumed to be a resident of the refuge and neighboring lands. This recently reintroduced group of bears in southcentral Arkansas is of management concern during this population establishment period, and active management to support bears is possible in conjunction with other management goals. It can be anticipated that more bears will use refuge lands in the future. However, Overflow NWR is not of sufficient size to support a self-sustaining population of bears, but it does contribute high quality habitat for bears and has been the central point for bear activity in southern Arkansas and northern Louisiana.

Currently the refuge is doing very little to monitor bear activity on the refuge. The implementation of monitoring will help assess the need for both wildlife management and habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Monitor population trends and productivity through bait-station surveys and den/reproduction surveys until the sustainability of populations can be established; then conduct mark-recapture studies to estimate bear population.
- Coordinate bear management partnership with the AGFC.

Objective 1.9: Resident Wildlife - Reptiles and Amphibians: Over 15-year life of the CCP, gain knowledge of reptile and amphibian species diversity and population densities to provide direction on improving habitat for priority resident species.

Discussion: Commonly seen species of reptiles and amphibians include the red-eared slider, water moccasin, eastern mud snake, five-lined skink, and southern leopard frog. No herpetological surveys have been conducted to date on refuge lands. Notably, the Graham's crayfish snake has been observed on Overflow NWR, which constituted a county range record. Several "Species of Greatest Conservation Need" have been recognized by the Arkansas Game and Fish Commission's Wildlife Action Plan for the Mississippi Alluvial Plain Ecoregion and may inhabit refuge lands. These include the mole salamander, western chicken turtle, and gulf crayfish snake.

Currently there is little active management, including monitoring and surveys, taking place on the refuge for reptiles and amphibians. The implementation of monitoring will help assess the need for both wildlife population management and habitat improvement, allowing the refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Encourage and support further herpetofaunal surveys and inventories in collaboration with the Arkansas Game and Fish Commission and Arkansas Herpetological Society.
- Work with partners to conduct a baseline reptile and amphibian survey, targeting various habitat types across refuge lands for a comprehensive inventory.

Objective 1.10: Fish and Aquatic Resources: Over 15-year life of the CCP, maintain and enhance approximately 2,000 acres of aquatic habitat for a diverse assemblage of fisheries species, particularly those recognized as species of special concern by state and/or federal agencies.

Discussion: Overflow NWR falls within the Mississippi Alluvial Plain, Bayou Bartholomew-Ouachita River Ecobasin, as defined by the State Wildlife Action Plan (Anderson 2006). This basin is characterized by meandering flat channels with extensive floodplain benches. Few streams, except Bayou Bartholomew itself, flow or carry water year-round. This is indicative of the waterways of Overflow NWR which experience extensive backflooding in winter and yet become low and barely flowing in summer. The aquatic habitats of Overflow NWR host a diverse assemblage of fisheries species. When springtime backwater flooding occurs, the bottomlands of Overflow NWR function as a nursery for spawning fish; the most abundant are bowfin, gar, carp, and both largemouth and smallmouth buffalo. Additionally, large numbers of largemouth bass and crappie are trapped in the moist soil units each year. Grinnel, or bowfin, are very abundant in the sloughs and beaver ponds. Fisheries sampling has not been conducted in refuge waters.

The AGFC recognizes 11 Species of Greatest Conservation Need (7 fishes and 4 mussels) that are associated with waters of the Bayou Bartholomew-Ouachita River ecobasin and therefore might occur on Overflow NWR: the crystal darter, alligator gar, bluehead shiner, lake chubsucker, goldeye, taillight shiner, goldstripe darter, southern mapleleaf mussel, pyramid pigtoe mussel, rock pocketbook mussel, and tapered pondhorn mussel.

Currently there is little active management, including monitoring and surveys, taking place on the refuge for fish and aquatic resources. The implementation of monitoring will help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Work with the Service's Ecological Services Division (Conway Field Office) to monitor pesticide levels in Overflow Creek.
- Work with partners, such as the AGFC, to conduct an aquatic (fish and mussel) inventory, with particular attention to identification of Species of Greatest Conservation Concern.
- Continue efforts by refuge farming operations to use best management practices in the farming operation to both reduce any sedimentation and to serve as an example for private farmland within the watershed.

Objective 1.11: Inventory, Monitoring and Research Plan: Over the 15 year life of the CCP, conduct inventory, monitoring, and research to assess response to management and to track and assess refuge resource condition.

Discussion: The National Wildlife Refuge System Improvement Act formally establishes the necessity of monitoring the status and trends of fish, wildlife and plants on Overflow NWR. The Service's policy is to collect baseline information on key plants, fish, and wildlife; to monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units; and to base management on biologically and statistically sound data derived from such inventory and monitoring (701 FW 2, Inventory and Monitoring of Populations).

It is Service policy that each refuge prepares, maintains, and implements an Inventory and Monitoring Plan (IMP) (701 FW 2, Inventory and Monitoring of Populations). The need for significantly increased emphasis on inventory and monitoring is closely linked to the process of adaptive management to better achieve objectives. Adaptive management is a system of adjusting management efforts using the best available knowledge and constantly seeking feedback from frequently monitoring resource response to management actions relative to stated objectives. The effectiveness of management decisions to meet refuge objectives can be determined via monitoring and subsequent evaluation of results. These processes should be a priority at Overflow NWR and the Oakwood Unit. Particular focus should be placed on adaptive management associated with waterfowl and forest management. Baseline biological surveys and inventories are lacking at Overflow NWR and should be addressed; recommended priorities include a forest inventory and bird, mussel, reptile, and amphibian occurrence surveys. Surveys and inventories are only useful if the data is analyzed and available, and future management actions have much better results if prior actions and results are clearly documented. Documenting and archiving survey methods and results are essential to efficient and effective land management; GIS and database tracking are recommended.

Strategies:

- Within 5 years of completion of the CCP, develop and implement an Inventory and Monitoring Plan.
- Collect and assess inventory and monitoring data which are relevant to and contribute towards assessment and decision-making regarding refuge management.
- Enhance the refuge's inventory and mapping capabilities through the use of Geographic Information Systems (GIS), especially use capabilities shared with the Lower Mississippi Joint Venture Office.
- Provide the refuge with adequate staff, including a Biological Technician position, and equipment and funding to acquire baseline inventory data on refuge resources and monitor fish, wildlife and plant responses to refuge management.

Objective 1.12: Climate Change: Over the life of the CCP, be responsive to evolving science and technology regarding climate change and implement the Service's climate change policy which will be outlined in a Climate Change Strategic Plan now in draft form.

Discussion: Global climate change poses risks to human health and to terrestrial and aquatic ecosystems. Important economic resources such as agriculture, forestry, fisheries, and water resources also may be affected. Warmer temperatures, more severe droughts and floods, and sea level rise could have a wide range of impacts. All these stresses can add to existing stresses on resources caused by other influences such as population growth, land-use changes, and pollution.

In addition to rising sea levels, the effects of climate change and global warming will be changes in weather/rainfall patterns, decreases in snow and ice cover, and stressed ecosystems. For the southeastern U.S. and the Felsenthal-Overflow region, this can mean extreme precipitation events; greater likelihood of warmer/drier summers and wetter/reduced winter cold; and alterations of ecosystems and habitats due to these changes in weather patterns—-to name but a few possibilities. For example, a recent study of the effects of climate change on eastern U.S. bird species concluded that as many as 78 species of birds could decrease by at least 25%; while as many as 33 species could increase in abundance by at least 25% due to climate and habitat changes.

Strategies:

- Work with partners such as other federal, state and tribal agencies, conservation groups and academic institutions on landscape conservation planning and design.
- Monitor and document changes in abundance and distribution of fish, wildlife, and plant species on the refuge.
- Monitor the refuge's flora and fauna for signs of new and/or increased rate of disease.
- Adapt management as necessary specifically to protect rare, threatened, and endangered plants and animals from the effects of climate change.

HABITAT MANAGEMENT

Goal 2. Protect, maintain, enhance, and where appropriate, restore suitable habitat for the conservation and management of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species endemic to the Complex.

Discussion: The Lower Mississippi River Ecosystem includes the alluvial plain of the Mississippi River downstream of its confluence with the Ohio River and the delta plain and associated marshes and swamps created by the meanderings of the Mississippi River and its tributaries (USFWS 2002). The drainage basins and tributaries of the Ouachita River, which include Felsenthal and Overflow NWRs, are part of the West Gulf Coastal Plain (Felsenthal NWR) and the Mississippi Alluvial Valley (Overflow NWR) sections of the Lower Mississippi River Ecosystem.

The refuges, characterized by bottomland hardwoods and wetlands, are managed for conservation, enhancement, and restoration of bottomland hardwoods; moist soil management; endangered species protection; environmental education; and compatible wildlife-dependent recreation in the Lower Mississippi River Ecosystem. The ecosystem guides Fish and Wildlife Service efforts to enhance, restore, and conserve the natural functional processes and habitat types, while maintaining economic productivity and recreational opportunities.

The ecosystem serves as a primary wintering habitat for midcontinental waterfowl populations, as well as breeding and migration habitat for migratory songbirds. The expansive floodplain forests of the past are now fragmented bottomland hardwood patches due to conversion from agriculture and flood control projects.

Felsenthal National Wildlife Refuge

Objective 2.1: Forest Management: Over the 15-year life of the CCP, manage 50,000 acres of forests to provide a diversity of native plant and animal species found in the Ouachita/Saline River Basin, to fulfill the mission and purposes of the refuge.

Discussion: Forest management treatments are needed to maintain or improve the general health, productivity, and plant diversity of the forest. Much of the forest is overstocked and needs to be gradually thinned to reduce stress, to lessen the chance for epidemics of damaging insects, to remove diseased trees, and to enhance vertical and horizontal diversity. Developing a broader range of tree ages, sizes, densities, and heights will increase diversity. Where previous landowner practices have degraded wildlife habitat, regeneration cuts may be used.

There are no established age limits for any tree species. Wildlife habitat needs, general health of trees, diseases, insect epidemics, tree species mix, overstocking, understocking, and existence of cavities are examples of factors that have to be considered in enhancing or maintaining the forest to meet wildlife habitat needs. Many other factors also need to be considered in deciding whether an area should receive forest management treatments. Every tree is judged for its current and future value to wildlife before a decision is made to cut it or leave it.

As mentioned above, there are ever-increasing concerns about forest-breeding birds, which have prompted new research to determine their habitat requirements, especially those for forest interior-dependent birds. The Forest Resource Conservation Working Group's (FRCWG) Desired Forest Conditions (DFCs) guidelines have been recently established for bottomland hardwood habitats and will be used to guide forest management to provide benefits for a variety of priority wildlife species. At the landscape level on the refuge, mature loblolly and shortleaf pine, pine/hardwood, upland, and bottomland hardwoods will be provided. All present forest management guidelines concerning forest interior birds are to be applied to all forest types of the refuge and are designed to minimize impacts to these birds.

Approximately 5,000 acres of pine habitat and 10,500 acres of bottomland hardwood habitat have been silviculturally treated since 1988. Some additional pine acreage (approximately 1,500) was treated prior to 1988 and, of course, the entire area was treated prior to the property being transferred to the Service.

Currently, silvicultural/wildlife management in the bottomland hardwoods reflects the guidelines established by the LMVJV Forest Resource Conservation Working Group. These recommendations fall within the parameters stated in the 1995 Revision of the Forest Management Plan/NEPA documents and have been implemented for the last six years.

Strategies:

- Instead of actively managing the entire bottomland forest, approximately 15% will be passively managed as an old-growth component.
- Instead of a 20-year cutting cycle with a 100-year even-aged rotation age, there will be a 10-year uneven-aged cutting cycle with no fixed rotation age. No more than 10% of the forest will be subject to harvesting during any one year.
- Restore historic range of variation in forest structure, following the requirements of songbirds, bats, and other priority species.
- Instead of 40-acre even-aged regeneration cuts, the group selection method will be applied using 0.5- to 5-acre regeneration cuts. Generally, group openings will be used to obtain new hardwood regeneration.
- Continue to improve small game habitats via forest management activities.

Objective 2.2: Forest Management - Red Cockaded Woodpecker: Over the 15-year life of the CCP, actively manage approximately 9,000 acres of pine stands for RCW habitat in accordance with the recovery plan.

Discussion: As dictated by the Endangered Species Act and red-cockaded woodpecker management guidelines, pine habitat will be managed for the RCW. Some stands will be thinned to provide the open park-like conditions preferred by the RCW. The RCW would lose some foraging habitat by thinning, but in the long term the remaining trees will be healthier and will increase in diameter, thus increasing forage. Thinning also reduces the threat of damage to trees by insects such the southern pine beetle.

Regeneration cuts of 5 to 20 acres in pine stands may be needed to provide future foraging habitat for the RCW. Older trees approaching 60 years old must be maintained for potential foraging and cavity trees to replace those 80 plus years old that are lost to natural mortality.

The current checkerboard pattern of stands greater than 60 years old alternating with stands between 25 and 30 years old (in 40-acre blocks) needs to be broken up. Special attention must be given to long-term management of existing foraging habitat for each colony of RCWs.

The use of prescribed fire will be necessary to control encroachment by hardwood midstory in RCW colony sites. Burning on a 1- to 3-year rotation basis should be done. In some areas, an annual burn would benefit other species such as the Bachman's sparrow. It might also be necessary to conduct growing-season burning in some areas to effectively control hardwood mid- and understory.

Strategies:

- Expand existing acres with fire to reduce midstory and promote a grassy/herbaceous understory with patches of shrub-scrub (usually oak) using a combination of dormant and growing season burning.
- Expand sparse canopy and low to moderate basal area in mature (sawtimber) pine forests (10-20ft2/acre to 70ft2/acre), except adjacent to floodplain where higher basal area and more hardwood mixed in the stands is preferred.
- Retain snags over 15 inches for cavity nesting species. Not posing a safety hazard to personnel, fire, visitors.

- When stands become overstocked, thinning will be applied in the matrix between group openings to reduce stem density, with a residual stand basal area target of about 50-60 ft2 per acre.

Objective 2.3: Greentree Reservoir (GTR): Over the 15-year life of the CCP, enhance management on the 21,000-acre GTR to achieve a sustainable wetland forest that provides forage for waterfowl, migrant birds, mammals, reptiles, amphibians, and fishes. Emulate natural flooding within the Felsenthal lowland forest.

Discussion: Naturally flooded lowland forests, such as the Felsenthal NWR bottomlands, follow a cycle of wet years and dry years. The wet years provide resources for waterfowl and the dry years provide resources for ground-dwelling forest animals. The dry years also allow trees to recover from flood-induced stress encountered during the wet years. Several back-to-back dry years are necessary to allow acorns to germinate and grow to a height that is above the high water mark and grow into a new generation of mature acorn-producing lowland oak trees.

Greentree reservoirs (GTRs) are wetland forests that are artificially flooded to attract fall/winter waterfowl. Eight species of waterfowl (one carnivore, the hooded merganser; two grazing herbivores, Canada goose and gadwall; three seed-eating grazers, pintail, green-winged teal, and ring-necked duck; and two omnivores, the mallard and wood duck) use flooded GTRs during the winter migration.

In contrast to dynamic and unpredictable flooding of naturally-flooded forests, GTRs are generally flooded in the fall and remain at full pool throughout the duck season and beyond. When GTRs are flooded weeks prior to the duck season through the spring, negative consequences to wildlife habitat occur. Trees undergo a change in respiration strategy, inhibition of photosynthesis, redirection of protein synthesis, changes in mineral nutrition, alteration in amounts and balances of growth hormones, and production of toxic compounds. Long-term flooding causes decreased acorn production, increased stress and disease of trees, and subsequent mortality.

Lowland forests typically have a variety of woody species that are adapted to various flooding regimes. Each of these species has a different level of tolerance to the timing, depth, and duration of flooding. Adaptations include regulating stomata and lenticels to permit exchange of dissolved gases in the floodwater and also release toxic compounds such as acetaldehyde, ethanol, and ethylene. The tree develops arenchyma tissue with large intercellular spaces to facilitate better transport of oxygen. Cypress, green ash, and water tupelo will often form adventitious roots to facilitate gas exchange. These adaptations are triggered by a deficiency of oxygen in the soil and are an attempt by flood-tolerant plants to survive anaerobic environments.

Lowland forests subjected to natural flooding regimes are likely to be dry or lack surface water accumulation until after tree senescence in the fall. Under natural flooding regimes, lowland forests are more likely to be wet or have surface water accumulations after trees break dormancy in the spring. Studies in both Missouri and Arkansas indicate that frequent or prolonged flooding during the active growing season is detrimental to lowland trees causing stress and eventual mortality.

Trees in the red oak group are not shade-tolerant and require light for seedling survival to the sapling stage. Seedlings of most species that have leafed out in spring and are subsequently inundated by high water exhibit high, if not complete, mortality.

Natural hydrological regimes are variable within and among years; these variables are driven by precipitation cycles of 7 to 14 years. Butt swelling, a sign of flood stress, is characteristic of trees in the red oak group that have been subjected to dormant-season flooding at the same time and to the same depth for 2 to 10 or more years.

Slow flooding to shallow depths maintains oxygen levels favorable for invertebrates and provides ideal foraging depths for mallards and wood ducks. Deep water (more than 10 inches) reduces the availability of invertebrates and herbaceous foraging to dabbling ducks. A slow drawdown makes invertebrates and other food resources available over a long time period and conserves nutrients within the system. Invertebrates are a source of protein that allow ducks to replace molted feathers, build muscle, produce egg albumen and egg shell. By mid-December, 85% of adult mallards and 50% of immature mallards have created pair bonds. At this time, flooded lowland forests are beneficial as a refuge for pairs and can decrease competition among unpaired males. Roosting in flooded lowlands can also aid in thermoregulation as ducks must maintain a body temperature of 104° Fahrenheit.

Biomass and composition of the invertebrate community are related to leaf litter type and duration of flooding. For example, moist leaves will break down faster than dry leaves and red maple leaves will deteriorate twice as fast as overcup oak leaves, due to 5% tannin in red maple vs. 10% tannin in overcup leaves.

As previously mentioned, it has become apparent from studies conducted by the USGS that the hardwood forest in the Felsenthal GTR is being impacted by the constant and prolonged flooding regime. In June of 2007, a new project leader was assigned to the South Arkansas Complex and one of the first issues to be addressed was GTR water management. After a review of all pertinent information and collaboration with staff, other Service personnel associated with long-term GTR management, NGO partners from Ducks Unlimited and others, a decision was made to alter the water management in the GTR, in an effort to improve forest health and thus provide better wintering habitat for waterfowl.

Strategies:

- Elevation mapping of the lowland forest should be completed to assist field staff in decisions concerning duration and extent of flooding at various elevations.
- The lowland forest should never be intentionally flooded prior to tree dormancy.
- Tree/seedling vigor and growth should be monitored annually to allow for adaptive management of water levels.
- Every 10 to 15 years the lowland forest should not be intentionally flooded for 2 to 3 years to nurse a new crop of red oak seedlings.
- A 7-year flooding schedule should be followed that closely emulates historic winter flood conditions.
- Flooding should be gradual to allow resources to be efficiently utilized.
- Staff gauges should be placed at critical locations to allow for proper monitoring of water elevations and to assist in locating and dismantling beaver dams to avoid pockets of tree mortality.
- Conduct baseline inventory of forest conditions for future reference to changes in waterfowl numbers and hunter harvest effort.

Objective 2.4: Fire Management: Annually manage and maintain prescribed and wildfire response programs on the 9,490 acres of pine forest on the refuge to achieve desired habitats and reduce fuels.

Discussion: Prescribed fire is a primary habitat management tool on the 9,490 acres of pine forest on the refuge. The objectives of the prescribed burning program are wildlife habitat improvement for the red-cockaded woodpecker and other species, fuel reduction, site preparation and understory management. The prescribed burns are managed on a rotational basis. The refuge rotates the area burned every year so that all areas included in the burn program are burned once every three years.

Prescribed burning in pine stands to control midstory for the RCW also benefits other species of wildlife, especially deer, rabbit, quail, the Bachman's sparrow, and wild turkeys. There is a possibility that prescribed fire could temporarily displace, injure, and/or kill wildlife, especially some amphibians and reptiles or result in loss of bird nests. However, mortality impacts from fire management are not believed to be critical to the populations and the resultant habitat conditions are expected to benefit an important suite of species. Additionally, fire management also includes the provision of wildfire response.

Strategies:

- Annually monitor 100% of the prescribed fire management units that were burned to provide optimal habitat for RCWs.
- Use an appropriate burn rotation to accomplish habitat management objectives.
- Use prescribed fire to accomplish annual wildlife habitat management objectives for forest (particularly pine forests), grasslands, and old fields (managed and natural) habitats.
- Respond appropriately to all wildfires within a mile of refuge lands.

Objective 2.5: Waterfowl: Over the 15-year life of the CCP, manage the 15,000-acre permanent pool and up to 21,000 acres of GTR to support traditional abundance and use patterns of key waterfowl species in the Ouachita-Saline River floodplain ecosystem and to help meet continental and regional population goals of the North American Waterfowl Management Plan as stepped down through the Lower Mississippi Valley Joint Venture.

Discussion: The process of relating habitat objectives for individual management areas to overall habitat objectives for the LMV involved several steps. First, habitat objectives were allocated among states relative to historic abundance of waterfowl. Then, knowledgeable managers within states determined strategies for meeting state habitat objectives by allocating percentages of the objectives to habitats with managed or naturally-flooded water regimes and habitats on public or private lands. One result of this “step-down” process was to clearly define the collective habitat objectives of state and federal wildlife areas in the LMV relative to objectives of the LMVJV, which in turn were related to the NAWMP. The collective objectives of state and federal wildlife areas then were assigned to individual management areas based on waterfowl management capabilities.

Because Felsenthal NWR does not have the capability to provide cropland or managed moist soil habitat, the step-down objectives that were established for the refuge were entirely comprised of the bottomland forest habitat type. The acreage objective (21,000 acres) represents the approximate size of the GTR, and the duck energy-day (DED) objective (2,646,000 DEDs) used a standard value of DEDs (126 DEDs/acre) assumed by the LMVJV to be available in this habitat type. Through recent research conducted in the LMV, the DED value has been adjusted for bottomland hardwoods containing 40% red oaks, to a value of 156 DEDs/acre. It is worth noting that this DED value is thought by many wetland managers to represent a conservative estimate of waterfowl foraging habitat actually available in the bottomland forest type, when resources such as moist soil vegetation

and invertebrates are factored in. Therefore, the refuge's actual DED capability should far exceed the stated objective. Besides the value that bottomland forests provide as foraging habitat for waterfowl, they probably play an even more important role by isolating birds during pair bonding, providing thermal protection on cold, windy days, and providing escape cover.

Use of skilled forest management through use of thinnings prescribed for wildlife can create conditions where sunlight through canopy gaps stimulates germination of many plants adapted to the moist soil conditions. These understory plants provide abundant food for waterfowl in the form of seeds and invertebrates that use the structure created by the understory plants. As succession of the plant community continues, a midstory forms that provides critical cover for waterfowl during pair bonding, brood rearing, and when thermal cover is needed during winter.

High waterfowl harvest rates and hunting activity in Arkansas make sanctuary an important function of Arkansas refuges. Activities such as maintaining body temperature, searching for food and roost sites, avoiding disturbance, molting, courtship, and pair bonding are energy consuming activities for waterfowl in winter. The assumed interaction between disturbance, energetic costs and low survival can at least partially be mitigated by sanctuary where waterfowl can rest and perform these activities with a minimum of interruption. Sanctuary, particularly when in close association to food resources, is critical for waterfowl to conserve energy to survive the winter period and conduct activities preparatory to perform other life functions, particularly reproduction. Due to the strategic location of Felsenthal NWR in the heavily hunted LMV, coupled with its ability to provide quality, forested wetland habitat, the refuge has a critical role to provide important waterfowl sanctuary. The current waterfowl sanctuary at Felsenthal NWR is 9,050 acres of primarily bottomland hardwood forest and is seasonally flooded within the GTR. Forest composition within this sanctuary is roughly 50% willow oak, 30% overcup oak, and 20% Nuttall oak. The waterfowl sanctuary is centered within the refuge boundary and is bounded by the pipeline on the north; the Ouachita River, Deep Slough, and Open Brake to the west; Open Brake and Open Brake cut to the south; and the Ouachita River, the Saline River, and Eagle Creek on the east.

Strategies:

- A water management plan should be developed and implemented for the permanent pool and GTR to provide habitat for wintering and resident waterfowl.
- Maintain the current level of designated waterfowl sanctuaries to provide areas of low disturbance critical for the area's wintering waterfowl to complete numerous activities necessary for adequate survival.
- Within 5 years of completion of the CCP, evaluate wood duck nest use and nesting success in boxes and adjust the program accordingly to add more boxes if over 50% of the existing boxes are used; Annual records should be maintained in a database.

Objective 2.6: Wetland-dependant Birds - Shorebirds: Over the 15-year life of the CCP, opportunistically provide fall (southbound) migration habitat as a contribution to the objectives set in the U.S. Shorebird Conservation Plan and the Lower Mississippi Valley/West Gulf Coastal Plain Shorebird Management Plan.

Discussion: Felsenthal NWR provides very little migration habitat for shorebirds on the refuge due to water management limitations. The nature of the forest habitat, the permanent pool, and the GTR allow for little opportunity to provide shorebird habitat.

Strategies:

- Where and when feasible, draw water down to create mudflats for migrating shorebirds.
- Develop partnership agreements with adjacent properties to facilitate information exchange and assistance.

Objective 2.7: Wetland Dependant Birds - Wading Birds: Within one year of completion of the CCP, monitor species presence, habitat use, and nesting activity of wading birds on an annual basis.

Discussion: Felsenthal NWR provides significant habitat for breeding and wintering colonial waterbirds in the permanent pool, the GTR, and other seasonal shallow water areas. Although this group of species is not a major priority, management for waterfowl should provide foraging habitat for wading birds. In addition to habitat management, rookeries should be protected from disturbance throughout the nesting season.

Strategy:

- Consider creating temporal sanctuaries around wading bird rookeries during the nesting season, to reduce disturbance when and where possible.

Objective 2.8: Resident Wildlife: Over the 15-year life of the CCP, maintain and develop diversified habitats throughout the refuge's 65,000 acres and promote management actions that will support healthy populations of resident wildlife species to meet the objectives of the National Wildlife Refuge Improvement Act.

Discussion: The habitats of Felsenthal NWR support a variety of mammals, including game species such as white-tailed deer, gray and fox squirrels, eastern cottontail and swamp rabbits, and furbearers such as raccoon, beaver, mink, opossum, striped skunk, coyote, bobcat, river otter, muskrat, nutria, red fox and gray fox. Other nongame mammals are more rarely recorded on refuge lands but can be expected to include several species of rodents and bats. Several priority species ("Species of Greatest Conservation Need') recognized by the State of Arkansas (State Wildlife Plan 2007) are known to, or may, inhabit refuge lands. These include the Rafinesque's big-eared bat, southeastern myotis, eastern harvest mouse, and long-tailed weasel.

Deer utilize a wide range of habitats, and most refuge forest management actions aimed at priority species, such as migratory birds, will provide direct benefits to deer by increasing the quality of deer habitat. Such active management will provide a diversity and abundance of understory, midstory, and overstory stand components (i.e., complex forest stand structure) to meet the needs of a variety of nongame forest birds and resident wildlife, including black bear and deer.

Temporarily flooded bottomland forests provide ideal habitat for many species of mammals. Food and cover are abundant and diverse, and a variety of mammalian species are present. In addition to the black bear, which is primarily associated with upland forests joined by extensive forested wetland corridors, other forest wetland inhabitants are the white-tailed deer, bobcat, coyote, river otter, raccoon, gray fox, red fox, beaver, mink, swamp rabbit, cottontail rabbit, eastern gray squirrel, fox squirrel, nutria, opossum, muskrat, and skunk.

Forest management, on a selective basis, can benefit turkeys by increasing the diversity and availability of foods, in the form of hard and soft mast, as well as grasses, sedges and forbs. Nesting habitat is often improved by selective thinning of trees which provides more ground cover for nest

concealment. Removal of more than 50 percent of the overstory degrades turkey habitat in the short term by resulting in extremely rank undergrowth that is generally avoided by turkeys.

Strategies:

- Within 5 years of CCP completion, improve food plots on the refuge.
- Control invasive plants and animals.
- Maintain rare prairie habitats which may support several Arkansas species of conservation concern.

Objective 2.9: Resident Wildlife - Reptiles and Amphibians: Over the life of the CCP, maintain and enhance habitat throughout the refuge's 65,000 acres for a diverse assemblage of reptile and amphibian species, particularly those recognized as species of special concern by state and/or federal agencies.

Discussion: The floodplain forest, sloughs, brakes, and shallow lakes, as well as remnant sand prairies and upland pine-dominated habitats of Felsenthal NWR are suitable for numerous species of reptiles and amphibians. Multiple species of snakes, lizards, frogs, toads, salamanders and turtles occupy the refuge. The refuge maintains a list of herpetofauna species which includes 83 species which have been identified or are expected in the three-county area of the refuge.

With the great variety of reptile and amphibian species, it is challenging to address all species with similar recommendations. However, common management concepts can provide benefits for many varied species in this group. Many reptile and amphibian species use multiple habitats for foraging, reproduction, hibernation or dispersal and require connectivity between habitat types (e.g. shallow lakes and adjacent bottomland hardwood forests, cypress brakes and floodplain forests, floodplain forests and adjacent uplands, temporary wetlands and adjacent uplands) in order to meet distinct life cycle habitat needs. Connectivity throughout floodplain forests also allows for important migration and dispersal corridors. Construction of barriers to aquatic and terrestrial wildlife such as improved roads should be discouraged and other alternatives such as road underpasses sought.

Many reptiles and all amphibians are closely linked to aquatic habitats and respond positively to various inundation conditions. Greentree management of the flooded "pool" portion of the refuge should mimic natural hydrologic patterns, with year to year variation in rates, periods and depth of inundation. Resident reptiles and amphibians should respond well through time as this (managed) natural cycle varies conditions annually to create conditions that benefit a variety of species needs. Within upland sites, isolated seasonal wetlands are a particularly important and rare habitat type for reptiles and amphibians. Isolated seasonal wetlands are fish-free, and have high amphibian productivity when surrounded by complementary upland habitats. These features should be noted and protected, or alternatively restored as appropriate upland sites are acquired within refuge lands.

Strategies:

- Maintain connectivity between habitats to allow reptiles and amphibians unrestricted movement between habitats needed for complete life cycles.
- Maintain or restore the natural hydrologic system and community structure, minimizing conversion of habitat types and hydrologic function as possible within legislative management constraints.

Objective 2.10: Invasive and Nuisance Species Control: Over the 15-year life of the CCP, prioritize the need for the removal of nuisance/native or exotic/invasive plant and animals on the refuge that are hindering the ability to meet habitat/population objectives for federal trust species.

Discussion: Felsenthal has several documented native and nonnative invasive and exotic plant species. These invasive species impact the refuge's ability to carry out desired wildlife and habitat management objectives and at times also reduce the range of visitor service activities. Many invasive plant species are difficult to control without applying chemical treatments. The moist soil conditions conducive to providing quality habitat for migratory waterfowl management frequently encourages germination of those invasive species.

Intrusion of invasive plants can displace native plant and animal species and change habitat productivity, through changes such as vegetative community, insect community, and structural environment.

Dense stands of nuisance aquatic vegetation are a major fisheries management problem in Felsenthal NWR. Warmer than average winters and drier than average springs in recent years have provided near optimal growing conditions for these plants. The coverage of macrophytes has exceeded acceptable levels (generally considered ≤ 30%), which has led to a number of negative ecological and socio-economic consequences. These plants restrict access for recreational boaters and anglers, and may lead to an unbalanced fish community structure due to their effect on predator-prey ratios. The introduction of nonnative aquatic plant species in southern Arkansas has exacerbated the problem. Species such as hydrilla and water hyacinth are relative "newcomers" to southern Arkansas lakes and rivers. Hydrilla has become established in the refuge and has demonstrated why it is such a feared pest by infesting waters too deep for native vegetation to grow, thereby increasing the aerial coverage of macrophytes. Water hyacinth has primarily remained confined to the Arkansas River and its backwaters, but has also been found in the Ouachita River above Thatcher Lock and Dam.

Although beavers can provide additional beneficial wetland habitats, it is often necessary to implement some form of beaver control to reduce the negative impacts in floodplain forest habitats. The beaver's natural behavior of damming and flooding forested areas can provide beneficial wetland areas, but also kills flooded trees. In the constrained landscape of a national wildlife refuge, such creation of dead tree stands can accumulate to unsustainable levels, as they can not be replaced within a reasonable time scale. In particular, beavers build dams and hold water during the summer months when trees are not adapted to flooding. This causes stress and ultimately mortality to individual flooded trees and flooded stands of trees. Beaver damage is easy to recognize from the air and on the ground in the form of flooding as a result of dam-building activities, and groupings of girdled and stressed or dead trees. Beaver activity and potential damage to forest resources should be continually assessed and beavers and dams removed if negative impacts are unacceptable within other management objectives. Individual beavers should be lethally removed by trapping (conibears, legholds, snares, etc.) and/or shooting. Beaver dams should be removed with heavy machinery, manually with hand tools, or with explosives.

Nutria are herbivorous, aquatic rodents. They are most problematic in coastal zones where they contribute to coastal erosion and marsh loss by eating the roots of marsh plants. In interior wetlands they tend to incur less dramatic impacts; however they do cause impacts to natural vegetation. Nutria are extremely prolific breeders and thereby often difficult to control. Nutria are currently found in the "pool" of Felsenthal NWR. Likely negative impacts from this species include exclusion of the native muskrat through competition, removal of emergent vegetation by feeding on roots and stalks, and weakening of levees through burrowing behavior.

Feral hogs, which are present on Felsenthal NWR, should be specifically controlled as they are known to cause significant negative impacts on native herpetofaunal populations through direct predation, disturbance or destruction of site-specific plant communities (e.g., seasonal wetlands) and soil conditions.

Strategies:

- Implement systematic removal of invasive plant species by mechanical, chemical, and prescribed burning.
- Develop nuisance/exotic/invasive plant/animal control plan.
- Beaver control activities should continue, with seasonal assessment of forest damage potential, removal of dams to decrease summer flooding, and systematic removal of associated beavers to discontinue dam building.
- Control nutria through systematic removal opportunities.
- Control feral hogs through systematic removal and under an objective of eradication from refuge lands.

Objective 2.11: Open Land: Over the 15-year life of the CCP, implement restoration techniques to enhance approximately 250 acres of wildlife openings for early successional habitat diversity.

Discussion: Prairies are rare throughout southern Arkansas and Felsenthal currently has several remnant prairies which are a direct result of early geomorphologic forces which created Lake Monroe; an early Paleocene lake that formed during the late Pleistocene and early Holocene eras. The lake, which was originally 40 miles long and 18 miles wide, left original beach terraces/dunes in place which today remain as prairie habitat, many of which are self maintained (without fire).

At this time, very little information exists on this remnant prairie habitat which is located on Felsenthal NWR. Efforts should be made to fully document the vegetation structure, soil composition, and geological history of the sites and in all cases use restoration management techniques that will enhance not only the ecosystem but also habitat for the northern bobwhite quail, American woodcock, and an array of sparrows typically wintering in southern Arkansas.

Strategies:

- Maintain openings with the use of fire and mowing.
- Supplemental planting of native forbs and grasses to promote early successional habitat diversity.
- Use herbicide for conversion to native plant species on roadsides.

Objective 2.12: Aquatic Resources: Over the 15-year life of the CCP, through adaptive management, maintain and enhance the refuge's approximately 18,000 acres of aquatic habitats to benefit fish populations and provide improved access for sport fishing opportunities.

Discussion: Most of the 15,000-acre Felsenthal Pool, a reservoir impounded by the creation of the Ouachita-Black River Navigation Project, is less than 1 meter in depth, making it ideal for the growth of aquatic vegetation. Due to the shallow nature of the reservoir, native aquatic vegetation became established soon after impoundment. However, coverage increased relatively slowly during the first 10 years following impoundment (1985-1995). Then, during the late 1990s and early 2000s, macrophyte species such as fanwort, American lotus, fragrant water-lily, duckweeds, and various marginal plant species began to spread rapidly throughout the reservoir. By 2004, almost all of the

15,000 acres impounded in 1985 were completely captured by aquatic vegetation. Then, in 2004, hydrilla was discovered at Felsenthal, which began to colonize deeper water than the native species previously noted. Hydrilla became established in backwater areas as well as along the Ouachita River channel. Its spread over the last 4 years has been rapid, and the consequences have been severe. Although no quantitative estimates have been made, it is estimated that, as of August 2007, more than 90 percent of the off-channel portions of the Felsenthal Pool are captured by aquatic vegetation seasonally.

The majority of the Felsenthal Pool is inaccessible to anglers and other boaters during the summer and fall months, due to nuisance aquatic vegetation. Consequently, accessible areas are highly congested. This has caused visitation by anglers to decrease by almost 50 percent since 2004, from around 400,000 trips/year to 200,000 trips/year (USFWS unpublished data). The social and economic consequences of this decline in visitation to the three counties surrounding the refuge are likely quite significant.

Aquatic plants may be controlled by chemical, biological, and/or mechanical means. The U.S. Army Corps of Engineers (USACE) is charged with maintaining a 9-foot navigation channel at all times, which prevents the reservoir from being drawn down as a means of controlling unwanted vegetation. Biological control methods are preferred because they are relatively inexpensive and long-lasting (Beyers and Carlson 1993). Grass carp are the most commonly used fish species for aquatic vegetation control in the United States (Chilton and Muoneke 1992). These fish are herbivorous, and when stocked at appropriate rates, have proven to be extremely effective at controlling or eliminating unwanted aquatic vegetation. Stott et al. (1971) and Shireman (1982) reported that the use of herbicides to control nuisance submerged aquatic vegetation was 6 and 14 times more expensive, respectively, than using grass carp. Chilton and Muoneke (1992) suggest that an integrated approach, where herbicide treatments are combined with grass carp stocking, may be the most effective means of aquatic vegetation control.

An experimental herbicide treatment was conducted by the Service and the AGFC during 2000-2002. Numerous plots throughout the reservoir, ranging in size from 2 to 20 acres, were treated with herbicides to assess their effectiveness at clearing small areas for fishing as well as boat lanes to access these areas. Some areas were covered with emergent species such as American lotus and water-lilies, while most areas were choked with fanwort. Herbicide treatment of the emergent species was highly successful, and some areas remained free of vegetation for almost three years. However, treatment of the submerged vegetation was unsuccessful in almost all areas. The continuous flow of water through the reservoir prevented the systemic herbicides from being effective at treating the submerged species. In some areas where emergent species were eliminated, submerged species such as fanwort became established in their place. Managers concluded that small-scale herbicide treatments were not effective for submerged aquatic vegetation control on the Felsenthal Pool.

The AGFC has recommended reducing the aerial coverage of aquatic vegetation to 50% of the off-channel portions of the Felsenthal Pool, using an integrated, adaptive approach that includes triploid grass carp stocking and herbicide applications. In 2006-2007, the AGFC conducted a telemetry study to determine if triploid grass carp would stay within the confines of the refuge. Forty-eight fish were implanted with radio transmitters and radiotracked for a one-year period. During this time, the fish were tracked between 1 and 4 times each month. The results showed that no fish moved south of the refuge through the lock and dam system, even though the gates on the lock and dam were open for an extended time period. All radio-marked fish remained in the boundaries of the refuge except for two fish, which moved north of the refuge. Based on the results of this study, it was decided that most fish would remain within the refuge boundary and stocking should be conducted. To control the submergent macrophytes (hydrilla, fanwort, etc.), triploid grass carp should be stocked at a rate of 10 triploid, yearling grass carp per acre, with additional stockings in subsequent years to maintain this density. As noted in numerous AGFC

sampling reports, diploid grass carp have been stocked throughout the Felsenthal Pool watershed, and are known to currently inhabit the reservoir in low densities. However, because Felsenthal NWR is controlled by the Service, and due to its close proximity to the Louisiana state line, it is recommended that triploid grass carp be stocked in this system. Emergent macrophytes (American lotus, fragrant water-lily, etc.) should be controlled with periodic applications of species-appropriate herbicides, applied in historically open water areas of the refuge.

Strategies:

- In cooperation with the AGFC, continue to conduct stocking of the Felsenthal Pool with triploid grass carp, to maintain a density greater than or equal to 10 grass carp of less than 24 inches total length per acre.
- Continue efforts to control emergent vegetation (lotus, water-lily) in the open-water areas with periodic herbicidal applications.
- Continue to monitor the effectiveness of vegetation treatments and consider contracting with local universities to conduct monitoring/research activities.
- Evaluate working with the USACE to strategically draw down the permanent pool every 5 to 7 years.

Objective 2.13: Climate Change: Over the life of the CCP, be responsive to evolving science and technology regarding climate change and implement the Service's climate change policy which will be outlined in a Climate Change Strategic Plan now in draft form.

Discussion: The Arkansas landscape is divided between highland ecosystems in the north and lowland habitats in the south. The Ozark and Ouachita plateaus are covered by oak, hickory, maple, and beech forests and host several endemic animal species, including fish and salamanders. The Mississippi alluvial plain region, the delta, contains the remnants of a once-extensive expanse of bottomland hardwood forests and meandering flatland rivers. The floodplains of the White and Cache rivers contain the most important breeding areas for mallard ducks in the world; as much as 10% of the continent's mallard population may winter in this area. Loess ridges are found within the delta region, and they contain several plant species that are uncommon elsewhere in the state. The sandy soils of the Gulf coastal plain are dominated by pine woods, including loblolly, longleaf, and shortleaf pines, and provide old-growth habitat for endangered red-cockaded woodpeckers and other animals. Scientists working in the Cache River have already documented a steady decline in magnitude and predictability of base flow during low flow periods since the 1920s, which they have attributed largely to intensive agriculture. Direct and indirect effects of climate change would exacerbate these and other threats to riparian ecosystems, including exotic species invasions, excess nutrient and toxin loading, and sedimentation.

Habitat for warmwater fish could also be reduced by hotter temperatures. The physical impacts on stream channels in the Ozarks could be significant. Because of extensive land use changes, coarse gravel (with low water retention capacity) has been accumulating along riparian shores at the expense of fine sediment. Research has demonstrated that changes in hydrology, which could be exacerbated by climate change in the future, affect the ability of willows and sycamores to germinate, which in turn is expected to affect sediment transport processes and habitat availability in these riparian systems. A warming climate with less midcontinental rrainfall would increase pressure on aquifers such as the Ogallala, which in turn could affect the Arkansas River basin. Increased air temperatures could have an adverse effect on the hydrology and productivity of loblolly pine stands, which in western Arkansas are at the limit of their range (EPA, Climate Change in Arkansas, 2008).

Strategies:

- Work with partners such as other federal, state and tribal agencies, conservation groups, and academic institutions on landscape conservation planning and design.
- Monitor various weather elements.
- Monitor and analyze water quality and quantity, as well as water temperatures, for potential changes that could affect habitat management activities.
- Monitor and document changes in habitat types on the refuge.
- Evaluate current carbon sequestration projects to gain a better understanding of the effects on climate change.
- Continue to support new carbon sequestration projects.
- Document and reduce nonclimate stressors on the refuge (i.e., invasive species, fuel loads to prevent destructive wildfires).

Overflow National Wildlife Refuge

Objective 2.1: Forest Management: Within 5 years of plan completion, manage up to 12,500 acres of forested habitat on Overflow NWR and the Oakwood Unit to provide a natural diversity of plant and animal species found in the Lower Mississippi Valley (LMV) to fulfill the mission and purposes of the refuge.

Discussion: About 80 percent of the forest lands in the LMV have been cleared and converted to other land uses, leaving only remnant forested tracts. Fish and wildlife resources have been similarly impacted, leaving remnant populations that must be managed to meet the refuge purpose and to achieve their maximum potential as it relates to landscape level planning.

Overflow NWR was established in 1980 to protect one of the remaining bottomland hardwood forest tracts in the LMV. The forested area is noted as approximately:

- 8,625 acres of bottomland hardwoods;
- 2,020 acres of fields reforested with native hardwoods;
- 179 acres of recently purchased pine plantation in the Conservation Reserve Program; and
- 175 acres of upland hardwoods with some mixed pine, for a total of about 11,000 acres of forest.

There are also about 1,500 acres of former forest in beaver ponds and wet scrub/shrub habitat.

The Oakwood Unit was acquired through fee-title transfer from the Farmers Home Administration inventory on August 2, 1990. The forested area is noted as about:

- 1,200 acres of fields reforested with native hardwoods;
- 220 acres of bottomland hardwoods; and
- 80 acres of fields passively reforested with natural regeneration, for a total of about 1,500 acres of forest.

Major characteristics of a forest that is currently thought to be productive as habitat for migratory birds (waterfowl and songbirds) in the LMV include an overstory cover of 60-70%, a midstory cover of 25-40%, and an understory cover of 25-40%, among others (LMVJV Forest Resource Conservation Working Group 2007). The plentiful overstory provides structure and food (hard mast, insects, etc.) for many species, while allowing sunlight penetration to stimulate plants at lower levels. Recent canopy gaps encourage herbaceous ground vegetation that provides food (soft mast, browse, etc.)

and cover for insects, songbirds, waterfowl, and other resident wildlife. As succession continues, woody plants begin in the understory then grow into the midstory. This structure in the midstory serves as cover and provides food (soft mast, insects, etc.) for many songbirds. Without further disturbance, the overstory and midstory canopies close up, eventually capturing most of the penetrating sunlight. The result shades out the plants remaining in the understory layer. Structural diversity in the forest is a key to wildlife productivity for many priority species. There is less known about the role of tree species diversity for many birds, but the value of having an array of trees native to the site is in no doubt.

An assessment of current and predicted conditions of the forest is needed to formulate desired future conditions. Any previous inventories can be mined for relevant data, considering time since collection in the analysis. Acquisition of additional information can be obtained using cost-efficient methodologies and sampling strategies, rather than an intensive fixed-sampling rate. A management plan can be prepared considering the overall and detailed ecology of the site, present and potential habitat conditions, and the needs of trust resources noted in enabling legislation and other laws of Congress. Maintaining ecological integrity is an underlying objective of all actions, and requires consideration of the ecology of the entire forest system, not any single component. Subsequent to the management plan, actions are prescribed considering current, predicted, and desired conditions, using as limits natural ecological boundaries understood from vegetation development patterns that occur on any given forest site. The diverse array of habitat requirements for species likely to inhabit the area, complex interactions of vegetation and disturbance, and micro-site considerations necessitate a multi-disciplinary approach.

On Overflow NWR, forest management is arguably one of the most important tools for the refuge to improve habitat quality for the majority of trust resources. The closed-canopy condition of the bottomland hardwood forests of the refuge, with minimal mid- and understory cover that is found on the majority of the refuge, is not beneficial to many priority species and has great potential for improvement. In addition to extant forest, the refuge currently has approximately 2,020 reforested acres. Past efforts have included direct seeding and hand planting seedlings, with a heavy oak component. Current restoration efforts commonly use a stocking rate of 302 seedlings per acre. There is considerable interest in the wildlife forestry community to increase both the diversity of trees planted and the number per acre in bottomland hardwood restoration, in order to improve habitat quality for wildlife through time.

Inventory and monitoring of forest resources are important components of responsible forest management for wildlife habitat. Collection and analysis of inventory data is an important precursor to decision making regarding application for forest management. Monitoring after application is an almost equally important part of the process, as this step is necessary in an adaptive management framework, which sets the stage for improvements in management through time. If data on manipulations and plant/animal responses are collected and analyzed, managers will more quickly begin to see desirable patterns which can be replicated through management. Conversely, undesirable habitat responses can be prevented if managers know what manipulations caused the problems. Finally, keeping records enables communication of desirable management actions to future personnel.

Forests are mostly flat, with slight slopes near Overflow Creek. Species composition is heavy to willow oak, Nuttall oak, overcup oak, cedar elm, ash, bitter pecan, and others. In general, crown closure was often greater than 90% due to lack of disturbance. Portions had crown closure of about 80% due to several tree fall gaps and recent mortality. Crown and bole health was relatively poor, with significant dieback in the top, as well as sap seeps and bulges in the bole indicating insect and/or fungal infection (Putnam et. al. 1960). Where crown closure is greater than 80%, habitat

productivity can be greatly enhanced by instituting thinnings with variable retention rates. Create canopy gaps by removing a portion of the co-dominant crown class trees and a majority of the intermediate and suppressed crown classes. Retain most, but not all, of the larger diameter class trees present for their inherent habitat values.

The Oakwood Unit has had extensive forest restoration through innovative means, including seeding acorns by hand, machine, and aerial application. Natural invasion has also been used to cost-effectively restore habitat to cleared land. These efforts have been successful in setting the stage for forest recovery over the long term. The use of water for vegetation management in moist soil areas has also worked well as the planted trees that can survive wet conditions remain in the upper reaches of the moist soil impoundment.

There are about 200 acres of forest on Oakwood, being a mixture of oaks, hickories, elm, and other native hardwoods. The has been an expressed interest in preserving this area as a "Natural Area" with no active management; however, it was noted that a more representative approach might be to set aside a portion of the area as a Natural Area, and juxtapose that by including the alternate portion in normal forest management. There is a natural east/west drain in the southern portion that would make a logical, long-term boundary for managing the forest south of the drain as a Natural Area. There is also an 80-acre reforested site adjacent and to the south of the extant forest that would be appropriate to set aside from active forest management as a control for reforested areas on the refuge which should receive active forest management through time.

Strategies:

- Conduct a forest inventory.
- Continue to maintain and update the forest management plans for Overflow NWR and the Oakwood Unit.
- Target about 600 acres of thinning every other year.
- Use silvicultural techniques to remove the loblolly pine component currently in reforested stands on Overflow NWR.
- Consider designating a Natural Area (excluded from normal forest management) within a portion (~30%) of the extant forest area of the Oakwood Unit (220 acres).
- Follow reforestation guidelines produced by the LMVJV Forest Resources Conservation Working Group in future reforestation establishment on Overflow NWR and the Oakwood Unit.
- Plan and implement efficient control and eradication of invasive plants where found.
- Monitor success of forestry and reforestation activities (i.e., changes in habitat and wildlife responses) in order to practice adaptive management.
- Use GIS technology as a component of forest management, to provide spatially explicit data regarding distribution of refuge resources (habitat types), habitat treatments, monitoring sites, and for annual management planning.

Objective 2.2: Greentree Reservoir (GTR): Immediately upon completion of the CCP, enhance management of the 4,000-acre greentree reservoir on Overflow NWR to achieve a sustainable wetland forest that provides forage for waterfowl, migrant birds, mammals, reptiles, amphibians and fishes.

Discussion: Seasonally flooded forested wetlands provide food for waterfowl in the form of acorns, moist soil seeds, and invertebrates, as well as cover where ducks can rest and form pair bonds with minimal disturbance. In addition to forest quantity, forest quality will determine the amount of waterfowl that will use an area. Forest features such as species composition (percentage of red oaks), age of dominant trees, and stand densities are some factors that will affect mast and moist soil production. A

critical component in the proper management of a greentree reservoir is water management (hydrology). As a general rule, the overall health and vigor of GTRs are maintained when hydrology is managed to closely mimic that of natural forested wetland systems. Such natural flooding regimes are varied in nature, depending upon rainfall and water conditions from one year to the next. Frequent early (November) and late (March) flooding of GTRs, as well as frequent prolonged flooding, is in most cases damaging to forest health, and leads to increased tree mortality, reduced production of hard mast as food for waterfowl, and shifts in plant species composition through time. Complementing appropriate water management is management of the forest structure and composition through active forest management; completion and implementation of a Forest Management Plan for the refuge that allows for forest silvicultural activities that strive to meet the LMVJV Desired Forest Conditions within the GTR area are important in maintaining quality wildlife habitat.

Seasonal flooding of the 4,000-acre greentree reservoir on Overflow NWR is conducted annually, generally with a target date between December 10 and January 1 to achieve maximum pool level. Drawdown is generally initiated at the end of January if water levels are low enough to access the floodgates. At this time of year, water levels vary over a wide range due to heavy late winter rainfall or occasionally, a scarcity of rainfall. During a dry winter, the structure may not be opened until a later date. The ability to influence water levels in the forest can provide significantly enhanced habitat for wintering waterfowl.

Strategies:

- Conduct a forest inventory within the refuge, specifically sampling forest condition metrics including chlorosis, basal swelling, tip die-back, red oak mortality and regeneration.
- Develop and implement a water management plan for the greentree reservoir.
- Do not impound water until after trees are dormant for the winter season (hardwood leaves dropped) to maintain aeration to actively respiring tree roots.
- Vary duration and depth of impoundment flooding annually.
- Attempt to ensure that the unit is dewatered prior to bud-break (annually).
- For maximum benefit for waterfowl, flood the GTR relatively shallow and slowly early in the dormant season (early December) and increase water levels slowly during rises, serving to maximize recently flooded areas which are most beneficial for dabbling ducks.
- Mimic flood pulses through the winter period to provide enhanced access to various food resources for dabbling ducks and to reduce adverse effects of artificially static water levels.
- Drain GTRs slowly throughout February to stimulate production of invertebrates, provide access for feeding by dabbling ducks, and to reduce adverse effects of late flooding to tree and seedling roots.

Objective 2.3: Moist Soil Management - Overflow: Upon completion of the CCP, provide and maintain moist soil management on 920 acres on Overflow NWR through effective management rotations, to provide a complex of habitat types for migratory waterfowl, shorebirds, wading birds and secretive marsh birds.

Discussion: The high seed production of moist soil plants and their value as waterfowl foods have been known since at least the 1940s (Low and Bellrose 1944). However, managing seasonally flooded herbaceous wetland impoundments or “moist soil units” only became a widely accepted practice after many years of research in southeastern Missouri (Fredrickson and Taylor 1982; Fredrickson, 1996). Today, more than 29,500 acres of moist soil habitat are managed in more than 400 impoundments on state and federal lands in the LMV (LMVJV Water Management Tracking System).

Although geese sometimes use moist soil impoundments and eat shoots of germinating plants, rhizomes, roots, or tubers, the primary emphasis of moist soil management is to produce seeds that will provide food for ducks. Most research has focused on estimating seed production and studies have shown that, under intensive management, species of barnyard grass (*Echinochloa* spp.), sprangletop (*Leptochloa* spp.), flatsedge (*Cyperus* spp.), smartweed (*Polygonum* spp.) and panicum (*Panicum* spp.) can produce more than 1,000 pounds per acre of seed (Fredrickson and Taylor 1982). However, far less is known about production that might be occurring under current conditions in the LMV. Reinecke et al. (1989) used an estimate of 400 pounds per acre of moist soil seeds to derive an average of about 1,386 duck energy-days (DEDs) per acre available on moist soil units. More recently, the LMVJV Waterfowl Working Group used available moist soil seed estimates of nearly 500 pounds per acre reported by Kross (2006) to increase the recognized value of this habitat to 1,868 DEDs per acre. Regardless of the quantity of seed produced, moist soil impoundments are highly recommended as a means of diversifying habitat (Fredrickson and Taylor 1982; Reinecke et al. 1989) and supplying food with nutrients not generally available. Suitable habitat can always be provided for shorebirds, waterfowl, and marshbirds by staggering the rotation among the existing moist soil units. For example, a unit that is disked will provide mudflats for shorebirds during that first year; annual grasses and sedges for waterfowl during years 2 and 3; and perennial vegetation for marsh birds during years 4 and 5, at which time this unit could then be treated again to set back succession. This management action could be conducted only if the woody vegetation doesn't become too large to disc or spray effectively to set back succession.

Vegetative surveys should be conducted at least once or twice annually in managed impoundments to assess waterfowl food production and vegetative treatment recommendations. Equally important keys to success are water control, good record-keeping, proper timing of management treatments, and adaptive management (feedback and adjustments). The goal should be to at least meet each refuge's foraging habitat objectives annually. Improved management strategies to increase food production and waterfowl usage of the food resources produced on each refuge should constantly be sought.

The current LMVJV objective for Overflow NWR of 2,850 acres of moist soil habitat is not attainable. Based upon the available acreage of open habitats (1,400 acres) and the amount of this total acreage dedicated to cropland production, a more realistic goal for the refuge's moist soil habitat is approximately 920 acres. The timing of drawdown in waterfowl impoundments on Overflow NWR to propagate moist soil plants has ranged from mid-March, for annual smartweed production, to late June to maximize barnyard grass production. Drawdown dates are generally dependent on habitat objectives, adjacent impoundment habitat objectives, and the amount of water in adjacent drainage ditches. Disking, flooding, mowing, chemical treatments, and rotating with Japanese millet or agricultural crops are common practices used when the nuisance plants are greater than 50% estimated cover and preferred moist soil seed production is less than 500 pounds/acre.

A private parcel of land located adjacent to the northern boundary of the Overflow NWR sanctuary area, known as the Blanks Tract, is a refuge acquisition priority, and would provide an opportunity for additional quality moist soil habitat of 360 acres, as well as incorporating this heavily hunted private land into sanctuary status.

Strategies:

- Maintain the current level of moist soil management to provide approximately 920 acres of moist soil production and provide over 1.7 million DEDs of waterfowl foraging habitat, while also providing foraging habitat for fall migrating shorebirds and breeding marshbirds.
- Maintain a minimum of 80 acres of mudflat habitat annually for shorebirds.
- Provide suitable habitat for marshbirds, on a rotational basis on at least 1 field unit (80 acres).

- Plan annual water management to optimize resources for a variety of migratory birds. Water should be strategically managed throughout the winter period.
- Within units targeted for waterfowl objectives, irrigate as necessary to promote preferred waterfowl plant production and reduce competition from pest plants.
- Within units targeted for shorebird management, continue to hold water during spring and early summer to prevent vegetation growth. Draw down water slowly in impoundments, beginning in July, until some mudflats are exposed and allow natural evaporation to continue through September to concentrate invertebrates.
- Within units targeted for marshbird management, extend the moist soil rotation to a ≥4-year rotation to reach a condition preferred by marshbirds. Provide flooded conditions in mid- to late summer during years in which units are in a vegetative condition for marshbirds.
- Determine the effects, results, and efficiencies of activities on seed production and percent coverage of moist soil plants (Fredickson estimate using flora structure) to assess success of management treatments and to fine-tune management activities.
- Monitor migratory bird (waterfowl, shorebird, marsh bird, wading bird) use of the different habitats by species and life cycle calendar to determine habitat used/preferred to fine tune habitat planning and management. Also monitor yearly waterfowl numbers, by species, to determine trends and adapt habitat management for target species as practical.

Objective 2.4: Moist Soil Management - Oakwood Unit: Upon completion of the CCP, enhance the current level of moist soil management at the Oakwood Unit by providing at least 800 acres of moist soil production annually.

Discussion: The Oakwood Unit's current capability for moist soil management is approximately 800 acres. Due to the high chloride content (> 300 ppm) of the groundwater in this area of Arkansas, intensive water management for maximum moist soil production is significantly compromised on the unit. Nevertheless, it is anticipated that during years with adequate precipitation during the growing season, the seed yield of beneficial moist soil plants should meet or exceed the production target of 500 pounds/acre.

Strategies:

- Provide a minimum of 100 acres of mudflat habitat annually for shorebirds. Follow similar management strategy to Overflow NWR.
- Produce a minimum of 500 pounds per acre of preferred waterfowl food or at least 50% coverage of good to preferred plants in all moist soil areas annually.

Objective 2.5: Fire Management: Within 3 years of CCP completion, implement prescribed and wildfire response programs refugewide to achieve desired habitats and reduce fuels.

Discussion: Currently, Overflow NWR does not have a fire management program due to the lack of a forest management plan. The refuge would like to implement a fire management program that allows for habitat management of forest grassland, old fields and marsh habitats through rotational prescribed fire. Additionally, the refuge would like to implement wildfire response management to respond to threats to the refuge and the surrounding area.

Strategies:

- Use prescribed fire to accomplish annual wildlife habitat management objectives for forest grasslands, old fields and marsh (managed and natural) habitats.
- Respond appropriately to all wildfires threatening/on refuge.
- Implement prescribed burning as needed for farmed fields.

Objective 2.6: Waterfowl: Immediately upon completion of the CCP, manage 5,800 acres of habitat on Overflow NWR and the Oakwood Unit to meet the habitat and population goals of the North American Waterfowl Management Plan as stepped down through the Lower Mississippi Valley Joint Venture, primarily for the purpose of meeting the nutritional requirements of wintering waterfowl.

Discussion: Habitat objectives are based on food production and acres by habitat type for the complex of habitats including harvested and unharvested cropland and moist soil areas. Each of these habitats is required to provide an important part of the food resources (i.e., native weed seeds, small grains and invertebrates) required by waterfowl wintering in the LMV. Agricultural grains are high in carbohydrates (i.e., "hot foods") needed by waterfowl to maintain body temperature during cold periods during winter. Native weed seeds (moist soil seeds) and invertebrates provide higher levels of protein and other nutrients used by waterfowl to complete other important functions during the winter period such as molting and improving body condition for return migration to the breeding grounds and egg laying. A variety of both natural and agricultural foods provide a diversity of nutrients for waterfowl with temporally varying nutritional needs. Because of the high production of agricultural crops, unharvested grain provides much higher duck energy day values per acre than natural areas. For example, unharvested corn is estimated to provide 28,591 DEDs per acre, whereas moist soil impoundments are predicted to provide 1,868 DEDs per acre, and bottomland hardwoods with a 40% red oak overstory component are predicted to provide 156 DEDs per acre.

Flooded shrub swamps and bottomland forests have some value as foraging habitats, particularly for invertebrate resources, but may play an even more important role by isolating birds during pair bonding, providing thermal protection on cold, windy days, and providing escape cover. It is critical that each component of habitat (i.e., agricultural grains, moist soil, and wooded swamp/bottomland forests) be available if the habitat needs of wintering waterfowl are to be met.

High waterfowl harvest rates and hunting activity in Arkansas make sanctuary an important function of Arkansas refuges. Activities such as maintaining body temperature, searching for food and roost sites, avoiding disturbance, molting, courtship and pair bonding are energy consuming activities for waterfowl in winter. The assumed interaction between disturbance, energetic demands, and low survival can at least partially be mitigated by sanctuary where waterfowl can rest and perform these activities with a minimum of interruption. Sanctuary, particularly when in close association to food resources, is critical for waterfowl to conserve energy to survive the winter and reproduce successfully.

Due to the strategic locations of Overflow NWR and the Oakwood Unit in the heavily hunted Mississippi Alluvial Valley (MAV), coupled with the ability of these refuges to manage for a concentrated source of high-quality waterfowl food resources, both refuge units provide critically important waterfowl sanctuaries. These must remain in place in order to provide areas free from disturbance to wintering waterfowl.

Strategies:

- Water management should be strategically managed throughout the winter period, especially at Overflow NWR, where excellent capability for water management exists.
- Adaptive management strategies should be followed for management of waterfowl habitat.
- Implement a more intensive moist soil management program at the Oakwood Unit (300 acres/year).
- Hire a heavy equipment operator.
- Beaver ponds should be reduced to no more than 5% of the refuge to reclaim valuable waterfowl habitat.

Objective 2.7: Wetland-dependent Birds - Shorebirds: Upon completion of the CCP, provide up to 100 acres of fall (southbound) migration habitat in contribution to the objectives set in the U.S. Shorebird Conservation Plan, Lower Mississippi Valley/West Gulf Coastal Plain Shorebird Management Plan.

Discussion: In 1995, the Mississippi Alluvial Valley Migratory Bird Initiative developed management objectives for shorebirds migrating through the MAV. These objectives were subsequently incorporated into the MAV Regional Shorebird Plan as part of the U.S. Shorebird Conservation Plan (Elliot and McKnight 2000). Habitat objectives for the MAV were derived from an energetic-based model with a number of parameters. A detailed description of the derivation process can be found on the LMVJV Shorebird Web Page (http://www.lmvjv.org/shorebird/sb_library.html). These habitat objectives were allocated among states, based on their land base contribution to the MAV. Within a state, objectives were allocated to public lands, such as State Wildlife Management Areas and National Wildlife Refuges, based on current and near-term management capabilities. The objectives established for Overflow NWR and the Oakwood Unit were 200 and 500 acres, respectively.

The moist soil/cropland impoundments at Overflow NWR provide the opportunity for ideal mudflat habitat for shorebirds during the most critical time of year for shorebird migration, occurring in late summer and early fall. Shorebird management at both Overflow NWR and the Oakwood Unit began in 1994 and currently about 80-100 acres are managed for mudflats. As many as 2,500 shorebirds have been counted in the unit known as the Horrible 80, when managed for the proper mudflat habitat. The most productive habitat for these birds is that which is flooded all winter, spring, and summer, into late July, when a very gradual drawdown is initiated. The key to maintaining populations during the late summer/early fall period is to maintain a mudflat along with an abundant acreage of shallow water that does not exceed 4 inches in depth. These mudflat habitats also provide foraging for several species of wading birds and water birds, including least tern, roseate spoonbill, tri-colored heron, and wood storks.

At the Oakwood Unit, the capability to intensively manage for shorebirds is somewhat reduced due to the lack of complete water management. However, habitat is provided annually by holding certain water units up until late summer, and allowing evaporation to take place, or initiating a slow drawdown if necessary. Units 5 and 7 are usually managed for mudflat habitat, with approximately 100 acres provided for shorebirds each year. Prominent birders throughout the U.S. have conducted shorebird surveys at Oakwood, and have documented up to 22 species in one day.

Strategy:

- Provide late-summer mudflat habitat for shorebirds at Overflow NWR (≥100 acres) and the Oakwood Unit (≥80 acres).

Objective 2.8: Wetland-Dependent Birds - Marshbirds: Upon completion of the CCP, provide for up to 100 acres of quality breeding marshbird habitat in conjunction with meeting waterfowl habitat requirements where possible.

Discussion: Given the apparent potential of Overflow NWR and the Oakwood Unit to support secretive marsh birds, particularly when compared with other national wildlife refuges in the Lower Mississippi Valley, it is clear that this refuge and its unit may contribute in a meaningful way to secretive marsh bird conservation. It is reasonable to consider increasing the amount of habitat which is managed specifically for marsh birds, to create additional conditions suitable for them at these sites within the LMV. With the exception of one 45-acre field (Unit #13), habitat management at Overflow NWR has emphasized resource needs for waterfowl and has largely been too intensive (short-rotation) to promote the dense stands of perennial vegetation such as cattails and rushes that secretive marsh birds seem to prefer. However, it may be reasonable to extend the rotational moist soil management to a 3 to 5+ year rotation on select units at Overflow NWR to allow increased structure for management for king rails and other secretive marshbirds in conjunction with management for other species groups (e.g. waterfowl, shorebirds).

The more passively managed Oakwood Unit contains target habitat conditions annually in several moist soil units, which correlates with the high populations of secretive marsh birds found there. Moist soil management under secretive marsh bird habitat objectives is particularly well suited for the Oakwood Unit. Passive adaptive management methods should be used to assess habitat managed under a marsh bird objective each year, and adapt management to achieve target conditions.

Strategies:

- Continue to provide comparable active management at both Overflow and Oakwood to promote habitat for marshbirds, most notably the king rail.
- Extend moist soil rotation in at least 1 field unit (80 acres) on Overflow NWR to a 4+ year rotation to provide additional suitable habitat on a rotational basis.

Objective 2.9: Wetland-dependent Birds - Wading Birds: Over the 15-year life of the CCP, provide up to 150 acres of critical habitat for long-legged wading birds to contribute to objectives set in the North American Waterbird Conservation Plan.

Discussion: Both refuge units provide significant habitat for breeding and wintering colonial water birds in shallow water areas, and, in the case of Overflow NWR, forested wetlands. Wading birds also take advantage of moist soil units that are not drained in the spring to provide shorebird habitat. Maintaining summer water at a percentage equal to approximately 10% of the moist soil acreage will benefit wading birds. In many cases, management for shorebirds and waterfowl should provide foraging habitat for wading birds incidentally.

Strategy:

- Provide areas of shallow water and mudflat habitat that will provide habitat for wading birds. In general, target maintenance of summer water at a percentage equal to approximately 10% of the moist soil acreage.

Objective 2.10: Resident Wildlife: Upon completion of the CCP, maintain and develop diversified habitats throughout the refuge and promote management actions that will support healthy populations of resident wildlife species to meet the objectives of the National Wildlife Refuge Improvement Act.

Discussion: The habitats of Overflow NWR support a variety of mammals, including game species such as white-tailed deer, gray and fox squirrels, eastern cottontail and swamp rabbits, and furbearers such as raccoon, opossum, otter, mink, muskrat, beaver, bobcat, long-tailed weasel and black bear. Other nongame mammals are more rarely recorded on refuge lands but can be expected to include several species of rodents and bats. Several priority species ('Species of Greatest Conservation Need") recognized by the State of Arkansas (State Wildlife Plan 2007) are known to or may inhabit refuge lands. These include Rafinesque's big-eared bat, southeastern myotis, eastern harvest mouse and long-tailed weasel.

Deer utilize a wide range of habitats and most refuge forest management actions aimed at priority species, such as migratory birds, will provide direct benefits to deer by increasing the quality of deer habitat. Such active management will provide a diversity and abundance of understory, midstory, and overstory stand components (i.e., complex forest stand structure) to meet the needs of a variety of nongame forest birds and resident wildlife, including black bear and deer.

Temporarily flooded bottomland forests provide ideal habitat for many species of mammals. Food and cover are abundant and diverse, and a variety of mammalian species are present. In addition to the black bear, which is primarily associated with upland forests joined by extensive forested wetland corridors, other forest wetland inhabitants are the white tailed deer, bobcat, coyote, river otter, raccoon, gray fox, red fox, beaver, mink, swamp rabbit, cottontail rabbit, eastern gray squirrel, fox squirrel, nutria, opossum, muskrat, and skunk.

Forest management, on a selective basis, can benefit turkeys by increasing the diversity and availability of foods, in the form of hard and soft mast, as well as grasses, sedges and forbs. Nesting habitat is often improved by selective thinning of trees which provides more ground cover for nest concealment. Removal of more than 50 percent of the overstory degrades turkey habitat in the short term by resulting in extremely rank undergrowth that is generally avoided by turkeys.

Strategies:

- Control invasive plants and animals.
- Maintain a diverse and productive bottomland hardwood habitat complex.
- Develop a food plot for wildlife observation behind visitor center.

Objective 2.11: Resident Wildlife - Reptiles and Amphibians: Over the life of the CCP, maintain and enhance habitat refuge wide for a diverse assemblage of reptile and amphibian species, particularly those recognized as species of special concern by state and/or federal agencies.

Discussion: Amphibians and reptiles are in decline across the southeastern United States, due most significantly to direct loss and modification of habitat. The Bayou Bartholomew Basin is a highly

modified system as the result of extensive drainage, flood control, and clearing of forested lands for agriculture. Multiple species of snakes, lizards, frogs, toads, salamanders, and turtles occupy the refuge. Changes in habitat structure and hydrology have without doubt extensively affected the historic distribution and populations of reptiles and amphibians. The riverine, floodplain forest, and diverse topography of Overflow NWR are suitable for numerous species of reptiles and amphibians. As such, Overflow NWR plays an important role in conserving remnant habitat as well as in restoration of habitat and ecological functions for reptiles and amphibians. Management, acquisition, and restoration of lands for wildlife habitat benefit reptile and amphibian populations. The refuge participation in landscape level planning and conservation also benefits herpetofauna beyond the boundaries of the refuge.

Many reptile and amphibian species use multiple habitats for foraging, reproduction, hibernation or dispersal and require connectivity between habitat types (e.g., shallow lake and adjacent bottomland hardwood forest, cypress brake and floodplain forest, floodplain forests and adjacent uplands, temporary wetlands and adjacent uplands) in order to meet distinct life cycle habitat needs. Connectivity throughout floodplain forests also allows for important migration and dispersal corridors. Construction of barriers to aquatic and terrestrial wildlife such as improved roads should be discouraged and other alternatives such as road underpasses sought.

Many reptiles and all amphibians are closely linked to aquatic habitats and respond positively to various inundation conditions. Greentree management on the refuge should seek to mimic natural hydrologic patterns, with year to year variation in rates, periods and depth of inundation. Resident reptiles and amphibians should respond well through time as this (managed) natural cycle varies conditions annually to create conditions that benefit a variety of species needs.

Strategies:

- Maintain connectivity between habitats to allow reptiles and amphibians unrestricted movement between habitats needed for complete life cycles.
- Maintain or restore the natural hydrologic system and community structure, minimizing conversion of habitat types and hydrologic function as possible within legislative management constraints.

Objective 2.12: Invasive and Nuisance Species Control: Within one year of CCP completion, control nuisance/native or exotic/invasive plant and animals on the refuge that are hindering the ability to meet habitat/population objectives for federal trust species.

Discussion: Intrusion of invasive plants can displace native plant and animal species and change habitat productivity for native reptiles and amphibians, through changes such as vegetative community, insect community, and structural environment. Feral hogs which are present on Overflow NWR should be specifically controlled, as they are known to cause significant negative impacts on native populations through direct predation, disturbance or destruction of site specific plant communities (e.g., seasonal wetlands) and soil conditions.

The spread of feral hogs to almost all habitats in the Southeast constitutes a real threat to wildlife habitat including that of Overflow NWR. Neighboring private lands to Overflow NWR harbor many hogs. They are highly sought after by hunters and are removed by farmers that experience crop damage. An estimated 500 hogs were removed in the vicinity of the refuge over the last year (2007) and yet damage due to hogs, both on and off refuge, persists. On Overflow NWR, hog populations have historically fluctuated annually, primarily in response to hard mast availability in refuge habitats. This exotic threat to wildlife habitat is now common throughout the southeastern United States,

continues to increase in range and intensity, and should be countered aggressively to keep population numbers severely reduced.

Beavers are a native species to Arkansas; however, they were extirpated from the area in the early 1900s. The species was reestablished in Arkansas in the late 1900's and has since reached a level at which they are often considered a nuisance species. Modified hydrologic conditions, minimal trapping pressure due to low demand for fur, minimal natural predation, and decreases in forested lands on a landscape scale have contributed to the nuisance impacts of beavers in current times.

The impact of beavers on forested habitats is severe on Overflow NWR and constitutes a significant threat to the forest health and survival. Particularly damaging on Overflow NWR is the combined impacts of summer agricultural irrigation runoff which is captured behind beaver dams and causes unnatural summer flooding. Currently, refuge staff conducts all beaver damage management activities on Overflow NWR. If the staff is able to maintain beaver damage at an acceptable level, this will remain the best option. If not, other options include contracting with an individual or agency that conducts beaver damage management activities.

Nutria are herbivorous, rodent-like aquatic mammals. They are most problematic in coastal zones where they contribute to coastal erosion and marsh loss by eating the roots of marsh plants. In interior wetlands they tend to incur less dramatic impacts; however, they do cause impacts to natural vegetation. Nutria are extremely prolific breeders and thereby often difficult to control. Nutria occur at low levels on Overflow NWR and the population will likely fluctuate based on annual reproduction and as reduced by severe winters. Likely negative impacts from this species include exclusion of the native muskrat through competition, removal of emergent vegetation by feeding on roots and stalks, and weakening of levees through burrowing behavior.

Strategies:

- Implement systematic removal of invasive plant species by mechanical, chemical, and prescribed burning.
- Develop nuisance/exotic/invasive plant/animal control plan.
- Beaver control activities should continue, with seasonal assessment of forest damage potential, removal of dams to decrease summer flooding, and systematic removal of associated beavers to discontinue dam building.
- Control nutria through systematic removal opportunities.
- Control feral hogs through systematic removal and under an objective of eradication from refuge lands.

Objective 2.13: Open Land/Crop Land: Immediately upon completion of the CCP, provide a complex of habitat conditions in time and space to meet the needs of migratory birds, including migratory waterfowl, shorebirds, wading birds and secretive marsh birds, through integrated open land rotational management.

Discussion: Unharvested grain crops are a critical ingredient of waterfowl foraging habitat needs, and if not available, the attractiveness of a refuge for waterfowl is decreased. This also goes hand-in-hand with refuges providing adequate sanctuary from disturbance along with the grain crops. Rice, corn, milo, and millet are top choices as grain crops for ducks. Rice is particularly resistant to decomposition even under flooded conditions and is high in calories. Corn, milo, and millet also provide high energy resources for waterfowl and can generally be kept above the water surface, but problems often arise from depredation prior to flooding, as well as seed degradation after flooding. It

is important to manage the cropland program to provide a good diversity of waterfowl foods. At first glance, one might assume that private lands in the area can provide all the cropland needs of these waterfowl species. However, privately held lands cannot be depended on to provide all the basic needs of wintering waterfowl. Additionally, carrying capacities for wintering waterfowl are greatly reduced on harvested fields compared to unharvested croplands, and availability of crops to ducks may be negatively affected by active hunting on private lands.

Presently, grain production at Overflow NWR is being accomplished through the cooperative farming program in an effort to meet the foraging habitat needs of wintering waterfowl. Given the limited staff and budget associated with this relatively small refuge, this has been the most effective method for the refuge to manage croplands. If farming conditions become unprofitable for the cooperative farmer, this critically important program would require farming by refuge staff (force account). Force account farming would not be a feasible method to achieve current waterfowl objectives, given current staff and budget constraints. The recommended annual unharvested cropland objective for Overflow NWR is 2,591,420 duck energy-days (DEDs). It has been recommended that 100 acres of rice and 40 acres of millet be grown and left unharvested by a contract farmer. If forced-account farming methods are utilized, acres which can be flooded in winter should be the priority for crop production with assessments to maintain acreage at a level sufficient to provide 2,591,420 DEDs, which is anticipated to be at minimum 100 acres of rice and 40 acres of millet. A secondary objective of the farming program should be to set back plant succession in the moist soil units to favor annual plants that typically have high yields of seeds preferred by waterfowl. A rotation that includes at least one-year farming of a crop is highly effective for this purpose. A rotational frequency of 2 to 4 years is generally recommended for wintering waterfowl, although select units could be placed on a rotation as long as 5 years to provide habitat generally preferred by secretive marshbirds.

At Oakwood NWR there are no plans to provide agricultural grain crops for waterfowl. In addition to use by wintering ducks, substantial numbers of snow and white-fronted geese have utilized Overflow NWR grain crops in recent years. In order to at least partially meet the foraging requirements of these geese, it is suggested that the DED objectives be recognized as minimal requirements, and that the refuge farming program should strive to provide grain/green forage at levels that exceed these minimal goals.

Strategies:

- Provide 100 acres (2,383,300 DEDs) of un-harvested rice to help meet the duck-energy-day foraging objectives for Overflow NWR.
- Provide 40 acres (208,120 DEDs) of millet to help meet the duck-energy-day foraging objectives for Overflow NWR.
- Use crop production strategically as a management strategy to set back succession in moist soil units to favor preferred annuals.
- Continue farming approximately 400 acres per year under the refuge Cooperative Farming Agreement.

Objective 2.14: Aquatic Resources: Upon completion of the CCP, through adaptive management, maintain and enhance 2,000 acres of refuge aquatic habitats to benefit aquatic fauna.

Discussion: The location of the refuge lands on both sides of Overflow Creek creates a key buffer from inputs from neighboring agricultural and commercial forest lands. The MAV- Bayou Bartholomew ecobasin ranks poorly (2/5) among Arkansas ecobasins relative to a key measure of aquatic habitat health, in having a low percentage (29%) of forested areas within riparian zones

(State Wildlife Action Plan 2007). The effects of agriculture to the north and east and timber harvesting practices in the coastal plain on the west side have created severe siltation problems along Overflow Creek. In addition, impoundment of irrigation runoff by beavers along with siltation has resulted in a significant loss of bottomland hardwoods and prolific weed growth in the creek channel. The beaver dams and vegetation have brought drainage to a standstill in several locations. When the refuge was under initial acquisition, a Level II Contaminant Survey was conducted and numerous fish of all species were found to harbor various levels of farm chemicals and other potentially toxic substances. A recreational fishing program was therefore never initiated.

Strategies:

- Continue to manage refuge lands in such a way that they serve as a buffer to local (off-refuge) impacts to the aquatic system, including sedimentation and chemical contamination.
- Maintain site appropriate vegetation adjacent to refuge waterways (e.g. bottomland forest) and conduct refuge management according to best management principles including maintenance of streamside management zones to limit sedimentation affects and minimization of roads in riparian zones.

Objective 2.15: Climate Change: Over the life of the CCP, be responsive to evolving science and technology regarding climate change and implement the Service's climate change policy which will be outlined in a Climate Change Strategic Plan now in draft form.

Discussion: The Arkansas landscape is divided between highland ecosystems in the north and lowland habitats in the south. The Ozark and Ouachita plateaus are covered by oak, hickory, maple, and beech forests and host several endemic animal species, including fish and salamanders. The Mississippi alluvial plain region, the delta, contains the remnants of a once-extensive expanse of bottomland hardwood forests and meandering flatland rivers. The floodplains of the White and Cache rivers contain the most important breeding areas for mallard ducks in the world; as much as 10% of the continent's mallard population may winter in this area. Loess ridges are found within the delta region, and they contain several plant species that are uncommon elsewhere in the state. The sandy soils of the Gulf coastal plain are dominated by pine woods, including loblolly, longleaf, and shortleaf pines, and provide old-growth habitat for endangered red-cockaded woodpeckers and other animals. Scientists working in the Cache River have already documented a steady decline in magnitude and predictability of base flow during low flow periods since the 1920s, which they have attributed largely to intensive agriculture. Direct and indirect effects of climate change would exacerbate these and other threats to riparian ecosystems, including exotic species invasions, excess nutrient and toxin loading, and sedimentation.

Habitat for warmwater fish could also be reduced by hotter temperatures. The physical impacts on stream channels in the Ozarks could be significant. Because of extensive land use changes, coarse gravel (with low water retention capacity) has been accumulating along riparian shores at the expense of fine sediment. Research has demonstrated that changes in hydrology, which could be exacerbated by climate change in the future, affect the ability of willows and sycamores to germinate, which in turn is expected to affect sediment transport processes and habitat availability in these riparian systems. A warming climate with less midcontinental rainfall would increase pressure on aquifers such as the Ogallala, which in turn could affect the Arkansas River basin. Increased air temperatures could have an adverse effect on the hydrology and productivity of loblolly pine stands, which in western Arkansas are at the limit of their range. (EPA, Climate Change in Arkansas, 2008)

Strategies:

- Work with partners such other federal, state and tribal agencies, conservation groups, and academic institutions on landscape conservation planning and design.
- Monitor various weather elements.
- Monitor and analyze water quality, quantity as well as water temperatures for potential changes that could affect habitat management activities.
- Monitor and document changes in habitat types on the refuge.
- Evaluate current carbon sequestration projects to gain a better understanding of the effects on climate change.
- Continue to support new carbon sequestration projects.
- Document and reduce nonclimate stressors on the refuge (i.e., invasive species, fuel loads to prevent destructive wildfires).

VISITOR SERVICES

Goal 3. Provide wildlife-dependent public use opportunities consistent with the Refuge System mission that leads to greater understanding and enjoyment of fish, wildlife, and their habitats on the Complex.

Discussion: The National Wildlife Refuge System Improvement Act of 1997 states that compatible wildlife-dependent recreational uses are the priority public uses of the National Wildlife Refuge System (e.g., wildlife observation, photography, environmental education and interpretation, fishing and hunting) and will receive enhanced consideration over the other general public uses. The Service will permit other uses only when they have been proven to be both appropriate and compatible (see 605 FW 1, General Guidance, and 603 FW 1, Appropriate Refuge Uses).

A variety of public use opportunities are available on the Felsenthal and Overflow NWRs. The Oakwood Unit is currently closed to the public. The Felsenthal and Overflow refuge staff manage an extensive visitor services program without a Visitor Service Specialists. Two fire staff provide excellent support for the visitor services program as a collateral duty. In addition, they manage recreation and education programs, volunteers, the Friends Group, and outreach for the Felsenthal and Overflow refuges. Visitors to the Felsenthal and Overflow refuges annually average approximately 400,000 and 15,000, respectively.

Felsenthal National Wildlife Refuge

Objective 3.1: Welcome and Orient Visitors: Within 3 years of CCP approval, at least 75 percent of sampled adult visitors who stop at the visitor center or entrance kiosks will find appropriate and sufficient information to guide themselves to refuge facilities.

Discussion: A visitor center located 5 miles west of Crossett on U.S. Highway 82 contains numerous wildlife exhibits and is open Monday-Friday. Facilities near the refuge headquarters and visitor center include a ½-mile accessible trail for visitors with disabilities. Wildlife viewing and auto touring, environmental education programs and group tours, hunting, fishing, and boating are popular activities located about ½-mile from the headquarters. The refuge has an extensive network of all-terrain vehicle (ATV) trails, 10 primitive camping areas, and 8 boat ramps. These facilities lack toilets but are maintained in conjunction with the hunting and fishing programs.

Strategies:

- Develop a Visitor Services Plan.
- Within 5 years of CCP completion, update signs to meet current standards and develop and implement a sign plan.
- Establish or reestablish boat and canoe trails by installing trail signs.
- Within 5 years of CCP completion, update all brochures to meet current standards.
- Place exhibit panels at popular trailheads on the north and south parts of refuge to discuss the greentree reservoir and other current management and their effects on waterfowl and fish populations.
- Within 5 years of CCP completion, update website to meet current standards.
- Designate parking areas at trailheads and popular access points.
- On Woodland Trail, repair the pavement where tree roots are uprooting the surface of the trail.
- Evaluate primitive camping facilities and management. Consider developing tent platforms, toilets, and fire rings.
- Develop an orientation video for the complex.

Objective 3.2: Hunting: Over the 15-year life of the CCP, continue to provide appropriate hunting opportunities that allow for quality public recreation and are compatible with refuge purposes.

Discussion: Biologically sound, compatible hunting is a legitimate activity and it is one of the six priority public uses to be allowed, when compatible, as outlined by the Refuge Improvement Act. However, there are times/periods when hunting on some sites will need to be curtailed due to lack of refuge personnel; safety reasons; the need for sanctuary sites for certain wildlife; and lack of sufficient land acres.

Felsenthal NWR provides numerous hunting opportunities for the public for both migratory and resident wildlife species. Hunters have the opportunity to hunt squirrel, rabbit, quail, woodcock, waterfowl, deer, raccoon, turkey, coyote and wild hogs. The refuge offers a wide range of deer hunting opportunities for those using archery, muzzleloader, and modern gun, as well as special opportunities for youth hunters with access available to most portions of the refuge. Currently, a hunt for hunters with disabilities is not offered on the refuge.

Waterfowl hunting on the refuge has decreased somewhat in recent years due to various conditions, including milder winters up north, which tends to reduce the number of ducks in the Felsenthal NWR area. However, duck hunting remains a very popular activity on the refuge, especially during drier winters, when hunting opportunity in south Arkansas is limited.

Strategies:

- Continue to conduct annual cooperative state/refuge hunting regulation meetings and standardize regulations across the south Arkansas refuges, where and when feasible.
- Utilize quotas, permits, period limitations, etc., as needed to improve the quality and safety of hunting activities.
- Continue providing opportunities for the public to hunt white-tailed deer and turkey on the refuge. Create additional opportunities for youth and hunters with disabilities to hunt deer and turkey when and where possible, given the limited amount of staff.
- Monitor deer herd conditions through collection of age-weight-antler (AWA) data at refuge check stations. Collect AWA data on at least 50% of the harvested deer each year.
- Maintain present hunting opportunities for small game, using current season formats.

- Continue maintaining hunter check stations in cooperation with the AGFC to monitor deer and turkey harvest on refuge.
- Upon completion of the CCP, update station hunt plans and all hunting Compatibility Determinations (CDs).

Objective 3.3: Trapping: Over the 15-year life of the CCP, continue to allow trapping to control nuisance wildlife and protect refuge infrastructure and wildlife.

Discussion: The refuge allows trapping by permit during the furbearer trapping season. This season runs from approximately November to January. Trapping of invasive and nuisance species such as nutria and beaver are included.

Strategy:

- Continue the current trapping program to control nuisance wildlife.

Objective 3.4: Fishing: Over the life of the CCP, provide appropriate fishing opportunities that do not detract from the original purposes of refuge establishment.

Discussion: The fishing (including frogging and craw fishing) program is not managed to control the number of fishermen. About 60 percent of the refuge's total consumptive public use is fishing. Problems associated with fishing include litter, styrofoam bait containers, fishing line and baits, and human food and drink packaging. Eight boat launching facilities with parking areas on the refuge and three boat launching facilities with parking areas off the refuge provide lake and river access. Restroom facilities are only provided by the refuge at the visitor center during open hours. Two nonrefuge recreation areas provide restroom facilities adjacent to the refuge's Crossett Harbor Recreation Site and Grand Marais Recreation Site. Adequate bank fishing opportunities are available. Anglers with disabilities are currently accommodated with accessible fishing piers.

Felsenthal NWR's waterways and lakes have historically received substantial fishing pressure; however, during the past 5-10 years fishing activities have declined due to an increase in dense submerged aquatic vegetation, which negatively affects both boat travel and fisheries resources.

Angler numbers are determined using existing formulas. Numbers of boats at refuge facilities are counted visually. Numbers of boats using Corp of Engineers facilities are counted by traffic counters; these numbers are provided to the refuge. A Youth/Public Fishing Derby is held by the staff annually at the Locust Ridge site.

Strategies:

- Allow appropriate seasonal fishing access to refuge waters via use of area/time closures to reduce disturbance impacts to migratory birds.
- Coordinate with AGFC efforts to improve fish habitats through vegetation control methods.
- Add a 3-panel kiosk with a brochure box at each boat launch/parking area.
- Within 5 years of CCP completion, add a youth or senior fishing derby to Woodland Trail Pond.
- Evaluate fishing tournaments (in terms of time, space, zone, demand and use). Continue to issue a special use permit (SUP) for each tournament.

Objective 3.5: Wildlife Observation and Photography: Over the 15-year life of the CCP, maintain and where possible expand walking, driving and boating access for wildlife observation and photography.

Discussion: Presently there are no auto tour routes available at Felsenthal NWR. There is a fishing pier located adjacent to the Felsenthal Lock and Dam. This structure is a multipurpose structure that is used by refuge visitors for wildlife viewing, wildlife photography, and film capture. This facility is well maintained and is accessible to visitors with disabilities. This multipurpose structure is strategically placed so as to allow the refuge visitor an opportunity to view and photograph various wildlife species. The Woodland Trail is a half-mile paved trail adjacent to the refuge headquarters. This small trail is accessible to refuge visitors with disabilities. The Sand Prairie Trail is approximately a three-mile trail that traverses through an upland red-cockaded woodpecker habitat. The Sand Prairie Trail, however, is not accessible for visitors with disabilities.

Strategies:

- Develop a parking area for the Sand Prairie Trail.
- Explore options of establishing an auto tour route along the old tram bed in Sand Prairie Trail or along Shallow Lake Road.
- Update the refuge's bird list.
- Take steps to start providing Audubon birding tours again.
- Explore options to put in food plots in strategic areas that are accessible to the general public.

Objective 3.6: Environmental Education/Interpretation:

Objective 3.6 (a): Within 3 years of CCP approval, develop an environmental education program for the South Arkansas Refuge Complex.

Objective 3.6 (b): Within 3 years of CCP approval, develop an interpretive plan for the Complex.

Discussion: Minimal environmental education is done on the refuge due to the lack of dedicated public use staff. The majority of existing programs fall under the interpretive program section.

Strategies:

- Hire a Visitor Services Specialist for the South Arkansas Refuge Complex to be stationed at Felsenthal NWR and develop an Environmental Education program for the Complex.
- As part of the Visitor Service Plan, develop an Environmental Education (EE) Program component for the Complex.
- Survey schools and/or teachers informally to find out about their needs and logistical limitations.
- Expand involvement of staff to manage the Junior Naturalist Program.
- Evaluate partnerships to enhance EE opportunities/EE center.
- As part of the Visitor Service Plan, develop an Interpretive Program component for the Complex. Develop an interpretive plan for the Complex.
- Incorporate the potential impacts of climate change/global warming into the EE program.

Objective 3.7: Outreach: Over the 15-year life of the CCP, increase public outreach to emphasize resource management practices by developing partnerships and promoting public use opportunities.

Discussion: Communication to various audiences (e.g., open houses; one-on-one conversations with decision-makers and/or opinion leaders; articles in local newspapers; special programs and/or presentations to community groups; offsite special events such as state fairs, agricultural shows, etc.) should continue to be utilized. Additional assistance is needed beyond the staff to redesign web sites and communicate issues to the public.

Strategies:

- Provide additional information to the public to provide a better understanding of flooding cycles within the GTR and the importance of periodic drying cycles.
- Develop a general outreach plan for the refuge.
- Where appropriate, develop specific outreach strategies to address issues.
- Continue to update/develop media contacts and hold media days.
- Develop a slide presentation that can be used or modified for a variety of presentations.
- Pick two to three events that the refuge is successful at performing, schedule them on an annual basis, and develop a news release before and after each event concerning its success.
- Issue a news release regarding water management changes and scheduling to benefit increased game fish populations and the long-term duck populations.
- Contact Georgia Pacific, the University of Arkansas at Monticello, and local towns to discuss the possibility of mutually beneficial programs for communities.
- Continue to host the annual Youth/Public Fishing Derby.
- Schedule a congressional focus day at the refuge to present management issues and enlist their support.
- Develop a refuge-specific tabletop exhibit.
- Pick one or two festivals and events that one of the staff could participate in and that relate to the purpose/mission of the refuge.

Objective 3.8: Friends Group/Volunteers: Over the 15-year life of the CCP, expand volunteer program by 25% to enhance aspects of refuge management. Include volunteers and the Friends group in most management efforts.

Discussion: Felsenthal National Wildlife Refuge has a volunteer staff of about 100 people. The refuge staff has a designated volunteer coordinator who also recruits, and assigns projects. Although the present volunteer coordinator has served in this position for some time, there has never been any formal training offered to the staff. Position descriptions have not been drafted. There is no formal method to process volunteer applications, orient volunteers, and update volunteer information. Due to staff size and office capacity, there is no space allotted to volunteers in the headquarters at this time. Onsite housing is not offered to volunteers, but hats and t-shirts are provided as uniforms. The station receives a nominal amount for volunteer funds which is used for various rewards such as banquets, t-shirts, plaques, and other service awards.

Presently the Friends of Felsenthal National Wildlife Refuge serves as the support group for the refuge. There are about 100 paying members of the Friends of Felsenthal organization. Their mission is to support the mission of the refuge. They have explored opportunities for local industry and corporate involvement from Plum Creek and Georgia Pacific. This cooperating association contributes an estimated $2,000-$3,000 per annum to the refuge budget. In the past they have

assisted with purchases of ink cartridges and paper for refuge administration. There are plans for the Friends of Felsenthal to assist with putting up a new sign and potentially paying for the grass carp project (airplane usage). The support group has a designated space in the foyer of the visitor's center where they can sell t-shirts, hats, stuffed animals, and maps to refuge visitors. Certain members of the Friend's group have taken the initiative to begin drafting the refuge newsletter without refuge staff assistance.

Strategies:

- Look for partnerships at the University of Arkansas-Monticello to develop programs, with possible internships.
- Expand the themes and messages for Felsenthal NWR.
- Seek a grant from the Friends group to hire a seasonal intern position. Look for partnerships at UA-Monticello and other state universities to help develop interpretive programs (possibly internships).
- Encourage Friends members to develop relationships with local businesses to help communicate refuge messages and increase opportunities to fund refuge interns and projects.
- Provide training for the Friends group and volunteers to lead interpretive programs.
- The volunteer coordinator should develop position descriptions and tasks for volunteers, and also annual work plans for volunteers.
- Generate media attention for volunteer projects.
- Use the Volunteer.GOV account to recruit additional volunteers for the refuge.
- Provide office space for the refuge volunteers/Friends in the refuge headquarters.
- The Friends groups should continue to send a representative to the regional or national Friends workshop to network and gain expertise from other regional and national refuge support groups.
- The Friends should explore partnerships with local businesses, birding groups, The Nature Conservancy, etc. to gain additional refuge support.

Objective 3.9: Climate Change: Over the 15-year life of the CCP, continue to gain knowledge about climate change, sharing information with the public and incorporating it into management strategies.

Discussion: The world's climate is changing and it will continue to change throughout the 21st century (Johnson 2009). Climate change is a global event but the ecological impacts will vary from region to region. Gaining an understanding of climate change and the human activities that are contributing to it can reduce the effects to the Earth.

Levels of carbon dioxide and other greenhouse gases in the Earth's atmosphere have increased dramatically since the Industrial Revolution. There is a strong belief that the observed warming over the past 50 years is a result of increased greenhouse gases generated by human activities (IPCC 2007). As stewards of this land, it is our duty to gain knowledge of the effects we are having on the Earth and do what we can to reduce the negative impacts.

Strategies:

- Inform partners and the public of refuge's research and carbon sequestration projects that support increased knowledge of climate change.
- Provide volunteers opportunities to support climate change-related projects on the refuge.
- Educate the public on ways to reduce each individual's carbon footprint.

Overflow National Wildlife Refuge

Objective 3.1: Welcome and Orient Visitors: Within 3 years of CCP approval, at least 75 percent of sampled adult visitors who stop at the refuge office or entrance kiosks will find appropriate and sufficient information to guide themselves to refuge facilities.

Discussion: The refuge has various ways to welcome and orient visitors, including signs, brochures and other publications. The current refuge office is not designed as a visitor contact area. Plans to replace the current office with a new one that would better function as a isitor center have been proposed. Additionally, the refuge would also update current signs and publications, while adding infrastructure upgrades to better accommodate visitors.

Strategies:

- Develop a Visitor Services Plan.
- Update signs to meet current standards and develop and implement a sign plan.
- Update all brochures to meet current standards
- Replace the current office with a new one. In the interim, consider reconfiguring the front area of the office to create a visitor contact area.
- Update website to meet current standards.
- Designate parking areas at trailheads and popular access points.
- Put additional welcome and orientation kiosks at both entrances to the wildlife drive and at the entrance to the greentree reservoir.
- Add a sidewalk to direct visitors to the office.
- Develop an orientation video for the Complex.

Objective 3.2: Hunting: Immediately upon completion of the CCP, continue to provide appropriate hunting opportunities that allow for quality public recreation and are compatible with refuge purposes.

Discussion: Current public use programs on Overflow NWR include hunting seasons for waterfowl, deer, turkey, squirrel, rabbit, woodcock, quail, raccoon and opossum. The Oakwood Unit is not open to hunting. The review team did not identify any reasons for concern that the current hunting seasons were unduly impacting wildlife populations and did not recommend any specific changes in hunting programs. Most hunting seasons are limited and the hunting pressure at Overflow NWR appears to be generally light.

Additional limited hunting opportunities, such as special hunts for hunters with disabilities and special youth hunts, for both turkey and deer, would be consistent with the refuge's biological goals and objectives. There is an opportunity to increase youth hunts through special weekends where they are the only legal participants. Cooperation with local chapters of the Wild Turkey Federation, especially Wheeling Sportsman, could be investigated as a method to address staff limitations to manage such hunts.

Waterfowl hunting rules are consistent with common conservative National Wildlife Refuge System rules, within the larger framework of migratory bird regulations. Refuge rules, such as ending hunting at noon each day, limitations on discharge of shells, and removal of all blinds/gear daily, limit pressure within the hunt areas and provide a lower intensity of hunting than that often allowed on neighboring lands. Additionally, Overflow NWR provides a specific waterfowl sanctuary during waterfowl hunting seasons on 1,300 acres, inclusive of all the open lands managed primarily for wintering waterfowl (crop and moist soil units). This sanctuary area is considered an essential

component of appropriate management for wintering waterfowl. The area open to waterfowl hunting is all within the greentree reservoir unit (4,000 acres). This hunting pressure is not considered a concern for waterfowl populations, although it is recognized that this situation may create public pressure on management to maintain water levels above that recommended for appropriate habitat management during the hunting season. Consistent management of water at levels most advantageous for waterfowl hunting will most likely conflict with biological goals and objectives for forested habitat management and create significant habitat damage over time.

Incidental take of feral hogs, beaver, nutria, and coyote during established hunting seasons was not identified as a conflict with any biological objectives and has the potential to assist in control of invasive animals. It should be noted, however, that incidental take is unlikely to significantly control invasive species and should not be the only action taken on populations that require active management (feral hogs, beaver, nutria).

Strategies:

- Develop a plan to accommodate hunters with disabilities.
- Change the regulation that allows hunters to leave stands up on the refuge the entire season and limit it to a shorter time period. Try to be consistent with other refuges in the state.
- Update the current hunt plan.
- Maintain present hunting opportunities for small game, using current season formats.
- Continue to allow trapping to control nuisance wildlife and protect refuge infrastructure and wildlife habitat.

Objective 3.3: Trapping: Immediately upon completion of the CCP, continue to allow trapping to control nuisance wildlife and protect refuge infrastructure and wildlife.

Discussion: Overflow NWR allows trapping by permit during the furbearer trapping season. This season runs from approximately November to January. Trapping of invasive and nuisance species such as nutria and beaver are included.

Strategy:

- Continue the current trapping program to control nuisance wildlife.

Objective 3.4: Fishing: Over the 15-year life of the CCP, through contamination monitoring evaluate the possibilities of opening up the refuge to fishing while providing the public an understanding for the closure.

Discussion: Public fishing is not currently offered on Overflow NWR, due largely to levels of pesticide contamination in refuge waters. Closure of fishing on the refuge does not conflict with any biological program goals or objectives, but it is indicative of a greater resource issue (pesticide contamination and impacts on refuge aquatic organisms). The biological review team does strongly recommend monitoring contamination levels, and contributing in whatever way possible to the improvement of water quality in the watershed.

Strategies:

- In the refuge's general brochure and hunt brochure, add a sentence to explain why the refuge is closed to fishing.
- Work with the State of Arkansas to periodically reassess contamination issues to determine if fishing could be allowed.

Objective 3.5: Wildlife Observation and Photography: Over the 15-year life of the CCP, maintain and, where possible and appropriate, expand walking, driving and boating access for wildlife observation and photography.

Discussion: Overflow NWR is open to the public for wildlife photography and observation year-round; the Oakwood Unit is closed to all public uses. Visitation for wildlife photography and observation is generally light on Overflow NWR. These opportunities in sanctuaries should be limited to specific locations that allow a viewpoint on resting and feeding waterfowl but are unlikely to cause repeated disturbance (flight and relocation of birds). Access should not be allowed throughout the sanctuary area.

Strategies:

- Limit public access for wildlife observation and wildlife photography in the waterfowl sanctuary area to specific areas that allow a viewpoint but are unlikely to cause repeated flushing of resting and feeding waterfowl.
- Add a parking area on the left side of the maintenance yard at the trail head.
- Add a trail head kiosk at the start of Photo Blind Trail.
- Provide information about photo blind protocol/courtesy and wildlife viewing ethics.
- Update the refuge's bird list.
- Explore options to put in food plots in strategic areas that are accessible to the general public.
- Put an observation tower at the point where Flat Slough crosses the wildlife drive.
- Open the wildlife drive to cars from April to November.
- Promote GTR Levee as a birding trail outside of hunting season.
- Promote the ATV trail that parallels the west boundary as a birding trail outside of hunting season.

Objective 3.6: Environmental Education/Interpretation:

Objective 3.6 (a): Within 3 years of CCP approval, develop an environmental education program for the South Arkansas Refuge Complex.

Objective 3.6 (b): Within 3 years of CCP approval, develop an interpretive plan for the Complex.

Discussion: Overflow NWR provides education programs only occasionally and opportunistically due to limitations of staff. These programs are not anticipated to represent any conflicts with the refuge's biological goals and objectives. In the larger sense, it is recognized that outdoor education on national wildlife refuges creates an improved public understanding of, and appreciation for, biological systems and resources and is a benefit to biological programs.

Strategies:

- Hire a Visitor Services Specialist for the South Arkansas Refuge Complex to be stationed at Felsenthal NWR and develop an Environmental Education (EE) Program for the Complex.
- As part of the Visitor Service Plan, develop an Environmental Education Program component for the Complex.
- Survey schools and/or teachers informally to find out about their needs and logistical limitations.
- Expand involvement of staff to manage the Junior Naturalist Program.
- As part of the Visitor Service Plan, develop an Interpretive Program component for the Complex. Develop an interpretive plan for the Complex.
- Contract with a local teacher to develop a teacher-led program on Ducks, Moist Soil Management, and Reforestation. Focus this effort with the elementary schools at Wilmot and Portland.
- Consider letting a staff member do two in-school programs a year (one at Wilmot, one at Portland.)
- Complex Visitor Services person will do annual teacher training.
- Work with Complex Visitor Services person to develop a "Welcome Back Ducks" special event (this could be a Friday (school group emphasis) and Saturday (community) event).
- Put bird identification panels in the photo blind.
- Develop a project in the SAMMS database for all new panels recommended.
- Develop an interpretive trail that loops thru the reforested area behind the office.
- Re-establish relationship with Chicot State Park to use the refuge as a site to do some programs. (i.e., annual birding trip).
- Incorporate the potential impacts of climate change/global warming into the EE program.

Objective 3.7: Outreach : Over the 15-year life of the CCP, increase public outreach to emphasize resource management practices by developing partnerships and promoting public use opportunities.

Discussion: Overflow NWR does not currently have an outreach plan. The manager and other staff regularly spend time speaking with the public while out in the surrounding communities, and with hunters and other refuge visitors about refuge issues. The manager provides programs upon request for civic and other groups in the surrounding communities. He has participated in career days at an area high school. Refuge regulation brochures are available in the few area locations that sell bait and at the hardware/sporting goods store in Hamburg. The refuge staff has participated in special events at the complex headquarters. News releases and other media contacts are handled from the complex headquarters at Felsenthal NWR.

Strategies:

- Develop a refuge-specific portable exhibit.
- Explore secure places in the surrounding communities to provide refuge brochures and other information (at welcome centers and post offices).
- Develop a standard "refuge story" slide show or PowerPoint presentation to present to local groups.
- Develop an annual special event such as "Welcome Back Ducks."
- Develop a refuge-specific audiovisual program.
- Develop a general outreach plan for the refuge.
- Where appropriate, develop specific outreach strategies to address issues.

- Continue to update/develop media contacts and hold media days.
- Pick one or two festivals and events that one of the staff could participate in and that relate to the purpose and mission of the refuge.

Objective 3.8: Friends Group/Volunteers: Over the 15-year life of the CCP, develop a volunteer program to enhance aspects of refuge management. Include volunteers and Friends group volunteers in most management efforts.

Discussion: Overflow NWR currently has no volunteers. In the past, volunteers have assisted the refuge staff with beaver trapping, trail clearing, litter pick up, and clearing waterways. The refuge staff sees a need for volunteers on the refuge. The refuge also has housing in the headquarters building that has been used for interns in the past.

There is no Friends group or community partners at the refuge. The Felsenthal NWR Friends group, Friends of Felsenthal, tends to focus its efforts on Felsenthal NWR. There is a group called the Bayou Bartholomew Alliance that works toward achieving conservation goals along the bayou.

Strategies:

- Develop a volunteer plan.
- Develop a recreational vehicle (RV) site and recruit camper-volunteers to provide office and administrative assistance, maintenance help, and educational assistance.
- Work with the local communities in the area to develop a Friends group for the refuge.
- Encourage Friends members to develop relationships with local businesses to help communicate refuge messages and increase opportunities to fund refuge interns and projects.
- Provide training for Friends and volunteers to lead interpretive programs.
- The volunteer coordinator should develop position descriptions and tasks for volunteers, and also annual work plans for volunteers.
- Generate media attention for volunteer projects.
- Use the Volunteer.GOV account to recruit additional volunteers for the refuge.
- The Friends groups should send a representative to the regional or national Friends workshop to network and gain expertise from other regional and national refuge support groups.
- The Friends group should explore partnerships with local businesses, birding groups, and The Nature Conservancy (TNC) to gain additional refuge support.

Objective 3.9: Climate Change: Over the 15-year life of the CCP, continue to gain knowledge about climate change, sharing information with the public and incorporating into management strategies.

Discussion: The world's climate is changing and it will continue to change throughout the 21st century (Johnson 2009). Climate change is a global event but the ecological impacts will vary from region to region. Gaining an understanding of climate change and the human activities that are contributing to it can reduce the effects to the Earth.

Levels of carbon dioxide and other greenhouse gases in the Earth's atmosphere have increased dramatically since the Industrial Revolution. There is a strong belief that the observed warming over the past 50 years is a result of increased greenhouse gases generated by human activities (IPCC 2007). As stewards of this land, it is our duty to gain knowledge of the effects we are having on the Earth and do what we can to reduce the negative impacts.

Strategies:

- Inform partners and the public of refuge research and carbon sequestration projects that support increased knowledge of climate change.
- Provide volunteers opportunities to support climate change related projects on the Refuge.
- Educate the public on ways to reduce each individual's carbon footprint.

RESOURCE PROTECTION AND REFUGE ADMINISTRATION

Goal 4. Protect the natural and cultural resources of the refuge and ensure visitor safety and facility integrity to fulfill the mission of the National Wildlife Refuge System. Provide for sufficient staffing, facilities and infrastructure to fulfill the Complex's purposes and the goals and objectives of its refuge comprehensive conservation plans.

Discussion: The administrative functions associated with the refuges include a wide range of activities that are critical to the mission of the Refuge System and the purpose(s) of each refuge. These functions include staffing, training, budgeting, planning, law enforcement, facility and infrastructure management, community relations, partnering, and equipment maintenance. To carry out these functions, each refuge must have the appropriate level of staffing and resources available.

Felsenthal and Overflow National Wildlife Refuges

Objective 4.1: Provide Visitor Safety, Protect Resources, and Ensure Public Compliance with Refuge Regulations: Within 3 years of approval of the CCP and through random surveys, at least 75 percent of refuge visitors will report that they feel safe and affirm that law enforcement personnel and refuge regulations are adequately protecting visitors and wildlife.

Discussion: Protecting the natural and cultural resources of both Felsenthal and Overflow NWRs and ensuring the safety of all refuge visitors are fundamental responsibilities of the Refuge System. Because of the extensive distance between the three refuges in the Felsenthal NWR Complex, it is difficult to share resources. Providing adequate law enforcement is essential and necessary to protect refuge resources including wildlife, habitat, and cultural resources. To ensure this mandated requirement is met, additional staff will be required.

Strategies:

- Develop and implement a Refuge Law Enforcement Plan.
- Develop and work cooperatively with local, state, and other federal law enforcement agencies to supplement resource protection.
- Continue to control incidental and illegal take of wildlife.
- Add one full-time Law Enforcement (LE) Officer to the staff.

Objective 4.2: Cultural Resources: Over the 15-year life of the CCP, enforce all federal and state laws applicable to the refuge. Protect all known archaeological sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the National Historic Preservation Act.

Discussion: The Service values and protects its archaeological and historical resources as defined in the National Historic Preservation Act of 1966 (NHPA), the Native American Grave Protection and Repatriation Act of 1990, and the Archaeological Resources Protection Act of 1979 (ARPA). There are various archeological sites located on each refuge.

Strategies:

- Continue law enforcement patrols on all known archeological and cultural resources sites to inspect for disturbances and illegal digging and or looting.
- Develop a plan to protect identified archeological sites in conjunction with Native American tribes, the State Historic Preservation office, and the U.S. Fish and Wildlife Service Archaeologist.

Overflow National Wildlife Refuge

Objective 4.3: Land Acquisition:

Objective 4.3 (a): Within the 15-year life of this CCP, acquire inholdings at Overflow NWR.

Objective 4.3 (b): Within 5 years of CCP approval, prepare and obtain approval of a minor expansion proposal for Overflow NWR.

Discussion: Acquisition of inholding lands at Overflow NWR continues and significant strides have been made to complete the refuge. Every effort should be made to finalize this effort through conservation groups such as The Nature Conservancy, The Trust for Public Land, and the Conservation Fund. In addition, carbon sequestration acquisition partnerships should be explored with these groups as well. A minor expansion plan should be enacted to ensure the opportunity for the refuge to acquire land between the refuge and Bayou Bartholomew. This would enhance management opportunities for wildlife and the public.

Land acquisitions are not a priority at the Oakwood Unit. However, it is strongly recommended that the Service acquire a legal right-of-way to the existing property to allow for unrestricted access for management purposes. The optimal location for this access should be assessed carefully, but it appears to be on the north side of the property near the shop.

Strategies:

- Continue to expand refuge boundaries and the ability to meet the refuge mission, goals, and objectives through strategic acquisitions from willing sellers.
- Develop a minor expansion proposal.
- Opportunities for acquisition which include additions of lands buffering the Overflow Creek and other contiguous waterways should be considered a priority for contributing to the health of the aquatic system.
- Acquire, develop, and maintain additional areas for moist soil impoundments on select private tracts (e.g. Blanks tract). Obtain additional resources needed to manage these units, to include manpower, well gear-heads, power units, fuel, heavy-duty disk, water-control structures, etc.

Objective 4.4: Private Lands: Over the 15-year life of the CCP, continue to work with willing private landowners near the refuges to promote refuge goals and objectives for federal trust resources.

Discussion: The National Wildlife Refuge System could never acquire enough land to meet the habitat needs of all resident and migratory wildlife. Imperiled wildlife such as Neotropical migratory birds, some waterfowl, and threatened and endangered species are dependent on lands in private ownership, in addition to public lands. While the refuges do have some landowners that actively manage all or a portion of their lands for wildlife, many others rely on their land to produce an income. Because government-based financial resources are scarce, efforts to restore habitat will be prioritized for areas of greatest need.

Strategy:

- Continue to work with private landowners near the refuges to promote refuge goals and objectives for federal trust resources.

Objective 4.5: Partnerships: Over the 15-year life of the CCP, continue to work with partners including the Arkansas Game and Fish Commission, Arkansas Natural Heritage Commission, Natural Resources Conservation Service, U.S. Army Corps of Engineers, U.S. Forest Service, USDA Wildlife Services, U.S. Geological Survey, University of Arkansas system, Ducks Unlimited, private timber companies and other private land-management companies, Audubon Society, and others to promote refuge goals and objectives for federal trust resources.

Discussion: Opportunities to work in partnership with private landowners, federal and state agencies, and nongovernmental organizations are increasingly beneficial. Working with partners to link habitat restoration and management projects can increase ecosystem management of lands located inside and outside refuge boundaries. Although a large portion of the lands inside current acquisition boundaries have been acquired, some critical inholdings are needed to meet habitat objectives, provide access to visitors, reduce off-refuge impacts, and protect unique habitats.

Strategies:

- Continue to work with partners to promote refuge goals and objectives for federal trust resources.
- Explore opportunities to establish new partnerships.

Objective 4.6: Maintain Capitalized Equipment, Facilities, and Infrastructure for the Refuges and Complex: Over 15-year life of the CCP, acquire and maintain equipment facilities, and infrastructure used as a part of refuge/complex management.

Discussion: Felsenthal NWR has a good base of facilities and equipment to support management operations for the 65,000 acre refuge. The facilities include an office and visitor center, shop facility, fire cache, wood shop, and two covered storage buildings for equipment. The refuge has approximately 25 miles of maintained roadways, 8 boat ramps and adjacent parking areas, 6 campgrounds, and a 15,000-acre permanent pool with an adjacent 21,000-acre greentree reservoir.

Overflow NWR has a modest complement of facilities. Facilities on this refuge include an office, shop facility, 7.5 miles of roadway, and several adjacent parking areas. The refuge also has 1,170 acres of moist soil units, an annually flooded 4,000-acre GTR, and approximately 1,464 acres of crop ground.

The Overflow Refuge also has the Oakwood Unit under its management. The Oakwood Unit represents the largest contiguous tract of land transferred to the Service by FmHA at 2,263 acres. There are no facilities located on the Oakwood Unit. It has only approximately 4.5 miles of roadway and 800 acres of moist soil units. The remainder of this unit has been reforested back to hardwoods. This unit is closed to public access.

This equipment is used in all aspects of these refuges' administration, including habitat, wildlife, public use, and protection projects and management. Project efficiency depends largely on the age, condition, and maintenance of the equipment needed to get work projects accomplished.

Strategies:

- Maintain more than $10,000,000 worth of capitalized equipment, facilities, and infrastructure used in all aspects of refuge management, such as habitat, wildlife, public use and protection.
- Develop an equipment maintenance schedule for heavy equipment and water craft.
- Ensure that existing heavy equipment is replaced as funding is available.
- Ensure deficiencies of all facilities and infrastructure are identified in SAMMS.
- Replace deteriorated water control structures at Overflow NWR.
- Update or replace Overflow NWR Visitor Center.
- Seek ways to become more energy-efficient to reduce the refuges' carbon footprint.

Objective 4.7: Staffing: Over the 15-year life of the CCP, provide much-needed support by supplementing staffing needs.

Discussion: The Felsenthal NWR staff includes 15 full-time members: the Project Leader; the Deputy Project Leader; one Biologist; one Forester; one Park Ranger (Public Use); one Fire Management Specialist; three Forestry Technicians (Fire); two Law Enforcement Officers; an Administrative Officer; an Administrative Support Assistant; one Equipment Operator; and one Heavy Equipment Mechanic.

Volunteer groups spend many hours helping with refuge tasks. The "Arkansas City Gang," in particular, has logged thousands of hours on the refuge in the past few years. The volunteers are recognized for their contributions to the refuge at an annual banquet. Another volunteer support group, known as the "Friends of Felsenthal," is also active in raising needed funds for developing facilities and promoting best management practices on the refuge. Some examples of their work include the construction of accessible fishing piers for visitors with disabilities, helping the refuge in its invasive aquatic plant management program, and assisting recovery efforts for the red-cockaded woodpecker.

The Overflow NWR staff includes four full-time members: the Refuge Manager, a Private Lands Biologist, a Biological Science Technician, and an Engineering Equipment Operator. A part-time STEP Biological Technician is also employed. In addition, individual volunteers provide many valuable services on the refuge, such as monitoring the migration of Monarch butterflies, beaver trapping, trail maintenance, waterfowl counts, etc.

Strategies:

- Hire an additional law enforcement officer in order to effectively protect the Complex resources.
- Hire an additional Biological Technician assigned to address biological needs of the Complex.
- Add a Park Ranger (environmental educator) to the staff.
- Convert two seasonal Fire Technicians to full-time.

V. Plan Implementation

INTRODUCTION

Refuge lands are managed as defined under the National Wildlife Refuge System Improvement Act of 1997. Congress has distinguished a clear legislative mission of wildlife conservation for all national wildlife refuges. National wildlife refuges, unlike other public lands, are dedicated to the conservation of the Nation's fish and wildlife resources and wildlife-dependent recreational uses. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but considerable emphasis is placed on balancing the needs and demands for wildlife-dependent recreation and environmental education.

To accomplish the purposes, vision, goals, and objectives contained in this plan for Felsenthal and Overflow NWRs, this chapter identifies the projects, funding and personnel needs, volunteers, partnerships opportunities, step-down management plans, a monitoring and adaptive management plan, and plan review and revision.

PROPOSED PROJECTS

Summarized below are the proposed projects and their associated costs for fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration over the next 15 years. This proposed project list reflects the priority needs identified by the public, the planning team, and refuge staff based upon available information. These projects were generated for the purpose of achieving the refuge's objectives and strategies. The primary linkages of these projects to those planning elements are identified in each summary.

FISH AND WILDLIFE POPULATION MANAGEMENT

1. Develop additional wood duck trapping sites on Felsenthal and Overflow NWRs to meet banding quotas.

Felsenthal and Overflow each have a banding quota of 63 birds including 8 adult males, 14 adult females, 17 immature males and 24 immature females. Currently neither refuge has been able to meet its quota due to lack of staff and available locations for trapping effectively. Development of efficient and effective trapping locations will ensure that quotas are met. Development of additional sites will require manipulation of vegetation in a few key areas, and then maintenance of these areas as trap sites.

Cost for development of trap sites (two on each refuge): $8,000.00 startup and $5,000.00 annually.

2. Nuisance animal control – feral hogs and beaver.

Feral hogs compete with native wildlife for food and create extensive damage to roads and levees by rooting up and consuming the grass roots that hold the road in place. The roads are often rendered impassable by conventional vehicles. Feral hogs decimate crops both on and off of the refuges. They are not a native animal and are not considered a wildlife species by the Arkansas Game and Fish Commission. The hogs are targeted for complete eradication from the refuges; however, this is probably a near-impossible goal.

A feral hog control plan will be implemented for both Felsenthal and Overflow NWRs, which will consist of the following:

a. Continue working with neighboring landowners by issuing permits for feral hog control to protect agriculture crops.
b. Continue to coordinate efforts with Arkansas Game and Fish Commission.
c. Develop strategies with the U.S. Department of Agriculture's Animal Plant Inspection Service to partner in feral hog control efforts.
d. Increased efforts to trap and shoot by staff.

A beaver control plan will also be developed to reduce the incidence of flooding due to beaver dam activities on both Felsenthal and Overflow NWRs. This plan will include the following:

a. Locate and GPS all existing known beaver dam locations on each refuge.
b. Increased efforts to remove beavers from the refuges via trapping and shooting.
c. Annual beaver dam removal efforts stepped up to reduce flooding.
d. Annual updates to GPS data base on dam locations.

Cost for implementing these two plans: $20,000.00 for startup and $5,000.00 per year to continue.

3. Develop a formal Red-cockaded Woodpecker Management Plan – Felsenthal NWR.

This plan will include the following information:

a. Activities and conditions needed to meet the overall recovery goal set for this refuge.
b. Maintenance of suitable nesting and foraging habitat to sustain all current clusters and at least five to eight recruitment clusters annually.
c. Monitoring of all clusters to determine most effective means of hardwood control by burning, herbicide or mechanical usage. Burning to be done at a minimum of every three years.
d. Continue intensive nest monitoring and banding efforts.
e. Develop refuge wide data base for all RCW activities.
f. GPS and uniquely identify each cluster on refuge.
g. Establish translocation program on refuge to supplement population and improve genetics.
h. Improve coordination with neighbors who manage RCW habitat on their lands to increase population numbers on a geographic basis.

Cost to develop plan: $31,000.00, with an annual reoccurring need of $10,000.00.

HABITAT MANAGEMENT

1. Develop formal water management plans for Felsenthal and Overflow NWRs.

Proper water management is the key to wildlife species and populations that use the refuge habitat on an annual basis. It is also the primary factor to consider in protecting bottomland hardwoods, optimizing conditions for dense stands of desirable species of moist soil plants, and providing habitat for shorebirds, wading birds, and secretive marsh birds. Even with a water management plan in place, it must be kept in mind that natural backwater flooding can occur for extensive periods during any month of the year, which can minimize the goals and objectives of the plan for any given year. An elevation map needs to be developed to show flooded area percentage at various elevation readings.

Overflow NWR: Develop a step-down plan for management of the 4,000-acre greentree reservoir (GTR) with alternative water management strategies to come closer to emulating a natural flooding pattern over years and still maintain wintering waterfowl habitat. Alternatives to be considered for additional habitat protection are listed as follows:

a. Partially close the structure to allow incremental flooding. Do not attempt to flood the GTR when one large rain event occurs. Leave the GTR flooded at 50% for 2-3 weeks before gradually adding boards to raise water levels to 100%.
b. Do not intentionally flood the GTR but once out of every 4 years.
c. Vary the dates to initiate draw downs or if flooded early by natural events, then consider pulling water down approximately one foot in mid-winter to prevent stable water levels over a prolonged period.
d. Inspect and repair levee as needed. Keep levee clear of trees and brush.
e. Develop a plan and description of each moist soil management unit at Overflow and the Oakwood Unit, outlining flooding dates, target wildlife and plant species, specific problems inherent to the unit, and drainage patterns.

Felsenthal NWR: Develop a step-down management plan of the 15,000-acre greentree reservoir (GTR) with alternative water management strategies to come closer to emulating a natural flooding pattern over years and still maintain wintering waterfowl habitat. Alternatives to be considered for additional habitat protection are listed as follows:

a. Work closely with the U.S. Army Corp of Engineers to flood incrementally to allow for a slow filling of the GTR. This will increase available edges for feeding waterfowl.
b. Develop a seven-year flooding schedule to closely emulate historic winter flood conditions. Avoid flooding at the same time, depth, duration and extent among and between years.
c. Develop a hydrograph to depict planned flooding regime, realizing that because of local precipitation conditions will often require adaptive management of water levels.
d. Develop an elevation map of the lowland forest to help in decision-making on the extent and duration of flooding at various elevations.
e. Tree/seedling vigor and growth will be monitored annually to allow for adaptive management of water levels.
f. Every 10-15 years the GTR will not be flooded artificially for 2-3 years to allow for a new crop of red oak seedlings to develop.
g. Increase public outreach to provide a better understanding of the flooding cycles within the GTR and the importance of periodic drying cycles.
h. Coordinate with the U.S. Corp of Engineers to conduct a drawdown of the permanent pool on Felsenthal by one foot every 10 years.

Cost for development and mapping for both refuges: $200,000.00 at startup and $10,000.00 annually.

2. Overflow NWR: Restore and manage 1,600 acres of moist soil management units at Overflow and the Oakwood unit.

Overflow NWR contains 20 separate units with excellent moist soil management capability. These units total approximately 800 manageable acres. There are also 800 manageable acres of moist soil units at the Oakwood Unit. Optimal management of the units is critical to achieve waterfowl and migratory bird objectives. Some units are becoming infested with woody plants and an

overabundance of perennial plants and must be restored to early successional plant communities consisting primarily of wild millet, other grasses, and annual smartweeds. Restoration and management needs for the 15-year CCP are listed as follows:

a. Replace 36 water control structures and 9 culverts at Overflow. Replace16 water control structures and 6 culverts at the Oakwood Unit.
b. Repair and reshape 7 miles of levee at the two refuges.
c. Maintain l3 miles of levee at the Oakwood unit and 20 miles of levee at Overflow by mowing, disking, shaping, grading, and chemical control of undesirable plants.

Cost: total cost of installation and purchase of structures and culverts is approximately $350,000. Annual cost of levee maintenance, restoration, and habitat management is approximately $30,000.

3. Implement a timber cruise on both Overflow and Felsenthal NWRs.

a. Initiate a timber cruise on 10,000 acres of Overflow NWR and 56,000 acres of Felsenthal NWR to determine inventory and management actions needed to move the forest toward achieving desired forest conditions.
b. Initiate a project to thin the Conservation Reserve Program (CRP) pine plantation on Overflow to release existing hardwoods.
c. Remove all pine trees of significant size that are encroaching in hardwood reforestation on Overflow.

Cost: unknown. Some revenue will be generated by pine harvest and hardwood thinning on both refuges.

4. Continue to monitor USGS study plots on Felsenthal NWR.

Continue to monitor study plots to determine if water management strategies are helping with recruitment and forest health in bottomland hardwoods. Monitoring has been done on a 5-year rotation and needs to be continued.

Cost to continue this effort: $10,000.00 for each monitoring year.

5. Develop fire management capabilities for Overflow NWR.

Overflow refuge has not been included in any fire management plans to date. There is a need to use fire in the management of the moist soil units and possibly for other habitat-related management.

Cost to include Overflow into fire management plans will be $8,000.00 startup and $5,000.00 annually.

6. Develop Fire Monitoring Plan for the Complex.

Fire has been used extensively on the Felsenthal NWR as a means of promoting acceptable red-cockaded woodpecker (RCW) habitat and discouraging hardwood growth in the RCW clusters. Fire will also play an important role in the management of moist soil habitats on Overflow NWR and in moist soil and pine stand management on Pond Creek. To ensure that the best practices are being used in the use of fire as a management tool, a monitoring plan needs to be developed that will document techniques and results for management purposes.

Cost to develop plan: $10,000.000. Annual cost to monitor burns: $8,000.00

RESOURCE PROTECTION

1. Provide adequate law enforcement protection for refuge resources, federal trust species, and the visiting public.

a. Protect visitors from vandalism, burglary, assault and otherwise provide a safe experience while on refuges.
b. Enforce refuge regulations.
c. Provide for search and rescue operations if needed.

Cost for additional full time officer for Complex: $150,000.00 start up and $75,000.00 annually

2. Maintain marked boundary and other identifying regulatory signs.

a. Conduct annual boundary inspections on 25% of refuge and repost as needed.
b. Replace faded or damaged signs throughout refuges to delineate hunting areas, no hunt areas, closed areas, waterfowl sanctuary, etc.
c. Repaint markings for all-terrain vehicle (ATV) trails and campgrounds.

Cost for both refuges: $25,000.00 per year.

3. Develop an Oil and Gas Management Plan for Felsenthal NWR.

There is a need to develop a plan for the management of oil and gas development on the refuge. This plan will address the precautions that need to be taken for oil spills, management of flow lines, mitigation measures to be taken, removal of nonfunctioning well equipment, restoration of well sites when nonfunctioning wells are present, and monitoring of well sites to ensure compliance.

Cost to develop plan: $10,000.00; annual cost $5,000.00.

VISITOR SERVICES

1. Develop navigational guide for the Felsenthal permanent pool and GTR.

Currently, only paper maps with low resolution are available for navigating through the numerous cuts, canals, and sloughs within the permanent pool and GTR on Felsenthal NWR. For visitors who are not familiar with the refuge, this can be both disconcerting and dangerous. Development of navigational guides will help visitors to find their way through the refuge waterways.

Cost for development: $5,000.00; annual maintenance for signs: $1,000.00.

2. Develop auto tour routes for Felsenthal and Overflow NWRs.

This project was identified as a need in the Visitor Services Review for both refuges. The road for the tour location is already in place with gravel on Overflow, while this road system will need development for Felsenthal. A wildlife observation blind will be constructed with interpretive materials and signs along the tour route and in the blind.

Cost: Observation Blinds: $15,000. Interpretive Signs and Materials: $7,500.00. Develop road for Felsenthal tour route: $25,000.00.

3. Dredge boat access canals off of Pine Island and Shallow Lake roads and access cuts in permanent pool.

Access canals have not been dredged for approximately 15 years and are starting to fill with silt, causing major access issues in the permanent pool. Dredging of these access areas will improve public access for both hunting and fishing activities on refuge.

Cost to dredge access canals: $200,000.00.

4. Increase public outreach and environmental education programming to enhance resource management practices.

a. Establish and maintain contacts with local school systems to match refuge programming with school curriculum.
b. Recruit full time volunteers and interns to supplement refuge staff in delivering environmental education and interpretative programming.
c. Recruit volunteers and volunteer groups such as recreational campers to supplement and assist refuge staff to provide education, visitor services, maintenance, and clerical duties.
d. Maintain and further develop the Friends of Felsenthal to further goals of Felsenthal NWR.
e. Issue press releases on special public use events and other important refuge activities.
f. Update and maintain refuge web site to include special programming, volunteer opportunities and regulations changes etc
g. Actively participate in career fairs to promote Student Career Employment, Student Temporary Employment programs, Youth Conservation Corp programs, and to increase Fish and Wildlife Service career awareness with in local communities.

Cost for increased public outreach/education: $15,000.00 annually.

FUNDING AND PERSONNEL

Figure 12 shows the current refuge complex staffing chart; it includes staff identified for Felsenthal and Overflow NWRs. Figure 13 shows the proposed staffing chart. Table 11 lists the proposed projects and their first-year and recurring annual costs. Table 12 lists the additional staff needed.

Figure 12. Current organization chart.

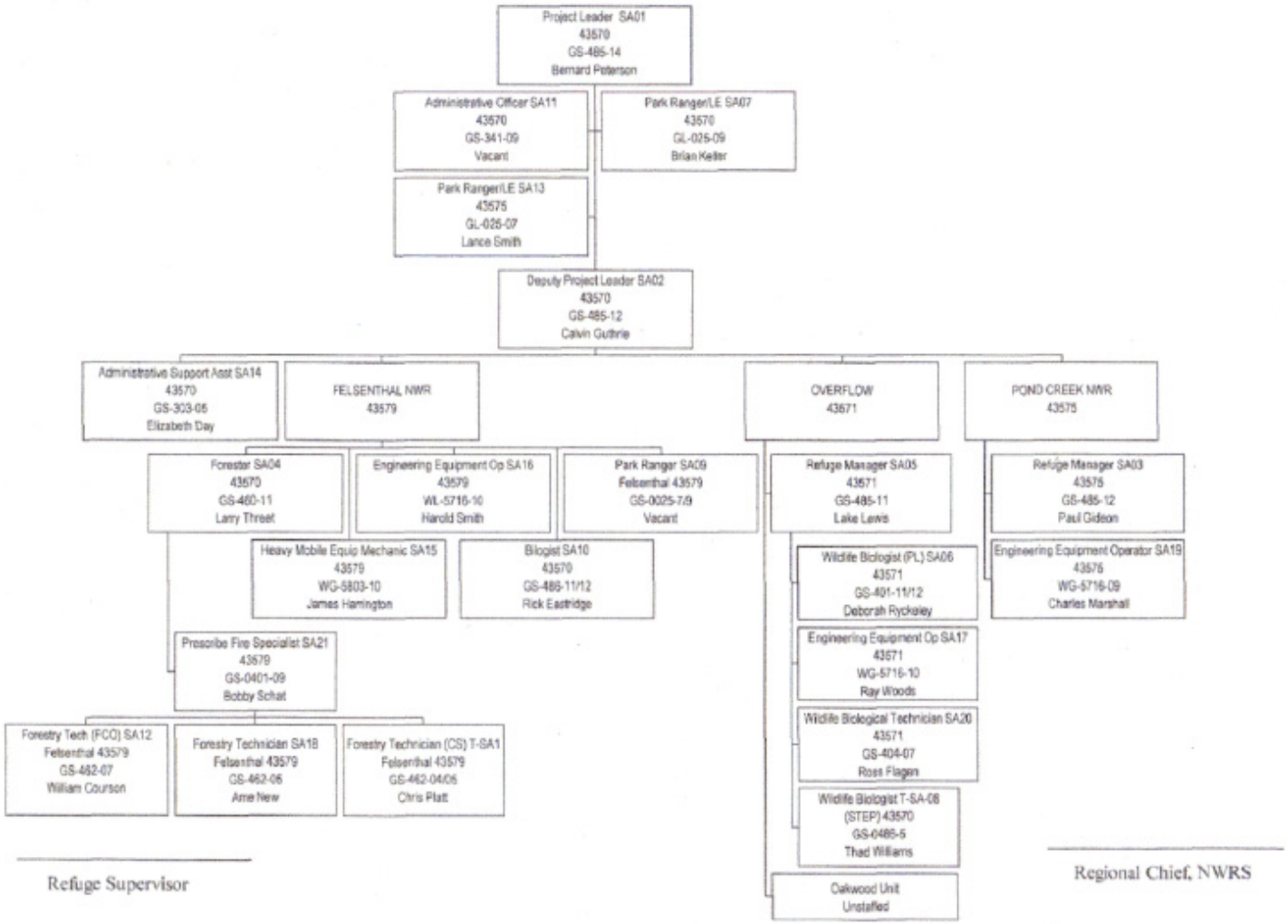
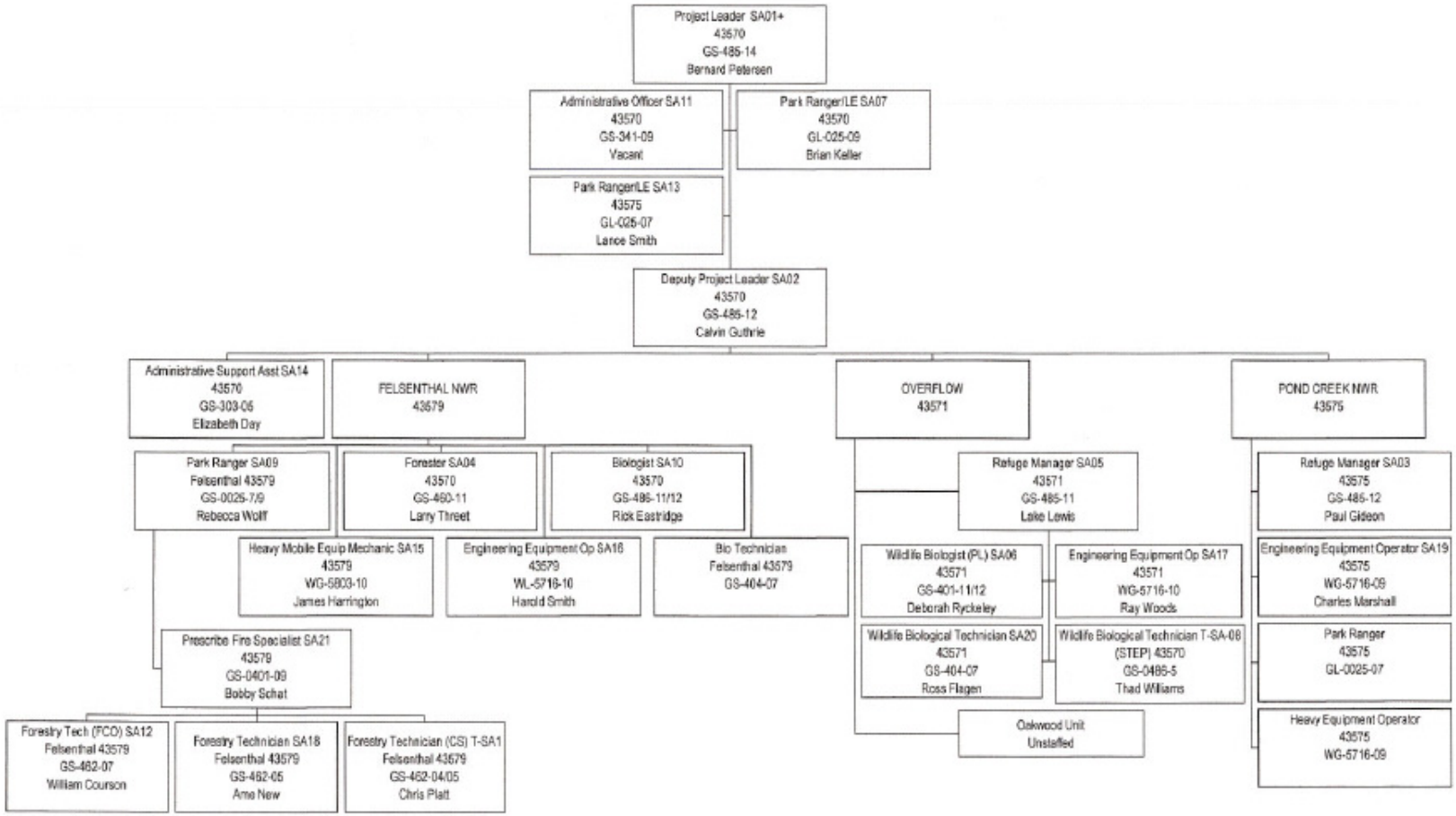


Figure 13. Proposed organization chart.

United States Fish and Wildlife Service
Southeast Region
Regional Chief, National Wildlife Refuge System
South Arkansas Refuge Complex 43570



Refuge Supervisor

Regional Chief, NWRS

Date Effective

Table 11. Summary of projects.

PROJECT NUMBER	PROJECT TITLE	FIRST YEAR COST	RECURRING ANNUAL COST
POPULATIONS 1	WOOD DUCK TRAPPING SITES	$8,000	$5,000
POPULATIONS 2	NUISANCE ANIMAL CONTROL FERAL HOG/BEAVER	$20,000	$5,000
POPULATIONS 3	RCW MANAGEMENT PLAN	$31,000	$15,000
HABITAT 1	WATER MANAGEMENT PLAN FELSENTHAL/OVERFLOW	$200,000	$10,000
HABITAT 2	RESTORE/MANAGE 1,600 ACRES MOIST SOIL OVERFLOW	$350,000	$30,000
HABITAT 3	TIMBER CRUISE FELSENTHAL/OVERFLOW	$	$
HABITAT 4	MONITOR USGS STUDY PLOTS FELSENTHAL	$0	$10,000
HABITAT 5	FIRE MANAGEMENT CAPABILITIES OVERFLOW	$8,000	$5,000
HABITAT 6	FIRE MONITORING PLAN FOR COMPLEX	$10,000	$8,000
PROTECTION 1	ADEQUATE LAW ENFORCEMENT FOR COMPLEX	$150,000	$75,000
PROTECTION 2	MAINTAIN BOUNDARY POSTINGS	$0	$25,000
PROTECTION 3	OIL/GAS MANAGEMENT PLAN FELSENTHAL	$10,000	$5,000
VISITOR SERVICES 1	NAVIGATIONAL GUIDES FELSENTHAL	$5,000	$1,000
VISITOR SERVICES 2	AUTO TOUR ROUTES FELSENTHAL/OVERFLOW	$47,500	$5,000
VISITOR SERVICES 3	DREDGE BOAT CANALS FELSENTHAL	$200,000	$0
VISITOR SERVICES 4	PUBLIC OUTREACH AND ENVIRONMENTAL EDUCATION	$0	$15,000

Table 12. Additional personnel identified to implement the CCP for the South Arkansas Refuge Complex.

Position Title	Grade	Funding Required
Park Ranger (LE)	GS-09	$50k
Park Ranger (VS)	GS-09	$50k
Biological Technician	GS-07	$39k
Heavy Equipment Operator	WG-08	$60k
Fire Technicians (2)	GS-06	$70k

PARTNERSHIP AND VOLUNTEER OPPORTUNITIES

A key element of this comprehensive conservation plan is to establish partnerships with local volunteers, landowners, private organizations, and state and federal natural resource agencies. In the immediate vicinity of the refuges, opportunities exist to establish partnerships with the U.S. Forest Service, U.S. Army Corp of Engineers, Arkansas Game and Fish Commission, University of Arkansas, the Crossett and Hamburg chambers of commerce, and multiple bass fishing clubs. At regional and state levels, partnerships may be established or enhanced with organizations such as Ducks Unlimited and the Wild Turkey Federation.

STEP-DOWN MANAGEMENT PLANS

A comprehensive conservation plan is a strategic plan that guides the direction of the refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services. These step-down management plans (Table 13) are also developed in accordance with the National Environmental Policy Act, which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

Table 13. Refuge step-down management plans related to the goals and objectives of the comprehensive conservation plan.

Step-down Plan	Completion Date
Law Enforcement Plan (1987)	2011
Inventory, Monitoring and Research Plan	2015
Hunting Plan (1988)	2012
Fishing Plan (1994)	2012
Trapping Plan (1979)	2012
Visitor Services Plan	2013
Invasive /Nuisance Species Control Plan (2006)	2012
Sign Plan (1985)	2011
Fire Management Plan	2011
Oil Spill Response Plan (1989)	2012
Cultural Resources Protection plan	2014
Habitat Management Plan	2013
Disaster Response Plan	Annual
Commercial fishing Plan (1981)	2012

MONITORING AND ADAPTIVE MANAGEMENT

Adaptive management is a flexible approach to long-term management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. More specifically, adaptive management is a process by which projects are implemented within a framework of scientifically driven experiments to test the predictions and assumptions outlined within a plan.

To apply adaptive management, specific survey, inventory, and monitoring protocols will be adopted for the two refuges. The habitat management strategies will be systematically evaluated to determine management effects on wildlife populations. This information will be used to refine approaches and determine how effectively the objectives are being accomplished. Evaluations will include ecosystem team and other appropriate partner participation. If monitoring and evaluation indicate undesirable effects for target and nontarget species and/or communities, then alterations to the management projects will be made. Subsequently, the comprehensive conservation plan will be revised. Specific monitoring and evaluation activities will be described in the step-down management plans.

In addition, there is a lot of information to learn about climate change as the Service continues to see change in and around the refuges. Monitoring and adaptive management will be the key to understanding climate change and its effects on ecological communities and natural resources. As the world changes, over the next 15 years Felsenthal NWR (Table 14) and Overflow NWR (Table 15) will address the relationship of habitat communities and the key species within those habitat communities with the potential effects of climate change in mind.

PLAN REVIEW AND REVISION

This comprehensive conservation plan will be reviewed annually as the refuges' annual work plans and budgets are developed. It will also be reviewed to determine the need for revision. A revision will occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or a major refuge expansion. The final plan will be augmented by detailed step-down management plans to address the completion of specific strategies in support of the refuges' goals and objectives. Revisions to the comprehensive conservation plan and the step-down management plans will be subject to public review and National Environmental Policy Act (NEPA) compliance.

Table 14. Felsenthal NWR – Managing for climate change through habitat and species management.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
Pine (as appropriate, longleaf, shortleaf, slash, loblolly, and pond pines)	Bachman's Sparrow Brown-headed Nuthatch Northern Bobwhite Red-cockaded Woodpecker (RCW)	Changes in climatological patterns (i.e., air temperature, humidity, precipitation, wind, storms, drought, floods) which could change habitat structure. Changing abundance and distribution of wildlife and plant species ((for instance interspecific competition from colonizing species (i.e natives and/or exotics)). Increased insect or disease outbreaks affecting habitat conditions and/or wildlife species. Soil characteristic changes. Increased wildfire threats affecting habitat conditions.	Continue to thin and burn to promote grassy-herbaceous ground cover for Bachman's sparrow, brown-headed nuthatch, and northern bobwhite. Maintain a sparse canopy and low to moderate basal area in mature pine forest except adjacent to floodplain. Retain snags over 15 inches for cavity nesting species. Maintain suitable nesting and foraging habitat to support current RCW clusters and at least five to eight recruitment clusters annually. Develop a RCW Management Plan. Reach or exceed 22 active RCW clusters.	Assess or inventory habitat conditions utilizing GIS. Identify current and desired future conditions in pine types on the refuge. Annually monitor 100% of the prescribed fire management units that were burned to provide optimal habitat for RCW. Conduct baseline surveys of wildlife resources, including but not limited to forest breeding birds, reptiles and amphibians, small mammals including bats, and mussels. Continue Christmas bird counts and point counts. Continue predator removal program as it relates to RCW. Coordinate and collaborate with neighboring lands to increase RCW population in geographic area.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
				Participate in RCW translocation program. Uniquely identify each managed RCW cluster and GPS all cavity trees. Conduct intensive RCW nest monitoring. Monitor for potential RCW breeding groups. A cavity suitability survey should be conducted annually. Develop a refuge-wide RCW nesting database to quantify current-year data. Establish a refugewide RCW Population Trends database to quantify long-term data as far back as good data are available. In RCW habitat consider a research study or adaptive management approach to evaluate whether herbicides or other fire-surrogate treatments would give better habitat conditions in areas where fire is not effectively controlling the resprouting hardwood understory.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
				Establish bird surveys to track bird responses in stands managed in near-term and for long- term.
Forested Wetlands on Mineral Soils (bottomland forests, bald cypress)	Wood Duck Cerulean Warbler American Woodcock Prothonotary Warbler Swainson's Warbler Rusty Blackbird Kentucky Warbler Red-headed Woodpecker Black Bear Rafinesques's Big-eared Bat Alligator Gar	Changes in climatological patterns (i.e., air temperature, humidity, precipitation, wind, storms, drought, floods) which could change habitat structure. Changing abundance and distribution of fish, wildlife, and plant species ((for instance interspecific competition from colonizing species (i.e natives and/or exotics)). Increased insect or disease outbreaks affecting habitat conditions and/or wildlife species. Soil characteristic changes.	Maintain a diverse and productive bottomland hardwood habitat complex. Strive for 50% of forest wetlands to be in desired future conditions. Forest management should emphasize retention of large trees and trees with large cavities within prescriptions designed to address more comprehensive goals of developing appropriate forest composition and structure. Retain a strong component of cypress and tupelo during forest management and manage so as to insure retention of these species in forest composition into the future. Provide wood duck nesting and brood-rearing habitat. Strive to meet annual preseason Wood Duck banding quota.	Conduct vegetation survey to determine if forested wetlands match desired forest condition (DFC). According to DFC guidelines, restore range of variation in forest structure, following the requirements of songbirds, bats, and other priority species. Tree/seedling vigor and growth should be monitored annually to allow for adaptive management of water levels. Conduct baseline surveys/inventories to determine species composition and densities before and after restoration. Staff gauges should be placed at critical locations to allow for proper monitoring of water

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
			Continue current forest management on the refuge to provide year-round habitat requirement for bears. Coordinate bear management partnership with AGFC. Refuge structures/facilities planned for closure or removal should be inventoried for use as a bat roost site before closure/removal. Report any incidental records of priority nongame mammal species occurrence and location to the AR Natural Heritage Program. Occurrence records and any associated information for Rafinesque's big-eared bat, southeastern myotis, long-tailed weasel or eastern harvest mouse may significantly add to data available to assess occurrence and status in Arkansas.	elevations and to assist in locating and dismantling beaver dams to avoid pockets of tree mortality. Conduct baseline inventory of forest conditions for future reference to changes in waterfowl numbers and hunter harvest effort. Conduct baseline surveys of wildlife resources, including but not limited to forest breeding birds, reptiles and amphibians, small mammals including bats, and mussels. Conduct wood duck banding activities. Maintain good records of wood duck banding and nest box program. Monitor bear population trends and productivity through bait-station surveys and bear den/reproduction surveys. Conduct mark-recapture studies to estimate bear population size when appropriate.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
				Work with partners to conduct bat and small mammal occurrence surveys as feasible, in order to assess occupancy and use of Felsenthal NWR by priority species. Conduct Avian Influenza monitoring.
Managed Freshwater Wetlands (moist soil, flooded cropland, GTR, impounded wetlands, etc.)	Wild Millet Sprangletop Sagitarria Foxtail Mallard Green-winged Teal Ring-necked Duck Wood Stork Little Blue Heron Least Sandpiper Greater Yellowlegs Sora Rail King Rail American Bittern Common Yellowthroat Marsh Wren Northern Harrier Bald Eagle Red-eared Slider Broad-banded water snake Cottonmouth (moccasin) Sirens	Changes in climatological patterns (i.e., air temperature, humidity, precipitation, wind, storms, drought, floods) which could change habitat structure. Changing abundance and distribution of fish, wildlife, and plant species (for instance, interspecific competition from colonizing species, i.e., natives and/or exotics). Soil characteristic changes.	Continue habitat enhancement of floodplain forest. Periodically review waterfowl habitat objectives to assure refuge and landscape-level objectives are being met. Maintain the current level of designated waterfowl sanctuaries to provide areas of low disturbance critical for the area's wintering waterfowl to complete numerous activities necessary for adequate survival. Waterfowl management should include providing foraging habitat for wading birds.	Conduct baseline surveys of wildlife resources, including but not limited to forest breeding birds, reptiles and amphibians, small mammals including bats, and mussels. Implement surveys to identify rookery location and monitor nesting activities. Conduct Avian Influenza monitoring. Determine use of permanent pool and GTR by waterfowl.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
	Green Tree Frog Raccoon Golden Mouse Hispid Cotton Rat Largemouth Bass Bluegill Black Crappie Redear Sunfish Channel Catfish Brown Bullhead Bluntnose Minnow Warmouth Flier Fathead Minnow Spotted Gar Bowfin		Where and when feasible, draw water down to create mudflats for migrating shorebirds. Provide for protective closures when colonially-nesting wading birds are found.	
Freshwater Emergent Wetlands (unmanaged emergent vegetation)	King Rail Purple Gallinule Wood Stork Roundtail Muskrat Alligator Crayfish Alligator Gar	Changes in climatological patterns (i.e., air temperature, humidity, precipitation, wind, storms, drought, floods) which could change habitat structure. Changing abundance and distribution of fish, wildlife, and plant species ((for instance interspecific competition from colonizing species (i.e natives and/or exotics)).	Ascertain a more accurate estimate of king rail and associated species in the region. Obtain clearer understanding, where possible, of wood stork reproductive success in Mexico and the SE U.S. relative to post-breeding dispersion. Gain a better understanding of marshbird migration (chronology and other aspects) in the southeast.	Conduct baseline surveys of wildlife resources, including but not limited to forest breeding birds, reptiles and amphibians, small mammals including bats, and mussels. Conduct a reconnaissance survey of the pool during April or May for any potential emergent wetlands that could provide for nesting pied-billed grebes, king rails, and purple gallinule.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
		Soil characteristic changes. Increased wildfire threats affecting habitat conditions.	Support establishing standardized protocols for monitoring waterbirds throughout the region. Support development of methods for centralizing storage of monitoring data. Support improving coordination among research and monitoring projects regionwide.	Guide research to focus on data needs for meeting conservation priorities. Identify threats to regional waterbird populations. Create and enhance opportunities for outreach.
Freshwater Aquatic Communities (streams, rivers, lakes, and ponds)	Least Tern Freshwater mussels Pearlymussels Pigtoes Darters Shiners Madtoms Redhorses Sturgeon (pallid sturgeon) Paddlefish Alligator Gar American Eel Alligator Snapping Turtle Canvasback Lesser Scaup	Changes in climatological patterns (i.e air temperature, humidity, precipitation, wind, storms, drought, floods, water levels, water temperature) which could change habitat structure. Changing abundance and distribution of aquatic animal and plant species ((for instance interspecific competition from colonizing species (i.e natives and/or exotics)).	Strive to maintain coverage of nuisance aquatic vegetation to less than 50% of the reservoir surface area, through triploid grass carp stocking, water level management, and herbicide treatments. Maintain and enhance refuge aquatic habitats to benefit fish populations and provide improved access for sportfishing opportunities. Stop loss of secondary channels and associated habitat. Restore in-channel and adjacent habitat diversity.	Strive to obtain baseline inventory data for mussels throughout refuge waters. Survey streams and rivers to identify aquatic "Species of Greatest Conservation Need." Strive to control emergent vegetation (lotus, water lily) in open-water areas with periodic herbicidal applications. Consider contracting with local universities to conduct monitoring/ research activities on vegetation treatment.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
				Develop program to monitor nuisance aquatic vegetation coverage on the reservoir. Conduct least tern nesting surveys. Develop methods to monitor population trends. Develop method(s) to monitor immediate habitat response to creative channel engineering Identify spawning areas Information gathering through research and monitoring.
Shrub-Scrub (disturbance-dependent communities other than xeric shrub-scrub) (Bogs, canebrakes, glades, early successional forests)	*Shrub-Scrub:* Eastern Painted Bunting Western Painted Bunting Blue-winged Warbler Eastern Bewick's Wren Bell's Vireo *Canebrakes:* Swainson's Warbler American Woodcock Kentucky Warbler Southern Pearly Eye Butterfly	Changes in climatological patterns (i.e., air temperature, humidity, precipitation, wind, storms, drought, floods) which could change habitat structure. Changing abundance and distribution of wildlife and plant species, for instance interspecific competition	Maintain connectivity between habitats to allow reptiles and amphibians unrestricted movement between habitats needed for complete life cycles.	Conduct baseline surveys of wildlife resources, including but not limited to forest breeding birds, reptiles and amphibians, small mammals including bats, and mussels.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Climate Change Impacts**	**Management Actions**	**Survey/Monitoring**
	Black Bear Swamp Rabbit Cotton Mouse Southeastern Myotis Timber Rattlesnake Southern Leopard Frog	from colonizing species (i.e., natives and/or exotics). Increased insect or disease outbreaks affecting habitat conditions and/or wildlife species. Soil characteristic changes. Increased wildfire threats affecting habitat conditions.		

Table 15. Overflow NWR – Managing for climate change through habitat and species management.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Impacts**	**Management Actions**	**Survey/Monitoring**
Forested Wetlands on Mineral Soils (bottomland forests, bald cypress)	Wood Duck Cerulean Warbler American Woodcock Prothonotary Warbler Swainson's Warbler Rusty Blackbird Kentucky Warbler Red-headed Woodpecker Black Bear Rafinesques's Big-eared Bat Alligator Gar	Changes in climatological patterns (i.e., air temperature, humidity, precipitation, wind, storms, drought, floods) which could change habitat structure. Changing abundance and distribution of fish, wildlife, and plant species; for instance, interspecific competition from colonizing species (i.e., natives and/or exotics). Increased insect or disease outbreaks affecting habitat conditions and/or wildlife species. Soil characteristic changes.	Develop and implement a Forest Management Plan which will incorporate the needs of priority forest breeding birds through achieving desired forest conditions, address objectives of promoting hard-mast producing trees and browse availability, and maintaining trees with cavities. Maintain a diverse and productive bottomland hardwood habitat complex. Use active forest management (silvicultural techniques) to improve forested habitat for priority species (e.g. waterfowl, songbirds, bears). Follow reforestation guidelines produced by the LMVJV Forest Resources Conservation Working Group in future reforestation projects. Provide wood duck nesting and brood-rearing habitat.	Conduct a forest inventory. Inventory and delineate forested refuge habitat to determine species composition and general forest health. Consider implementing annual hard mast surveys to index annual habitat productivity for a variety of mast-dependent wildlife. Monitor success of forestry and reforestation activities (i.e., changes in habitat and wildlife responses) in order to practice adaptive management. Use GIS technology as a component of forest management, to provide spatially explicit data regarding distribution of refuge resources (habitat types), habitat treatments, monitoring sites, and for annual management planning.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Impacts**	**Management Actions**	**Survey/Monitoring**
			Strive to meet annual preseason Wood Duck banding quota. Continue to manage refuge lands in such a way that they serve as a buffer to local (off-refuge) impacts to the aquatic system, including sedimentation and chemical contamination. Develop a nuisance animal management plan which details objectives and methods for nuisance animal control. Coordinate bear management partnership with AGFC.	Conduct baseline surveys of wildlife resources, including but not limited to forest breeding birds, reptiles and amphibians, small mammals including bats, and mussels. Document species occurrence and coordinate reporting with AGFC Natural Heritage program. When forest management decisions are made, establish bird surveys in stands that will be subjected to management in the near term as well as stands that will not be managed in the near term to track bird responses. Continue Christmas bird counts and point counts. Conduct wood duck banding activities and maintain good records of wood duck banding and nest box program. All existing and any newly erected wood duck nest boxes should be mapped using GPS.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Impacts**	**Management Actions**	**Survey/Monitoring**
				Monitoring population trends and productivity through bait-station surveys and den/reproduction surveys until sustainability of populations established, then conduct mark-recapture studies to estimate bear population. Work with partners, such as AGFC, to conduct an aquatic (fish/mussel) inventory, with particular attention to identification of Species of Greatest Conservation Concern. Monitor beaver populations and maintain, through management control, at population levels below that causing significant habitat damage. Plan and implement efficient control and eradication of invasive plants where found. Refuge structures/facilities planned for closure or removal should be surveyed for use as a bat roost site before closure/removal.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Impacts**	**Management Actions**	**Survey/Monitoring**
Managed Freshwater Wetlands (moist soil, flooded cropland, GTR, impounded wetlands, etc.)	Wild Millet Sprangletop Sagitarria Foxtail Mallard Green-winged Teal Ring-necked Duck Wood Stork Little Blue Heron Least Sandpiper Greater Yellowlegs Sora King Rail American Bittern Common Yellowthroat Marsh Wren Northern Harrier Bald Eagle Red-eared Slider Broad-banded Water Snake Cottonmouth (moccasin) Sirens Green Tree Frog Raccoon Golden Mouse Hispid Cotton Rat Largemouth Bass Bluegill Black Crappie Redear Sunfish Channel Catfish	Changes in climatological patterns (i.e air temperature, humidity, precipitation, wind, storms, drought, floods) which could change habitat structure. Changing abundance and distribution of fish, wildlife, and plant species, for instance interspecific competition from colonizing species (i.e., natives and/or exotics). Soil characteristic changes.	Integrate migratory waterfowl, shorebird, wading bird and secretive marsh bird habitat objectives into moist soil management, through effective management rotations to provide a complex of habitat types in space and time. Moist soil water management should be strategically managed throughout the winter period. Included in Water Management Plans should be some early water (100-200 acres) for early-migrating waterfowl, teal and pintails, beginning no later than September 1 of each year. Additional acres should be flooded from November through December to continually provide food resources for wintering waterfowl. By mid- to late January, water levels in some impoundments should be slowly decreased to concentrate invertebrates for spring migrants, and this practice should be continued into mid-April.	Oakwood - Conduct a forest inventory specifically within the green-tree management unit, specifically sampling forest condition metrics, including chlorosis, basal swelling, tip die-back, red oak mortality and regeneration. Determine affect/results and efficiencies of activities on seed production and percent coverage of moist soil plants (Fredickson estimate using flora structure) to assess success of management treatments and to fine-tune management activities. Conduct baseline surveys of wildlife resources, including but not limited to forest breeding birds, reptiles and amphibians, small mammals including bats, and mussels. Monitor migratory bird (waterfowl, shorebird, marsh bird, wading bird) use of the different habitats by species and life cycle calendar to

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Impacts**	**Management Actions**	**Survey/Monitoring**
	Brown Bullhead Bluntnose Minnow Warmouth Flier Fathead Minnow Spotted Gar Bowfin		Water management for shorebirds and early-migrating waterfowl should be integrated with water management for waterfowl to the degree possible. Provide late-summer mudflat habitat for shorebirds at Overflow NWR (≥80 acres) and the Oakwood Unit (≥100 acres). Provide suitable habitat for marshbirds, on a rotational basis on at least one field unit (80 acres). In association with management for shorebirds, provide areas of shallow water and mudflat habitat that will also provide habitat for wading birds. In general target maintenance of summer water at a percentage equal to approximately 15% of the moist soil acreage. Continued holding of water in impoundments during spring and early summer to prevent vegetation growth.	determine habitat used/preferred to fine tine habitat planning and management. Monitor yearly waterfowl numbers, by species, to determine trends and adapt habitat management for target species as practical. Conduct bi-weekly waterfowl surveys from mid-November through February. Coordinate with the state to conduct aerial waterfowl surveys. For each waterfowl impoundment, maintain accurate records of management actions, plant response, and waterfowl response. Record management actions by type and date, vegetation response by percent plant cover (by species) and estimated food production. Determine habitat use by waterfowl from waterfowl surveys conducted at least twice monthly from

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Impacts**	**Management Actions**	**Survey/Monitoring**
			Recognize the value of on-going management at the Oakwood Unit for secretive marsh birds and continue to provide comparable active management to promote habitat for this species group, most notably the King Rail. Provide critical habitats for long-legged wading birds. Assess water quality through contaminant testing. Develop and implement a water management plan for the green-tree reservoir. Develop a nuisance animal management plan which details objectives and methods for nuisance animal control. Strategic acquisition of additional refuge lands to maximize the effectiveness of existing managed wetlands for waterfowl and secretive marshbirds.	November through February, and once monthly in September, October and March. Maintain currently designated waterfowl sanctuaries to provide areas of low disturbance critical for the area's wintering waterfowl to complete numerous activities necessary for adequate survival. Continue to survey secretive marshbirds using playback calls during May and June. Continued volunteer shorebird monitoring including 2-3 surveys per week during July through September. Implement annual surveys to identify rookery locations. Provide protection from disturbance during the breeding and fledging period, and monitor production of identified rookeries.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Impacts**	**Management Actions**	**Survey/Monitoring**
				Continue to coordinate monitoring of active eagle nests with Arkansas Game and Fish Commission. Record any bald eagle nest building activity or established nest sites. Protect any nesting bald eagles from disturbance that could lead to nest abandonment. Work with partners (AGFC and State Wildlife Grants, Arkansas Herpetological Society) to conduct herpetofauna surveys across refuge habitats. Conduct Avian Influenza monitoring.
Shrub-scrub disturbance-dependent communities other than xeric shrub-scrub (bogs, canebrakes, early successional forests)	*Shrub-Scrub:* Eastern Painted Bunting Western Painted Bunting Blue-winged Warbler Eastern Bewick's Wren Bell's Vireo	Changes in climatological patterns (i.e., air temperature, humidity, precipitation, wind, storms, drought, floods) which could change habitat structure.	Evaluate the amount and condition of early successional habitats on the Oakwood Unit, relative to priority shrub-scrub species. Consider maintenance of some habitats in a shrub-scrub condition through strategic setting back of succession,	Conduct baseline surveys of wildlife resources, including but not limited to forest breeding birds, reptiles and amphibians, small mammals including bats, and mussels.

Geographic Area: West Gulf Coastal Plain				
Ecological Community	**Potentially Affected Species**	**Potential Impacts**	**Management Actions**	**Survey/Monitoring**
	Canebrakes: Swainson's Warbler American Woodcock Kentucky Warbler Southern Pearly Eye Butterfly Black Bear Swamp Rabbit Cotton Mouse Southeastern Myotis Timber Rattlesnake Southern Leopard Frog	Changing abundance and distribution of wildlife and plant species, for instance interspecific competition from colonizing species (i.e natives and/or exotics). Increased insect or disease outbreaks affecting habitat conditions and/or wildlife species. Soil characteristic changes. Increased wildfire threats affecting habitat conditions.	as needed to maintain a component of this habitat type on the unit. Maintain connectivity between habitats to allow reptiles and amphibians unrestricted movement between habitats needed for complete life cycles. Maintain and enhance habitat for a diverse assemblage of resident reptile and amphibian species, particularly those recognized as Species of Greatest Conservation Need in the Arkansas Wildlife Action Plan. Develop a nuisance animal management plan which details objectives and methods for nuisance animal control.	Work with partners (AGFC and State Wildlife Grants, Arkansas Herpetological Society) to conduct herpetofauna surveys across refuge habitats. Control invasive plants and animals, particularly aggressive control of feral hogs under an objective of eradication.

SECTION B. ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

The U.S.Fish and Wildlife Service (Service) has prepared this Environmental Assessment (EA) for the Felsenthal and Overflow national wildlife refuges in compliance with the National Environmental Policy Act and the National Wildlife Refuge System Improvement Act of 1997. The National Wildlife Refuge System Improvement Act requires the development of comprehensive conservation plans (CCPs) for all refuges. Following a public review and comment period on the Draft CCP (Section A), a final decision will be made by the Service that will guide the Felsenthal and Overflow Refuges' management actions and decisions over the next 15 years; provide greater public understanding about the refuges and their management activities; and incorporate information and suggestions from the public and refuge partners.

The Draft CCP proposes a management direction, which is described in detail through a set of goals, objectives, and strategies. It addresses current management issues, provides long-term management direction and guidance for the refuges, and satisfies the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997. While the plan provides general management direction, subsequent step-down plans will provide more detailed management direction and actions.

The environmental assessment determines and evaluates a range of reasonable management alternatives. The intent is to support informed decision-making regarding the future management of the two refuges. Each alternative presented in this environmental assessment was generated with the potential to be fully developed into a final comprehensive conservation plan. The predicted biological, physical, social, and economical impacts of implementing each alternative are analyzed in this environmental assessment. This analysis assists the Service in determining if the alternatives represent no significant impacts, thus requiring the preparation of a Finding of No Significant Impact; or if the alternatives represent significant impacts, thus requiring more detailed analysis through an Environmental Impact Statement and a Record of Decision. Following public review and comment, the Service will select an alternative to be fully developed for the Felsenthal and Overflow Refuges.

This plan is needed to address current management issues, to provide long-term management direction for the two refuges, and to satisfy the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997, which requires the preparation of a comprehensive conservation plan for all national wildlife refuges.

PURPOSE AND NEED FOR ACTION

The purpose of the environmental assessment is to meet the purpose(s) of the refuge and the goals identified in the comprehensive conservation plan (for which we evaluate each alternative). The purpose is to ensure that Felsenthal and Overflow NWRs serve as sanctuary for migrating birds; protect and conserve rare, threatened and endangered species; serve the development, advancement, management, conservation, restoration, and protection of fish, wildlife, and habitat resources; provides opportunities for compatible wildlife-dependent recreation; control and eliminate exotic, invasive and nuisance species; promote awareness and appreciation of natural resources;

administer and protect the wilderness character; and protect and preserves archaeological and historical resources. The need of the environmental assessment is to adopt a 15-year management plan that provides guidance for future management and that meets the mandates of the National Wildlife Refuge System Improvement Act of 1997.

This environmental assessment addresses the need to adopt a 15-year management plan for the Felsenthal and Overflow Refuges that provides guidance for future refuge management and meets the requirements of the National Wildlife Refuge System Improvement Act.

DECISION FRAMEWORK

Based on the assessment described in this document, the Service will select an alternative to implement the Comprehensive Conservation Plan for Felsenthal and Overflow national wildlife refuges. The finalized plan will include a Finding of No Significant Impact (FONSI), which is a statement explaining why the selected alternative will not have a significant effect on the quality of the human environment. This determination is based on an evaluation of the mission of the Service and the Refuge System; the purpose(s) for which the refuges were established; and other legal mandates. Assuming no significant impact is found, implementation of the plan will begin after the FONSI is signed, and the plan will be monitored annually and revised when necessary.

PLANNING STUDY AREA

Felsenthal National Wildlife Refuge is located in Ashley, Bradley, and Union counties, Arkansas, about 5 miles west of Crossett, Arkansas, on U.S. Highway 82. Felsenthal NWR, established in 1970, occupies a low-lying area dissected by an intricate system of rivers, creeks, sloughs, buttonbush swamps and lakes throughout a vast bottomland hardwood forest that gradually rises to an upland forest community. This 65,000-acre refuge is named for the small Felsenthal community located at its southwest corner. It contains an abundance of water resources dominated by the Ouachita and Saline rivers and the Felsenthal Pool. Historically, periodic flooding of the "bottoms" (bottomland hardwoods) during the winter and spring provide excellent wintering waterfowl habitat. These wetlands, in combination with the pine and upland hardwood forest on the higher ridges, support a wide diversity of native plants and animals, providing habitat for migrant and resident waterfowl, marsh and water birds, and Neotropical migratory birds. The refuge has the highest density of endangered red-cockaded woodpeckers in the state and provides habitat and protection for the threatened American alligator and bald eagle. The refuge also contains some of the region's richest cultural resources, with more than 200 known archeological (Native American) sites.

Overflow National Wildlife Refuge, established in 1980, encompasses 13,973 fee-title acres in Ashley County in southeast Arkansas, about five miles west of Wilmot. It was established to protect one of the remaining bottomland hardwood forests considered vital for maintaining mallard, wood duck, and other waterfowl populations in the Mississippi Flyway. The western boundary of the refuge follows the 110-foot contour along the Mississippi Alluvial Valley escarpment; an abrupt rise in elevation separates the Mississippi River Delta from the Gulf Coastal Plain. Bottomland hardwood forests, agriculture fields, scrub/shrub wetlands and beaver ponds, and upland pine-hardwood are the principal habitats on the refuge. These habitats provide a diversity of habitat types and protection for migratory waterfowl and other birds, including the American bald eagle. In addition, the Oakwood Unit, an area of 2,263 acres in Desha County transferred from the Farmers Home Administration in 1990, is administered by Overflow NWR. The Oakwood Unit is currently closed to the public and is very passively managed.

This environmental assessment will identify management on refuge lands, as well as those lands proposed for acquisition by the Service.

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The Service has developed this plan in compliance with the National Wildlife Refuge System Improvement Act of 1997 and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within this plan also meet the requirements of the National Environmental Policy Act of 1969. The refuge staff achieved compliance with this Act through the involvement of the public and the incorporation of an environmental assessment in this document, with a description of the alternatives considered and an analysis of the environmental consequences of the alternatives (Chapters III and IV in this section). When fully implemented, the plan will strive to achieve the vision and purposes of Felsenthal and Overflow national wildlife refuges.

The plan's overriding consideration is to carry out the purposes for which the refuges were established. The laws that established the refuges and provided the funds for acquisition state the purposes. Fish and wildlife management is the first priority in refuge management, and the Service allows and encourages public use (wildlife-dependent recreation) as long as it is compatible with, or does not detract from, the mission and purposes of the two refuges.

COMPATIBILITY

The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy Refuge System lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use is defined as one that "...will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

An interim compatibility determination is a document that assesses the compatibility of an activity during the period of time the Service first acquires a parcel of land to the time a formal, long-term management plan for that parcel is prepared and adopted. The Service has completed an interim compatibility determination for the six priority general public uses of the system, as listed in the National Wildlife Refuge System Improvement Act of 1997. These uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and National Environmental Policy Act recommendations, public involvement has been a crucial factor throughout the development of the Draft Comprehensive Conservation Plan for Felsenthal and Overflow national wildlife refuges. This plan has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for the Felsenthal and Overflow refuges. The Service, as a whole, and the refuge staff, in particular, are grateful to each individual who has contributed time, expertise, and ideas to the planning process. The staff remains impressed by the passion and commitment of so many individuals for the lands and waters administered by the two refuges.

The development of the Felsenthal and Overflow NWRs' Draft Comprehensive Conservation Plan was executed in accordance with refuge planning policy (602 FW 3.4C(1)) and the National Environmental Policy Act. Initial planning began in January 2008, with the establishment of a core planning team and the preparation of the team charter and work plan. Through the planning process, and with input from local, state, and federal agencies, the public, and conservation associations, the planning team identified the issues and concerns that were relevant to the current and future conservation and management of the two refuges.

In June 2008, a biological review was completed that assessed the status of the biological resources and programs currently in place on Felsenthal NWR. The Service had previously established a biological review team for Overflow NWR with representatives from the same agencies that conducted an onsite evaluation and completed a biological review report. These reviews also aided in identifying additional information needs and establishing preliminary management goals and objectives. The teams that prepared the two biological reviews were comprised of biologists, managers, conservation society members, and employees of local, state and federal agencies. These reviews also served as an intergovernmental scoping meeting to obtain the participation of other government agency partners in the CCP process. Issues discussed included habitat management, water quality, migratory birds, threatened and endangered species, other wildlife, fisheries, fire management, forest management, and refuge staffing and equipment needs.

In September 2007, visitor services reviews were conducted on both refuges to evaluate the status of their existing public use programs, facilities, and opportunities. These visitor services reviews provided guidance on short, intermediate, and long-term recommendations for improving the quality of public use and educational services. The recommendations of these reviews included developing a current Visitor Services Plan, enhancing environmental education and volunteer programs, and increasing law enforcement presence on the refuges.

Public involvement and input into the development of the Draft CCP was initiated by the submission of a notice of intent (NOI). The NOI summarizing the intent of the refuges to begin the CCP process was published in the *Federal Register* on April 2, 2008 (73 FR 64). Five public scoping meetings were held in four different counties: Ashley, Bradley, Desha, and Union counties, Arkansas, during June and July 2008 that were attended by approximately 35 stakeholders. Both written and verbal comments were received from stakeholders. The public comments received during this public scoping process, as well as the issues and concerns that were identified, are summarized in Appendix D, Public Involvement.

II. Affected Environment

For a description of the affected environment, please refer to Chapter II, Refuge Overview, in the Draft Comprehensive Conservation Plan (Section A).

III. Description of Alternatives

FORMULATION OF ALTERNATIVES

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the purposes and vision of the Felsenthal and Overflow NWRs, and the goals identified in the comprehensive conservation plan; the priorities and goals of the Lower Mississippi River Ecosystem Team; the goals of the National Wildlife Refuge System; and the mission on the U.S. Fish and Wildlife Service. Alternatives are formulated to address the significant issues, concerns, and problems identified by the Service and the public during public scoping.

The three alternatives identified and evaluated represent different approaches to provide permanent protection, restoration, and management of the refuges' fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. The refuge staff assessed the biological conditions and analyzed the external relationships affecting the refuges. This information contributed to the development of refuge goals and, in turn, helped to formulate the alternatives. As a result, each alternative presents different sets of objectives for reaching refuge goals. Each alternative was evaluated based on how much progress it would make and how it would address the identified issues related to fish and wildlife populations, habitat management, resource protection and conservation, visitor services, and refuge administration. A summary of the alternatives for Felsenthal NWR is provided in Table 15 and for Overflow NWR in Table 16.

DESCRIPTION OF ALTERNATIVES - FELSENTHAL NWR

Serving as a basis for each alternative, a number of goals and sets of objectives were developed to help achieve the refuge's purpose and the mission of the Refuge System. Objectives are desired conditions or outcomes that are grouped into sets and, for this planning effort, consolidated into three alternatives. These alternatives represent different management approaches for managing the refuge over a 15-year timeframe while still meeting the refuge's purposes and goals. The three alternatives for Felsenthal National Wildlife Refuge are summarized below. A comparison of each alternative follows the general description.

ALTERNATIVE A: CURRENT MANAGEMENT (NO ACTION)

This alternative is required by the National Environmental Policy Act (NEPA) and is the "no action" or "status quo" alternative in which no major management changes would be initiated by the Service. This alternative also provides a baseline to compare the current habitat, wildlife, and public use management to the two action alternatives (Alternatives B and C).

Alternative A continues the Felsenthal NWR's current management strategies, with little or no change in budget or funding. Under this alternative, the Service would protect, maintain, and enhance 65,000 acres of refuge lands, primarily focusing on the needs of threatened and endangered species, with additional emphasis on the needs of migratory birds, resident wildlife, and migratory nongame birds. The Service would continue mandated activities for protection of federally listed species. Control of nuisance wildlife populations and invasive plant species would be undertaken on an opportunistic basis. Habitat management efforts would be concentrated on forest management, water management, including greentree reservoir (GTR) management, and open lands. The Service would continue the fire management program.

The refuge complex, with the support of volunteers and the Friends group, manages an extensive visitor services program that includes recreation, education, and outreach programs for the complex (Felsenthal, Overflow, and Pond Creek NWRs). The Service would maintain the current levels of wildlife-dependent recreation activities (hunting, fishing, wildlife observation and photography, and interpretation and environmental education opportunities). The refuge has an extensive network of public use facilities including 65 miles of all-terrain vehicle (ATV) trails, 8 boat ramps, and 10 primitive campgrounds. Except for two archeological sites, all of the refuge is open to visitors. These facilities do not interfere substantially with or detract from the achievement of wildlife conservation.

The hunting program at Felsenthal NWR would continue to be managed via quota hunts for white tailed deer and turkey. Special conditions of the hunt program would continue to include the use of ATVs along designated trails. Hunters with disabilities would still be allowed to extend their use of ATVs approximately 200 yards off of designated trails. The use of dogs would continue during waterfowl, squirrel and rabbit, and raccoon and opossum hunts.

About 60 percent of the total consumptive public use on the refuge is fishing. There are eight boat launching facilities with parking areas on the refuge and three boat launching facilities with parking areas off refuge that provide lake and river access. Adequate bank fishing opportunities would continue to be made available.

The Service would maintain the refuge as funding allows. The refuge staff would continue to include 15 staff members, including the Project Leader; the Deputy Project Leader; one Biologist; one Forester; one Park Ranger (Public Use); one Fire Management Specialist; three Forestry Technicians (Fire); two Law Enforcement Officers; an Administrative Officer; an Administrative Support Assistant; one Equipment Operator; and one Heavy Equipment Mechanic.

ALTERNATIVE B: ENHANCED BIOLOGICAL MANAGEMENT AND VISITOR SERVICES (PROPOSED ALTERNATIVE)

The proposed action (Alternative B) was selected by the Service as the alternative that best signifies the vision, goals and purposes of Felsenthal National Wildlife Refuge. Under Alternative B, the emphasis would be on restoring and improving refuge resources needed for wildlife and habitat management, while providing additional public use opportunities. This alternative would also allow Felsenthal NWR to provide law enforcement protection that adequately meets the refuge purposes.

This alternative would focus on augmenting wildlife and habitat management to identify, conserve, and restore populations of native fish and wildlife species with an emphasis on migratory birds and threatened and endangered species. This would partially be accomplished by increased monitoring of waterfowl, other migratory birds, and endemic species in order to assess and adapt management strategies and actions. The restoration of the Felsenthal South Pool would be a vital part of this proposed action and would be crucial to ensuring healthy and viable ecological communities in the greentree reservoir. This restoration would require increased water management control, invasive aquatic vegetation control, reestablishing water quality standards and possibly reestablishing populations of game fish species. The control of nuisance wildlife populations and invasive plant species would be more aggressively managed by implementing a control plan and systematic removal.

Alternative B enhances the refuge's visitor services opportunities by improving the quality of fishing opportunities; where feasible, creating additional hunting opportunities for youth and hunters with disabilities; implementing an environmental education program component for the complex that utilizes volunteers and local schools as partners; enhancing wildlife viewing and photography opportunities by implementing food plots in observational areas and evaluating the possibility of

implementing an auto tour; developing and implementing a visitor services management plan; and enhancing personal interpretive and outreach opportunities. The refuge's volunteer programs and Friends group would also be expanded to enhance all aspects of refuge management and to increase resource availability.

In addition to the enforcement of all federal and state laws applicable to the refuge to protect archaeological and historical sites, the refuge would identify and develop a plan to protect all known sites. The allocation of an additional law enforcement officer to the refuge would not only provide security for these resources, but would also ensure visitor safety and public compliance with refuge regulations.

Additional staff would include a Park Ranger (Law Enforcement - LE); a Biological Ttechnician; a Park Ranger (Visitor Services -VS - Environmental Educator/Volunteer Coordinator); a Heavy Equipment Operator; and the conversion of two seasonal fire technicians to full-time to accomplish objectives for establishing baseline data on refuge resources, for managing habitats, and for adequate protection of wildlife and visitors.

ALTERNATIVE C: ENHANCED BIOLOGICAL MANAGEMENT

Alternative C would provide for the enhancement and restoration of Felsenthal NWR's native wildlife, fish and plant communities and the health of those communities by maximizing wildlife and habitat management, while maintaining a portion of the current compatible public use opportunities. Threatened and federally listed species would be of primary concern, but the needs of other resident and migratory wildlife would also be considered. Like Alternative B, the focus would be centralized on augmenting wildlife and habitat management to identify, conserve, and restore populations of native fish and wildlife species by increased monitoring of waterfowl, other migratory birds, and endemic species in order to assess and adapt management strategies and actions. Extensive wildlife, plant, and habitat inventories would be initiated to obtain the biological information needed to implement and monitor management programs.

Habitat management would be increased to provide additional sanctuary habitat for waterfowl, provide additional active clusters of red-cockaded woodpeckers (RCWs), promote additional edge habitat as a transition between habitat types for resident wildlife, and provide additional openings for native grasslands. A minor expansion plan would be evaluated to be able to expand the current acquisition boundary. This would allow the refuge to expand critical or viable habitat. The refuge would inventory and more aggressively monitor, control, and, where possible, eliminate invasive plants and nuisance wildlife through the use of refuge staff and contracted labor.

Environmental education, wildlife observation, photography, and interpretation opportunities would continue as currently managed, but only when and where they would not conflict with wildlife management activities and objectives. The use of ATVs and campgrounds would be reduced or would require a permit to better control use. Night fishing and fishing tournaments would be phased out. Harvest counts for waterfowl hunting would be monitored annually to determine the species hunted. Outreach would additionally focus on providing information to the public on flooding cycles within the GTR and the importance of periodic drying cycles.

Administration plans would stress the need for increased maintenance of existing infrastructure and facilities benefiting wildlife conservation. Additional staff would include a Park Ranger (Law Enforcement - LE); a Biological Technician; a Biologist; a Heavy Equipment Operator; and the conversion of two seasonal fire technicians to full-time to accomplish objectives for establishing baseline data on refuge resources, for managing habitats, and for adequate protection of wildlife and visitors.

FEATURES COMMON TO ALL FELSENTHAL NWR ALTERNATIVES

Although the three alternatives differ in many ways, there are similarities among them as well. These common features are listed below to reduce the length and redundancy of the individual alternative descriptions.

- Resource Protection – Current enforcement of all federal and state laws applicable to the refuge to protect all known archaeological and historical sites would continue, including any efforts to increase resource protection through education and inventories. Certain mandated responsibilities such as protection of federal trust species; wetlands; prevention and control of invasive species; and payment of revenue-sharing in lieu of taxes would be accomplished under all alternatives.

- Habitat Management – Existing management by habitat type would continue. Management activities may increase or decrease to meet other objectives under the various alternatives.

- Control of Invasive Plants – Each alternative would develop an Integrated Pest Management Plan that provides for control of invasive plants.

- Threatened and Endangered Species – Each alternative would provide protective conservation measures for federally-listed species and their habitats on the refuge.

- Resident Wildlife – Each alternative would use sound scientific principles for managing populations of resident wildlife species such as white-tailed deer and wild turkey.

- Control of Nuisance Wildlife Populations – Each alternative would provide for control of wildlife populations that reach nuisance levels and negatively impact other refuge resources.

- Monitoring – Existing monitoring of waterfowl, other migratory birds, and endemic species would continue. Monitoring activities may increase or decrease to meet other objectives under the various alternatives.

- Management Plans – All alternatives include the development and implementation of a visitor services and habitat management plans.

- Maintain Refuge Boundary – The existing refuge boundary and directional signs would be maintained as part of all alternatives.

- Law Enforcement – Law enforcement would provide visitor safety, protect resources and ensure public compliance with refuge regulations under all alternatives. Enforcement presence varies under the various alternatives to meet specific objectives.

- Maintain Capitalized Equipment – All alternatives contain maintenance of refuge equipment, which is required to meet safety standards.

- Partnerships – Currently established partnerships with agencies, organizations and individuals would continue to support refuge management programs.

- Prescribed Burns – Existing fire management, including prescribed burns, would continue. Fire management activities may increase or decrease to meet other objectives under the various alternatives.

COMPARISON OF ALTERNATIVES – FELSENTHAL NWR

Table 16 compares each of the three alternatives by management issues for Felsenthal National Wildlife Refuge.

Table 16. Comparison of alternatives by management issues for Felsenthal National Wildlife Refuge.

Goal 1. WILDLIFE POPULATION MANAGEMENT - Protect, maintain, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within south Arkansas in a manner that supports national and international treaties, plans and initiatives.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Threatened and Endangered Species	Red-Cockaded Woodpecker (RCW) - Actively monitor and manage the RCW population (11 to 14 active clusters) on the refuge by examining nest and roost cavities, installing artificial cavities, installing cavity restrictors, banding nestlings to achieve the refuge's RCW population goals.	Same as A, but also enhance program by reaching or exceeding 22 active RCW clusters, completing and implementing a RCW management plan, begin translocation program, and implementing an intensive nest monitoring program and database.	Same as B, but also: - Reach 34 active RCW clusters - Add biotech to staff - Squirrel removal bi-annually - Survey 2/3 of all pine stands - Maximize translocation potential
Landbirds	Continue Christmas Bird Count and breeding Bird Point Counts.	Same as A, but expand species monitoring surveys to include baseline surveys and forest management adaptive habitat monitoring.	Same as B.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Waterfowl	Conduct weekly waterfowl surveys during fall winter, pre-season wood duck banding, and Avian Influenza monitoring.	Same as A, but enhance monitoring and surveying of waterfowl by conducting bi-weekly surveys from mid-November through February and coordinating with the State to conduct aerial surveys. Also, conduct wood duck banding with the addition of one banding site to support objectives of the Mississippi Flyway Council.	Same as B, but also: - Conduct aerial surveys monthly by refuge. - Add additional banding sites. - Exceed yearly banding quota.
Wetland-dependent birds	No Active management	Initiate surveys (baseline, vegetation, and bird rookery location) for representative managed wetland dependent birds and provide quality breeding and wintering habitat.	Same as B, but also implement population management for selected species.
Raptors	Monitor and protect established bald eagle nest sites. Record any new bald eagle nest building activity.	Same as A	Same as A, implement a baseline survey for raptors on the Refuge.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Resident Wildlife	Collect deer data through hunter check stations during managed hunts. Maintain current deer hunting program at or near current level of harvest. Collect turkey data from brood surveys, gobble counts and harvest numbers from checked birds. Maintain turkey hunting at or near current level of harvest.	Same as A, but enhance habitat quality for resident game species to contribute to balanced species diversity and to allow for opportunities for recreational hunting. Implement deer herd health and black bear surveys while continuing turkey surveys. Monitor and control nuisance animal species such as feral hog. Implement forest management plans to enhance forested habitats for resident wildlife. Utilize partnerships such as the Arkansas Game and Fish Commission (AGFC) to aid in resident wildlife management.	Same as B but also: - Conduct research geared toward turkey and quail survival and recruitment. - Implement baseline survey for bat populations.
Reptiles and Amphibians	No active management.	Implement herpetofaunal surveys and inventories in collaboration with the AGFC and Arkansas Herpetological Society. Work with partners to conduct a baseline reptile and amphibian survey, targeting various habitat types across refuge lands for a comprehensive inventory.	Same as B, but also establish a monitoring protocol and encourage research opportunities.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fish and Aquatic Resources	Active management done by Arkansas Game and Fish Commission in coordination with Refuge.	Same as A, but improve habitat for fish and aquatic resources by controlling nuisance aquatic vegetation to less than 50% of the reservoir surface area, developing a monitoring program for nuisance aquatic vegetation, and survey of streams and rivers for mussels baseline inventory data and other species of greatest conservation.	Same as B, but also: - Improve habitat for identified, aquatic "Species of Greatest Conservation Need", - Maintain nuisance aquatic vegetation coverage to less 25% of the reservoir surface area.
Inventory, Monitoring and Research Plan	No plan.	Develop and implement an Inventory and Monitoring Plan. Provide refuge with adequate staff, equipment and funding to acquire baseline inventory data on refuge resources and monitor fish, wildlife and plant responses to refuge management.	Same as B.
Populations – Climate Change	Opportunistically monitor climate change/sea level rise.	Increase information and research to enable adaptive management to cope with long-term climate change impacts	Same as B.

Goal 2. HABITAT MANAGEMENT - Protect, maintain, enhance, and where appropriate, restore suitable habitat for the conservation and management of migratory birds, resident wildlife, fish, and native plants, including all Federal and State threatened and endangered species endemic to the Complex.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management Plan	Develop and implement a habitat management plan.	Same as A.	Same as A.
Forest Management	Actively managing 10K acres upland pine. Prescribed burning on 3 year rotation. Bottomland hardwoods managed in accordance with the Lower Mississippi Joint Venture recommendations for desired forest conditions. Pine stands managed for RCW habitat per the recovery plan.	Forest management would be increased/enhanced by adapting management techniques such as cutting cycles, thinning, prescribed fire, expanding sparse canopy and low to moderate basal area in mature pine stands, and passively managing some bottomland forest as an old growth component. All of these techniques would be utilized to provide RCW habitat and to restore historic range of variation in forest structure, following the requirements of songbirds, bats, and other priority species.	Same as B, but also: - Under-plant with hardwood seedlings after timber harvest. - Pre-commercial thinning.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Greentree Reservoir (GTR)	Management of winter flooding accomplished through cooperation with U.S. Corp of Engineers. Current plan has 4 options available for management.	Same as A, but enhance management, by utilizing adaptive habitat management, lowland forest mapping and management and implementation of water management planning and flooding regime to achieve a sustainable wetland forest that provides forage for waterfowl, migrant birds, mammals, reptiles, amphibians and fishes. Emulate natural flooding within the Felsenthal lowland forest.	Same as B, but also: - The lowland forest should not be intentionally flooded for 2 to 3 years following a good acorn crop to encourage natural regeneration.
Fire Management	Manage and maintain current fire management programs to achieve healthy and viable wildlife and plants on the refuge and reduce fuels. Burning on a 3 year rotation. Continue fuels monitoring program.	Same as A, but also implement adaptive habitat management component by monitoring burn units.	Same as B.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Waterfowl	Manage bottomland hardwoods to provide maximum sustainable GTR habitats.	Same as A, but enhance waterfowl habitat by, managing water levels throughout winter periods and implementing a water management plan.	Same as B, but also: - Increase acreage of sanctuaries. - Relocate sanctuaries.
Wetland-dependent Birds	No specific management is currently taking place for wetland-dependant birds other than habitat management for waterfowl.	Provide mudflat habitat for shorebirds and long-legged wading birds and create temporal sanctuaries around wading bird rookeries during nesting season.	Same as in B.
Resident Wildlife	Maintain current levels of management for resident species in accordance with AGFC. Monitor deer and turkey populations.	Maintain a diverse and productive prairie and bottomland hardwood habitat to support resident wildlife by controlling invasive plant and animal species, developing of food plots, and maintaining conductivity between habitats for reptile and amphibian movement.	Same as B, but promote additional edge habitat as a transition between habitat types.
Invasive and Nuisance Species Control	Opportunistic treatment of invasive plants by herbicide and prescribed burning. Opportunistic removal of nuisance animal species.	Develop nuisance/exotic/invasive plant/animal control plan. Implement systematic removal of invasive plant species by mechanical, chemical, and prescribed burning. Control beaver, nutria and feral hogs through systematic removal.	Same as B, but contract for beaver, nutria, and hog removal.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Open Land	Maintaining wildlife openings and roadsides through mowing.	Same as A, but also conduct supplemental planting of native forbs and grasses to promote early successional habitat diversity. Also, use herbicide for conversion to native plant species on roadsides.	Same as B, but also: - Convert roadsides to native warm season grasses/forbs. - Add more openings.
Aquatic Resources	Active management done by Arkansas Game and Fish Commission in coordination with Refuge. In cooperation with AGFC, conducting stocking of the Felsenthal Pool with triploid grass carp, to maintain a density greater than or equal to 10 grass carp, less than 24 inches total length, per acre.	Same as A, but enhance refuge aquatic habitats to benefit fish populations and provide improved access for sport fishing opportunities by evaluating working with Corps of Engineers to strategically drawdown the permanent pool every 5 to 7 years.	Same as B, but also: - Contract to reduce aquatic vegetation by aerial spraying.
Habitat Management – Climate Change	Opportunistically monitor climate change/sea level rise.	Increase information and research to enable adaptive management to cope with long-term climate change impacts	Same as B.

Goal 3. VISITOR SERVICES - Provide wildlife-dependent public use opportunities consistent with the refuge system mission that leads to greater understanding and enjoyment of fish, wildlife and their habitats on the Complex.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Welcome and Orient Visitors	Maintain current visitor services such as signs, brochures, website, Visitor Center, and maps.	Improve program to welcome and orient visitors to the refuge through directional and entrance signs, design and upkeep of facilities, and the provision of information regarding programs and facilities. Also, reestablish boat/canoe trails, adding exhibit panels in high usage areas, and designate parking areas at trailheads.	Same as A, but: - Add ATV permits as a condition to use ATV's and evaluate charging a fee. - Encourage trail maintenance days as a condition of free ATV permits. - Reduce camp sites. - Reduce ATV trails.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Hunting	Continue two quota deer hunts for modern gun, one quota hunt for primitive weapon (muzzle loader) and state season archery. Refuge close to hunting Jan. 31. Two turkey quota hunts. One youth quota hunt. Open state season archery. Small game in accordance with state seasons. Ducks in accordance with state seasons.	Same as A, continue to provide current appropriate hunting opportunities that allow for quality public recreation and are compatible with refuge purposes. Upon completion of the CCP update station hunt plans and all hunting Compatibility Determinations (CDs).	Same as A, but also: -Reduce ATV use for hunters without disabilities. - Conduct waterfowl hunter harvest surveys annually to determine changes in hunter effort and species harvested in different habitat components (permanent pool versus seasonally-flooded portions). - Reduce campgrounds on refuge property.
Trapping	Trapping done by Special Use Permit. Seasons in accordance with state seasons.	Same as A, continue to allow trapping to control nuisance wildlife and protect refuge infrastructure and wildlife habitat.	Same as A.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fishing	In accordance with state seasons. Commercial fishing by Special Use Permit in accordance with state seasons.	Same as A, continue to provide appropriate fishing opportunities that do not detract from the original purposes of refuge establishment. Also enhance opportunities by coordinating with AGFC efforts to improve fish habitats through vegetation control methods; adding a 3-panel kiosk with a brochure box at each boat launch/parking area; and adding additional fishing opportunities.	Same as A, but also: - Begin phase out closure of night fishing, ATV access for fishing, and camping associated with fishing. - Eliminate fishing tournaments. Same as B, but: - Work to enhance fishing for and harvest of nontypical fish species. - Reduce biomass of carp species in the reservoir through commercial and recreational harvest. - Evaluate harvest rates for game fish species.
Wildlife Observation and Photography	Maintain hiking trails and public road system. Explore options with butterfly garden at the headquarters Woodland trail or the other foot trail behind the visitor center.	Same as A, but also develop parking area for Sand Prairie Trail, explore options of establishing an auto tour route along old tram bed in Sand Prairie Trail or along Shallow Lake Road, and explore options to add food plots in strategic wildlife viewing areas.	Same as A.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Environmental Education/Interpretation	Limited on and off site as staff are available. Maintain current EE such as information kiosks, brochures, and panels.	Hire a Visitor Services Specialist for the South Arkansas Refuge Complex to be stationed at Felsenthal NWR and develop an Environmental Education program for the complex. In addition to the refuge staff, utilize partnerships and volunteers to enhance the EE program. Expand involvement of staff to manage the Junior Naturalist Program. As part of the Visitor Service Plan, develop an Interpretive Program component for the Complex and develop an interpretive trail that loops through the reforested area behind the office.	Same as A.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Outreach	Done on an as requested basis. Number of opportunities varies from year to year.	Develop general outreach plan for the refuge that will be used to increase public outreach to emphasize resource management practices and promote public use opportunities. Also provide additional information to the public to provide a better understanding of flooding cycles within the GTR and the importance of periodic drying cycles. Tools to increase public outreach will be to develop a refuge specific portable exhibit, develop special events on the refuge, partner with local businesses and develop refuge story slide show/Power Point.	Same as A, but: - Issue a news release regarding water management changes and scheduling to benefit increase game fish populations and the long-term duck populations. - Where appropriate develop specific outreach strategies to address issues.
Friends Group/Volunteers	Refuge currently has active Friends group and volunteer program. Currently creating two pads on refuge grounds for work camper volunteers.	Same as A, but enhance current Friends and volunteer involvement by seeking grants to hire a seasonal intern, establishing partnerships with schools and local businesses, and the prevision of office space to Friends/volunteers at Complex office.	Same as B.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Education – Climate Change	Opportunistically share knowledge on climate change.	Same as A, but as science, technology, and policy evolve, become more aggressive at educating partners and the public the FWS direction on climate change.	Same as B.

Goal 4. RESOURCE PROTECTION/REFUGE ADMINISTRATION - Protect the natural and cultural resources of the refuge and ensure visitor safety and facility integrity to fulfill the mission of the National Wildlife Refuge System. Provide for sufficient staffing, facilities and infrastructure to fulfill the Complex's purposes and the goals and objectives of its Comprehensive Conservation Plan.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Provide Visitor Safety, Protect Resources and Ensure Public Compliance with Refuge Regulations	Provide visitor safety, protect resources, and ensure public compliance with refuge regulations Currently two full time LE and cooperation with AGFC officers and local enforcement officials.	Same as A, but develop and implement Refuge Law Enforcement Plan and add additional staff to support LE efforts.	Same as B.
Cultural Resources	Enforce all Federal and State laws applicable to the refuge. Protect all known archaeological sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act. Active consultation with regional archaeologist.	Same as A, but also develop a plan to protect identified archeological sites in conjunction with Native American tribes, State Historic Preservation office, and the USFWS archaeologist.	Same as B.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Land Acquisition	Currently no acquisitions planned. All areas within acquisition boundary have been acquired.	Currently no acquisitions planned. All areas within acquisition boundary acquired.	Evaluate minor expansion plan.
Private Lands	Work with private landowners near the refuge to promote refuge goals and objectives for federal trust resources.	Same as Alternative A	Same as Alternative A
Partnerships	Coordination before and after RCW breeding season monitoring has been complete and just prior to the fall/winter prescribed burning season. Partnership with AGFC on vegetation eradication program. Biological monitoring conducted by University of Arkansas.	Same as Alternative A, but explore opportunities for new partnerships.	Same as Alternative B

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Maintain Capitalized Equipment, Facilities, and Infrastructure for the Refuge Complex	Maintain more than $3,474,910.24 worth of capitalized equipment, facilities, and infrastructure used in all aspects of refuge management such as habitat, wildlife, public use and protection.	Same as A, but increase both biological and visitor services infrastructures (equipment, staff, and facilities).	Same as A, but increase both biological and visitor services infrastructures (equipment, staff, and facilities).
Staffing	Maintain current staff: complex manager, deputy manager, two LE officers, engineering equipment operator, maintenance mechanic, administrative officer, office assistant, biologist, administrative forester, park ranger-VS, prescribed fire specialist, forestry technician, and two seasonal forestry technicians. Maintain existing equipment and facilities used in refuge management.	Add additional staff to support CCP goals and objectives. - Evaluate staffing needs. - Hire a Park Ranger-LE (law enforcement) in order to effectively protect the refuge resources. - Hire an additional biological technician, assigned to address biological needs of the Refuge. - Add a Park Ranger-VS (environmental educator) to the Complex staff. -Add a heavy equipment operator. -Convert two seasonal fire techs to full time on the Complex staff.	Same as B, but instead of Park Ranger (environmental educator), hire an additional Biologist.

DESCRIPTION OF ALTERNATIVES - OVERFLOW NWR

Serving as a basis for each alternative, a number of goals and sets of objectives were developed to help achieve the refuge's purpose and the mission of the Refuge System. Objectives are desired conditions or outcomes that are grouped into sets and, for this planning effort, consolidated into three alternatives. These alternatives represent different management approaches for managing the refuge over a 15-year timeframe while still meeting the refuge's purposes and goals. The three alternatives for Overflow National Wildlife Refuge are summarized below. A comparison of each alternative follows the general description.

ALTERNATIVE A: CURRENT MANAGEMENT (NO ACTION)

This alternative is required by the National Environmental Policy Act (NEPA) and is the "no action" or "status quo" alternative in which no major management changes would be initiated by the Service. This alternative also provides a baseline to compare the current habitat, wildlife, and public use management to the two action alternatives (Alternatives B and C).

Alternative A continues Overflow NWR's current management strategies, with little or no change in budget or funding. Under this alternative, the Service would protect, maintain, restore, and enhance 13,973 acres of refuge lands and 2,263 additional acres included in the Oakwood Unit, primarily focusing on the needs of migratory waterfowl, with additional emphasis on the needs of resident wildlife, migratory nongame birds, and threatened and endangered species. Control of nuisance wildlife populations and invasive plant species would be undertaken on an opportunistic basis. Habitat management efforts would be concentrated on moist soil management, waterfowl impoundments, forest management, and crop production. The Service would continue 400 acres of cooperative farming.

Currently, active habitat management targeting waterfowl includes water management of impoundments for moist soil and crop food resource generation in open habitats as well as greentree reservoir (GTR) management in forested areas to produce complimentary food and behavioral resources. Approximately 600 acres would continue to be managed in rotation fashion in moist soil and crops. A stop-log structure on Overflow Creek would continue to be used to manage a single 4,000-acre GTR impoundment during the winter months.

Public use opportunities on the refuge would continue to include hunting (waterfowl, deer, turkey, small game, woodcock and quail), wildlife observation, photography, and limited environmental education activities. Three thousand acres would continue to be protected from public intrusion during the wintering waterfowl season in areas designated as waterfowl sanctuary.

Standard management and monitoring activities at the Oakwood Unit would continue to include the disking of the moist soil units on a rotational basis, monitoring seedling survival and mortality, bird surveys, and levee and boundary line maintenance. This unit would continue to not provide any visitor services opportunities. As compared to Overflow NWR, the Oakwood Unit is passively managed due to its location 80 miles from the refuge office, staff, and budget limitations and completion of habitat restoration actions.

The Service would maintain Overflow NWR as funding allows. The refuge staff would continue to include four staff members: the Refuge Manager, a Private Lands Biologist, a Biological Science Technician, and an Engineering Equipment Operator, as well as one part-time STEP Biological Technician. In addition, individual volunteers provide many valuable services on the refuge (e.g., monitoring the migration of Monarch butterflies, beaver trapping, trail maintenance, waterfowl counts, etc.).

ALTERNATIVE B: ENHANCED BIOLOGICAL MANAGEMENT AND VISITOR SERVICES (PROPOSED ALTERNATIVE)

The proposed action (Alternative B) was selected by the Service as the alternative that best signifies the vision, goals and purposes of Overflow NWR. Under Alternative B, the emphasis would be on restoring and improving refuge resources needed for wildlife and habitat management, while providing additional public use opportunities. This alternative would also allow the refuge to provide law enforcement protection that adequately meets the refuge purposes.

This alternative would focus on augmenting wildlife and habitat management to identify, conserve, and restore populations of wildlife species with an emphasis on waterfowl, migratory birds and resident wildlife. This would partially be accomplished by increased monitoring in order to assess and adapt management strategies and actions. Habitat management would be increased to extend the moist soil rotation in to a 4+year rotation to reach a condition preferred by marshbirds, adapt flooding and water management regimes in the GTR and moist soil units, and implement a more intensive moist soil management program at the Oakwood Unit (300 acres/year). Land acquisitions within the approved acquisition boundary would be based on importance of the habitat for target management species and public use value. The control of nuisance wildlife populations and invasive plant species would be more aggressively managed by implementing a control plan and systematic removal.

Alternative B enhances the refuge's visitor services opportunities by: where feasible, making hunting opportunities more accessible for hunters with disabilities; implementing an environmental education program component for the complex that utilizes volunteers and local schools as partners; enhancing wildlife viewing and photography opportunities by implementing food plots in observational areas and promoting all-terrain vehicle (ATV) trails as birding trails; welcoming visitors by establishing a visitor center or contact station on the refuge; developing and implementing a visitor services management plan; and enhancing personal interpretive and outreach opportunities. The refuge's volunteer programs and Friends group would also be expanded to enhance all aspects of refuge management and to increase resource availability.

In addition to the enforcement of all federal and state laws applicable to the refuge to protect archaeological and historical sites, the refuge would identify and develop a plan to protect all known sites. An additional refuge law enforcement officer would not only provide security for these resources, but would also ensure visitor safety and public compliance with refuge regulations.

Under Alternative B, to accomplish the objectives for establishing baseline data on refuge resources, for managing habitats, and for adequate protection of wildlife and visitors, additional staff would include a Park Ranger - LW (law enforcement); a Biological Technician; a Park Ranger – VS (Visitor Services environmental educator/volunteer coordinator); and a Heavy Equipment Operator.

ALTERNATIVE C: ENHANCED BIOLOGICAL MANAGEMENT

Alternative C would provide for the enhancement and restoration of native wildlife and plant communities and the health of those communities by maximizing wildlife and habitat management, while maintaining a portion of the current compatible public use opportunities. The Service would broaden Overflow NWR's focus on migratory waterfowl by maximizing monitoring and habitat enhancement. In addition to continuing mandated activities for protection of federally listed species, the refuge would develop a strategy to address federally listed threatened and endangered species. Like Alternative B, the focus would be centralized on augmenting wildlife and habitat management to identify, conserve, and restore populations of wildlife species by increased monitoring of waterfowl, other migratory birds, and endemic species in order to assess and adapt management strategies and

actions. Extensive wildlife, plant, and habitat inventories would be initiated to obtain the biological information needed to implement and monitor management programs.

Habitat management would be maximized to provide additional moist soil management and provide more intensive forest management. The refuge would inventory and more aggressively monitor, control, and, where possible, eliminate invasive plants and nuisance wildlife through the use of refuge staff and contracted labor. Land acquisitions within the approved acquisition boundary would be based on importance of the habitat for target management species. Additionally, the expansion of the Oakwood Unit to provide a right-of-way to the public would be evaluated.

Environmental education, wildlife observation, photography, and interpretation opportunities would continue as currently managed, but only when and where they would not conflict with wildlife management activities and objectives. Additionally, the opening of the Oakwood Unit to deer hunting would be evaluated and the staff offices on the refuge would be updated in lieu of a new visitor center.

Administration plans would stress the need for increased maintenance of existing infrastructure and facilities benefiting wildlife conservation. Additional staff would include a Park Ranger-LE (law enforcement), a biological technician, a biologist, and a heavy equipment operator to accomplish objectives for establishing baseline data on refuge resources, for managing habitats and for adequate protection of wildlife and visitors.

FEATURES COMMON TO ALL OVERFLOW NWR ALTERNATIVES

Although the alternatives differ in many ways, there are similarities among them as well. These common features are listed below to reduce the length and redundancy of the individual alternative descriptions.

- Resource Protection – Current enforcement of all Federal and State laws applicable to the refuge to protect all known archaeological and historical sites would continue, including any efforts to increase resource protection through education and inventories. Certain mandated responsibilities such as protection of federal trust species; wetlands; prevention and control of invasive species; and payment of revenue sharing in lieu of taxes would be accomplished under all alternatives.

- Habitat Management – Existing management by habitat type would continue. Management activities may increase or decrease to meet other objectives under the various alternatives.

- Cropland – Each alternative would use cooperative farming to help meet foraging habitat objectives for migratory waterfowl.

- Moist soil habitat – Each alternative would provide moist soil habitat to help meet foraging habitat objectives for migratory waterfowl.

- Control of Invasive Plants – Each alternative would develop a plan that provides for control of invasive plants.
- Waterfowl – Each alternative would continue a focus on migratory waterfowl.

- Threatened and Endangered Species – Each alternative would provide protective conservation measures for federally-listed species and their habitats on the refuge.

- Resident Wildlife – Each alternative would use sound scientific principles for managing populations of resident wildlife species such as white-tailed deer and wild turkey.

- Control of Nuisance Wildlife Populations – Each alternative would provide for control of wildlife populations that reach nuisance levels and negatively impact other refuge resources.

- Monitoring – Existing monitoring of waterfowl, other migratory birds and endemic species would continue. Monitoring activities may increase or decrease to meet other objectives under the various alternatives.

- Land Acquisition – Each alternative would include pursuing opportunities to purchase or exchange for priority tracts within the refuge acquisition boundary.

- Management Plans – All alternatives include the development and implementation of a visitor services and habitat management plans.

- Maintain Refuge Boundary – The existing refuge boundary and directional signs would be maintained as part of all alternatives.

- Law Enforcement – Law enforcement would provide visitor safety, protect resources and ensure public compliance with refuge regulations under all alternatives. Enforcement presence varies under the various alternatives to meet specific objectives.

- Maintain Capitalized Equipment – All alternatives contain maintenance of refuge equipment, which is required to meet safety standards.

- Partnerships – Currently established partnerships with agencies, organizations and individuals would continue to support refuge management programs.

COMPARISON OF ALTERNATIVES – OVERFLOW NWR

Table 17 compares each of the three alternatives by management issues for Overflow National Wildlife Refuge.

Table 17. Comparison of alternatives by management issues for Overflow National Wildlife Refuge.

Goal 1. WILDLIFE POPULATION MANAGEMENT - Protect, maintain, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within south Arkansas in a manner that supports national and international treaties, plans and initiatives.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Threatened and Endangered Species	No active management. Consult with USFWS-Ecological Services on potential impacts of refuge programs/actions on endangered and threatened species.	Same as A, continue to support endangered species through surveys, habitat management, and research. Begin coordination with state for state species of concern.	Same as B, but also initiate baseline surveys for T&E and state species of concern with an outside contractor or additional staff.
Landbirds	Continue Christmas Bird Count and neo-tropical point counts.	Same as A, but expand species monitoring surveys by conducting baseline surveys, adding additional staff support and continuing current monitoring.	Same as B, but also hire contractor/interns to conduct monitoring and research.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Waterfowl	Maintain 1500 acres at Overflow and 800 acres at Oakwood in moist soil native plants. Coop farm 200 – 300 acres of agricultural crops at Overflow. Manage a 3500 acre greentree reservoir (GTR) at Overflow.	Same as A, but also annually conduct wood duck banding with additional staff support. Also monitor yearly waterfowl numbers, by species, to determine trends and adapt habitat management for target species as practical.	Same as B, but implement mast surveys.
Wetland dependent birds	Manage intensively for waterfowl, shorebirds, wading birds, and secretive marsh birds.	Same as A, but also implement staff/volunteer shorebird monitoring including 2-3 surveys/week during July through September. Also, determine affect/results and efficiencies of activities on seed production and percent coverage of moist soil plants to assess success of management treatments and to fine-tune management activities.	Same as B, but add additional biologist to support management needs and to survey moist soil plots every one to two weeks depending on season.
Raptors	Protect established bald eagle nest sites. Record any new bald eagle nest building activity.	Same as A.	Same as A, but also implement a baseline survey for raptors on the Refuge.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Resident Wildlife	Maintain current deer hunting program at or near current level of harvest. Furbearers, squirrels, rabbits, and bobwhite quail hunting is allowed in conjunction with statewide open seasons. Feral hog are actively trapped by refuge personnel due to their threat and competition with resident wildlife for acorns and other food sources.	Implement hard mast, bat and small mammal occurrence, deer herd health, and black bear surveys. Monitor and control nuisance animal species such as beaver and feral hog. Implement forest management plans to enhance forested habitats for resident wildlife. Also, utilize partnerships such as the Arkansas Game and Fish Commission (AGFC) to aid in resident wildlife management.	Same as B but: - Research geared toward turkey survival and recruitment. - Baseline survey for bat populations. - Implement deer check station to obtain biological data (age, weights, antler development, lactation, etc.) during all refuge hunts.
Reptiles and Amphibians	No active management.	Implement herpetofaunal surveys and inventories in collaboration with the AGFC and Arkansas Herpetological Society. Work with partners to conduct a baseline reptile and amphibian survey, targeting various habitat types across refuge lands for a comprehensive inventory.	Same as B, but also establish a monitoring protocol and encourage research opportunities.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fish and Aquatic Resources	No active management. No invasive species and no fishing program due to high pesticide levels in water.	Work with USFWS ES office to monitor pesticide levels in Overflow creek. Conduct an aquatic (fish/mussel) inventory, with particular attention to identification of Species of Greatest Conservation Concern.	Same as B, but also implement Level 2 contaminant survey and coordinate efforts with NRCS to reduce chemical usage during farming operations on and off refuge.
Inventory, Monitoring and Research	Limited monitoring, inventory and research are currently taking place on the refuge.	Develop and implement an Inventory and Monitoring Plan.	Same as B.
Populations – Climate Change	Opportunistically monitor climate change/sea level rise.	Increase information and research to enable adaptive management to cope with long-term climate change impacts.	Same as B.

Goal 2. HABITAT MANAGEMENT - Protect, maintain, enhance, and where appropriate, restore suitable habitat for the conservation and management of migratory birds, resident wildlife, fish, and native plants, including all Federal and State threatened and endangered species endemic to the Complex.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management Plan	Develop and implement a habitat management plan.	Same as A.	Same as A.
Forest Management	No active management due to lack of plan.	Forest management would be increased by finalizing the forest management plan, increasing invasive plant control, increasing targeted thinning areas to 600 acres, and consider designation of a Natural Area in the Oakwood Unit.	Same as B, but also: - Use 3-4 temporary staff (e.g. interns, students) to augment forestry/biological staff on a seasonal basis. - Under plant with hardwood seedlings after timber harvest. - Pre-commercial thinning. -Expand targeted thinning areas up to 1000 acres.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fire Management	Opportunistic management due to no plan. A Fire Management Plan is currently under review. Partnership with State Forestry Commission is in place to allow the Commission to suppress wildfire.	Implement prescribed and wildfire response programs to achieve healthy habitats and reduce fuels.	Same as B, but also monitor response to fire.
Habitat Management - Waterfowl	Manage bottomland hardwoods to provide maximum sustainable GTR habitats, moist soil units, and agricultural croplands.	Same as A, but enhance waterfowl habitat by, increasing staff, strategically managing water levels throughout winter periods, implementing a more intensive moist soil management program at the Oakwood Unit, and controlling beaver dams.	Same as B, but also: -increase moist soil management and monitoring to 800 acres per year at Oakwood. - Every third year no flooding of GTR. - Fluctuate flooding levels of GTR.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management Wetland Dependent Birds	At Overflow and Oakwood, approximately 80 acres at each refuge are managed for fall shorebird migration. Also at each refuge approximately 50-100 acres are managed in 5 year soil disturbance rotations to provide habitat for King Rails and bitterns. About 100 acres of flooded moist soil habitat in the summer for wading birds.	Same as A, but enhance by providing late-summer mudflat habitat for shorebirds and long-legged wading birds at Overflow NWR (≥100 acres) and the Oakwood Unit (≥80 acres). Extend moist soil rotation in at least 1 field unit (80 acres) on Overflow NWR to a 4+ year rotation to provide additional suitable habitat on a rotational basis.	Same as B.
Resident Wildlife	Maintain current levels of management for resident wildlife species in accordance with AGFC. Monitor deer and turkey populations.	Maintain a diverse and productive bottomland hardwood habitat complex to support resident wildlife by controlling invasive plant species, developing of food plots, and maintaining conductivity between habitats for reptile and amphibian movement.	Same as B.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Greentree Reservoir (GTR)	The 3500-acre greentree reservoir is managed with a concrete stop-log structure to provide wintering waterfowl habitat annually.	Same as A, but enhance management, by adaptive habitat management and implementation of water management planning to achieve a sustainable wetland forest that provides forage for waterfowl, migrant birds, mammals, reptiles, amphibians and fishes.	Same as B, but also incorporate no flooding of GTR every third year.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Moist Soil Management	Periodic drawdowns and planting as a demonstration area for waterfowl. Current levels of moist soil management provide approximately 920 acres of moist soil production and provide over 1.7 million Duck Energy Days (DEDs) of waterfowl foraging habitat, while also providing foraging habitat for fall migrating shorebirds and breeding marshbirds. A minimum of 80 acres of mudflat habitat annually are provided for shorebirds.	Same as A, but also provide suitable habitat for marshbirds, on a rotational basis on at least 1 field unit (80 acres). Within units targeted for marsh bird management, extend the moist soil rotation in to a 4+ year rotation to reach a condition preferred by marsh birds. Provide flooded conditions in mid to late summer during years in which units are in a vegetative condition for marsh birds. Also, monitor use of the different habitats by species and life cycle calendar to determine habitat used/preferred to fine tune habitat planning and management. Enhance current level of moist soil management at the Oakwood Unit by providing at least 800 acres of moist soil production annually.	Same as B, but also: - Increase per acre DED's and habitat diversity by more intensively managing moist soil units. - Increase moist soil management and monitoring to 800 acres per year at Oakwood. - Implement statistical analysis of preferred vegetation.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Invasive and Nuisance Species Control	Opportunistic treatment of invasive plants by herbicide. Opportunistic removal of invasive animal species.	Develop nuisance/exotic/invasive plant/animal control plan. Implement systematic removal of invasive plant species by mechanical, chemical, and prescribed burning. Control beaver, nutria and feral hogs through systematic removal.	Same as B, but contract beaver, nutria, and hog removal.
Open Land	Approximately 400 acres per year are farmed under the refuge Cooperative Farming Agreement.	Same as A, but enhance management by maintaining wildlife openings and roadsides through mowing. Continue current farming levels, but use crop production strategically as a management strategy to set back succession in moist soil units to favor preferred annuals.	Same as B, but also hire a heavy equipment operator to implement force account farming at Overflow and Oakwood.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Aquatic Resources	There are several thousand acres of aquatic habitat in place created by beaver dams on Overflow Creek, Hill Slough, and other associated drains and small sloughs. Each year dams are blown with explosives and beavers are trapped in an attempt to control timber damage and loss. However, much timber loss has and will continue to occur without a more aggressive program than the current staff can provide.	Manage refuge lands in such a way that they serve as a buffer to local (off-refuge) impacts to the aquatic system, including sedimentation and chemical contamination. Maintain site appropriate vegetation adjacent to refuge waterways (e.g. bottomland forest) and conduct refuge management according to best management principles. Consider additions of lands buffering Overflow Creek and other contiguous waterways to improve aquatic health of system.	Same as B, but also contract to reduce aquatic vegetation by aerial spraying on a three year rotation.
Habitat Management – Climate Change	Opportunistically monitor climate change/sea level rise.	Increase information and research to enable adaptive management to cope with long-term climate change impacts.	Same as B.

Goal 3. VISITOR SERVICES - Provide wildlife-dependent public use opportunities consistent with the refuge system mission that leads to greater understanding and enjoyment of fish, wildlife and their habitats on the Complex.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Welcome and Orient Visitors	Maintain current Visitor Services such as signs, brochures, website, and maps. Visitor Center is an old house and not really an official looking facility.	Improve program to welcome and orient visitors to the refuge through directional and entrance signs, design and upkeep of facilities, and the provision of information regarding programs and facilities. Also, replace the current office with a new one. In the interim consider re-configuring the front area of the office to create a visitor contact area.	Same as B, but only update staff facilities instead of building new Visitor Center.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Hunting	Maintain current hunting programs for deer, turkey, squirrel, rabbit, quail, and waterfowl and incidental species such as beaver and feral hog - with weapons legal for that particular hunt.	Same as A, continue to provide current appropriate hunting opportunities that allow for quality public recreation and are compatible with refuge purposes. Also, develop a plan to accommodate hunters with disabilities and change the regulation that allows hunters to leave stands up on the refuge the entire season and limit it to a shorter time period. Try to be consistent with other refuges in the state.	Same as A, but: - Consider opening the Oakwood Unit to deer hunting (contingent upon establishment of a legal right-of-way for public access and sufficient staff for management) to provide recreational opportunities for the local public and encourage public policing against poaching. - monitor deer herd health. - add deer check station. - deer telemetry study.
Trapping	Trapping done by Special Use Permit. Seasons in accordance with state seasons.	Same as A.	Same as A.
Fishing	None.	Same as A, but in general brochure and hunt brochure, add a sentence to explain why the refuge is closed to fishing. Work with State to periodically reassess contamination issues to determine if fishing could be allowed.	Same as B

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Wildlife Observation and Photography	Public road system is in place, which can be seasonally opened for additional wildlife viewing.	Same as A, plus put an observation tower at the point where Flat Slough crosses the wildlife drive, open the wildlife drive to cars from April to November, and explore options to add food plots in strategic wildlife viewing areas.	Same as A.
Environmental Education/Interpretation	Limited on and off site as staff are available. Maintain current EE effort with information kiosks, brochures, and panels.	Hire a Park Ranger-VS (Visitor Services Specialist) for the South Arkansas Refuge Complex to be stationed at Felsenthal NWR and develop an Environmental Education program for the complex. In additional to the refuge staff, utilize partnerships and volunteers to enhance the EE program. Expand involvement of staff to manage the Junior Naturalist Program. As part of the Visitor Service Plan, develop an Interpretive Program component for the Complex and develop an interpretive trail that loops thru the reforested area behind the office.	Same as A.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Outreach	Done on an as requested basis. Number of opportunities varies from year to year.	Develop general outreach plan for the refuge that will be used to increase public outreach to emphasize resource management practices and promote public use opportunities. Tools to increase public outreach will be to develop a refuge specific portable exhibit, an annual special event, and a refuge story slide show/Power Point.	Same as A, but also develop general outreach plan for the refuge. Where appropriate develop specific outreach strategies to address issues.
Friends Group/Volunteers	There is no Friends Group for the refuge. A minimal amount of work is achieved through volunteers.	Develop a volunteer plan that will expand the volunteer program to enhance aspects of refuge management. Organize a Friends Group and include volunteers and Friends in most management efforts. Develop an RV site and recruit camper volunteers to provide office/administrative assistance, maintenance help, and educational assistance.	Same as B.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Education – Climate Change	Opportunistically share knowledge on climate change.	Same as A, but as science, technology, and policy evolve, become more aggressive at educating partners and the public the FWS direction on climate change.	Same as B.

Goal 4. RESOURCE PROTECTION/REFUGE ADMINISTRATION - Protect the natural and cultural resources of the refuge and ensure visitor safety and facility integrity to fulfill the mission of the National Wildlife Refuge System. Provide for sufficient staffing, facilities and infrastructure to fulfill the Complex's purposes and the goals and objectives of its Comprehensive Conservation Plan.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Provide Visitor Safety, Protect Resources and Ensure Public Compliance with Refuge Regulations	Provide visitor safety, protect resources, and ensure public compliance with refuge regulations. No officers currently are on staff at Overflow, but two Complex officers are available and do work the area, as well as one state wildlife officer.	Same as A, but develop and implement Refuge Law Enforcement Plan and add additional staff to support LE efforts.	Same as B.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Cultural Resources	Enforce all Federal and State laws applicable to the refuge. Protect all known archaeological sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act. Active consultation with regional archaeologist	Same as A, but also develop a plan to protect identified archeological sites in conjunction with Native American tribes, State Historic Preservation office, and the US Fish and Wildlife Service Archaeologist.	Same as B.
Land Acquisition	Opportunistic acquisitions of inholdings within the acquisition boundary.	Same as A, but also develop a minor expansion proposal and actively seek opportunities for acquisition which include additions of lands buffering the Overflow Creek and other contiguous waterways to improve the health of the aquatic system.	Same as B, but also acquire a legal right-of-way for access to the Oakwood Unit.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Private Lands	Work with private landowners near the refuge to promote refuge goals and objectives for federal trust resources. Currently, 12 Farmers Home Administration easement sites are passively managed by refuge staff.	Same as Alternative A.	Same as Alternative A.
Partnerships	Partnership with Arkansas Game and Fish Commission private lands biologists is in place with the DMAP (Deer Management Assistance Program). It provides assistance to lands adjacent to the refuge.	Same as A, but explore opportunities for new partnerships.	Same as Alternative B.
Maintain Capitalized Equipment, Facilities, and Infrastructure for the Refuge Complex	Equipment and facilities are maintained in good condition and maintenance is reported to the proper maintenance management system or kept in refuge files.	Same as A, but replace deteriorated water control structures.	Same as B, but obtain new equipment for habitat management activities.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Staffing	Maintain current staff: refuge manager, engineering equipment operator, biological technician, and private lands biologist. Maintain existing equipment and facilities used in refuge management	Add additional staff to support CCP goals and objectives. - Evaluate staffing needs. - Hire a Park Ranger-LE (law enforcement) in order to effectively protect the refuge resources. - Hire an additional biological technician assigned to address biological needs of the Refuge. - Add a Park Ranger-VS (environmental educator) to the Complex staff. - Add a heavy equipment operator - Convert two seasonal fire techs to full time on the Complex staff.	Same as B, but instead of Park Ranger-VS (environmental educator) hire an additional biologist.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

The alternative development process under the NEPA and the Refuge Improvement Act is designed to allow consideration of the widest possible range of issues and potential management approaches. During the alternatives development process, many different solutions were considered. The following alternative components were considered but not selected for detailed study in this draft comprehensive conservation plan and environmental assessment for the reason(s) described.

In addition to the three alternatives that were discussed and considered in this process, one additional alternative was discussed:

Alternative D - Maximizing Visitor Services

In Alternative D, the focus would be placed on maximizing visitor service opportunities. All funding and staffing support would be channeled towards this goal and all wildlife management would be managed to maximize these opportunities. The inclusion of this alternative into the NEPA process was eliminated from further consideration because the visitor services opportunities provided on the refuges are already quite extensive and focusing on the expansion of these opportunities would compromise the refuges' ability to meet their purposes and goals where key species are concerned.

IV. Environmental Consequences

OVERVIEW

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of each of the three alternatives described in Chapter III of this environmental assessment for Felsenthal and Overflow NWRs. For each alternative, the expected outcomes are portrayed through the 15-year life of the comprehensive conservation plan.

EFFECTS COMMON TO ALL ALTERNATIVES

A few potential effects will be the same under each alternative and are summarized under seven categories: environmental justice, climate change, other management, land acquisition, cultural resources, refuge revenue-sharing, and other effects.

ENVIRONMENTAL JUSTICE

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was signed by President Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities with access to public information and opportunities for participation in matters relating to human health or the environment.

None of the management alternatives described in this environmental assessment will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public use and environmental education is anticipated to provide a benefit to the residents residing in the surrounding communities.

CLIMATE CHANGE

The U.S. Department of the Interior issued an amended order on January 16, 2009, requiring federal agencies with land management responsibilities under its direction to consider the potential impacts of climate change as part of their long-range planning endeavors. This order replaces Secretarial Order No. 3226, signed on January 19, 2001, entitled "Evaluating Climate Change Impacts In Management Planning."

The increase of carbon within the earth's atmosphere has been linked to the gradual rise in surface temperatures commonly referred to as global warning. In relation to comprehensive planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The U.S. Department of Energy's *Carbon Sequestration Research and Development* (U.S. Department of Energy 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forests, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this comprehensive conservation plan would conserve or restore land and water, and would thus enhance carbon sequestration. This, in turn, contributes positively to efforts to mitigate human-induced global climate changes.

Climate Change in Arkansas

Some potential impacts of climate change in Arkansas are listed below:

- By 2100, temperatures in Arkansas could increase by about 2 degrees (°) Fahrenheit (F) in the summer (with a range of 1 to 4°F); 3°F in the winter and spring (with a range of 1 to 7°F); and 4°F in the fall (with a range of 2 to 9°F).

- The frequency of extreme hot days in summer is expected to increase along with the general warming trend. This may increase the number of heat-related deaths and the incidence of heat-related illnesses.

- Higher temperatures, decreased soil moisture, and more frequent fires will stress forest ecosystems. Arkansas and the southeast is likely to experience net economic losses in the forestry sector as tree species migrate northward and tree productivity declines. Climate models predict that the southeastern U.S. will experience a 30% increase in forest fire risk by mid-century due to climate change. Southern pine beetle infestations and associated damages are expected to increase more than four-fold due to climate change.

- Warmer temperatures could increase the incidence of Lyme disease and other tick-borne diseases in Arkansas, because populations of ticks, and their rodent hosts, could increase under warmer temperatures and increased vegetation.

- Agriculture is the economic base of Arkansas, and the availability of water for irrigation of crops and maintenance of fish farms in the eastern part of the state is a primary concern. Because of large withdrawals, groundwater levels have declined rapidly in recent years, and saline water from underlying rocks has begun to intrude into the freshwater aquifers. Farmers have resorted to drilling deeper wells and exploring the use of surface waters from the Arkansas, White, and Little Red rivers as an alternative source. In a warmer climate, these problems could be exacerbated. Without increases in rainfall, higher temperatures and evaporation in the summer could cause drier summer conditions. This could result in lower stream flows, lake levels, and ground water levels at a time when water demand, particularly for irrigation, is often the highest.

- The most common varieties of rice grown in Arkansas are more sensitive to high temperatures than the Asian grown varieties, and the higher costs of irrigation, as competition increases for water resources, are expected to put Arkansas at a significant disadvantage in the global rice commodities market. Climate models predict that by 2100 climate change could cause rice cultivation in the Mississippi Delta to decline by 10-20%.

- Many of the tributaries of the Arkansas River currently go dry during dry periods. Lower summer flows could also affect water-based recreation such as hunting, fishing, boating, and canoeing. Climate warming will lead to a northward movement of freshwater fish species, along with loss of habitat for cold- and cool-water fish and a gain in habitat for warm-water fish. The effects of more frequent drought cycles could significantly impact the annual mean population of ducks by up to as much as 50%.

- Warmer, drier summer conditions could also increase water quality problems, such as low dissolved oxygen and lake eutrophication, and could adversely affect wetlands.

Some of the changes the southeastern United States might expect the following:

- *Agriculture* – While experts estimate that US agricultural production will be adequate for domestic needs even under the most extreme scenario, they do expect major regional changes in the production and quality of food commodities. Production is generally seen as shifting northward, with crops in the Southeast particularly vulnerable.

- *Productivity could change* – Although warmer temperatures may lead to increase yields in some parts of the country, Arkansas already has a high baseline temperature. Adding to it is likely to increase the moisture and heat-stress crops are subject to. The wettest scenario doesn't offset crops' increase water needs, and the dry one suggests yield could decrease by nearly 80 percent. Even the direct positive effects on photosynthesis of a CO_2-enriched atmosphere can not in such cases make-up for the indirect effects of moisture-stress resulting from climatic change.

- *Need for irrigation may increase* -- Under the wet scenario model of the NASA Goddard Institute for Space Sciences (GISS), it is estimated that the Southeast will require increased irrigation in two ways: already-irrigated land will require more water, and more land will require irrigation (South Carolina Department of Natural Resources, “The Impact of Climate Change on South Carolina”).

- *Crop mix may change* – With warmer temperatures, crops like corn would cease to be profitable in the Southeast, while heat-tolerant crops like cotton could make a come back.

- *Disease and pest vulnerability might increase* – Warmer conditions may accelerate the life cycles of insect pests, leading to attacks on plants at earlier and more susceptible stages of growth. The range of some Gulf Coast pests could also shift northwards if winters became less severe.

- *Cultivated acreage could decrease* – Because many farms are already marginal enterprises, farmers may not be able to compete in a changed environment. The amount of land under cultivation could decrease.

- *Fish and shellfish populations could be reduced* – Both increased water temperatures and changes in the salinity of habitats could reduce the population of species profitable to the state's fishing industry.

- *Forestry* – Dieback of forests in 30 to 80 years. Even modest warming could cause significant changes, but a CO_2-induced warming poses the additional threat of occurring so quickly that forests would not be able to adjust in time.

- Loss of species. Southern hardwoods (black gum, laurel oak, and elm) might replace loblolly pines as the dominant species.

- Conversion of forest to grasslands. The drier scenarios suggest that sections of the Southeast might not support forests at all. Abandoned farms that have traditionally reverted to forest might now remain in grass.

- Increased vulnerability to pests and disease. Not only is the range of pests likely to increase, but climate-stressed stands are more susceptible to attack by disease, pests, and fire.

- *Water Resources* – Exactly how water resources will be affected by climate change is difficult to ascertain. Not only do the global climate models vary widely in how they expect precipitation (i.e., the supply of water) to change, but climate changes will also influence the demand for water.

- Water Resource availability could change. Studies indicate the regional availability and reliability of water resources may be responsible for the most dramatic effects of climate change. With warmer temperatures, demand for water is likely to increase for agriculture, energy, cooling, and recreation. It is not certain whether the supply will be able to meet the demand.

- Water quality could be affected. Regardless of precipitation changes, water quality could be affected. Drier scenarios create oxygen-starved lakes and streams; wet scenarios increase the threat of pollution from runoff.

- Risk of flooding might increase. The capacity of current drainage system to handle an increase in the frequency of large amounts of precipitation might be exceeded under some scenarios.

- *Energy* – The demand for electricity is rather sensitive to the weather and to industrial growth. Changes in the weather patterns mean changes in energy consumption. Higher temperatures would mean:

- An increase demand for air conditioning. Higher summertime temperatures would mean increased use of air conditioners; the cooling season would also last longer.

- Decrease in demand for heating. Warmer winters would decrease the amount of energy required for heating.

- Require a significant increase in the southeast's electrical capacity. Higher demands for air conditioning in the summer would only be partially offset by lower wintertime temperatures, affecting total consumption only moderately.

OTHER MANAGEMENT

All management activities that could affect the refuge's natural resources, including subsurface mineral reservations, utility lines and easements, soils, water and air, and historical and archaeological resources, would be managed to comply with all laws and regulations. In particular, any existing and future oil and gas exploration, extraction, and transport operations on the refuges would be managed identically under each of the alternatives. Thus, the impacts would be the same.

LAND ACQUISITION

Funding for land acquisition from willing sellers within the approved acquisition boundary of Felsenthal and Overflow national wildlife refuges would come from the Land and Water Conservation Fund, the Migratory Bird Conservation Fund, the Corps of Engineers' mitigation programs, or donations from conservation and private organizations. Conservation easements and leases can be

used to obtain the minimum interests necessary to satisfy refuge objectives if the refuge staff can adequately manage uses of the areas for the benefit of wildlife. The Service can negotiate management agreements with local, state, and federal agencies, and accept conservation easements. Some tracts within the refuge acquisition boundary may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

CULTURAL RESOURCES

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on the refuge's cultural and historic resources. Potentially negative effects could include logging, construction of new trails or facilities, and development of water impoundments. In most cases, these management actions would require review by the Service's Regional Archaeologist in consultation with the State of Arkansas Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Therefore, the determination of whether a particular action within an alternative has the potential to affect cultural resources is an on-going process that would occur during the planning stages of every project.

Service acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources: protection from damage by federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a Federal agency which may affect archaeological or historical resources be reviewed by the State Historic Preservation Office, and that the identified effects must be avoided or mitigated. The Service's policy is to preserve these cultural, historic, and archaeological resources in the public trust, and avoid any adverse effects wherever possible.

Land acquisition, within the current acquisition boundary, by the Service would provide some degree of protection to significant cultural and historic resources. If acquisition of private lands does not occur and these lands remain under private ownership, the landowner would be responsible for protecting and preserving cultural resources. Development of off-refuge lands has the potential to destroy archaeological artifacts and other historical resources, thereby decreasing opportunities for cultural resource interpretation and research.

REFUGE REVENUE-SHARING

Annual refuge revenue-sharing payments to Ashley, Bradley, Desha, and Union counties would continue at similar rates under each alternative. If lands are acquired and added to the refuges, the payments would increase accordingly.

OTHER EFFECTS

Each of the alternatives would have similar effects or minimal to negligible effects on soils, water quality and quantity, aesthetics, visitor services, socioeconomic environment, and public health and safety, as discussed below:

- *Soils* -- All alternatives are anticipated to positively impact soil formation processes on lands the refuges acquire and manage. Some disturbances to surface soils and topography would occur at those locations selected for administrative, maintenance, and visitor facilities, as well as in areas targeted for exotic and invasive species removal and eradication. However, these

limited impacts would be at discrete sites. Best Management Practices (BMPs) will be utilized during earth moving projects to reduce sediment erosion.

- *Water quality, wetlands, and flood plains* -- All alternatives are anticipated to positively impact water quality. Positive impacts are anticipated from protecting groundwater recharge, preventing runoff, retaining sediment, and minimizing nonpoint source pollution in select areas. The management alternatives are not anticipated to have any adverse effects on the area's wetland, pursuant to Executive Order 11990 and Executive Order 11988. Further, the refuges provide protection to lands and waters that might otherwise be developed into commercial and/or residential uses in the future.

- *Aesthetics* – Each alternative would protect the aesthetic characteristics associated with natural habitats. Minor, short-term, discrete negative aesthetic impacts may result from habitat management, restoration, and facility development activities, but these are short lived and are offset by refuge management and resultant native habitats.

- *Visitor services* -- Under any of the alternatives, the service would consult with local and state officials and the public during detailed planning for and construction of any new facilities. Each of the action alternatives is anticipated to positively impact visitor services.

- *Socioeconomic environment* – Each of the alternatives is anticipated to positively impact socioeconomic factors of the community. Although the refuges do occupy lands that might provide income to the local tax base, those lost tax revenues are offset by enhanced property values on adjacent lands and by improved aesthetics related to conservation lands and open space. Further, the refuge does provide Union, Bradley, Desha, and Ashley counties with refuge revenue sharing act payments in lieu of property tax income. And, conservation lands require less expenditure of local taxes to fund infrastructure and other services than required by developed lands.

- *Public health and safety* – Based on the nature of each alternative, the location of the refuges, and current land use, the three alternatives are not anticipated to have any significant negative impacts on the quality of the human environment, including public health and safety.

SUMMARY OF EFFECTS BY ALTERNATIVE

Each of the action alternatives is anticipated to result in net positive environmental benefits. Impacts under each of the three refuge management alternatives are summarized by issue under four broad management categories: Wildlife Population Management, Habitat Management, Visitor Services, and Resource Protection/Refuge Administration. A review of the environmental effects for each of the alternatives is given below. Specific issues and likely outcomes are addressed for each of these alternatives. Tables 17 (Felsenthal NWR) and 18 (Overflow NWR) summarize and address the likely outcomes for the specific issues, and is organized by the four broad management categories.

ALTERNATIVE A: CURRENT MANAGEMENT (NO ACTION)

Alternative A continues refuge management activities and programs for Felsenthal and Overflow NWRs at current management levels. Alternative A continues current management strategies, with little or no change in budget or funding. Maintaining only current funding and staffing would limit the refuges' ability to significantly address issues identified by the planning team. Implementing

Alternative A would maintain the status quo and would have either neutral or neutral to mildly beneficial impacts on most management activities, programs, and projects.

Felsenthal National Wildlife Refuge

- *Wildlife Population Management* – Under Alternative A, Felsenthal NWR activities would continue to focus on the needs of threatened and endangered species (specifically the red-cockaded woodpecker), with additional emphasis on the needs of migratory birds, resident wildlife, and migratory nongame birds. Active management and/or adaptive management would provide limited landbird and waterfowl information. There would be no active management for wetland-dependant birds, reptiles and amphibians. Mandated activities for protection of federally-listed species would continue. Control of nuisance wildlife populations and invasive plant species would only be undertaken on an opportunistic basis resulting in a potential increase of invasive species that could be detrimental to native species and their habitats.

- *Habitat Management* – Staff would continue to protect, maintain, and enhance Felsenthal's 65,000 acres of refuge lands. Staff would develop and implement a habitat management plan. Habitat management efforts would be concentrated on forest management, water management, including GTR management, and open lands. The existing fire management program would continue. Triploid grass carp would be stocked in Felsenthal Pool to help control infestation of aquatic macrophytes. With limited water quality monitoring, there may be unknown impacts to native fish and mussel species. The impacts of industrial activities (both within and outside the refuge) to water, air and soil are unknown.

- *Visitor Services* – Current levels of wildlife-dependent recreation activities (hunting, fishing, wildlife observation and photography, and interpretation and environmental education opportunities) positively support the local economy and would be continued. The hunting program at Felsenthal NWR would continue to be managed via quota hunts for white tailed deer and turkey. Special conditions of the hunt program would continue to include the use of All Terrain Vehicles (ATVs) along designated trails. Hunters with disabilities would be allowed to extend their use of ATVs approximately 100 yards off of designated trails. The use of dogs would continue during waterfowl, squirrel, rabbit, raccoon and opossum hunts. Use of the refuge's boat launching facilities, parking areas, and bank fishing opportunities would continue to be made available. Hiking trails and the public road system would continue to be maintained. With the support of volunteers and Friends, refuge staff would continue to manage a limited visitor services and environmental education programs, with educational outreach activities only conducted on an as requested basis.

- *Resource Protection/Refuge Administration* – The refuge staff would continue to include 15 staff members: the Project Leader; the Deputy Project Leader; one Biologist; one Forester; one Park Ranger Public Use; one Fire Management Specialist; three Forestry Technicians (Fire); two Law Enforcement Officers; an Administrative Officer; an Administrative Support Assistant; one equipment operator; and, one heavy equipment mechanic. This current staffing (Alternative A) does not allow the refuge to provide law enforcement protection that adequately meets the refuges' purposes and protect public safety.

Overflow National Wildlife Refuge

- *Wildlife Population Management* – Under Alternative A, the Service would continue to focus on the needs of migratory waterfowl, with additional emphasis on the needs of resident wildlife, migratory nongame birds, and threatened and endangered species. There is no active management or monitoring of threatened and endangered species. No active management of reptiles and amphibians. Control of nuisance wildlife populations and invasive plant species would only be undertaken on an opportunistic basis resulting in a potential increase of invasive species that could be detrimental to native species and their habitats. No active management of fish and aquatic resources due to high pesticide levels in water and without water quality monitoring there may be unknown impacts to native fish and mussels.

- *Habitat Management* – Alternative A would develop and implement a habitat management plan that would continue activities to protect, maintain, restore, and enhance Overflow's 13,973 acres and 2,263 additional acres included in the Oakwood Unit. Current wetland management positively supports wintering waterfowl, migratory birds, and other wetland dependant birds. Habitat management efforts, targeting waterfowl, would be concentrated on moist soil management, waterfowl impoundments, forest management, and crop production. Crop food resource generation in open habitats as well as GTR management in forested areas would be continued for the production of complimentary food and behavioral resources. Approximately 600 acres would continue to be managed in rotation fashion in moist soil and crops. A stop-log structure on Overflow Creek would continue to be used to manage a single 4,000 acre GTR impoundment during winter months. The Service would continue 400 acres of cooperative farming. There is currently, no forest management plan for Overflow NWR. The impacts of industrial activities (both within and outside the refuge) to water, air and soil are unknown.

  Standard management and monitoring activities at the Oakwood Unit would only include the disking of the moist soil units on a rotational basis, monitoring seedling survival and mortality, bird surveys, and levee and boundary line maintenance.

- *Visitor Services* – Public use opportunities on Overflow NWR which positively support the local economy would continue to include hunting, wildlife observation, photography and limited environmental education activities. Three thousand acres would continue to be protected from public intrusion during the wintering waterfowl season in areas designated as waterfowl sanctuary. Overflow has no official visitor center, a limited environmental education/interpretation program, and no Friends Group for the refuge. The current level of law enforcement would not be adequate for protection of resources and public safety.

  The Oakwood Unit would continue to not provide any visitor services opportunities.

- *Resource Protection/Refuge Administration* – The Service would maintain the refuge as funding allows. The Overflow NWR staff would continue to include four staff members: the Refuge Manager, a Private Lands Biologist, a Biological Science Technician, and an Engineering Equipment Operator, as well as one part-time STEP Biological Technician. The refuge would continue to depend on individual volunteers to provide services on the refuge (e.g., beaver trapping, trail maintenance, waterfowl counts, monitoring the migration of Monarch butterflies, etc.) No officers are currently on staff at Overflow and current law enforcement staffing cannot accommodate the entire complex.

As compared to Overflow NWR, the Oakwood Unit would continue to be passively managed due to its location 80 miles from the refuge office, limited staff, and budget limitations.

ALTERNATIVE B: ENHANCED BIOLOGICAL MANAGEMENT AND VISITOR SERVICES (PROPOSED ALTERNATIVE)

The proposed action (Alternative B) was selected by the Service as the alternative that best signifies the vision, goals and purposes of Felsenthal and Overflow NWRs. Under Alternative B, the emphasis would be on restoring and improving refuge resources needed for biological management and visitor services activities. This alternative would also allow each refuge to provide law enforcement protection that adequately meets each refuge's purposes. This alternative would focus on augmenting wildlife and habitat management to identify, conserve, and restore populations of native fish and wildlife species with an emphasis on migratory birds and threatened and endangered species. This would partially be accomplished by increased monitoring of waterfowl, other migratory birds, and endemic species in order to assess and adapt management strategies and actions.

Felsenthal National Wildlife Refuge

- *Wildlife Population Management* – Staff would enhance the red-cockaded woodpecker (RCW) program and develop and implement a baseline Inventory Monitoring and Research Plan (IMRP) for waterfowl and birds, fish, wildlife, and plants. This IMRP would positively affect the refuge's biological foundation and fill data gaps, resulting in habitat improvements. Staff would partner with the Arkansas Game and Fish Commission (AGFC) to aid in resident wildlife management. The control of nuisance wildlife populations (feral hog, nutria, beaver, etc.) and invasive plant species would be more aggressively managed by implementing a control plan and systematic removal that would improve the overall habitat of native species.

- *Habitat Management* – Staff would expand forest management and greentree reservoir management activities, of which the restoration of the Felsenthal South Pool would be a vital part and would be crucial to ensuring healthy and viable ecological communities in the greentree reservoir. This restoration would require increased water management control, invasive aquatic vegetation control (<50% surface area coverage), reestablishing water quality standards, improve fish habitats, and possibly re-establishing populations of game fish species. Forest management would be increased by adapting appropriate management techniques (cutting cycles, thinning, prescribe fires, etc.) in mature pine stands and bottomland forests. Waterfowl/wetland habitat would be enhanced by managing water levels in bottomland hardwoods. The refuge work with the Corps of Engineers to manage pool levels and improve sportfishing and aquatic habitats. These various expanded and restored wetland management activities would positively support wintering waterfowl, migratory birds, and other wetland dependant birds. Habitat improvements would result through increased monitoring and adaptive habitat management. The impacts of industrial activities (both within and outside the refuge) to water, air and soil are unknown.

- *Visitor Services* – Alternative B would continue current levels of wildlife-dependent recreation activities (hunting, fishing, wildlife observation and photography, and interpretation and environmental education opportunities) of Alternative A, all of which positively support the local economy. However, Alternative B would also enhance and expand the refuge's visitor services opportunities in several positive ways: by improving the quality of fishing opportunities; by creating additional hunting opportunities for youth and hunters with disabilities (where feasible); by developing and implementing a visitor services management plan; and by hiring a Park Ranger (Public Use) to implement an environmental education and

outreach program component for the South Arkansas National Wildlife Refuge Complex. The visitor services management plan would include enhancing wildlife viewing and photography opportunities by placing food plots in observational areas; developing parking areas; evaluating the possibility of implementing auto tours; and enhancing personal interpretive and outreach opportunities. Volunteer programs, local school partnerships, and "Friends of the Refuge" groups also would be expanded. These new activities, facilities, and staff would enhance visitor interpretation, environmental education and provide additional opportunities for the community. However, increased visitation may cause additional disturbance to wildlife, additional law enforcement issues, and additional maintenance issues.

- *Resource Protection/Refuge Administration* – In addition to the enforcement of all federal and state laws applicable to the refuge to protect archaeological and historical sites, the refuge would identify and develop a Refuge Law Enforcement Plan to protect all known sites. Alternative B would increase biological and visitor services infrastructures (equipment, staff, and facilities).

  Additional staff would include a Park Ranger (Law Enforcement - LE); a Biological Technician; a Park Ranger (Visitor Services - VS, Environmental Educator/Volunteer Coordinator); a Heavy Equipment Operator; and the conversion of two seasonal fire technicianss to full-time to accomplish objectives for establishing baseline data on refuge resources, for managing habitats and for adequate protection of wildlife and visitors. The allocation of an additional law enforcement officer to the refuge would not only provide security for these resources, but would also ensure visitor safety and public compliance with refuge regulations. These staff additions would improve the ability to manage wildlife and habitat, maintain equipment and facilities provide more visitor services, and ensure public safety.

Overflow National Wildlife Refuge

- *Wildlife Population Management* – Alternative B for Overflow NWR would focus on augmenting wildlife and habitat management by developing and implementing an Inventory and Monitoring and Research Plan (IMRP) that establishes baseline data on refuge resources to identify, conserve, and restore populations of wildlife species with an emphasis on waterfowl, migratory birds and resident wildlife. The IMRP would positively affect biological foundation and fill data gaps. Alternative B would initiate an aquatic (fish/mussel) inventory with particular attention to species of concern; would increase coordination with the AGFC for species of concern; and, partner with the AGFC to aid in resident wildlife management. There would be no active monitoring of threatened and endangered species. The control of nuisance wildlife populations and invasive plant species would be more aggressively managed by implementing a control plan and systematic removal that would improve the overall habitat of native species.

- *Habitat Management* – Habitat management would be increased to extend the moist soil rotation to a 4+ year rotation to reach a condition preferred by marshbirds, adapt flooding and water management regimes in the GTR and moist soil units, and implement a more intensive moist soil management program at the Oakwood Unit (300 acres/year). Land acquisitions within the approved acquisition boundary would be based on importance of the habitat for target management species and public use value. A forest management plan would be finalized and implemented. Expanded and restored wetland management activities would positively support wintering waterfowl, migratory birds, and other wetland dependant birds. Habitat improvements would result through increased monitoring and adaptive habitat management. The impacts of industrial activities (both within and outside the refuge) to water, air and soil are unknown.

- *Visitor Services* – Alternative B would continue current levels of wildlife-dependent recreation activities (hunting, fishing, wildlife observation and photography, and interpretation and environmental education opportunities) of Alternative A, all of which positively support the local economy. However, Alternative B would also enhance Overflow's visitor services opportunities by making hunting opportunities more accessible for hunters with disabilities (where feasible); welcoming visitors by establishing a visitor center or contact station on the refuge; developing and implementing of a visitor services management plan; and enhancing personal interpretive and outreach opportunities. This alternative would include hiring a Visitor Services Specialist (environmental educator) (for the South Arkansas National Wildlife Refuge Complex) and implementing an outreach and environmental education program component that utilizes volunteers and local schools as partners; enhancing wildlife viewing and photography opportunities by implementing food plots in observational areas and promoting ATV trails as birding trails; and expanding volunteer programs and "Friends of the Refuge" groups. These new activities, facilities, and staff would enhance visitor interpretation, environmental education and provide additional opportunities for the community. However, increased visitation may cause additional disturbance to wildlife, additional law enforcement issues, and additional maintenance issues.

- *Resource Protection/Refuge Administration* – In addition to the enforcement of all Federal and State laws applicable to the refuge to protect archaeological and historical sites, the refuge would identify and develop a plan to protect all known sites. Develop a minor expansion proposal to acquire lands buffering Overflow Creek, to improve the health of the aquatic system. Construct a new office building and visitor center. Under Alternative B, to accomplish the objectives for establishing baseline data on refuge resources, for managing habitats, and for adequate protection of wildlife and visitors – additional staff would include a Park Ranger - LE (law enforcement); a Biological Technician; a Park Ranger - VS (Visitor Services Environmental Educator/Volunteer Coordinator); and a Heavy Equipment Operator. The additional refuge law enforcement officer would help protect refuge populations from illegal take and disturbance, not only providing security for these resources, but also ensuring visitor safety and public compliance with refuge regulations. These staff additions would improve the ability to manage wildlife and habitat; maintain equipment and facilities; provide more visitor services; and ensure public safety.

ALTERNATIVE C: ENHANCED BIOLOGICAL MANAGEMENT

Alternative C would focus on enhancing biological management activities. Alternative C would expand the biological management activities of Alternative B, and continue the limited environmental education activities of Alternative A. Alternative C would provide for the enhancement and restoration of native wildlife, fish and plant communities and the health of those communities by maximizing wildlife and habitat management, while maintaining a portion of the current compatible public use opportunities. Alternative C would add refuge staff to facilitate the additional biological management programs and activities, resulting in an additional biologist being hired rather than an environmental educator.

Felsenthal National Wildlife Refuge

- *Wildlife Population Management* – Threatened and federally listed species would be of primary concern, but the needs of other resident and migratory wildlife would also be considered. Like Alternative B, focus would be centralized on augmenting wildlife and habitat management to identify, conserve, and restore populations of native fish and wildlife species by increased monitoring of waterfowl, other migratory birds, and endemic species in order to assess and adapt management strategies and actions. Extensive wildlife, plant and habitat

inventories would be initiated to obtain the biological information needed to implement and monitor management programs. The control of nuisance wildlife populations (feral hog, nutria, beaver, etc.) and invasive plant species would be more aggressively managed through the use of refuge staff and contracted labor by implementing a control plan and systematic removal that would improve the overall habitat of native species. This added research and increased monitoring would positively affect biological foundation and fill data gaps, resulting in habitat improvements.

- *Habitat Management* – Habitat management would be increased to provide additional sanctuary habitat for waterfowl, provide additional active clusters of RCW, promote additional edge habitat as a transition between habitat types for resident wildlife, and provide additional openings for native grasslands. A minor expansion plan would be evaluated to be able to expand the current acquisition boundary. This would allow the refuge to expand critical or viable habitat. The expanded and restored wetland management activities would positively support wintering waterfowl, migratory birds, and other wetland dependant birds. Habitat improvements would result through increased monitoring and adaptive habitat management. The impacts of industrial activities (both within and outside the refuge) to water, air and soil are unknown.

- *Visitor Services* – Environmental education, wildlife observation, photography, and interpretation opportunities would continue as currently managed, but only when and where they would not conflict with wildlife management activities and objectives. There would be limited environmental education and outreach programs. The use of ATVs and campgrounds would be reduced or would require a permit to better control use. Night fishing and fishing tournaments would be phased out. Harvest counts for waterfowl hunting would be monitored annually to determine the species hunted. Outreach would focus on providing information to the public on flooding cycles within the GTR and the importance of periodic drying cycles. The existing public use opportunities of Alternative C would positively support the local economy.

- *Resource Protection/Refuge Administration* – Administration plans would stress the need for increased maintenance of existing infrastructure and facilities benefiting wildlife conservation. Additional staff would include a Park Ranger (Law Enforcement - LE); a Biological Technician; a Biologist; and a Heavy Equipment Operator to accomplish objectives for establishing baseline data on refuge resources, for managing habitats and for adequate protection of wildlife and visitors. The additional refuge law enforcement officer would help protect refuge populations from illegal take and disturbance, providing security for these resources, but would also ensuring visitor safety and public compliance with refuge regulations. These staff additions would improve the ability to manage wildlife and habitat; maintain equipment and facilities; provide more visitor services; and ensure public safety.

Overflow National Wildlife Refuge

- *Wildlife Population Management* – Under Alternative C, the Service would broaden Overflow's focus on migratory waterfowl by maximizing monitoring and habitat enhancement. In addition to continuing mandated activities for protection of federally listed species, the refuge would develop a strategy to address federally listed threatened and endangered species. Like Alternative B, focus would be centralized on augmenting wildlife and habitat management to identify, conserve, and restore populations of wildlife species by increased monitoring of waterfowl, other migratory birds, and endemic species in order to assess and adapt management strategies and actions. Extensive wildlife, plant and habitat inventories would be initiated to obtain the biological information needed to implement and monitor management

programs. Baseline surveys for threatened and endangered species would be initiated. The control of nuisance wildlife populations (feral hog, nutria, beaver, etc.) and invasive plant species would be more aggressively managed through the use of refuge staff and contracted labor by implementing a control plan and systematic removal that would improve the overall habitat of native species. This added research and increased monitoring would positively affect biological foundation and fill data gaps, resulting in habitat improvements.

- *Habitat Management* – Habitat management would be maximized to provide additional moist soil management and provide more intensive forest management. Land acquisitions within the approved acquisition boundary would be based on importance of the habitat for target management species. Additionally, the expansion of the Oakwood Unit to provide a right-of-way to the public would be evaluated. Expanded and restored wetland management activities would positively support wintering waterfowl, migratory birds, and other wetland dependant birds. Habitat improvements would result through increased monitoring and adaptive habitat management. The impacts of industrial activities (both within and outside the refuge) to water, air and soil are unknown.

- *Visitor Services* – Limited environmental education, wildlife observation, photography, and interpretation opportunities would continue as currently managed, but only when and where they would not conflict with wildlife management activities and objectives. Additionally, the staff offices on the refuge would be updated in lieu of a new visitor center. Staff would consider opening the Oakwood Unit to deer hunting and initiate deer monitoring telemetry and deer herd health studies. Under Alternative C, the existing public use opportunities (hunting, fishing, wildlife observation and photography, and interpretation and environmental education opportunities) positively support the local economy.

- *Resource Protection/Refuge Administration* – Administration plans would stress the need for increased maintenance of existing infrastructure and facilities benefiting wildlife conservation. Additional staff would include a Park Ranger - LE (law enforcement), a Biological Technician, a Biologist, and a Heavy Equipment Operator to accomplish objectives for establishing baseline data on refuge resources, for managing habitats and for adequate protection of wildlife and visitors. The additional refuge law enforcement officer would help protect refuge populations from illegal take and disturbance, not only providing security for these resources, but also ensuring visitor safety and public compliance with refuge regulations. These staff additions would improve the ability to manage wildlife and habitat, maintain equipment and facilities provide more visitor services, and ensure public safety.

Table 18. Summary of environmental effects by alternative, Felsenthal National Wildlife Refuge.

Goal 1. WILDLIFE POPULATION MANAGEMENT - Protect, maintain, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within south Arkansas in a manner that supports national and international treaties, plans and initiatives.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Threatened and Endangered Species	Red-Cockaded Woodpecker (RCW) - Actively monitor and manage the RCW population (11 to 14 active clusters) on the refuge by examining nest and roost cavities, installing artificial cavities, installing cavity restrictors, banding nestlings to achieve the refuge's RCW population goals. **Neutral to Positive** **Uses current staff to monitor, but has an adequate monitoring, banding and population management program.**	Same as A, but also enhance program by reaching or exceeding 22 active RCW clusters, completing and implementing a RCW management plan, begin translocation program, and implementing an intensive nest monitoring program and database. **Positive** **Establishes management plan and more detailed monitoring. Will incorporate adaptive habitat management to increase populations. Increased information will support T&E Species populations.**	Same as B, but also: - Reach 34 active RCW clusters - Add biotech to staff - Squirrel removal bi-annually - Survey 2/3 of all pine stands - Maximize translocation potential **Positive** **Establishes management plan and more detailed monitoring. Will incorporate adaptive habitat management to increase populations. Increased information will support T&E Species populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Landbirds	Continue Christmas Bird Count and breeding Bird Point Counts. **Neutral** **Active management and/or adaptive habitat management provides for stable populations.**	Same as A, but expand species monitoring surveys to include baseline surveys and forest management adaptive habitat monitoring. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Waterfowl	Conduct weekly waterfowl surveys during fall winter, preseason wood duck banding, and Avian Influenza monitoring. **Neutral to Positive** **Active management and/or adaptive habitat management provides for stable waterfowl population.**	Same as A, but enhance monitoring and surveying of waterfowl by conducting bi-weekly surveys from mid-November through February and coordinating with the State to conduct aerial surveys. Also, conduct wood duck banding with the addition of one banding site to support objectives of the Mississippi Flyway Council. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but also: - Conduct aerial surveys monthly by refuge. - Add additional banding sites. - Exceed yearly banding quota. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Wetland-dependent birds	No active management. **Neutral to Negative** **No known change in population levels.**	Initiate surveys (baseline, vegetation, and bird rookery location) for representative managed wetland dependent birds and provide quality breeding and wintering habitat. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but also implement population management for selected species. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**
Raptors	Monitor and protect established bald eagle nest sites. Record any new bald eagle nest building activity. **Neutral to Positive** **Provides protection and information, but does not provide baseline survey of refuge use.**	Same as A **Neutral to Positive** **Provides protection and information, but does not provide baseline survey of refuge use.**	Same as A, implement a baseline survey for raptors on the Refuge. **Positive** **Establishes baseline surveys. Will incorporate adaptive habitat management and additional protection to increase populations**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Resident Wildlife	Collect deer data through hunter check stations during managed hunts. Maintain current deer hunting program at or near current level of harvest. Collect turkey data from brood surveys, gobble counts and harvest numbers from checked birds. Maintain turkey hunting at or near current level of harvest. **Neutral to Positive** **Results of active management are captured through game species surveys which lead to adaptive habitat management for the resident wildlife populations.**	Same as A, but enhance habitat quality for resident game species to contribute to balanced species diversity and to allow for opportunities for recreational hunting. Implement deer herd health and black bear surveys while continuing turkey surveys. Monitor and control nuisance animal species such as feral hog. Implement forest management plans to enhance forested habitats for resident wildlife. Utilize partnerships such as the Arkansas Game and Fish Commission (AGFC) to aid in resident wildlife management. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but also: - Conduct research geared toward turkey and quail survival and recruitment. - Implement baseline survey for bat populations. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Reptiles and Amphibians	No active management. **Neutral to Negative** **No known change in population levels.**	Implement herpetofaunal surveys and inventories in collaboration with the AGFC and Arkansas Herpetological Society. Work with partners to conduct a baseline reptile and amphibian survey, targeting various habitat types across refuge lands for a comprehensive inventory. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but also establish a monitoring protocol and encourage research opportunities. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fish and Aquatic Resources	Active management done by Arkansas Game and Fish Commission in coordination with refuge. **Neutral to Positive** **Current management provides some information and utilizes partnerships to manage habitat.**	Same as A, but improve habitat for fish and aquatic resources by controlling nuisance aquatic vegetation to less than 50% of the reservoir surface area, developing a monitoring program for nuisance aquatic vegetation, and survey of streams and rivers for mussels baseline inventory data and other species of greatest conservation. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but also: - Improve habitat for identified, aquatic "Species of Greatest Conservation Need", - Maintain nuisance aquatic vegetation coverage to less 25% of the reservoir surface area. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Inventory, Monitoring and Research Plan	No plan. **Negative** **Little to no additional information does not facilitate implementation of adaptive management. Minimal data and guidance limits quality resource adaptive management.**	Develop and implement an Inventory and Monitoring Plan. Provide refuge with adequate staff, equipment and funding to acquire baseline inventory data on refuge resources and monitor fish, wildlife and plant responses to refuge management. **Negative to positive** **Plan will provide guidance for management of inventory and monitoring for trust species and species of concern to support a more strategic habitat conservation approach.**	Same as B. **Negative to positive** **Plan will provide guidance for management of inventory and monitoring for trust species and species of concern to support a more strategic habitat conservation approach.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Populations – Climate Change	Opportunistically monitor climate change impacts. **Neutral to Negative** **With minimal increase of information refuge may not be able to cope with long-term climate change impacts.**	Increase information and research to enable adaptive management to cope with long-term climate change impacts. Support research through partnerships to gain additional knowledge of potential wildlife population shifts. **Neutral to Positive** **Increased information and research may enable adaptive management to cope with long-term climate change impacts.**	Same as B. **Neutral to Positive** **Increased information and research may enable adaptive management to cope with long-term climate change impacts.**

Goal 2. HABITAT MANAGEMENT - Protect, maintain, enhance, and where appropriate, restore suitable habitat for the conservation and management of migratory birds, resident wildlife, fish, and native plants, including all Federal and State threatened and endangered species endemic to the Complex.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management Plan	Develop and implement a habitat management plan. **Positive** **Plan will provide guidance for management of habitats for trust species and species of concern.**	Same as A. **Positive** **Plan will provide guidance for management of habitats for trust species and species of concern.**	Same as A. **Positive** **Plan will provide guidance for management of habitats for trust species and species of concern.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Forest Management	Actively managing 10,000 acres of upland pine. Prescribed burning on 3-year rotation. Bottomland hardwoods managed in accordance with the Lower Mississippi Joint Venture recommendations for desired forest conditions. Pine stands managed for RCW habitat per the recovery plan. **Neutral to Positive** **Stable active management to support populations that thrive in forested habitats.**	Forest management would be increased or enhanced by adapting management techniques such as cutting cycles, thinning, prescribed fire, expanding sparse canopy and low to moderate basal area in mature pine stands, and passively managing some bottomland forest as an old growth component. All of these techniques would be utilized to provide RCW habitat and to restore historic range of variation in forest structure, following the requirements of songbirds, bats, and other priority species. **Positive** **Increased partnerships and habitat improvements should increase populations that thrive in forested habitats.**	Same as B, but also: - Under-plant with hardwood seedlings after timber harvest. - Pre-commercial thinning. **Positive** **Increased partnerships and habitat improvements should increase populations that thrive in forested habitats.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Greentree Reservoir (GTR)	Management of winter flooding accomplished through cooperation with U.S. Corps of Engineers. Current plan has 4 options available for management. **Neutral to Positive** **Minimal active management to provide current acreage of suitable forested wetland habitat.**	Same as A, but enhance management, by utilizing adaptive habitat management, lowland forest mapping and management and implementation of water management planning and flooding regime to achieve a sustainable wetland forest that provides forage for waterfowl, migrant birds, mammals, reptiles, amphibians and fishes. Emulate natural flooding within the Felsenthal lowland forest. **Positive** **The enhanced management/rehabilitation may provide optimal habitat to support stable and possibly increasing wintering waterfowl populations.**	Same as B, but also: - The lowland forest should not be intentionally flooded for 2 to 3 years following a good acorn crop to encourage natural regeneration. **Positive** **The enhanced management/rehabilitation may provide optimal habitat to support stable and possibly increasing wintering waterfowl populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fire Management	Manage and maintain current fire management programs to achieve healthy and viable wildlife and plants on the refuge and reduce fuels. Burning on a 3-year rotation. Continue fuels monitoring program. **Positive** **Current program utilized for habitat improvement and fuel reduction.**	Same as A, but also implement adaptive habitat management component by monitoring burn units. **Positive** **This management option offers both monitoring and expansion of prescribed fire as a habitat management tool.**	Same as B. **Positive** **This management option offers both monitoring and expansion of prescribed fire as a habitat management tool.**
Waterfowl	Manage bottomland hardwoods to provide maximum sustainable GTR habitats. **Neutral** **Current active management provides suitable wetland habitat.**	Same as A, but enhance waterfowl habitat by, managing water levels throughout winter periods and implementing a water management plan. **Positive** **This management provides suitable wetland habitat plus enhanced management.**	Same as B, but also: - Increase acreage of sanctuaries. - Relocate sanctuaries. **Positive** **This management provides increased acreage of suitable wetland habitat plus enhanced management.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Wetland-Dependant Birds	No specific management is currently taking place for wetland-dependent birds other than habitat management for waterfowl. **Neutral** **No active management to provide suitable habitat for wetland dependent birds.**	Provide mudflat habitat for shorebirds and long-legged wading birds and create temporal sanctuaries around wading bird rookeries during nesting season. **Positive** **The maintenance/increase of habitat may support stable and possibly increase wetland dependent bird populations.**	Same as in B. **Positive** **The maintenance/increase of habitat may support stable and possibly increase wetland dependent bird populations.**
Resident Wildlife	Maintain current levels of management for resident species in accordance with AGFC. Monitor deer and turkey populations. **Neutral to Positive** **Stable active management to support other fish, wildlife and plant populations.**	Maintain a diverse and productive prairie and bottomland hardwood habitat to support resident wildlife by controlling invasive plant and animal species, developing of food plots, and maintaining conductivity between habitats for reptile and amphibian movement. **Positive** **This management provides suitable habitat plus enhanced management.**	Same as B, but promote additional edge habitat as a transition between habitat types. **Positive** **The maintenance/increase of habitat will support stable and possibly increase resident wildlife populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Invasive and Nuisance Species Control	Opportunistic treatment of invasive plants by herbicide and prescribed burning. Opportunistic removal of nuisance animal species. **Neutral to Positive** **Control of invasive fauna and flora are at minimal levels with some benefit to native wildlife populations and habitat.**	Develop nuisance/exotic/invasive plant/animal control plan. Implement systematic removal of invasive plant species by mechanical, chemical, and prescribed burning. Control beaver, nutria and feral hogs through systematic removal. **Positive** **This management option offers both expanded monitoring and removal. Control of invasive fauna and flora would increase from current levels and would have positive impacts to habitat via removal of invasive species through a more systematic approach.**	Same as B, but contract for beaver, nutria, and hog removal. **Positive** **This management option offers both expanded monitoring and removal. Control of invasive fauna and flora would increase from current levels and would have positive impacts to habitat via removal of invasive species through a more systematic approach.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Open Land	Maintaining wildlife openings and roadsides through mowing. **Neutral** **Maintains current openings and roadsides.**	Same as A, but also conduct supplemental planting of native forbs and grasses to promote early successional habitat diversity. Also, use herbicide for conversion to native plant species on roadsides. **Positive** **This management provides suitable habitat plus enhanced management.**	Same as B, but also: - Convert roadsides to native warm season grasses/forbs. - Add more openings. **Positive** **The maintenance/increase of habitat will support stable and will possibly increase wildlife populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Aquatic Resources	Active management done by Arkansas Game and Fish Commission in coordination with refuge. In cooperation with AGFC, conducting stocking of the Felsenthal Pool with triploid grass carp, to maintain a density greater than or equal to 10 grass carp, less than 24 inches total length, per acre. **Neutral to Positive** **This management does provide some added control of invasive plant species, which possibly will increase water quality and increase aquatic resource populations.**	Same as A, but enhance refuge aquatic habitats to benefit fish populations and provide improved access for sport fishing opportunities by evaluating working with Corps of Engineers to strategically drawdown the permanent pool every 5 to 7 years. **Positive** **This management does provide some added control of invasive plant species, which may possibly increase water quality and increase aquatic resource populations.**	Same as B, but also: - Contract to reduce aquatic vegetation by aerial spraying. **Positive** **This management does provide some added control of invasive plant species, which may possibly increase water quality and increase aquatic resource populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management – Climate Change	Opportunistically monitor climate change/sea level rise. **Neutral to Negative** **Increased information to enhance decision making, but currently available data and models lack sufficient detail at the local scale to effectively respond to climate change impacts. Without increased information refuge may not be able to effectively respond to climate change impacts.**	Support research through partnerships to gain additional knowledge of potential habitat shifts. Evaluate carbon sequestration projects. Monitor weather. Monitor water temperatures **Neutral to Positive** **Increased information and research may enable adaptive management to better respond to climate change impacts.**	Same as B. **Neutral to Positive** **Increased information and research may enable adaptive management to better respond to climate change impacts.**

Goal 3. VISITOR SERVICES - Provide wildlife-dependent public use opportunities consistent with the refuge system mission that leads to greater understanding and enjoyment of fish, wildlife and their habitats on the Complex.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Welcome and Orient Visitors	Maintain current visitor services such as signs, brochures, website, Visitor Center, and maps. **Neutral to Positive** **No change to existing program.**	Improve program to welcome and orient visitors to the refuge through directional and entrance signs, design and upkeep of facilities, and the provision of information regarding programs and facilities. Also, reestablish boat/canoe trails, adding exhibit panels in high usage areas, and designate parking areas at trailheads. **Positive** **Increased information and facilities.**	Same as A, but: - Add ATV permits as a condition to use ATV's and evaluate charging a fee. - Encourage trail maintenance days as a condition of free ATV permits. - Reduce camp sites. - Reduce ATV trails. **Neutral to Negative** **The addition of ATV permits, maintenance days and reduction of campgrounds will decrease adverse impact to some habitats.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Hunting	Continue two quota deer hunts for modern gun, one quota hunt for primitive weapon (muzzle loader) and state season archery. Refuge closed to hunting on Jan. 31. Two turkey quota hunts. One youth quota hunt. Open state season archery. Small game in accordance with state seasons. Ducks in accordance with state seasons. **Neutral to Positive** **No change to existing program.**	Same as A, continue to provide current appropriate hunting opportunities that allow for quality public recreation and are compatible with refuge purposes. Upon completion of the CCP update station hunt plans and all hunting Compatibility Determinations (CDs). **Neutral to Positive** **No change to existing program.**	Same as A, but also: -Reduce ATV use for hunters without disabilities. - Conduct waterfowl hunter harvest surveys annually to determine changes in hunter effort and species harvested in different habitat components (permanent pool versus seasonally-flooded portions). - Reduce campgrounds on refuge property. **Neutral to Negative** **The addition of ATV permits, maintenance days and reduction of campgrounds will decrease adverse impact to some habitats.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Trapping	Trapping done by Special Use Permit. Seasons in accordance with state seasons. **Neutral to Positive** **No change to existing program.**	Same as A, continue to allow trapping to control nuisance wildlife and protect refuge infrastructure and wildlife habitat. **Neutral to Positive** **No change to existing program.**	Same as A. **Neutral to Positive** **No change to existing program.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fishing	In accordance with state seasons. Commercial fishing by Special Use Permit in accordance with state seasons. **Neutral to Positive** **Stable active management of fishing and facilities.**	Same as A, continue to provide appropriate fishing opportunities that do not detract from the original purposes of refuge establishment. Also enhance opportunities by coordinate with AGFC efforts to improve fish habitats through vegetation control methods; adding a 3-panel kiosk with a brochure box at each boat launch/parking area; and adding additional fishing opportunities. **Positive** **Increased control of invasive species may increase fish population and habitat stability, but may also increase fishing opportunities.**	Same as A, but also: - Begin phase out closure of night fishing, ATV access for fishing, and camping associated with fishing. - Eliminate fishing tournaments. Same as B, but: - Work to enhance fishing for and harvest of nontypical fish species. - Reduce biomass of carp species in the reservoir through commercial and recreational harvest. - Evaluate harvest rates for game fish species. **Neutral** **Increased control of invasive species may increase fish population and habitat stability, but may also increase fishing opportunities. Eliminating night fishing and fishing tournaments will decrease fishing opportunities.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Wildlife Observation and Photography	Maintain hiking trails and public road system. Explore options with butterfly garden at the headquarters Woodland trail or the other foot trail behind the visitor center. **Neutral to Positive** **Stable facilities and opportunities.**	Same as A, but also develop parking area for Sand Prairie Trail, explore options of establishing an auto tour route along old tram bed in Sand Prairie Trail or along Shallow Lake Road, and explore options to add food plots in strategic wildlife viewing areas. **Positive** **Increased wildlife viewing and photography opportunities.**	Same as A. **Neutral to Positive** **Stable facilities and opportunities.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Environmental Education/Interpretation	Limited on and off site as staff are available. Maintain current EE such as information kiosks, brochures, and panels. **Neutral to Positive** **Continue with limited program.**	Hire a Visitor Services Specialist for the South Arkansas Refuge Complex to be stationed at Felsenthal NWR and develop an Environmental Education program for the complex. In addition to the refuge staff, utilize partnerships and volunteers to enhance the EE program. Expand involvement of staff to manage the Junior Naturalist Program. As part of the Visitor Service Plan, develop an Interpretive Program component for the Complex and develop an interpretive trail that loops through the reforested area behind the office. **Positive** **Increased environmental education programs, facilities and participation.**	Same as A. **Neutral to Positive** **Continue with limited program.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Outreach	Done on an as requested basis. Number of opportunities varies from year to year. **Neutral** **Maintain current outreach.**	Develop general outreach plan for the refuge that will be used to increase public outreach to emphasize resource management practices and promote public use opportunities. Also provide additional information to the public to provide a better understanding of flooding cycles within the GTR and the importance of periodic drying cycles. Tools to increase public outreach will be to develop a refuge specific portable exhibit, develop special events on the refuge, partner with local businesses and develop refuge story slide show/Power Point. **Positive** **Increased outreach**	Same as A, but: - Issue a news release regarding water management changes and scheduling to benefit increase game fish populations and the long-term duck populations. - Where appropriate develop specific outreach strategies to address issues. **Neutral to Positive** **Maintain current outreach, but also add outreach that pertains to water management and public other issues.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Friends Group/Volunteers	Refuge currently has active Friends group and volunteer program. Currently creating two pads on refuge grounds for work camper volunteers. **Neutral to Positive** **Stable volunteer work force.**	Same as A, but enhance current Friends and volunteer involvement by seeking grants to hire a seasonal intern, establishing partnerships with schools and local businesses, and the prevision of office space to Friends/volunteers at Complex office. **Positive** **Expanded volunteer work force.**	Same as B. **Positive** **Expanded volunteer work force.**
Education – Climate Change	Opportunistically share knowledge on climate change. **Neutral to Negative Continue with limited information.**	Same as A, but as science, technology, and policy evolve, become more aggressive at educating partners and the public the FWS direction on climate change. **Positive** **Increased information and research may enable staff to better inform others of FWS response to climate change impacts**.	Same as B. **Positive** **Increased information and research may enable staff to better inform others of FWS response to climate change impacts**.

Goal 4. RESOURCE PROTECTION/REFUGE ADMINISTRATION - Protect the natural and cultural resources of the refuge and ensure visitor safety and facility integrity to fulfill the mission of the National Wildlife Refuge System. Provide for sufficient staffing, facilities and infrastructure to fulfill the Complex's purposes and the goals and objectives of its Comprehensive Conservation Plan.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Provide Visitor Safety, Protect Resources and Ensure Public Compliance with Refuge Regulations	Provide visitor safety, protect resources, and ensure public compliance with refuge regulations. Currently, two full-time LEs, cooperation with AGFC officers, and local enforcement officials. **Neutral to Negative** **Potential for increased violations. Current staffing cannot accommodate entire Complex.**	Same as A, but develop and implement Refuge Law Enforcement Plan and add additional staff to support LE efforts. **Neutral to Positive** **Increased information and protection.**	Same as B. **Neutral to Positive** **Increased information and protection.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Cultural Resources	Enforce all federal and state laws applicable to the refuge. Protect all known archaeological sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act. Active consultation with regional archaeologist. **Neutral to Negative** **Potential for damage, theft, and vandalism is possible due to limited enforcement resources.**	Same as A, but also develop a plan to protect identified archeological sites in conjunction with Native American tribes, State Historic Preservation office, and the USFWS archaeologist. **Neutral to Positive** **Increases protection.**	Same as B. **Neutral to Positive** **Increases protection.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Land Acquisition	Currently no acquisitions planned. All areas within acquisition boundary have been acquired. **Neutral** **All areas within acquisition boundary have been acquired.**	Currently no acquisitions planned. All areas within acquisition boundary acquired. **Neutral** **All areas within acquisition boundary have been acquired**	Evaluate minor expansion plan. **Positive** **Opportunistically increase refuge lands with a minor acquisition boundary expansion.**
Private Lands	Work with private landowners near the refuge to promote refuge goals and objectives for federal trust resources. **Neutral to Positive** **No change.**	Same as Alternative A. **Neutral to Positive** **No change.**	Same as Alternative A. **Neutral to Positive** **No change.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Partnerships	Coordination before and after RCW breeding season monitoring has been complete and just prior to the fall/winter prescribed burning season. Partnership with AGFC on vegetation eradication program. Biological monitoring conducted by University of Arkansas. **Neutral to Positive** **No change.**	Same as Alternative A, but explore opportunities for new partnerships **Positive** **Increase partnerships**	Same as Alternative B. **Positive** **Increase partnerships.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Maintain Capitalized Equipment, Facilities, and Infrastructure for the Refuge Complex	Maintain more than $3,474,910.24 worth of capitalized equipment, facilities, and infrastructure used in all aspects of refuge management such as habitat, wildlife, public use and protection. **Neutral** **Maintain existing facilities and equipment at current levels.**	Same as A, but increase both biological and visitor services infrastructures (equipment, staff, and facilities). **Positive** **Add additional biological and visitor services facilities and equipment to the current infrastructure while increasing levels of operations and maintenance of existing facilities and equipment.**	Same as A, but increase both biological and visitor services infrastructures (equipment, staff, and facilities). **Positive** **Add additional biological facilities and equipment to the current infrastructure while increasing levels of operations and maintenance of existing facilities and equipment.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Staffing	Maintain current staff: complex manager, deputy manager, two LE officers, engineering equipment operator, maintenance mechanic, administrative officer, office assistant, biologist, administrative forester, park ranger-VS, prescribed fire specialist, forestry technician, and two seasonal forestry technicians. Maintain existing equipment and facilities used in refuge management. **Neutral** **No change in staffing levels.**	Add additional staff to support CCP goals and objectives. - Evaluate staffing needs. - Hire a Park Ranger-LE (law enforcement) in order to effectively protect the refuge resources. - Hire an additional biological technician, assigned to address biological needs of the Refuge. - Add a Park Ranger-VS (environmental educator) to the Complex staff. - Add a heavy equipment operator. - Convert two seasonal fire techs to full time on the Complex staff. **Positive** **Comprehensive increase in staff. Enhanced information, habitat management and visitor services.**	Same as B, but instead of Park Ranger (environmental educator), hire an additional Biologist. **Positive** **Increase in biological and law enforcement staff. Enhanced information and habitat management.**

Table 19. Summary of environmental effects by alternative, Overflow National Wildlife Refuge.

Goal 1. WILDLIFE POPULATION MANAGEMENT - Protect, maintain, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within south Arkansas in a manner that supports national and international treaties, plans and initiatives.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Threatened and Endangered Species	No active management. Consult with USFWS-Ecological Services on potential impacts of refuge programs/actions on endangered and threatened species. **Negative** **No active monitoring and does not establish baseline or conduct time based surveys.**	Same as A, continue to support endangered species through surveys, habitat management, and research. Begin coordination with state for state species of concern. **Neutral to Negative** **No active monitoring and does not establish baseline or conduct time based surveys.**	Same as B, but also initiate baseline surveys for T&E and state species of concern with an outside contractor or additional staff. **Positive** **Establishes baseline and time based surveys. Will incorporate adaptive habitat management and additional protection to increase populations. Increased information will support T&E Species populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Landbirds	Continue Christmas Bird Count and neo-tropical point counts. **Neutral** **Active management and/or adaptive habitat management provides for stable populations.**	Same as A, but expand species monitoring surveys by conducting baseline surveys, adding additional staff support and continuing current monitoring. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but also hire contractor/interns to conduct monitoring and research. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**
Waterfowl	Maintain 1,500 acres at Overflow and 800 acres at Oakwood in moist soil native plants. Coop farm 200-300 acres of agricultural crops at Overflow. Manage a 3,500-acre greentree reservoir (GTR) at Overflow. **Neutral to Positive** **Active management and/or adaptive habitat management provides for stable waterfowl population.**	Same as A, but also annually conduct wood duck banding with additional staff support. Also monitor yearly waterfowl numbers, by species, to determine trends and adapt habitat management for target species as practical. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but implement mast surveys. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Wetland dependant birds	Manage intensively for waterfowl, shorebirds, wading birds, and secretive marsh birds. **Neutral to Positive** **Active management and/or adaptive habitat management provides for stable populations.**	Same as A, but also implement staff/volunteer shorebird monitoring including 2-3 surveys/week during July through September. Also, determine affect/results and efficiencies of activities on seed production and percent coverage of moist soil plants to assess success of management treatments and to fine-tune management activities. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but add additional biologist to support management needs and to survey moist soil plots every one to two weeks depending on season. **Positive** **Increased information and staffing leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Raptors	Protect established bald eagle nest sites. Record any new bald eagle nest building activity. **Neutral to Positive** **Provides protection and information, but does not provide baseline survey of refuge use.**	Same as A. **Neutral to Positive** **Provides protection and information, but does not provide baseline survey of refuge use.**	Same as A, but also implement a baseline survey for raptors on the refuge. **Positive** **Establishes baseline surveys. Will incorporate adaptive habitat management and additional protection to increase populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Resident Wildlife	Maintain current deer hunting program at or near current level of harvest. Furbearers, squirrels, rabbits, and bobwhite quail hunting is allowed in conjunction with statewide open seasons. Feral hog are actively trapped by refuge personnel due to their threat and competition with resident wildlife for acorns and other food sources. **Neutral** **Results of active management are captured through game species surveys, which leads to adaptive management for the resident wildlife populations.**	Implement hard mast, bat and small mammal occurrence, deer herd health, and black bear surveys. Monitor and control nuisance animal species such as beaver and feral hog. Implement forest management plans to enhance forested habitats for resident wildlife. Also, utilize partnerships such as the Arkansas Game and Fish Commission (AGFC) to aid in resident wildlife management. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B but: - Research geared toward turkey survival and recruitment. - Baseline survey for bat populations. - Implement deer check station to obtain biological data (age, weights, antler development, lactation, etc.) during all refuge hunts. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Reptiles and Amphibians	No active management **Neutral to Negative** **Limited information does not facilitate implementation of qualitative adaptive management, potentially leading to ineffective management of resources.**	Implement herpetofaunal surveys and inventories in collaboration with the AGFC and Arkansas Herpetological Society. Work with partners to conduct a baseline reptile and amphibian survey, targeting various habitat types across refuge lands for a comprehensive inventory. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but also establish a monitoring protocol and encourage research opportunities. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fish and Aquatic Resources	No active management. No invasive species and no fishing program due to high pesticide levels in water. **Neutral to Negative** **Limited information does not facilitate implementation of qualitative adaptive management, potentially leading to ineffective management of resources.**	Work with USFWS ES office to monitor pesticide levels in Overflow creek. Conduct an aquatic (fish/mussel) inventory, with particular attention to identification of Species of Greatest Conservation Concern. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	Same as B, but also implement Level 2 contaminant survey and coordinate efforts with NRCS to reduce chemical usage during farming operations on and off refuge. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**
Inventory, Monitoring and Research	Limited monitoring, inventory and research are currently taking place on the refuge. **Neutral to Negative** **Limited information does not facilitate implementation of qualitative adaptive management, potentially leading to ineffective management of resources.**	Develop and implement an Inventory and Monitoring Plan. **Positive** **Plan will provide guidance for management of inventory and monitoring for trust species and species of concern.**	Same as B. **Positive** **Plan will provide guidance for management of inventory and monitoring for trust species and species of concern.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Populations – Climate Change	Opportunistically monitor climate change impacts. **Neutral to Negative** **With minimal increase of information refuge may not be able to cope with long-term climate change impacts.**	Increase information and research to enable adaptive management to cope with long-term climate change impacts. Support research through partnerships to gain additional knowledge of potential wildlife population shifts. **Neutral to Positive** **Increased information and research may enable adaptive management to cope with long-term climate change impacts.**	Same as B. **Neutral to Positive** **Increased information and research may enable adaptive management to cope with long-term climate change impacts.**

Goal 2. HABITAT MANAGEMENT - Protect, maintain, enhance, and where appropriate, restore suitable habitat for the conservation and management of migratory birds, resident wildlife, fish, and native plants, including all Federal and State threatened and endangered species endemic to the Complex.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management Plan	Develop and implement a habitat management plan. **Positive** **Plan will provide guidance for management of habitats for trust species and species of concern.**	Same as A. **Positive** **Plan will provide guidance for management of habitats for trust species and species of concern.**	Same as A. **Positive** **Plan will provide guidance for management of habitats for trust species and species of concern.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Forest Management	No active management due to lack of plan. **Negative** **Limited information does not facilitate implementation of qualitative adaptive management, potentially leading to ineffective management of resources.**	Forest management would be increased by finalizing the forest management plan, increasing invasive plant control, increasing targeted thinning areas to 600 acres, and consider designation of a Natural Area in the Oakwood Unit . **Positive** **Increased partnerships and habitat improvements should increase populations that thrive in forested habitats**	Same as B, but also: - Use 3-4 temporary staff (e.g. interns, students) to augment forestry/biological staff on a seasonal basis. - Under plant with hardwood seedlings after timber harvest. - Pre-commercial thinning. - Expand targeted thinning areas up to 1000 acres. **Positive** **Increased partnerships and habitat improvements should increase populations that thrive in forested habitats.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Fire Management	Opportunistic management due to no plan. A Fire Management Plan is currently under review. Partnership with State Forestry Commission is in place to allow the Commission to suppress wildfire. **Neutral to Negative** **Limited information does not facilitate implementation of qualitative adaptive management, potentially leading to ineffective management of resources.**	Implement prescribed and wildfire response programs to achieve healthy habitats and reduce fuels. **Positive** **This management option offers prescribed fire as a habitat management tool, but does not monitor habitat response.**	Same as B, but also monitor response to fire. **Positive** **This management option offers both monitoring and prescribed fire as a habitat management tool.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management - Waterfowl	Manage bottomland hardwoods to provide maximum sustainable GTR habitats, moist soil units, and agricultural croplands. **Neutral to Positive** **Current active management provides food and suitable wetland habitat.**	Same as A, but enhance waterfowl habitat by, increasing staff, strategically managing water levels throughout winter periods, implementing a more intensive moist soil management program at the Oakwood Unit , and controlling beaver dams. **Positive** **This management provides food and suitable wetland habitat plus enhanced management.**	Same as B, but also: -increase moist soil management and monitoring to 800 acres per year at Oakwood. - Every third year no flooding of GTR. - Fluctuate flooding levels of GTR **Positive** **This management provides increased acreage of suitable wetland habitat plus enhanced management.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management Wetland Dependent Birds	At Overflow and Oakwood, approximately 80 acres at each refuge are managed for fall shorebird migration. Also at each refuge approximately 50-100 acres are managed in 5 year soil disturbance rotations to provide habitat for King Rails and bitterns. About 100 acres of flooded moist soil habitat in the summer for wading birds. **Neutral to Positive** **Current active management provides food and suitable wetland habitat.**	Same as A, but enhance by providing late-summer mudflat habitat for shorebirds and long-legged wading birds at Overflow NWR (≥100 acres) and the Oakwood Unit (≥80 acres). Extend moist soil rotation in at least 1 field unit (80 acres) on Overflow NWR to a 4+ year rotation to provide additional suitable habitat on a rotational basis. **Positive** **This management provides increased acreage of suitable wetland habitat plus enhanced management.**	Same as B. **Positive** **This management provides increased acreage of suitable wetland habitat plus enhanced management.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Resident Wildlife	Maintain current levels of management for resident wildlife species in accordance with AGFC. Monitor deer and turkey populations. **Neutral** **Stable active management to support other fish, wildlife and plant populations.**	Maintain a diverse and productive bottomland hardwood habitat complex to support resident wildlife by controlling invasive plant species, developing of food plots, and maintaining conductivity between habitats for reptile and amphibian movement. **Neutral to Positive** **This management provides suitable habitat plus enhanced management.**	Same as B. **Neutral to Positive** **This management provides suitable habitat plus enhanced management.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Greentree Reservoir (GTR)	The 3,500-acre greentree reservoir is managed with a concrete stop-log structure to provide wintering waterfowl habitat annually. **Neutral to Positive** **Current active management provides suitable forested wetland habitat.**	Same as A, but enhance management, by adaptive habitat management and implementation of water management planning to achieve a sustainable wetland forest that provides forage for waterfowl, migrant birds, mammals, reptiles, amphibians and fishes. **Positive** **The enhanced management/rehabilitation of habitat may support stable and possibly increase waterfowl populations.**	Same as B, but also incorporate no flooding of GTR every third year. **Positive** **The enhanced management/rehabilitation of habitat may support stable and possibly increase waterfowl populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Moist Soil Management	Periodic drawdowns and planting as a demonstration area for waterfowl. Current levels of moist soil management provide approximately 920 acres of moist soil production and provide over 1.7 million Duck Energy Days (DEDs) of waterfowl foraging habitat, while also providing foraging habitat for fall migrating shorebirds and breeding marshbirds. A minimum of 80 acres of mudflat habitat annually are provided for shorebirds. **Neutral to Positive** **Current active management provides food and suitable wetland habitat.**	Same as A, but also provide suitable habitat for marshbirds, on a rotational basis on at least 1 field unit (80 acres). Within units targeted for marsh bird management, extend the moist soil rotation in to a 4+ year rotation to reach a condition preferred by marsh birds. Provide flooded conditions in mid to late summer during years in which units are in a vegetative condition for marsh birds. Also, monitor use of the different habitats by species and life cycle calendar to determine habitat used/preferred to fine tune habitat planning and management. Enhance current level of moist soil management at the Oakwood Unit by providing at least 800 acres of moist soil production annually. **Positive** **The provision of more diverse habitat and resources will increase and support bird populations.**	Same as B, but also: - Increase per acre DEDs and habitat diversity by more intensively managing moist soil units. - Increase moist soil management and monitoring to 800 acres per year at Oakwood. - Implement statistical analysis of preferred vegetation. **Positive** **The provision of more diverse habitat and resources will increase and support bird populations.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Invasive and Nuisance Species Control	Opportunistic treatment of invasive plants by herbicide. Opportunistic removal of invasive animal species. **Negative** **This management offers ineffective control of these species which could be detrimental to wildlife populations and habitat.**	Develop nuisance/exotic/invasive plant/animal control plan. Implement systematic removal of invasive plant species by mechanical, chemical, and prescribed burning. Control beaver, nutria and feral hogs through systematic removal. **Positive** **This management option offers both expanded monitoring and removal.**	Same as B, but contract beaver, nutria, and hog removal. **Positive** **This management option offers both expanded monitoring and removal.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Open Land	Approximately 400 acres per year are farmed under the refuge Cooperative Farming Agreement. **Positive** **Current active management provides food for waterfowl and wetland dependent birds.**	Same as A, but enhance management by maintaining wildlife openings and roadsides through mowing. Continue current farming levels, but use crop production strategically as a management strategy to set back succession in moist soil units to favor preferred annuals. **Positive** **This management provides current acreage of suitable habitat plus enhanced management.**	Same as B, but also hire a heavy equipment operator to implement force account farming at Overflow and Oakwood. **Positive** **This management provides current acreage of suitable habitat plus enhanced management.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Aquatic Resources	There are several thousand acres of aquatic habitat in place created by beaver dams on Overflow Creek, Hill Slough, and other associated drains and small sloughs. Each year dams are blown with explosives and beavers are trapped in an attempt to control timber damage and loss. However, much timber loss has and will continue to occur without a more aggressive program than the current staff can provide. **Neutral to Negative** **Active management does not have staffing to implement needed habitat management.**	Manage refuge lands in such a way that they serve as a buffer to local (off-refuge) impacts to the aquatic system, including sedimentation and chemical contamination. Maintain site appropriate vegetation adjacent to refuge waterways (e.g. bottomland forest) and conduct refuge management according to best management principles. Consider additions of lands buffering Overflow Creek and other contiguous waterways to improve aquatic health of system. **Neutral to Positive** **This management does provide some added control measures, which possibly will increase water quality and increase aquatic resource populations**	Same as B, but also contract to reduce aquatic vegetation by aerial spraying on a three-year rotation. **Neutral to Positive** **This management does provide some added control measures, which possibly will increase water quality and increase aquatic resource populations**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Habitat Management – Climate Change	Opportunistically monitor climate change/sea level rise. **Neutral to Negative** **Without increased information refuge may not be able to effectively respond to climate change impacts.**	Increase information and research to enable adaptive management to cope with long-term climate change impacts **Neutral to Positive** **Increased information and research may enable adaptive management to better respond to climate change impacts.**	Same as B. **Neutral to Positive** **Increased information and research may enable adaptive management to better respond to climate change impacts**

Goal 3. VISITOR SERVICES - Provide wildlife-dependent public use opportunities consistent with the refuge system mission that leads to greater understanding and enjoyment of fish, wildlife and their habitats on the Complex.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Welcome and Orient Visitors	Maintain current Visitor Services such as signs, brochures, website, and maps. Visitor Center is an old house and not really an official looking facility. **Neutral to Positive** **No change to existing program.**	Improve program to welcome and orient visitors to the refuge through directional and entrance signs, design and upkeep of facilities, and the provision of information regarding programs and facilities. Also, replace the current office with a new one. In the interim consider reconfiguring the front area of the office to create a visitor contact area. **Positive** **Increased information and facilities.**	Same as B, but only update staff facilities instead of building new Visitor Center. **Positive** **Increased information and facilities.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Hunting	Maintain current hunting programs for deer, turkey, squirrel, rabbit, quail, and waterfowl and incidental species such as beaver and feral hog - with weapons legal for that particular hunt. **Neutral to Positive** **No change to existing program.**	Same as A, continue to provide current appropriate hunting opportunities that allow for quality public recreation and are compatible with refuge purposes. Also, develop a plan to accommodate hunters with disabilities and change the regulation that allows hunters to leave stands up on the refuge the entire season and limit it to a shorter time period. Try to be consistent with other refuges in the state. **Positive** **Explores the possibility of increasing hunting opportunities provided on refuge.**	Same as A, but: - Consider opening the Oakwood Unit to deer hunting (contingent upon establishment of a legal right-of-way for public access and sufficient staff for management) to provide recreational opportunities for the local public and encourage public policing against poaching. - monitor deer herd health. - add deer check station - deer telemetry study **Positive** **More streamlined hunt process and explores the possibility of increasing hunting opportunities provided on refuge.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Trapping	Trapping done by Special Use Permit. Seasons in accordance with state seasons. **Neutral to Positive** **No change to existing program.**	Same as A. **Neutral to Positive** **No change to existing program.**	Same as A. **Neutral to Positive** **No change to existing program.**
Fishing	None **Neutral** **No program due to water quality issues.**	Same as A, but in general brochure and hunt brochure, add a sentence to explain why the refuge is closed to fishing. Work with state to periodically reassess contamination issues to determine if fishing could be allowed. **Neutral** **No program due to water quality issues, but reevaluates contamination issues periodically.**	Same as B. **Neutral** **No program due to water quality issues, but reevaluates contamination issues periodically.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Wildlife Observation and Photography	Public road system is in place, which can be seasonally opened for additional wildlife viewing. **Neutral to Positive** **Stable facilities and opportunities.**	Same as A, plus put an observation tower at the point where Flat Slough crosses the wildlife drive, open the wildlife drive to cars from April to November, and explore options to add food plots in strategic wildlife viewing areas. **Positive** **Increased wildlife viewing and photography opportunities.**	Same as A. **Neutral to Positive** **Stable facilities and opportunities.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Environmental Education/Interpretation	Limited onsite and offsite as staff are available. Maintain current EE effort with information kiosks, brochures, and panels. **Neutral to Positive** **Continue with limited program.**	Hire a Park Ranger-VS (Visitor Services Specialist) for the South Arkansas Refuge Complex to be stationed at Felsenthal NWR and develop an Environmental Education program for the complex. In additional to the refuge staff, utilize partnerships and volunteers to enhance the EE program. Expand involvement of staff to manage the Junior Naturalist Program. As part of the Visitor Service Plan, develop an Interpretive Program component for the Complex and develop an interpretive trail that loops thru the reforested area behind the office. **Positive** **Increased environmental education programs, facilities and participation.**	Same as A. **Neutral to Positive** **Continue with limited program.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Outreach	Done on an as requested basis. Number of opportunities varies from year to year. **Neutral** **Maintain current outreach.**	Develop general outreach plan for the refuge that will be used to increase public outreach to emphasize resource management practices and promote public use opportunities. Tools to increase public outreach will be to develop a refuge specific portable exhibit, an annual special event, and a refuge story slide show/Power Point. **Positive** **Increased outreach.**	Same as A, but also develop general outreach plan for the refuge. Where appropriate develop specific outreach strategies to address issues. **Neutral to Positive** **Maintain current outreach.**
Friends Group/Volunteers	There is no Friends Group for the refuge. A minimal amount of work is achieved through volunteers. **Neutral to Negative** **Minimal volunteer work force.**	Develop a volunteer plan that will expand the volunteer program to enhance aspects of refuge management. Organize a Friends Group and include volunteers and Friends in most management efforts. Develop an RV site and recruit camper volunteers to provide office/administrative assistance, maintenance help, and educational assistance. **Positive** **Expanded volunteer work force.**	Same as B. **Positive** **Expanded volunteer work force.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Education – Climate Change	Opportunistically share knowledge on climate change. **Neutral to Negative Continue with limited information.**	Same as A, but as science, technology, and policy evolve, become more aggressive at educating partners and the public the FWS direction on climate change. **Positive** **Increased information and research may enable staff to better inform others of FWS response to climate change impacts.**	Same as B. **Positive** **Increased information and research may enable staff to better inform others of FWS response to climate change impacts**.

Goal 4. RESOURCE PROTECTION/REFUGE ADMINISTRATION - Protect the natural and cultural resources of the refuge and ensure visitor safety and facility integrity to fulfill the mission of the National Wildlife Refuge System. Provide for sufficient staffing, facilities and infrastructure to fulfill the Complex's purposes and the goals and objectives of its Comprehensive Conservation Plan.

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Provide Visitor Safety, Protect Resources and Ensure Public Compliance with Refuge Regulations	Provide visitor safety, protect resources, and ensure public compliance with refuge regulations. No officers currently are on staff at Overflow, but two Complex officers are available and do work the area, as well as one state wildlife officer. **Neutral to Negative** **Potential for increased violations. Current LE staffing cannot accommodate the entire Complex**	Same as A, but develop and implement Refuge Law Enforcement Plan and add additional staff to support LE efforts. **Neutral to Positive** **Increased information and protection.**	Same as B. **Neutral to Positive** **Increased information and protection.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Cultural Resources	Enforce all federal and state laws applicable to the refuge. Protect all known archaeological sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act and the National Historic Preservation Act. Active consultation with regional archaeologist. **Neutral to Negative** **Potential for damage, theft, and vandalism is possible due to limited Law Enforcement resources.**	Same as A, but also develop a plan to protect identified archeological sites in conjunction with Native American tribes, State Historic Preservation office, and the U.S. Fish and Wildlife Service Archaeologist. **Neutral to Positive** **Increases protection.**	Same as B. **Neutral to Positive** **Increases protection**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Land Acquisition	Opportunistic acquisitions of in-holdings within the acquisition boundary. **Neutral to Positive** **Opportunistically increase refuge lands within current acquisition boundary.**	Same as A, but also develop a minor expansion proposal and actively seek opportunities for acquisition which include additions of lands buffering the Overflow Creek and other contiguous waterways to improve the health of the aquatic system. **Positive** **Opportunistically increase refuge lands with a minor acquisition boundary expansion.**	Same as B, but also acquire a legal right-of-way for access to the Oakwood Unit. **Positive** **Opportunistically increase refuge lands with a minor acquisition boundary expansion.**
Private Lands	Work with private landowners near the refuge to promote refuge goals and objectives for federal trust resources. Currently, 12 Farmer Service Administration Easement sites are passively managed by refuge staff. **Neutral to Positive** **No change.**	Same as Alternative A **Neutral to Positive** **No change.**	Same as Alternative A **Neutral to Positive** **No change.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Partnerships	Partnership with Arkansas Game and Fish Commission private lands biologists is in place with the DMAP (Deer Management Assistance Program). It provides assistance to lands adjacent to the refuge. **Neutral to Positive** **No change.**	Same as A, but explore opportunities for new partnerships. **Positive** **Increase partnerships.**	Same as Alternative B. **Positive** **Increase partnerships.**
Maintain Capitalized Equipment, Facilities, and Infrastructure for the Refuge Complex	Equipment and facilities are maintained in good condition and maintenance is reported the proper maintenance management system or kept in refuge files. **Neutral** **No change in the levels of operations and maintenance of existing facilities and equipment.**	Same as A, but replace deteriorated water control structures, build new office building, and visitor center. **Positive** **New facilities in addition to the maintenance of existing structures and equipment.**	Same as B, but obtain new equipment for habitat management activities. **Positive** **Purchase of new equipment in addition to the maintenance of existing equipment.**

Issue	Alternative A: Current Management (No Action)	Alternative B: Enhanced Biological Management and Visitor Services (Proposed Alternative)	Alternative C: Enhanced Biological Management
Staffing	Maintain current staff: refuge manager, engineering equipment operator, biological technician, and private lands biologist. Maintain existing equipment and facilities used in refuge management **Neutral** **No change in staffing levels.**	Add additional staff to support CCP goals and objectives. - Evaluate staffing needs. - Hire a Park Ranger-LE (law enforcement) in order to effectively protect the refuge resources. - Hire an additional biological technician assigned to address biological needs of the Refuge. - Add a Park Ranger-VS (environmental educator) to the Complex staff. - Add a heavy equipment operator - Convert two seasonal fire techs to full time on the Complex staff. **Positive** **Comprehensive increase in staff. Enhanced information, habitat management and visitor services.**	Same as B, but instead of Park Ranger-VS (environmental educator) hire an additional biologist. **Neutral to Positive** **Increase in biological and law enforcement staff. Enhanced information and habitat management.**

UNAVOIDABLE IMPACTS AND MITIGATION MEASURES

Under Alternative A—the no action alternative—there are numerous unavoidable impacts, including law enforcement that is not adequate for protecting visitors and resources; continued degradation of the biological functions of native plant communities and wildlife habitat due to the invasion of exotic plants and nuisance animals; and a continued decrease in biodiversity. Over time, if these issues are not addressed, they will continue to impact refuge resources.

Alternative B, the proposed alternative, also has some unavoidable impacts. These impacts are expected to be minor and/or short-term in duration. However, the refuge will attempt to minimize these impacts whenever possible. The following sections describe the measures Felsenthal and Overflow NWRs (the Oakwood Unit is closed to the public and very passively managed) will employ to mitigate and minimize the potential impacts that would result from implementation of the proposed alternative.

WATER QUALITY FROM SOIL DISTURBANCE AND USE OF HERBICIDES

Soil disturbance and siltation due to water management activities; road and levee maintenance; and the construction of observation towers, parking lots, boat ramps, visitor center, etc. is expected to be minor and of short duration. To further reduce potential impacts, the refuges will use best management practices such as effecting silt fence or broadcasting native grass seed over denuded areas to minimize the erosion of soils into water bodies.

Foot traffic on new and extended foot trails is expected to have a negligible impact on soil erosion. To minimize the impacts from public use, the refuges will include informational signs that request trail users to remain on the trails, in order to avoid causing potential erosion problems.

Long-term herbicide use for exotic plant control could result in a slight decrease in water quality in areas prone to exotic plant infestation. Through the proper application of herbicides, however, this is expected to have a minor impact on the environment, with the benefit of reducing or eliminating exotic plant infestations.

WILDLIFE DISTURBANCE

Disturbance to wildlife is an unavoidable consequence of any public use program, regardless of the activity involved. While some activities such as wildlife observation may be less disturbing than others, all of the public use activities proposed under the proposed alternative will be planned to avoid unacceptable levels of impacts.

The known and anticipated levels of disturbance from the proposed alternative are not considered to be significant. Nevertheless, the refuges will manage public use activities to reduce impacts. Providing access for fishing opportunities allows the use of a renewable natural resource without adversely impacting other resources. Hunting will also be managed with restrictions that ensure minimal impact on other resources. General wildlife observation may result in minimal disturbance to wildlife. If the refuges determine that impacts from the expected additional visitor uses are above the levels that are anticipated, those uses will be discontinued, restricted, or rerouted to other less sensitive areas.

VEGETATION DISTURBANCE

Negative impacts could result from the creation, extension, and maintenance of trails and roads that require the clearing of nonsensitive vegetation along their length. This is expected to be a minor short-term impact.

Increased visitor use may increase the potential for the introduction of new exotic species into areas when visitors do not comply with boating regulations at the boat ramps and other access points, or with requests to stay on trails. The refuges will minimize this impact by enforcing the regulations for access to the refuge's water bodies, and by installing informational signs that request users to stay on the trails.

USER GROUP CONFLICTS

As public use increases, unanticipated conflicts between different user groups could occur. If this should happen, the refuges will work with partners to adjust their programs, as needed, to eliminate or minimize any public use issues. The refuges will use methods that have proven to be effective in reducing or eliminating public use conflicts. These methods include establishing separate use areas, different use periods, and limits on the numbers of users in order to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities.

EFFECTS ON ADJACENT LANDOWNERS

Implementation of the proposed alternative is not expected to negatively affect the owners of private lands adjacent to the refuges. Positive impacts that would be expected include higher property values, less intrusion of invasive exotic plants, and increased opportunities for viewing more diverse wildlife.

However, some negative impacts that may occur include a higher frequency of trespass onto adjacent private lands, and noise associated with increased traffic. To minimize these potential impacts, the refuges will provide informational signs that clearly mark refuge boundaries; maintain the refuges' existing parking facilities; use law enforcement; and provide increased educational efforts at the visitor center.

Prescribed burning could negatively impact adjacent landowners, but the refuges would minimize effects by informing the public well in advance of any burns. Furthermore, prescribed burns would be relatively infrequent and of short duration. Prescribed burning on refuge lands will also benefit adjacent landowners by decreasing fuel loads and minimizing the risk of catastrophic fires.

LAND OWNERSHIP AND SITE DEVELOPMENT

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. Currently, no acquisitions are planned for Felsenthal NWR, as all lands within the acquisition boundary are acquired. Most of the nonService-owned lands within Overflow's approved acquisition boundary are currently undeveloped. The acquisition of lands buffering Overflow Creek and other contiguous waterways would improve the overall health of the aquatic system. If these lands are acquired as additions to the refuge, they would be maintained in a natural state, managed for native wildlife populations, and opened to wildlife-compatible public uses, where feasible.

Potential development of the refuges' buildings, trails, and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. Construction efforts would be made to use recycled products and environmentally sensitive treated lumber. Visitor center renovations at Overflow will be constructed to be aesthetically pleasing to the community and to avoid any additional impacts to native plant communities. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; Executive Order 11988, Floodplain Management; and other applicable regulatory requirements.

CUMULATIVE IMPACTS

A cumulative impact is defined as an impact on the natural or human environment, which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or nonfederal) or person undertakes such other actions (40 Code of Federal Regulations, 1508.7).

Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially canceling out each other's effect on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource. In addition, sometimes the overall effect is greater than merely the sum of the individual effects, such as when one more reduction in a population crosses a threshold of reproductive sustainability, and threatens to extinguish the population.

A thorough analysis of impacts always considers their cumulative aspects, because actions do not take place in a vacuum; there are virtually always some other actions that have affected that resource in some way in the past, or are affecting it in the present, or will affect it in the reasonably foreseeable future. So any assessment of a specific action's effects must in fact be made with consideration of what else has happened to that resource, what else is happening, or what else will likely happen to it.

The refuges are not aware of any past, present, or future planned actions that would result in a significant cumulative impact when added to the refuges' proposed actions, as outlined in the proposed alternative. Because outside effects can impact refuge resources, Felsenthal NWR would like to acknowledge that potential cumulative impacts to the greentree reservoir are possible due to long-term mismanagement of water levels; water quality issues steaming from pollution from local industries; climate changes impacts; and the infestation of aquatic vegetative species. The management activities in the proposed action are intended to maintain or improve the area's biological resources, protecting the biological integrity of the refuges. Benefits are anticipated for rare, threatened, and endangered species; migratory birds; and native wildlife and habitat diversity, including the minimization of negative impacts associated with exotic, invasive, and nuisance species. Nor are significant adverse impacts expected from the proposed action regarding the local economy; instead, the proposed management activities are anticipated to support area property values and aesthetics.

DIRECT AND INDIRECT EFFECTS OR IMPACTS

Direct effects are caused by an action and occur at the same time as the action. Indirect effects are caused by an action but are manifested later in time or further removed in distance, but still reasonably foreseeable.

The actions proposed for implementation under the proposed alternative include facility development, wildlife and population management, resource protection, public use, and administrative programs. These actions would result in both direct and indirect effects. Facility development, for example, would most likely lead to increased public use, a direct effect; and it, in turn, would lead to indirect effects such as increased littering, noise, and vehicular traffic.

Other indirect effects that may result from implementing the proposed alternative include minor impacts from siltation due to the disturbance of soils and vegetation while expanding the water control structures, as well as expanding or creating new foot trails; construction of the observation tower and visitor center; and providing greater visitor access through improvements to the boat ramps.

None of the direct or indirect effects are anticipated to be significant.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The habitat protection and management actions proposed under the proposed alternative are dedicated to maintaining the long-term productivity of refuge habitats. The benefits of this plan for long-term productivity far outweigh any impacts from short-term actions, such as the construction of observation towers and a visitor center, or creation of new trails. While these activities would cause short-term negative impacts, the educational values and associated public support gained from the improved visitor experience would produce long-term benefits for the refuges' entire ecosystem.

The key to protecting and ensuring the refuges' long-term productivity is to find the threshold where public uses do not degrade or interfere with the refuge's natural resources through careful monitoring and adaptive management. The plans proposed under the proposed alternative have been carefully conceived to achieve that threshold. Therefore, implementing the proposed alternative would lead to long-term benefits for wildlife protection and land conservation that far outweigh any short-term impacts.

V. Consultation and Coordination

OVERVIEW

This chapter summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed alternative, which are presented in this Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA). It lists the meetings that have been held with the various agencies, organizations, and individuals who were consulted in the preparation of the Draft CCP/EA.

The Draft CCP/EA for Felsenthal and Overflow national wildlife refuges was written by the Service's Core Planning Team (members listed below), with the participation and assistance of numerous other refuge and Service staff, the Friends of Felsenthal NWR, and the Arkansas Game and Fish Commission (AGFC).

The following meetings, contacts, and presentations were undertaken during the preparation of the Draft CCP/EA.

Core Planning Team

The Core Planning Team is comprised exclusively of Service staff and a contractor. Personnel from the South Arkansas National Wildlife Refuge Complex, which includes Felsenthal, Overflow and Pond Creek NWRs, are on the team. Key tasks of the team included defining and refining the refuges' vision; identifying, reviewing, and filtering the issues; defining the goals and objectives; and outlining the alternatives.

U.S. Fish and Wildlife Service

- Bernie Petersen, Team Leader, South Arkansas NWR Complex
- Calvin Guthrie, Deputy Project Leader, South Arkansas NWR Complex
- Ame New, Forestry Tech, South Arkansas NWR Complex
- Lake Lewis, Refuge Manager, South Arkansas NWR Complex
- Larry Threet, Administrative Forester, South Arkansas NWR Complex
- Williams Courson, Forestry Tech, South Arkansas NWR Complex
- Ruth McDonald, Refuge Forester, South Arkansas NWR Complex
- Elizabeth Day, Administrative Support Assistant, South Arkansas NWR Complex
- Ricky Eastridge, Wildlife Biologist, South Arkansas NWR Complex
- Monica Harris, Regional Planner, Jacksonville, North Carolina
- Mike Dawson, Regional Planner, Jackson, Mississippi Ecological Services Office
- Evelyn Nelson, Writer/Editor, Southeast Regional Office, Atlanta, Georgia
- Chevales Williams, Contractor, Tennessee Valley Authority

Interagency Coordination Planning Team

The Interagency Coordination Planning Team includes local, state, and federal governmental field staff representatives involved with the resources at the local level. In addition to the members of the Core Planning Team, the Interagency Coordination Planning Team consists of personnel from the Service's local Ecological Services office; the Arkansas Game and Fish Commission; and the Friends of Felsenthal. During the interagency scoping meeting held on June 6, 2008, the team

identified and discussed issues and opportunities for resource protection, habitat restoration, and public uses on the Felsenthal and Overflow NWRs and drafted goals and a vision statement. The members of the team are as follows:

U.S. Fish and Wildlife Service

- Bernie Petersen, Team Leader, South Arkansas NWR Complex
- Calvin Guthrie, Deputy Project Leader, South Arkansas NWR Complex
- Ame New, Forestry Tech, South Arkansas NWR Complex
- Lake Lewis, Refuge Manager, South Arkansas NWR Complex
- Larry Threet, Administrative Forester, South Arkansas NWR Complex
- Williams Courson, Forestry Tech, South Arkansas NWR Complex
- Ruth McDonald, Refuge Forester, South Arkansas NWR Complex
- Elizabeth Day, Administrative Support Assistant, South Arkansas NWR Complex
- Mike Dawson, Regional Planner, Jackson, Mississippi Ecological Services Office
- Evelyn Nelson, Writer/Editor, Southeast Regional Office, Atlanta, Georgia
- Chevales Williams, Contractor, Tennessee Valley Authority
- Mark Sattelberg, FWS, Arkansas Ecological Services
- Jason Phillips, FWS, Arkansas Ecological Services

Friends of Felsenthal NWR

- Ronnie Greer

Arkansas Game and Fish Commission

- Brady Barker, Arkansas Game and Fish Commission
- Don Turman, Arkansas Game and Fish Commission

Alternatives Workshop

The Alternatives Workshop included members of both the core and interagency planning teams, as well as local, state, and federal governmental field staff representatives involved with the resources at the local level. During the Alternatives Workshop held on February 21-22, 2009, the team reviewed the issues identified at both the internal and public scoping meetings and identified a range of alternatives complete with objectives and strategies for the proposed alternative. Members of the team are as follows:

U.S. Fish and Wildlife Service

- Bernie Petersen, Team Leader, South Arkansas NWR Complex
- Calvin Guthrie, Deputy Project Leader, South Arkansas NWR Complex
- Ame New, Forestry Tech, South Arkansas NWR Complex
- Lake Lewis, Refuge Manager, South Arkansas NWR Complex
- Larry Threet, Administrative Forester, South Arkansas NWR Complex
- Williams Courson, Forestry Tech, South Arkansas NWR Complex
- Ruth McDonald, Refuge Forester, South Arkansas NWR Complex
- Elizabeth Day, Administrative Support Assistant, South Arkansas NWR Complex
- Ricky Eastridge, Wildlife Biologist, South Arkansas NWR Complex
- Bobby Schat, Felsenthal Tech, South Arkansas NWR Complex
- Thad Willaims, Biotech, South Arkansas NWR Complex
- Ray Woods, Engineer Operator, South Arkansas NWR Complex
- Monica Harris, Regional Planner, Jacksonville, NC

- Mike Dawson, Regional Planner, Jackson, Mississippi Ecological Services Office
- Williams Smith, Assistant Planner
- Evelyn Nelson, Writer/Editor, Southeast Regional Office
- Chevales Williams, Contractor, Tennessee Valley Authority
- Mark Sattelberg, FWS, Arkansas Ecological Services

Friends of Felsenthal NWR

- Ronnie Greer

Arkansas Game and Fish Commission

- Brady Barker, Arkansas Game and Fish Commission
- Susan Gregory, Regional Supervisor, Arkansas Game and Fish Commission
- Eric Brinkman, Fisheries Management, Arkansas Game and Fish Commission

BIOLOGICAL REVIEW TEAMS

The Biological and Habitat Review Teams consisted of Service staff and invited participants. The invited participants included local and regional experts, researchers, and individuals with intimate knowledge of and expertise in the biological resources of the refuges. The Felsenthal NWR biological review took place on June 16-18, 2008; and the Overflow NWR biological review took place on November 13-15, 2007. The members of these biological review teams are listed below.

Felsenthal NWR Bioreview Team

- Lynn Askins, USFWS, Carolina Sandhills NWR, Project Leader
- Eric Brinkman, Arkansas Game and Fish Commission, Fisheries Biologist
- Eddie Courson, USFWS, South Arkansas Refuge Complex, Fire Technician
- Phil Covington, Ducks Unlimited, Inc., Biologist
- Jeff Denman, USFWS, White River NWR, Administrative Forester
- Rick Eastridge, Arkansas Game and Fish Commission, Bear Biologist
- Tom Edwards, USFWS, Division of Migratory Birds, Biologist
- Janet Ertel, USFWS, National Wildlife Refuge System - Southeast Region, Biologist
- Jim Guldin, USDA Forest Service, Supervisory Ecologist
- Dale Guthrie, USFWS, South Arkansas Refuge Complex, Deputy Project Leader
- Richard Hines, USFWS, White River NWR, Biologist
- Laura Housh, USFWS, National Wildlife Refuge System, Southeast Region, Planner
- Chuck Hunter, USFWS, Chief, SE Refuge System, Div. of Planning and Resource Mgmt.
- Ruth McDonald, USFWS, South Arkansas Refuge Complex, Forester
- Bernie Petersen, USFWS, South Arkansas Refuge Complex, Project Leader
- Dan Scheiman, Audubon Arkansas, Ornithologist
- Larry Threet, USFWS, South Arkansas Refuge Complex, Administrative Forester
- Don Turman, Arkansas Game and Fish Commission, District Fisheries Supervisor

Overflow NWR Bioreview Team

- Ray Aycock, USFWS, Ecological Services, Mississippi Field Office, Leader
- Jeff Denman, USFWS, White River National Wildlife Refuge, Administrative Forester
- Tom Edwards, USFWS, Division of Migratory Birds, Biologist
- Janet Ertel, USFWS, National Wildlife Refuge System - Southeast Region, Biologist

- Lake Lewis, USFWS, Overflow National Wildlife Refuge, Manager
- Bernie Petersen, USFWS, South Arkansas Refuges Complex, Project Leader
- Catherine Rideout, AGFC, Ornithologist
- Timmy R. Walker, USFWS, Overflow National Wildlife Refuge, Biological Technician

VISITOR SERVICES REVIEW TEAMS

The Visitor Services Review Teams consisted of staff from the Service's Southeast Regional Office and the South Arkansas National Wildlife Refuge Complex. The Felsenthal NWR visitor services review took place in December 2007. The Overflow NWR visitor services review took place in September 2007. The members of these two visitor services review teams are listed below.

Felsenthal NWR Visitor Services Review Team

- Deborah Jerome, Visitor Services and Outreach, Southeast Regional Office
- Diane Borden-Billiot, Southwest Louisiana NWR
- Durwin Carter, Grand Bay NWR

Overflow NWR Visitor Services Review Team

- Garry Tucker, Visitor Services and Outreach, Southeast Regional Office
- Gay Brantley, Black Bayou Lake NWR
- Doug Hunt, Southeast Louisiana Refuges Complex

Appendix A. Glossary

Adaptive Management: Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alluvial: Sediment transported and deposited in a delta or riverbed by flowing water.

Alternative: 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6B).

Anadromous: Migratory fishes that spend most of their lives in the sea and migrate to fresh water to breed.

Aquifer An underground bed or layer of earth, gravel, or porous stone that yields water.

Biological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as biodiversity.

Carrying Capacity: The maximum population of a species able to be supported by a habitat or area.

Categorical Exclusion: A category of actions that does not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

CFR: Code of Federal Regulations.

Compatible Use: A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge [50 CFR 25.12 (a)]. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan: A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (Service Manual 602 FW 1.6 E).

Concern: See Issue

Cover Type: The present vegetation of an area.

Cultural Resource Inventory: A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Cultural Resource Overview: A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office's background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).

Cultural Resources: The remains of sites, structures, or objects used by people in the past.

Demographics The physical characteristics of a population such as age, sex, marital status, family size, education, geographic location, and occupation

Designated Wilderness Area: An area designated by the U.S. Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).

Disturbance: Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).

Ecosystem: A dynamic and interrelating complex of plant and animal communities and their associated nonliving environment.

Ecosystem Management:	Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.
Endangered Species (Federal):	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Endangered Species (State):	A plant or animal species in danger of becoming extinct or extirpated in the state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.
Environmental Assessment (EA):	A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).
Environmental Impact Statement (EIS):	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
Estuary:	The wide lower course of a river into which the tides flow. The area where the tide meets a river current.
Finding of No Significant Impact (FONSI):	A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).
Force Account Farming	Contracted or subsidized farming paid-for on the basis of time taken and product produced.
Goal:	Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Service Manual 620 FW 1.6J).
Greentree Reservoir	Greentree reservoirs consist of bottomland hardwood forest land which is shallowly flooded in the fall and winter.

Groundwater	Water that exists beneath the earth's surface in underground streams and aquifers.
Habitat:	Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.
Habitat Restoration:	Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.
Habitat Type:	See Vegetation Type.
Hydrology	The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.
Improvement Act:	The National Wildlife Refuge System Improvement Act of 1997.
Informed Consent:	The grudging willingness of opponents to “go along” with a course of action that they actually oppose (Bleiker).
Issue:	Any unsettled matter that requires a management decision [e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or other presence of an undesirable resource condition (Service Manual 602 FW 1.6K)].
Management Alternative:	See Alternative
Management Concern:	See Issue
Management Opportunity:	See Issue
Migration:	The seasonal movement from one area to another and back.
Mission Statement:	Succinct statement of the unit’s purpose and reason for being.
Monitoring:	The process of collecting information to track changes of selected parameters over time.
National Environmental Policy Act of 1969 (NEPA):	Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500).

National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57): Under the Refuge Improvement Act, the Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges outside Alaska. The Act also describes the six public uses given priority status within the Refuge System (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation).

National Wildlife Refuge System Mission: The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

National Wildlife Refuge System: Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management areas; or waterfowl production areas.

National Wildlife Refuge: A designated area of land, water, or an interest in land or water within the Refuge System.

Native Species: Species that normally live and thrive in a particular ecosystem.

Noxious Weed: A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or nonnative, new, or not common to the United States. According to the Federal Noxious Weed Act (P.L. 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the Untied States and to the public health.

Objective: A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N).

Organochlorines An organic compound containing at least one covalently bonded chlorine atom. Their wide structural variety and divergent chemical properties lead to a broad range of uses. These chemicals are typically nonaqueous and are usually denser than water due to the presence of heavy chlorine atoms.

Plant Association: A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

Plant Community: An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.

Preferred Alternative: This is the alternative determined (by the decision-maker) to best achieve the refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.

Prescribed Fire: The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May occur from natural ignition or intentional ignition.

Priority Species: Fish and wildlife species that require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance.

Public Involvement Plan: Broad long-term guidance for involving the public in the comprehensive conservation planning process.

Public Involvement: A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public: Individuals, organizations, and groups; officials of federal, state, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in service issues and those who do or do not realize that Service decisions may affect them.

Purposes of the Refuge: "The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit." For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge (Service Manual 602 FW 106 S).

Recommended Wilderness:	Areas studied and found suitable for wilderness designation by both the Director of the Fish and Wildlife Service and the Secretary of the Department of the Interior, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress" (Draft Service Manual 610 FW 1.5).
Record of Decision (ROD):	A concise public record of decision prepared by the federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).
Refuge Goal:	See Goal
Refuge Purposes:	See Purposes of the Refuge
Shrub-scrub Habitat	Areas dominated by woody vegetation less than 20 feet tall, including true shrubs, young trees, and trees or shrubs that may be stunted because of environmental conditions; these areas are sometimes referred to as early successional communities.
Socioeconomic	Involving social as well as economic factors.
Songbirds: (Also Passerines)	A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory.
Step-down Management Plan:	A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, and safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U).
Strategy:	A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).
Study Area:	The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas.
Threatened Species (Federal):	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Threatened Species (State):	A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue.
Tiering:	The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).
U.S. Fish and Wildlife Service Mission:	The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.
Unit Objective:	See Objective
Vegetation Type, Habitat Type, Forest Cover Type:	A land classification system based upon the concept of distinct plant associations.
Vision Statement:	A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z).
Wetland	Lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface.

Wilderness Study Areas: Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria:

- Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation; and
- Has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5).

Wilderness: See Designated Wilderness

Wildfire: A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildland Fire: Every wildland fire is either a wildfire or a prescribed fire (Service Manual 621 FW 1.3

ACRONYMS AND ABBREVIATIONS

AIRFA	American Indian Religious Freedom Act
ADA	Americans with Disabilities Act
ARPA	Archaeological Resources Protection Act
ADEQ	Arkansas Department of Environmental Quality
AGFC	Arkansas Game and Fish Commission
AHPP	Arkansas Historic Preservation Program
BCC	Birds of Conservation Concern
BRT	Biological Review Team
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
CWCS	Comprehensive Wildlife Conservation Strategy
cfs	cubic feet per second
DOI	Department of the Interior
DU	Ducks Unlimited
EA	Environmental Assessment
EE	environmental education
EIS	Environmental Impact Statement
FmHA	Farmers Home Administration
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
FTE	full-time equivalent
FY	Fiscal Year
GIS	Global Information System
GCRASA	Gulf Coast Regional Aquifer System Analysis
GTR	Greentree Reservoir
NGO	Nongovernmental Organization
NHPA	National Historic Preservation Act
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
NAGPRA	Native American Graves Protection and Repatriation Act
PFT	Permanent Full Time
PUNA	Public Use Natural Area
RM	Refuge Manual
RNA	Research Natural Area
ROD	Record of Decision
RCW	Red Cockaded Woodpecker
RONS	Refuge Operating Needs System
RRP	Refuge Roads Program
SARP	Southeast Aquatic Resources Partnership
SWG	State Wildlife Grants Program
T&E	Threatened and Endangered
FWS	U.S. Fish and Wildlife Service (also Service)
TFT	Temporary Full Time
USACE	United States Army Corps of Engineers
USC	United States Code
FDA	United States Food and Drug Administration

Appendix B. References and Literature Citations

About.com: Geology. "Bedrock Geologic Map of Arkansas." http://geology.about.com/library/bl/maps/blarkansasmap.htm

Anderson, J.E. (Ed). 2006. Arkansas Wildlife Action Plan. Arkansas Game and Fish Commission, Little Rock, Arkansas. 2028pp.

Arkansas Department of Environmental Quality. February 2008. "2008 List of Impaired Waterbodies (303(d) List)."

Arkansas Department of Environmental Quality. "Strategic Planning Project." http://www.adeq.state.ar.us/diroffice/strategic_plan/default.htm

Arkansas Department of Environmental Quality, Water Division. "2004 Integrated Water Quality Monitoring and Assessment Report." http://www.adeq.state.ar.us/water/branch_planning/pdfs/WQ05-07-01.pdf

Arkansas Game and Fish Commission. "Arkansas Fishing Guidebook, 2007-08." http://www.agfc.com/!userfiles/pdfs/guidebooks/2008Fishing.pdf

Arkansas.gov. "Arkansas Geological Survey - Bromine Brine." http://www.state.ar.us/agc/bromine.htm

Arkansas.gov. "Arkansas Geological Survey - Facts About Arkansas." http://www.state.ar.us/agc/facts.htm

Arkansas.gov. "Arkansas Geological Survey - Geology of Arkansas." http://www.state.ar.us/agc/argeol.htm

Arkansas.gov. "Arkansas Wildlife Action Plan - Ecoregions - Mississippi Alluvial Valley Species and Habitats." http://www.wildlifearkansas.com/plain.html

Arkansas.gov. "Arkansas Wildlife Action Plan - Ecoregions - South Central Plains Species and Habitats." http://www.wildlifearkansas.com/southplains.html

Arkansas.gov. "Arkansas Wildlife Action Plan - Program Overview." http://www.wildlifearkansas.com

Arkansas Natural Heritage Commission, Arkansas Heritage Program. "Rare Species of Arkansas." http://www.naturalheritage.org/program/rare-species/

Audubon Arkansas. "Birds & Science - Arkansas' Important Birds Areas." http://www.ar.audubon.org/BirdSci_IBAMap.html

Bailey, R.G. 1978. "Descriptions of the Ecoregions of the United States." U.S. Department of Agriculture Forest Service, Misc. Publ. #1391, Washington, D.C. http://www.fs.fed.us/colorimagemap/ecoreg1_divisions.html and http://www.fs.fed.us/colorimagemap/ecoreg1_provinces.html

Beyers, D.W., and C.A. Carlson. 1993. Movement and habitat use of triploid grass carp in a Colorado irrigation canal. North American Journal of Fisheries Management 13: 141-150.

Caudill, J., and E. Henderson. September 2005. "Banking on Nature 2004: The Economic Benefits to Local Communities of National Wildlife Visitation." Division of Economics, U.S. Fish and Wildlife Service, Washington, DC.

Chilton, E.W., II, and M. I. Muoneke. 1992. Biology and management of grass carp *Ctenopharyngodon idella*, (Cyprinidae) for vegetation control: a North American perspective. Reviews in Fish Biology and Fisheries 2: 283-320.

Columbia University, The Earth Institute, Next Generation Earth. "Climate Change in Arkansas." http://www.nextgenerationearth.org/contents/view/12

Department of Arkansas Heritage. "The Arkansas Historic Preservation Program-Archaeology and Section 106 Review." http://www.arkansaspreservation.org/archaeology-section106/

Dupree, A. Hunter. 1957. Science in the Federal Government: A History of Policies and Activities to 1940. Harvard University Press, Cambridge, Massachusetts. 460 pp.

Elliot, L. and K. McKnight. 2000. U.S. Shorebird conservation plan: Lower Mississippi Valley/Western Gulf Coastal Plain. Mississippi Alluvial Valley/West Gulf Coastal Plain Working Group.

Fredrickson, L.H., and T.S. Taylor. 1982. Management of seasonally flooded impoundments for wildlife. U.S. Fish and Wildlife Service Resource Publication 148, Washington, DC, USA.

Fredrickson, L.H. 1996. Moist soil management, 30 years of field experimentation. International Waterfowl Symposium 7:168-177.

Gabrielson, Ira N. 1943. Wildlife Conservation. The Macmillan Company, New York, New York. 250 pp.

Guendling, Randall L. 1985. *Archeological Survey and Testing of Eight Public Access Sites, Felsenthal National Wildlife Refuge, Arkansas (Project 569).* Submitted to United States Fish and Wildlife Service, Atlanta, Georgia. 175 pp.

Guendling, Randall L. 1986. *Archeological Survey and Testing at the Headquarters Property and Along Shallow Lake Access Road (Project 594).* Submitted to the Fish and Wildlife Service, Atlanta, Georgia. 70 pp.

Johnson, Anne Frances. 2009. Booklet based on the report “Ecological Impacts of Climate Change” by The National Academies Committee on Ecological Impacts of Climate Change. Booklet developed by Anne Frances Johnson and designed by Francesca Moghari with funding provided by the United States Geological Survey. http://dels.nas.edu/dels/rpt_briefs/ecological_impacts.pdf

Krabill, W., W. Abdalati, E. Frederick, S. Manizade, C. Martin, J. Sonntag, R. Swift, R. Thomas, W. Wright, and J. Yungel. "Greenland Ice Sheet: High-elevation Balance and Peripheral Thinning." Science July 21, 2000: pp. 428-430.

Kross, J. 2006. Conservation of waste rice and estimates of moist soil seed abundance for wintering waterfowl in the Mississippi Alluvial Valley. Thesis, Missisippi State University, Mississippi State, Mississippi. 56 pp.

Laycock, George. 1965. The Sign of the Flying Goose: A Guide to the National Wildlife Refuges. The Natural History Press, Garden City, New York. 299 pp.

LMVJV Forest Resource Conservation Working Group. 2007. Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for enhancing wildlife habitat. Edited by R. Wilson, K. Ribbeck, S. King, and D. Twedt.

LMVJV Water Management Tracking System. Lower Mississippi Joint Venture Office, Vicksburg, Mississippi, USA.

Loesch, C.R., K.J. Reinecke, and C.K. Baxter. 1994. Lower Mississippi Valley joint venture evaluation plan. North American Waterfowl Management Plan, Vicksburg, Mississippi.

Low, J.B., and F.C. Bellrose Jr. 1944. The seed and vegetative yield of waterfowl food plants in the Illinois River valley. J. Wildl. Manage. 8:7-22.

Matthews, S., R. O'Connor, L.R. Iverson, and A.M. Prasad, 2004: *Atlas of Climate Change Effects in 150 Bird Species of the Eastern United States*. General Technical Report NE-GTR-318. USDA/USFS, Newtown Square, PA, 340 pp. http://www.usgcrp.gov/usgcrp/Library/ocp2006/ocp2006-hi-eco.htm

Putnam, J.A., G.M. Furnival, and J.S. McKnight. 1960. Management and inventory of southern hardwoods. U.S. Department of Agriculture. U.S. Forest Service. Agriculture Handbook No. 181.

Reinecke, K.J. and C.R. Loesch. 1996. Integrating research and management to conserve wildfowl (Anatidae) and wetlands in the Mississippi Alluvial Valley, U.S.A. Gibier Faune Sauvage, Game and Wildlife. 13:927-940.

Reinecke, K.J., R.M. Kaminski, D.J. Moorhead, J.D. Hodges, and J.R. Nassar. 1989. Mississippi Alluvial Valley. Pages 203-247 *in* L.M. Smith, R.L. Pederson, and R.M. Kaminski, eds. Habitat management for migrating and wintering waterfowl in North America. Texas Tech. Univ. Press, Lubbock 560 pp.

Shireman, J.V. 1982. Cost analysis of aquatic weed control: fish versus chemicals in a Florida lake. Progressive Fish-Culturist 44: 199-200.

South Carolina Department of Natural Resources. "POR Monthly Total Snowfall-El Dorado Airport, Arkansas, and Crossett, Arkansas." http://cirrus.dnr.state.sc.us/cgi-bin/sercc/cliMONtsng.pl?ar2300 and http://cirrus.dnr.state.sc.us/cgi-bin/sercc/cliMONtsng.pl?ar730

South Carolina Department of Natural Resources, South Carolina State Climatology Office. Accessed July 2009. "The Impact of Climate Change on South Carolina." http://www.dnr.sc.gov/climate/sco/Publications/climate_change_impacts.php

Southeast Aquatic Resources Partnership. http://www.sarpaquatic.org/

Southeast Quail Study Group. "Northern Bobwhite Quail Initiative." http://seqsg.qu.org/seqsg/nbci/nbci.cfm

Southern Regional Climate Center. "Climate Synopsis for Arkansas." (Adapted from: Climatography of the United States No. 60, *National Climatic Center*), http://www.srcc.lsu.edu/southernClimate/atlas/ardescription/view

Southern Regional Climate Center. "Normal Daily Temperature-Arkansas." http://www.srcc.lsu.edu/southernClimate/atlas/images/ARtavg.html, http://www.srcc.lsu.edu/southernClimate/atlas/images/ARtmaxhtml, and http://www.srcc.lsu.edu/southernClimate/atlas/images/ARtminhtml.

Southern Regional Climate Center. "Normal Monthly Precipitation-Arkansas." http://www.srcc.lsu.edu/southernClimate/atlas/images/ARprcp.html

Southern Regional Climate Center. "Temperature and Precipitation Normals (1971-2000)." http://www.srcc.lsu.edu/southernClimate/atlas/AR

Stott, B., D.G. Cross, R.E. Iszard, and T.O. Robson. 1971. Recent work on grass carp in the United Kingdom from the standpoint of its economics in controlling submerged aquatic plants. Proceedings of the European Research Council International Symposium on Aquatic Weeds 3: 105-116.

The Encyclopedia of Arkansas History and Culture. "Ashley County." http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID-746

The Encyclopedia of Arkansas History and Culture. "Bromine." http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=4514

The Encyclopedia of Arkansas History and Culture. "Geography and Geology." http://encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=401&type=Category&item=Geography+and+Geology

The Encyclopedia of Arkansas History and Culture. "Ouachita River." http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=2392

The Encyclopedia of Arkansas History and Culture. "River Designations." http://encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=2623

The Encyclopedia of Arkansas History and Culture. "Saline River." http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=2649

The Encyclopedia of Arkansas History and Culture. "Union County." http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID-812

The National Wilderness Preservation System, Wilderness.net. "Wilderness Legislation: The Wilderness Act of 1964." http://www.wilderness.net/index.cfm?fuse=NWPS&sec=legisAct

The Nature Conservancy. "Global Climate Change, Climate Change Impacts in Arkansas." http://www.nature.org/initiatives/climatechange/files/arkansas_factsheet_1.pdf

The Nature Conservancy. June 2002. "Upper West Gulf Coastal Ecoregional Plan." http://www.wildlifearkansas.com/materials/updates/Appendix_3%5B1%5D.3_Upper_West_Gulf_Coastal_Plain_ecoregional_assessment.pdf

United Nations Environment Programme, World Conservation Monitoring Centre. "Felsenthal National Wildlife Refuge."http://www.unep-wcmc.org/protected_areas/data/sample/0176u.htm

University of Arkansas, Division of Agriculture, Arkansas Agricultural Experiment Station. August 1998. "Soils of Desha County, Arkansas." Special Report 187.

U.S. Census Bureau, Bureau of Economic Analysis, and Bureau of Labor Statistics. http://www.fedstats.gov/qf (accessed April 14, 2008).

U.S. Census Bureau. "U.S. Census Bureau, Bureau of Economic Analysis, and Bureau of Labor Statistics." http://www.fedstats.gov/qf/states/00000.html

U.S. Department of Agriculture, Natural Resources Conservation Service. 2006. "Soil Survey of Union County, Arkansas."

U.S. Department of Agriculture, Natural Resources Conservation Service, Southeast Coastal Plain and Caribbean, Soil Survey Region #15. "131B—Arkansas River Alluvium." http://www.mo15.nrcs.usda.gov/technical/MLRAs/mlra_131b.html

U.S. Department of Agriculture, Natural Resources Conservation Service, Southeast Coastal Plain and Caribbean, Soil Survey Region #15. "133B—Western Coastal Plain." http://www.mo15.nrcs.usda.gov/technical/MLRAs/mlra_133b.html

U.S. Department of Agriculture, Soil Conservation Service and Forest Service. December 1979. "Soil Survey of Ashley County, Arkansas."

U.S. Department of Energy. 1999 "Carbon Sequestration Research and Development." http://www.fossil.energy.gov/programs/sequestration/publications/1999_rdreport/

U.S. Department of the Interior, National Park Service, National Center for Recreation and Conservation. "Nationwide Rivers Inventory." http://www.nps.gov/ncrc/programs/rtca/nri/index.html

U.S. Environmental Protection Agency. "Air Quality Index (AQI) - A Guide to Air Quality and Your Health." *AirNow.* http://airnow.gov/index.cfm?action=static.aqi

U.S. Environmental Protection Agency. "Air Quality Index Report-Arkansas." http://www.epa.gov/air/data/monaqi.html?st~AR~Arkansas

U.S. Environmental Protection Agency. “Climate Change.” http://www.epa.gov/climatechange/

U.S. Environmental Protection Agency. "County Air Quality Map - Criteria Air Pollutants." http://www.epa.gov/air/data/msummary.html?st~AR~Arkansas

U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. "National Ambient Air Quality Standards (NAAQS)." http://www.epa.gov/air/criteria/html

U.S. Environmental Protection Agency, Western Ecology Division. "Ecoregions of Arkansas." http://www.epa.gov/wed/pages/ecoregions/ar_eco.htm

U.S. Environmental Protection Agency, Western Ecology Division. "Level III Ecoregions." http://www.epa.gov/wed/pages/ecoregions/level_iii.htm

U.S. Environmental Protection Agency. 1998. Climate Change and Arkansas, EPA 236-F-98-007d, September 1998. Washington, DC.

U.S. General Accounting Office, GAO-03-517. August 2003. "National Wildlife Refuges – Opportunities to Improve the Management and Oversight of Oil and Gas Activities on Federal Lands."

U.S. Geological Survey, Arkansas Water Science Center. "Mississippi Embayment Regional Aquifer Study." http://ar.water.usgs.gov/meras/index2.php

U.S. Geological Survey, Biological Informatics Office, National Biological Information Infrastructure (NBII) Program. "Felsenthal National Wildlife Refuge: Greentree Reservoir Study." http://www.nbii.gov/portal/community/Communities/Geographic_Perspectives/Central_Southwest_&_Gulf_Coast/Regional_Themes/Biodiversity_&_Vital_Habitat/Felsenthal_NWR_Greentree_Reservoir_Study/

U.S. Geological Survey. "Ground Water Atlas of the United States, Regional Summary-Arkansas, Louisiana, Mississippi (HA 730-F)." http://capp.water.usgs.gov/gwa/ch_f/F-text1.html

U.S. Geological Survey. July 2006. "Monitoring the Recovery of the Sparta Aquifer in Southern Arkansas and Northern Louisiana." http://pubs.usgs.gov/fs/2006/3090/

U.S. Geological Survey, Northern Prairie Wildlife Research Center. "Bird Checklists of the United States, Felsenthal National Wildlife Refuge." http://www.npwrc.usgs.gov/resource/birds/chekbird/r4/felinfo.htm

U.S. Geological Survey. November 2004. "The Sparta Aquifer: A Sustainable Water Resource?" Fact Sheet 111-02. http://pubs.usgs.gov/fs/fs-111-02/#fig1

U.S. Geological Survey. "Water Resources of Arkansas." http://ar.water.usgs.gov/index.html

U.S. Fish and Wildlife Service and U.S. Census Bureau. "2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation - Arkansas.” http://www.census.gov/prod/2008pubs/fhw06-ar.pdf

U.S. Fish and Wildlife Service, Division of Bird Habitat Conservation. "North American Waterfowl Management Plan." http://www.fws.gov/birdhabitat/NAWMP/index.shtm

U.S. Fish and Wildlife Service. "Ecosystem Units." http://www.fws.gov/offices/ecounits.html

U.S. Fish and Wildlife Service. "Felsenthal Annual Narrative – 2006."

U.S. Fish and Wildlife Service. "Felsenthal National Wildlife Refuge." http://www.fws.gov/refuges/profiles/index.cfm?id=43579

U.S. Fish and Wildlife Service. "Felsenthal National Wildlife Refuge Annual Narrative, 2005."

U.S. Fish and Wildlife Service, Felsenthal National Wildlife Refuge, Region 4 (Southeast Region). December 2007. "Visitor Services Review Report."

U.S. Fish and Wildlife Service. "Felsenthal National Wildlife Refuge, Unit Purposes." http://refugedata.fws.gov/databases/purposes.taf?_function=detail&Layout_0_uid1=32926&_UserReference=ECC97FDC9CD23DD0CBC32358

U.S. Fish and Wildlife Service, Felsenthal National Wildlife Refuge. "Water Management." http://www.fws.gov/felsenthal/

U.S. Fish and Wildlife Service. Letter to Mr. Martin Maner, Chief, Arkansas Department of Environmental Quality Water Division, from Mr. Melvin Tobin, Acting Field Supervisor. Conway, AR, June 20, 2006. 10 pp.

U.S. Fish and Wildlife Service. "Lower Mississippi River Ecosystem Plan, Version 2.5 (Final Draft)." September 10, 2002. http://www.fws.gov/lmre/strategic_plan.htm

U.S. Fish and Wildlife Service. November 1, 2007. "Overflow National Wildlife Refuge Overview."

U. S. Fish and Wildlife Service. "Oakwood Unit Annual Narrative – 2006."

U.S. Fish and Wildlife Service. "Overflow Annual Narrative – 2007."

U.S. Fish and Wildlife Service. "Overflow National Wildlife Refuge." http://www.fws.gov/refuges/profiles/index.cfm?id=43571

U.S. Fish and Wildlife Service. "Overflow National Wildlife Refuge, Unit Purposes." http://refugedata.fws.gov/databases/purposes.taf?_function=detail&Layout_0_uid1=33113&_UserReference=ECC97FDC9CD23DD0CBC32358

U.S. Fish and Wildlife Service. "Partners for Fish and Wildlife." http://ecos.fws.gov/partners/viewContent.do?viewPage=contactInfo4

U.S. Fish and Wildlife Service. "Recovery Plan for the Red-Cockaded Woodpecker (*picoides borealis*)." Second Revision, January 2003. http://www.fws.gov/rcwrecovery/recovery_plan.html

U.S. Fish and Wildlife Service, Region 4 (Southeast Region). December 2007. "Visitor Services Review Report, Felsenthal National Wildlife Refuge."

U.S. Fish and Wildlife Service, Region 4 (Southeast Region). September 2007. "Visitor Services Review Report, Overflow National Wildlife Refuge."

U.S. Fish and Wildlife Service, Southeast Region. "Felsenthal National Wildlife Refuge." http://www.fws.gov/felsenthal/

U.S. Fish and Wildlife Service, Southeast Region. October 2006. Adapted from "D'Arbonne National Wildlife Refuge Comprehensive Conservation Plan"

U.S. Fish and Wildlife Service, Southeast Region. "Overflow National Wildlife Refuge." http://www.fws.gov/southeast.Overflow/index.html

U.S. Fish and Wildlife Service, Southeast Region, Planning Division. "Southeast Region Comprehensive Conservation Plan Schedule." http://www.fws.gov/southeast/planning/ScheduleByState.htm

U.S. Fish and Wildlife Service. "U.S. Fish and Wildlife Service Piedmont National Wildlife Refuge Fire Management Plan." (draft).

U.S. North American Bird Conservation Initiative. "Integrated Bird Conservation in the United States." http://www.nabci-us.org/

U.S. North American Bird Conservation Initiative. "NABCI-Bird Conservation, Region 27, Southeastern Coastal Plain." http://www.nabci-us.org/bcr27.html and "NABCI-Bird Conservation, Region 29, Piedmont." http://www.nabci-us.org/bcr29.html

Waterbird Conservation for the Americas. "North American Waterbird Conservation Plan." http://www.waterbirdconservation.org/nawcp.html

Zahn, Ellen. 1985. *A Cultural Resources Survey of Seismic Exploration Baselines, Felsenthal National Wildlife Refuge, Arkansas (Project 599).* Submitted to Shoreline Geophysical Services, Inc., Houston, Texas. 42 pp.

Appendix C. Relevant Legal Mandates and Executive Orders

STATUE	DESCRIPTION
Administrative Procedures Act (1946)	Outlines administrative procedures to be followed by federal agencies with respect to identification of information to be made public; publication of material in the Federal Register; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions.
American Antiquities Act of 1906	Provides penalties for unauthorized collection, excavation, or destruction of historic or prehistoric ruins, monuments, or objects of antiquity on lands owned or controlled by the United States. The Act authorizes the President to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the Unites States.
American Indian Religious Freedom Act of 1978	Protects the inherent right of Native Americans to believe, express, and exercise their traditional religions, including access to important sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.
Americans With Disabilities Act of 1990	Intended to prevent discrimination of and make American society more accessible to people with disabilities. The Act requires reasonable accommodations to be made in employment, public services, public accommodations, and telecommunications for persons with disabilities.
Anadromous Fish Conservation Act of 1965, as amended	Authorizes the Secretaries of Interior and Commerce to enter into cooperative agreements with states and other nonfederal interests for conservation, development, and enhancement of anadromous fish and contribute up to 50 percent as the federal share of the cost of carrying out such agreements. Reclamation construction programs for water resource projects needed solely for such fish are also authorized.
Archaeological Resources Protection Act of 1979, as amended.	This Act strengthens and expands the protective provisions of the Antiquities Act of 1906 regarding archaeological resources. It also revised the permitting process for archaeological research.
Architectural Barriers Act of 1968	Requires that buildings and facilities designed, constructed, or altered with federal funds, or leased by a federal agency, must comply with standards for physical accessibility.
Bald and Golden Eagle Protection Act of 1940, as amended	Prohibits the possession, sale or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes, or for the religious purposes of Indians.

STATUE	DESCRIPTION
Bankhead-Jones Farm Tenant Act of 1937	Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, conservation of natural resources and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this Act.
Cave Resources Protection Act of 1988	Established requirements for the management and protection of caves and their resources on federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on federal lands.
Clean Air Act of 1970	Regulates air emissions from area, stationary, and mobile sources. This Act and its amendments charge federal land managers with direct responsibility to protect the "air quality and related values" of land under their control. These values include fish, wildlife, and their habitats.
Clean Water Act of 1974, as amended	This Act and its amendments have as its objective the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. Section 401 of the Act requires that federally permitted activities comply with the Clean Water Act standards, state water quality laws, and any other appropriate state laws. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands.
Coastal Barrier Resources Act of 1982 (CBRA)	Identifies undeveloped coastal barriers along the Atlantic and Gulf Coasts and included them in the John H. Chafee Coastal Barrier Resources System (CBRS). The objectives of the act are to minimize loss of human life, reduce wasteful federal expenditures, and minimize the damage to natural resources by restricting most federal expenditures that encourage development within the CBRS.
Coastal Barrier Improvement Act of 1990	Reauthorized the Coastal Barrier Resources Act (CBRA), expanded the CBRS to include undeveloped coastal barriers along the Great Lakes and in the Caribbean, and established "Otherwise Protected Areas (OPAs)." The Service is responsible for maintaining official maps, consulting with federal agencies that propose spending federal funds within the CBRS and OPAs, and making recommendations to Congress about proposed boundary revisions.
Coastal Wetlands Planning, Protection, and Restoration (1990)	Authorizes the Director of the Fish and Wildlife Service to participate in the development of a Louisiana coastal wetlands restoration program, participate in the development and oversight of a coastal wetlands conservation program, and lead in the implementation and administration of a national coastal wetlands grant program.

STATUE	DESCRIPTION
Coastal Zone Management Act of 1972, as amended	Established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans and requires that “any federal activity within or outside of the coastal zone that affects any land or water use or natural resource of the coastal zone” shall be “consistent to the maximum extent practicable with the enforceable policies” of a state’s coastal zone management plan. The law includes an Enhancement Grants Program for protecting, restoring, or enhancing existing coastal wetlands or creating new coastal wetlands. It also established the National Estuarine Research Reserve System, guidelines for estuarine research, and financial assistance for land acquisition.
Emergency Wetlands Resources Act of 1986	This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan, required the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at national wildlife refuges.
Endangered Species Act of 1973, as amended	Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging the establishment of state programs. It provides for the determination and listing of threatened and endangered species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species.
Environmental Education Act of 1990	This Act established the Office of Environmental Education within the U.S. Environmental Protection Agency to develop and administer a federal environmental education program in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service.
Estuary Protection Act of 1968	Authorized the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired for protection. The Secretary is also required to encourage state and local governments to consider the importance of estuaries in their planning activities relative to federal natural resource grants. In approving any state grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries.

STATUE	DESCRIPTION
Estuaries and Clean Waters Act of 2000	This law creates a federal interagency council that includes the Director of the Fish and Wildlife Service, the Secretary of the Army for Civil Works, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency and the Administrator for the National Oceanic and Atmospheric Administration. The council is charged with developing a national estuary habitat restoration strategy and providing grants to entities to restore and protect estuary habitat to promote the strategy.
Food Security Act of 1985, as amended (Farm Bill)	The Act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.
Farmland Protection Policy Act of 1981, as amended	The purpose of this law is to minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of federal lands.
Federal Advisory Committee Act (1972), as amended	Governs the establishment of and procedures for committees that provide advice to the federal government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.
Federal Coal Leasing Amendment Act of 1976	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.
Federal-Aid Highways Act of 1968	Established requirements for approval of federal highways through national wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other federal agencies before approving any program or project requiring the use of land under their jurisdiction.
Federal Noxious Weed Act of 1990, as amended	The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other federal, State and local agencies, farmers' associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The Act requires each Federal land-managing agency, including the Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the states, including integrated management systems to control undesirable plants.

STATUE	DESCRIPTION
Fish and Wildlife Act of 1956	Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also includes the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it authorizes the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources including, but not limited to, research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein.
Fish and Wildlife Conservation Act of 1980, as amended	Requires the Service to monitor nongamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.
Fish and Wildlife Coordination Act of 1958	Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the Fish and Wildlife Service and the state fish and wildlife agencies where the "waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by any agency under federal permit or license.
Improvement Act of 1978	This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.
Fishery (Magnuson) Conservation and Management Act of 1976	Established Regional Fishery Management Councils comprised of federal and state officials, including the Fish and Wildlife Service. It provides for regulation of foreign fishing and vessel fishing permits.
Freedom of Information Act, 1966	Requires all federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs.
Geothermal Steam Act of 1970, as amended	Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15 c of the Act prohibits issuing geothermal leases on virtually all Service-administrative lands.

STATUE	DESCRIPTION
Lacey Act of 1900, as amended	Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species, this Act prohibits interstate and international transport and commerce of fish, wildlife or plants taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species.
Land and Water Conservation Fund Act of 1948	This Act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.
Marine Mammal Protection Act of 1972, as amended	The 1972 Marine Mammal Protection Act established a federal responsibility to conserve marine mammals with management vested in the Department of the Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals, as well as products taken from them.
Migratory Bird Conservation Act of 1929	Established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The role of the commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council.
Migratory Bird Hunting and Conservation Stamp Act of 1934	Also commonly referred to as the “Duck Stamp Act,” requires waterfowl hunters 16 years of age or older to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges.
Migratory Bird Treaty Act of 1918, as amended	This Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export or import any migratory bird, part, nest, egg, or product.
Mineral Leasing Act for Acquired Lands (1947), as amended	Authorizes and governs mineral leasing on acquired public lands.

STATUE	DESCRIPTION
Minerals Leasing Act of 1920, as amended	Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons; sulphur; phosphate; potassium; and sodium. Section 185 of this title contains provisions relating to granting rights-of-way over federal lands for pipelines.
Mining Act of 1872, as amended	Authorizes and governs prospecting and mining for the so-called "hardrock" minerals (i.e., gold and silver) on public lands.
National and Community Service Act of 1990	Authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on federal or Indian lands.
National Environmental Policy Act of 1969	Requires analysis, public comment, and reporting for environmental impacts of federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations.
National Historic Preservation Act of 1966, as amended	It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.
National Trails System Act (1968), as amended	Established the National Trails System to protect the recreational, scenic, and historic values of some important trails. National recreation trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved state(s), and other land managing agencies, if any. National scenic and national historic trails may only be designated by Congress. Several national trails cross units of the National Wildlife Refuge System.
National Wildlife Refuge System Administration Act of 1966	Prior to 1966, there was no single federal law that governed the administration of the various national wildlife refuges that had been established. This Act defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes(s) for which the refuge was established.

STATUE	DESCRIPTION
National Wildlife Refuge System Improvement Act of 1997	This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority wildlife-dependent public uses, establishes a formal process for determining compatible uses of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the Refuge System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska.
Native American Graves Protection and Repatriation Act of 1990	Requires federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.
Neotropical Migratory Bird Conservation Act of 2000	Establishes a matching grant program to fund projects that promote the conservation of neotropical migratory birds in the united States, Latin America, and the Caribbean.
North American Wetlands Conservation Act of 1989	Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the United States, and Mexico. The North American Wetlands Conservation Council was created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States' share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands).
Refuge Recreation Act of 1962, as amended	This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife-oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.
Partnerships for Wildlife Act of 1992	Establishes a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the state fish and game agencies in carrying out their responsibilities for conservation of nongame species. The funding formula is no more that 1/3 federal funds, at least 1/3 foundation funds, and at least 1/3 state funds.

STATUE	DESCRIPTION
Refuge Revenue Sharing Act of 1935, as amended	Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas.
Rehabilitation Act of 1973	Requires nondiscrimination in the employment practices of federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities.
Rivers and Harbors Appropriations Act of 1899, as amended	Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.
Sikes Act (1960), as amended	Provides for the cooperation by the Departments of Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the United States. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction, and requires that federal and state fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.
Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948	This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.
Transportation Equity Act for the 21st Century (1998)	Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations, and bicycle/pedestrian facilities.
Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended	Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

STATUE	DESCRIPTION
Water Resources Planning Act of 1965	Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational and fish and wildlife needs. The act also established a grant program to assist States in participating in the development of related comprehensive water and land use plans.
Wild and Scenic Rivers Act of 1968, as amended	This Act selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects their local environments.
Wilderness Act of 1964, as amended	This Act directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated wilderness areas that do not alter natural processes. Wilderness values are preserved through a “minimum tool” management approach, which requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas.
Youth Conservation Corps Act of 1970	Established a permanent Youth Conservation Corps (YCC) program within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 11593, Protection and Enhancement of the Cultural Environment (1971)	States that if the Service proposes any development activities that may affect the archaeological or historic sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.
EO 11644, Use of Off-road Vehicles on Public Land (1972)	Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.
EO 11988, Floodplain Management (1977)	The purpose of this Executive Order is to prevent federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." In the course of fulfilling their respective authorities, federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains."
EO 11989 (1977), Amends Section 2 of EO 11644	Directs agencies to close areas negatively impacted by off-road vehicles.
EO 11990, Protection of Wetlands (1977)	Federal agencies are directed to provide leadership and take action to minimize the destruction, loss of degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
EO 12372, Intergovernmental Review of Federal Programs (1982)	Seeks to foster intergovernmental partnerships by requiring federal agencies to use the state process to determine and address concerns of state and local elected officials with proposed federal assistance and development programs.
EO 12898, Environmental Justice (1994)	Requires federal agencies to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 12906, Coordinating Geographical Data Acquisition and Access (1994), Amended by EO 13286 (2003). Amendment of EOs and other actions in connection with transfer of certain functions to Secretary of DHS.	Recommended that the executive branch develop, in cooperation with state, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to comprehensive conservation planning is the National Vegetation Classification System (NVCS), which is the adopted standard for vegetation mapping. Using NVCS facilitates the compilation of regional and national summaries, which in turn, can provide an ecosystem context for individual refuges.
EO 12962, Recreational Fisheries (1995)	Federal agencies are directed to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with states and tribes.
EO 13007, Native American Religious Practices (1996)	Provides for access to, and ceremonial use of, Indian sacred sites on federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites.
EO 13061, Federal Support of Community Efforts Along American Heritage Rivers (1997)	Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Act directs Federal agencies to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.
EO 13084, Consultation and Coordination With Indian Tribal Governments (2000)	Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.
EO 13112, Invasive Species (1999)	Federal agencies are directed to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions and to control invasive species, and promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987, Exotic Organisms (1977).

EXECUTIVE ORDERS	DESCRIPTIONS
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. (2001)	Instructs federal agencies to conserve migratory birds by several means, including the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents.
EO 13443, Facilitation of Hunting Heritage and Wildlife Conservation (2007)	Directs federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitats.

Appendix D. Public Involvement

SUMMARY OF PUBLIC SCOPING COMMENTS

Public input to the development of this draft plan was obtained, in part, through five public scoping meetings held in four different counties (Ashley, Bradley, Desha, and Union counties, Arkansas) from April through June 2008 that were attended by approximately 35 stakeholders. The meetings were held on April 28, 2008 and June 5, 2008 in Crossett, Arkansas; on April 29, 2008 in Hamburg, Arkansas; on May 5, 2008 in El Dorado, Arkansas; and on May 6, 2008 in Warren, Arkansas. The public meetings included an informal workshop where the public was invited to talk with the refuge staff and review maps and information on the refuges; a presentation on the refuges and the CCP process; and an open comment period during which the public was invited to raise issues and topics of concern and to ask questions.

The Service published announcements for the public meetings in the *Federal Register* and legal notices were sent to several local newspapers. The Service also sent news releases to local newspapers and public service announcements to radio stations.

The planning team expanded its list of issues and concerns to include those generated by the agencies, organizations, businesses, and citizens from the local communities. These issues and concerns formed the basis for the development and comparison of objectives in the three alternatives described in the EA. The following tables summarize the comments from the public meetings.

PUBLIC COMMENTS
FELSENTHAL NWR COMMENTS

TOPIC	PUBLIC COMMENTS
Fish and Wildlife Management	• Need to move sanctuary/rest areas for ducks from year to year. • The decreasing fish and duck population is an issue that needs to be addressed. • Do not need to manage for red cockaded woodpecker (RCW) and ducks. • There has been too much habitat taken away for RCW management. Too much hardwood removed. • Keep the greentree reservoir (GTR). • Too many gar, carp and freshwater drum and not a good diversity of fish. Would like a study to address why bass numbers have decreased. • Too much aquatic vegetation. There is not enough food for migrating birds. Maybe can bring in fish to eat invasive aquatic vegetation.
Habitat Conservation and Management	• Aquatic vegetation is a big problem. Water needs to be drawn-down again to kill vegetation. • Trees need to be removed from Hoop Lake entrance. • Do not agree that water is killing timber in • GTR in September and October flooding. • Need to regenerate the red oak in the GTR. • The GTR needs to be flooded at least two weeks prior to season so it is full when ducks arrive. • High pool waters need to be released at a slower rate. Hold the water up to 68 feet every three years allowing fish to spawn until the end of April. • Would like to see a different flooding plan. • Timber management on Felsenthal; It seems as if the last true pine - hardwood mix is gone; concerned by timber removal in that area. • Increase cutting of pine timber when market permits. Would like refuge to stop killing trees in GTR. Need to control the water at lower elevations. • Would like to see something done about the snakes on Felsenthal. • Alligators are not native to Arkansas and should be removed. • Stop burning so often. Need only to burn every 3 to 4 years. • Nuisance wildlife species, like hogs and beaver are a problem on the refuge.

TOPIC	PUBLIC COMMENTS
Visitor and Education Services	• Ban all hunting and trapping on refuge. Stop using words like “wildlife dependent” in regards to hunting. • Fishing should be first priority on the refuge. • Need better ATV access below Highway 82. More blue trails need to be designated as year-round trails so families can experience riding in the woods. • Half of ATV trails need to be taken out because they are destructive. • Designate handicap ATV trail with high LE presence. • ATV trails need to be better maintained. • Due to low fish levels, need to increase AGFC stocking levels of game fish. • Flood earlier to make sure there is adequate water for hunters when season opens. • Because of longer bow hunting season and new bow technology, deer population is decreasing and is a problem. • Refuge bag limit for deer needs to be 2 deer per season one doe and one buck with at least 8 points. • There was no need to change the deer hunting regulations…the 4 inch rule and doe hunt worked very well. • Refuge needs to give fewer permits for deer and turkey quota hunts to increase populations. • Reduce the length of deer season, one hunt in November and one in December. • This is the way the refuge should manage their hunts for the next three years: * Allow bow hunters to only take one turkey and permits should cost $20. * Hold one youth turkey hunt for 2 days with a limit of one. (35-40 permits) * Hold one muzzleloader hunt for two days with 500 permits. * The bag limits for deer should be 1 of either sex - Buck must have 4 points on one side. • The refuge needs to have a quota duck hunt. • Refuge needs to go back to a three duck limit. • Refuge needs to put more emphasis on trash fish harvest (perhaps could encourage bow fishing for gar). • Would like access to Turkey Ridge, Strong Deer Camp, Beryl Anthony, and Gravel Ridge. The road should not be blocked. • Refuge needs to be three times larger. • Wants additional hog hunting opportunities.

TOPIC	PUBLIC COMMENTS
	• Clear brush away down at the Hogan Track for camping. • Allow dogs during hog hunts. • Would like to have squirrel season with dogs earlier. • Would like to continue to allow trapping on the refuge. • Alter hunting hours. • Would like to see more use of the refuge and visitor's center by schools. • Does not agree with the refuge's proposed new time of 4:30 am for the entry time for duck hunters. Thinks it will be unsafe because of fog, danger of making others angry at the boat launch and long traveling times due to having to use lighted boat ramps. Would like the entry time to be no later than 3:00 am to beat fog.
Resource Projection	•
Refuge Administration	• Reduce/eliminate the regulations that govern the refuge.

PUBLIC COMMENTS
OVERFLOW NWR COMMENTS

TOPIC	PUBLIC COMMENTS
Fish and Wildlife Management	• Farmers are not leaving enough food for ducks in the cost shared program.
Habitat Conservation and Management	• Need to pump water into Overflow when rain does not flood bottoms. • For land owners, they have a decrease in productivity because of the damage the hogs are causing to their crops. • There is a need for a more aggressive program to eliminate beaver dams and beavers. • Fix the hole in the dam or tear it out and put pipe or valve in.
Visitor and Education Services	• Good structure for the plan. Do not lose focus of things that can be done; specifically hog problem. Can only go in with dogs during a certain period. There is only a certain timeframe for hog hunting; and it seems that as I am thought of as an outlaw because I am a "hog hunter"; this is an issue. The beavers also need to be addressed. • Allow use of a higher caliber for hunting hogs. • Turkey season - do away with the "quota" hunt. Archery only. • Fees for hog and beaver hunting are a concern. • Change squirrel season; being able to use dog during this season would assist in getting rid of the hogs. • We should be allowed to go off the trail to get the hog; especially if using a horse. • Deer – Muzzleloader hunt - the way Overflow does the deer program is great and is run the right way and needs to stay the way it is. • Duck hunting –There is a certain place at Overflow, north of the boat ramp near the power line, where the water is not deep enough for boat across. What I would like too see is an elevation there to make it easier to put your boat(s) in.
Resource Projection	•
Refuge Administration	•

Appendix E. Appropriate Use Determinations

Felsenthal and Overflow National Wildlife Refuges Appropriate Use Determinations

An appropriate use determination is the initial decision process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must find that a use is appropriate before undertaking a compatibility review of the use. This process clarifies and expands on the compatibility determination process by describing when refuge managers should deny a proposed use without determining compatibility. If a proposed use is not appropriate, it will not be allowed and a compatibility determination will not be undertaken.

Except for the uses noted below, the refuge manager must decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. Uses that have been administratively determined to be appropriate are:

- Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997, the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate. However, the refuge manager must still determine if these uses are compatible.

- Take of fish and wildlife under state regulations - States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

Statutory Authorities for this policy:

National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. §668dd-668ee. This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and "under such regulations as he may prescribe." This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states ". . . it is the policy of the United States that . . .compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System . . .compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and . . . when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated . . . the Secretary shall . . . ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System . . . ." The law also states "in administering the System, the Secretary is authorized to take the following actions: . . . issue regulations to carry out this Act." This policy implements the standards set in the Act by providing enhanced consideration of priority general public uses and ensuring other public uses do not interfere with our ability to provide quality, wildlife-dependent recreational uses.

Refuge Recreation Act of 1962, 16 U.S.C. 460k. The Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Other Statutes that Establish Refuges, including the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) (16 U.S.C. §410hh - 410hh-5, 460 mm - 460mm-4, 539-539e, and 3101 - 3233; 43 U.S.C. 1631 et seq.).

Executive Orders. The Service must comply with Executive Order 11644 when allowing use of off-highway vehicles on refuges. This order requires the Service to designate areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered. Furthermore, Executive Order 11989 requires the Service to close areas to off-highway vehicles when it is determined that the use causes or will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources. Statutes, such as ANILCA, take precedence over executive orders.

Definitions:

Appropriate Use
A proposed or existing use on a refuge that meets at least one of the following four conditions.

1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3) The use involves the take of fish and wildlife under state regulations.
4) The use has been found to be appropriate as specified in section 1.11.

Native American. American Indians in the conterminous United States and Alaska Natives (including Aleuts, Eskimos, and Indians) who are members of federally recognized tribes.

Priority General Public Use. A compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Quality. The criteria used to determine a quality recreational experience include:

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.

- Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

Wildlife-Dependent Recreational Use. As defined by the Improvement Act, a use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge

Use: Power Boating

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 02-26-2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge

Use: Bee Keeping

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ____

Refuge Manager: _____ Date: 02-26-2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: All Terrain Vehicle Use

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: Berry Picking

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: Camping

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: Commerical Fishing

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: FIELD TRIALS

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: Firewood Cutting

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: Forest Management

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: Furbearer Trapping

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ___ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: Horseback Riding

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge - Arkansas

Use: OUTDOOR RECREATION ACTIVITIES

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Felsenthal National Wildlife Refuge

Use: Guided hunting/fishing - waterfowl, deer, turkey etc.

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ___ No ✓

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate** ___

Refuge Manager:_____ Date: August 17, 2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Overflow National Wildlife Refuge

Use: FURBEARER TRAPPING

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Overflow National Wildlife Refuge

Use: ALL-TERRAIN VEHICLE USE

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Overflow National Wildlife Refuge

Use: Bee Keeping

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate**_____

Refuge Manager:_____ Date: 02-26-2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Overflow National Wildlife Refuge

Use: CROPLAND MANAGEMENT

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Overflow National Wildlife Refuge

Use: FIELD TRIALS

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ___ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Overflow National Wildlife Refuge

Use: FIREWOOD CUTTING

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ___ **Appropriate** ✓

Refuge Manager: _____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: _____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Overflow National Wildlife Refuge

Use: HORSEBACK RIDING

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Overflow National Wildlife Refuge

Use: POWER BOATING

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	**YES**	**NO**
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date: 08-18-2009

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appendix F. Compatibility Determinations

FELSENTHAL NATIONAL WILDLIFE REFUGE COMPATIBILITY DETERMINATIONS

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the Refuge System and the purposes of the refuge.

Felsenthal NWR:

1. Power boating
2. All-terrain vehicle use
3. Berry picking
4. Camping
5. Commercial fishing
6. Dog field trials
7. Firewood cutting
8. Forest management
9. Furbearer trapping
10. Horseback riding
11. Bicycling, boating (nonmotorized), swimming, beach use, and hiking/backpacking
12. Hunting
13. Fishing
14. Wildlife observation, photography, environmental education, and Interpretation

Refuge Name: Felsenthal National Wildlife Refuge.

Date Established: 1970.

Establishing and Acquisition Authority(ies):

- 16 U.S.C. § 664 (Fish and Wildlife Coordination Act)
- 16 U.S.C. § 460k-1
- 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended)
- 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

Section 118 of the River and Harbor Act of 1970 (Public Law 91-611), approved December 31, 1970, modified the Ouachita and Black Rivers Navigation Project ..."to provide for the acquisition of lands for establishment of national wildlife refuges, under the provisions of Public Law 85-624 and section 6(c) of Public Law 89-72, ... substantially in accordance with the report of the Chief of Engineers dated November 25, 1970 ..." Under the authority of this act, 64,813 acres of land was transferred from the Department of the Army to the Department of the Interior for the establishment of the refuge subject to "the right of the U.S. Corps of Engineers to construct, modify, operate, and maintain the Ouachita-Black Rivers Navigation Project, as presently authorized or as it may be subsequently modified; and further, to complete construction of approved recreational developments located within the Felsenthal National Wildlife Refuge as specified in the approved (Recreational) Master Plan for the Project."

Refuge Purposes:

- Provide habitat for migratory waterfowl and other birds;
- Provide habitat and protection for endangered species such as the red-cockaded woodpecker, and the threatened American alligator and the protected bald eagle;
- Provide recreation and environmental education for the public;
- Protect cultural resources.

- "... that the Felsenthal area has significant value in carrying out the National Migratory Bird Management Program ... that acquisition of lands for a refuge at this location would contribute to the national goals for conservation of migratory waterfowl by providing important migration and wintering habitat ... that creation of a national wildlife refuge ... would provide a vital link in the Mississippi Flyway for the enhancement of the waterfowl and wildlife of the Nation ..." (Report of the Chief of Engineers, November 25, 1970).

- "The proposed refuge would be managed to provide a wide range of benefits of both a recreational and economic nature." (Report of the Chief of Engineers, November 25, 1970).

- "... shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon ..." 16 U.S.C. 664 (Fish and Wildlife Coordination Act).

- "... full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation and for fish and wildlife enhancement and that, wherever any such project can reasonably serve either or both of these purposes consistently with the provisions of this Act, it shall be constructed, operated, and maintained accordingly ..." 16 U.S.C. 4601-12 (Federal Water Project Recreation Act).

- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. 460k-1 (Refuge Recreation Act).

National Wildlife Refuge System Mission: The mission of the Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997, is:

> *... to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.*

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)

Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” and the succeeding section “Approval of Compatibility Determinations” are only written once within the plan, they are part of each descriptive use and become part of that compatibility determination if considered outside of the comprehensive conservation plan.

Use: *Power Boating*

Description of Use: The use of powerboats and water skiing occurs in a portion of the 15,000 acres of refuge waters. By far, the majority of powerboat use is associated with sport fishing, the single largest refuge use, accounting for some 85 percent of the 350,000 annual visits. Some purely recreational boating use does occur that is self-confined to a portion of the navigable Ouachita River itself. Hunters, particularly waterfowl hunters, also commonly utilize powerboats to access remote areas. Only about 5,000 of the 15,000 acres comprising the Felsenthal navigation pool is suitable for most powerboats during normal water levels due to the shallow, log and vegetation-chocked condition. During periods of flooding, as much as 90 percent of the 65,000-acre refuge is underwater and at least marginally negotiable by powerboat. Powerboat use is considered essential to support priority public use activities.

Availability of Resources: The areas used for power boating have been open to public use since they were acquired. Supervision and enforcement of these activities will be administered by Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: The most obvious biological impacts of these activities are disturbance to wildlife, increased litter, and possibly some water pollution from exhaust gases and spilled fuel. Time and space zoning is utilized (egg waterfowl sanctuaries closed to all public entry - including boats, closed areas) to eliminate possible impacts to sensitive areas and wildlife populations sensitive to disturbance. Existing zoning actions have effectively maintained disturbance at an acceptable level. Some level of disturbance is unavoidable when any use occurs; obviously degree of disturbance varies tremendously dependent upon time of year and type of use. Given current public use patterns, levels and time/space zoning regulations in place, use of power boats does not negate achieving wildlife objectives and function as a critical mode of transportation for priority public use activities.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Enforcement of refuge regulations and state and federal boating regulations.

2. Continued seasonal closure of waterfowl sanctuary areas to all public entry will minimize disturbance to wildlife.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Use of powerboats is a longstanding traditional use of the Ouachita River and adjacent waterways. Boat use is essential as a mode of transportation for priority public uses such as hunting and fishing. Commitments were made during public meetings associated with establishment of the refuge that such uses will continue to be allowed even though they may have to be regulated. The entire Ouachita River is a navigable waterway and, as such, open to power boating. No change is proposed in this use.

Mandatory 10-Year Re-evaluation Date: _____

Use: *All-terrain Vehicle Use*

Description of Use: The use of high-flotation all-terrain vehicles (ATVs) is permitted only on designated roads and trails to reach remote areas open to hunting, fishing, and trapping. This refuge, located along the Ouachita and Saline rivers and subjected to annual extended, deep-water flooding, does not have a developed or improved road system within the floodplain. Road system development under these conditions is extremely expensive and maintenance is expensive with perhaps the biggest issue being impacts to localized hydrology associated with elevated roadbeds required within this type topography. Instead, a system of ATV trails was identified early on in the development of this refuge with most access to remote areas for wildlife-dependent activities restricted to these trails. Virtually without exception, these trails were superimposed upon existing "logging" roads that had been used for decades to reach remote areas. Utilization of ATVs as a mode of transportation on designated routes of travel has been the 'norm' at this station for well over 20 years and is considered essential by the refuge staff in order to develop and implement a refuge public use program involving wildlife dependent priority uses (hunting, fishing, etc.).

All ATV use is restricted to designated, marked trails. Approximately 65 miles of specifically-marked trails exist; about 8 miles are “blue” trails—painted with blue paint—that are open year-round to reach traditional fishing areas without road access. The remaining trails are “yellow” trails—painted with yellow paint—that are open only during the refuge hunting and trapping seasons (September–January 31). Trails are marked by spray painting trees along the designated route of travel and erecting signs at trailheads. ATV engine size is restricted to 700cc displacement, a vehicle width of 63 inches and ATV tires are restricted to those having a maximum pressure of 12 p.s.i. and a centerline lug depth not greater than one inch. ATVs are not allowed on any improved or gravel road open to conventional vehicles. The existing designated trail system is close to optimum, e.g., the minimal level needed to conduct the public use program. Minor additions/deletions, re-routing or seasonal opening date changes may be implemented from time to time to address needs as they occur but major changes/modifications will not occur.

Availability of Resources: Felsenthal NWR staff maintains the trails marked for all-terrain vehicle use by clearing trails of debris/down trees (typically by small crawler tractor and/or chainsaws) and repainting marked trees. Supervision and enforcement of all-terrain vehicle use is administered by Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Use of ATVs does result in some minimal disturbance to wildlife as with any use. Restricting use to designated trails routed to avoid sensitive areas such as major stream crossings or archaeological areas and opening most trails to seasonal use minimizes overall potential impacts. Disturbance to waterfowl is very minimal in that these unelevated trails flood quickly (particularly slough/high water drain crossings) and become impassible. Negligible impacts to endangered species are anticipated because the designated trails are located to intentionally avoid red-cockaded woodpecker colony areas. Despite the fact that ATV's are high flotation vehicles with tire thread restrictions, there are some ground vegetation impacts and some rutting when soils are saturated. These impacts are confined to the designated trails and in general, are temporary in that these areas tend to fill back or heal from one year to the next.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Only standard manufacturer's high flotation ATVs (such as 4-wheelers and "Hustlers") with an engine size not greater than 700cc displacement, maximum vehicle width of 63 inches, tires with a maximum pressure of 12 p.s.i. and a centerline lug depth not greater than one inch, are allowed.
2. ATVs are restricted to designated trails only.
3. ATVs may be used only to reach areas open to wildlife-dependent activities such hunting, fishing, etc., and their use is restricted to a mode of transportation for those individuals involved these on-refuge uses.
4. Most trails are open only from September – January 31.
5. ATVs may not be used on improved or gravel roads open to conventional vehicles.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: ATVs cause much less damage to roads and trails than do conventional and four-wheel drive vehicles. ATVs provide access to traditionally-used portions of the refuge with minimal disturbance to wildlife and damage to the environment compared to other types of motorized travel. Use of ATVs helps distribute hunters (especially deer hunters), thereby facilitating a balanced harvest and reducing hunter crowding. Since no developed road system is present within the floodplain of this refuge, authorizing utilization of ATVs is essential to implementing a public use program involving priority uses.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Berry Picking*

Description of Use: The traditional collection (picking) of native mayhaw (*Crataegus aestivalis* [Walter]) fruit and other berries (almost exclusively blackberries) for personal (noncommercial) use on the refuge is permitted without a Special Use Permit. A commonly occurring shrub or small tree within floodplain hardwood communities of the Deep South, mayhaw fruit ripens in late April - May and has been used for decades to make jelly. This practice has decreased dramatically over the last 10 -20 years as life style changes rendered this activity to a novelty. Generally, no more than 25 individuals actually make an effort to gather mayhaws, with these numbers usually less than 5-10 people annually. Actual collection is time consuming and quite difficult, further complicated by the fact that the refuge is usually totally flooded through early summer each year. Actual quantity of fruit removed, therefore, is quite small. The level of use has been such that previous refuge staff found no reason to restrict numbers of individuals involved.

Availability of Resources: The area used for fruit and berry picking has been open to public use since it was acquired. Felsenthal NWR staff will not be involved in the collection of berries.

Anticipated Impacts of the Use: Collection of fruits and berries for personal use will have a negligible impact on forest and wildlife resources. No adverse impacts are anticipated at the current level of use. If, for some unknown reason, this level of use increases, refuge staff will reevaluate this activity and consider additional measures such as individual SUPs and establishing a quantity limit.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Restrict the use of mayhaw fruit and other berry collection to personal use only.
2. Ensure that all refuge regulations pertaining to access and public use is enforced.
3. Staff should continue to periodically review level of use and revise the condition under which this activity can be continued, if necessary, to eliminate any negative impacts.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: The collection of mayhaw fruit and other berries is a longstanding tradition within the Felsenthal Basin. Commitments were made during public meetings associated with establishment of the refuge in the 1970s were that such uses would be allowed even though they may be regulated. Essentially all of this activity occurs during the month of May and is self-limited to mayhaw trees within walking distance of roads, trails, and waterways open to vehicles and boats. This use has dropped significantly over the years and will likely continue to diminish with changing of population demographics.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Camping*

Description of Use: Camping is permitted in 10 designated primitive (no facilities) campgrounds strategically located within the 100-square mile refuge. Camping is only allowed in conjunction with on-refuge, wildlife-oriented activities, primarily hunting and fishing. Two of the campgrounds are accessible only by watercraft (via the Ouachita River), eight are accessible by watercraft and land vehicles (depending on water levels), while two are accessible solely by land vehicles. All campgrounds except for one are open year-round. The 10 campgrounds on the refuge are primitive camping only and have been identified in refuge plans/station public use reviews as essential to the public use program over the course of many years. Camping area entrances are marked by signs and boundaries are marked with orange paint.

Availability of Resources: The areas used for camping have been open to public use since they were acquired. Supervision and enforcement of camping activities will be administered by Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Camping may result in some disturbance to wildlife, increased litter, increased demand on limited staff time and funding, and increased administrative burden associated with enforcing refuge regulations. These impacts, at this time, are within allowable levels to maintain compatibility in that this use is critical to support the existing priority refuge public uses such as hunting and fishing. Also, some loss of native vegetation (within the campgrounds) resulting in limited soil compaction and erosion has been noted.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Existing level (number of campground locations) is the minimum needed to support existing public use levels. In fact, during peak use periods, inadequate space is available and users have to be routed to other locations or off the refuge. At the same time, existing level (number of campground locations) is at the maximum level that can be physically maintained given existing staffing/funding levels and is at the maximum level for maintenance of compatibility. It is the opinion of the current refuge staff that this refuge, at existing acreage, simply cannot absorb additional increases in public use without impacting refuge wildlife resources. Camping availability, which directly supports these activities, plays a role in contributing to the level of use given the rural nature of this area and thus must be part of the solution, if necessary.
2. All camping is restricted to designated locations marked with signs and paint and identified in refuge publications. All campground locations on refuge property will be primitive in nature (no facilities) and function simply as an alternative for the user public given the remote location and general absence of adequate commercial facilities. Developed locations with facilities such as designated sites, sewer, water, etc. will not be provided - the cost of development, maintenance and operation exceeds funding levels and would likely result in increased public use demands associated with nonwildlife-dependent recreational activities.
3. Campers may stay no more than 14 days during any 30-day period in any refuge campground.
4. All camps must be occupied daily.
5. All disturbances, including the use of generators, are prohibited after 10 p.m. Consumption of alcoholic beverages in plain view is also not permitted.
6. All users must be involved in on-refuge, wildlife-dependent recreational activities. Camping on the refuge while hunting or fishing off the refuge is not permitted.
7. A moderate law enforcement presence is maintained throughout the year with an increased presence during higher use periods, especially the hunting seasons.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement (516 DM 2, Appendix 1, 1.4. B.(2) - is a routine recurring management activity which results in no changes in the sue and has negligible environmental effects on-site or in the vicinity of the site).

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: The outdoor experience, especially by hunters and fishermen from distant locations, is vastly enhanced by the primitive camping opportunity. It should be noted that a large percent of refuge users are from nonlocal areas (e.g., in excess of 75-100 miles from the area). There are inadequate overnight accommodations (i.e., hotels, motels, etc.) in close proximity to the refuge. Providing primitive, on-refuge camping locations has been viewed by all refuge staff since refuge establishment in the 1970s as essential to support development and implementation of priority public use activities such as hunting and fishing. Current use rates, including public use in general (all activities) and physical capacity to support camping are about at maximum capacity with little if any room for expansion. At existing levels, this use remains compatible and is an essential part of the refuge public use program. Staff needs to remain vigilant to changes (increases/decreases) in use levels and patterns and adjust opportunities available through time and space zoning as needed to eliminate overall resource impacts.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Commercial Fishing*

Description of Use: Commercial fishing, including use of any commercial fishing tackle as defined in state regulations, by the public is allowed on portions of the refuge via a $35.00 Special Use Permit (SUP). Commercial fishing is utilized to remove fish commonly known as rough fish from the refuge streams and oxbow lakes. The species targeted for removal (are identified as commercial species by the state) include German carp, silver carp, big head carp, grass carp, black carp, buffalo, and catfish. The five carp species are exotics, which as a group, have impacted and to some degree, replaced the native fisheries within the refuge and ecosystem. The overly abundant native buffalo and, to a lesser degree, catfish also compete with other native fisheries.

One of the primary objectives of the refuge system is to remove exotics from refuges and to restore historic native populations. Removal of these exotics and a reduction in the native rough fish population by commercial harvest is a management practice aimed at reducing the competition and adverse impacts to native species, especially during early life stages. During early developmental stages, fry from these species and native species both feed on micro and macro organisms, which are no longer available in historic concentrations due to increased water turbidity and other factors.

Fishery biologists with the Service have historically recommended to refuge managers the commercial harvest of 'rough' species as a management tool with the objective to increase/restore native sport fish populations on refuges. Commercial harvest of these species at Felsenthal NWR is a management activity aimed at achieving the Service mission of removal of exotics, restoration of native fish populations, and to provide a native and sport fishery for the enjoyment of the public now and for future generations. Commercial fishing is open year-round on navigable waters (nonrefuge waters) and from September 30 – May 1 on nonnavigable waters (refuge waters). These dates coincide with state regulations within this area. Collection of certain fish species, such as flathead catfish, for commercial purposes is prohibited due to mercury advisories.

Availability of Resources: The waters used for commercial fishing have been open to public use since they were acquired. The vast network of rivers, creeks, and lakes on the refuge support abundant populations of rough fish and is able to support a sustained harvest of these species. Fishermen will provide necessary equipment and resources to administer the harvest. Thus, commercial fishing activities will require minimal effort from Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Conducted under conditions imposed by the refuge special use permit, no adverse long-term impacts are anticipated from commercial fishing. Removal of some species of rough fish (through commercial fishing or other means) can serve as a positive population control mechanism and enhance sport fish populations by reducing competition between species. Some nontarget (noncommercial) species will inadvertently be caught with commercial tackle. Conflict between commercial fishermen and recreational fishermen may occur and result in hard feelings, expressed anger, property theft, and damage to nets, trotlines, or other gear. Felsenthal NWR law enforcement officers will monitor and regulate such activities.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Fishing for commercial purposes or with commercial tackle requires an SUP.
2. Commercial fishing is open year-round on navigable waters and from September 30 – May 1 on nonnavigable waters.
3. Fishermen must meet all local, state, and federal license/permit requirements and comply with subject regulations.
4. Continue a moderate level of law enforcement to ensure compliance with state and federal regulations and to monitor potential conflicts between user groups.
5. Gill and trammel nets must be checked daily and any nontarget species must be released.
6. Any alligators caught in nets must be promptly reported to the Refuge Manager.
7. All trotlines must be anchored with cotton or biodegradable lines.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Use of commercial tackle to catch rough fish and catfish for personal consumption and/or for sale is a longstanding traditional activity in this part of the country. Felsenthal NWR has been open to commercial fishing activity in accordance with state regulations since establishment in the 1970's. Commitments were made at public meetings held during establishment of the refuge that such uses will continue to be allowed even though they may be regulated. This activity is compatible with the purposes for which the refuge was established, provides both wildlife-oriented recreational and economic opportunities, and serves as a scientifically accepted wildlife population control tool. Overall, the amount of commercial fishing has declined in refuge waters the past few years and is expected to remain at current levels. For the past five years the number of special use permits issued ranged from 35 to 23, with a five year average of 29 permits per year. This refuge contains approximately 20,000 acres of permanent water at normal (low) water levels and in excess of 50,000 acres of water during the 3-6 months of each year when extended, deep water flooding occurs. Encouraging/allowing commercial fishing will provide increased removal of rough fish species and positively impact populations of sport fish.

Mandatory 10-Year Re-evaluation Date:_____

Use: *Dog Field Trials*

Description of Use: PKC/UKC (or other recognized sanctioning body) sanctioned dog field trials are allowed on Felsenthal NWR via a Special Use Permit. Fee schedules utilized are $25 for each permit where no entry fee (simply friendly competition) to participate is charged and $50 for each permit where entry fees are charged. These fee schedules may be adjusted as needed commensurate with prevailing rates for such use in the area. This activity is viewed as a "secondary" use of the national wildlife refuge system and is administered in a fashion to minimize any impacts to priority uses.

Availability of Resources: The land needed for administering dog field trials has been open to public use since it was acquired. Felsenthal NWR staff will have limited involvement in the field trial operations.

Anticipated Impacts of the Use: Conducted under carefully controlled conditions typically imposed by the sanctioning organizations and the refuge special use permit, very few if any impacts occur as a result of these infrequently held field trial activities. Annually, about 4-5 such events will be conducted on parts of Felsenthal NWR. If the frequency of the activity is increased to a high level (weekly or perhaps even monthly), the level of cumulative impacts due to disturbance could become unacceptable.

As with any activity, some disturbance to other wildlife species will probably occur as a result of this activity. However, based upon years of experience in administering this type activity, this disturbance will be minimal and will not result in unacceptable impacts to refuge wildlife resources or other refuge visitors at low levels of occurrence. Refuge staff carefully monitors all such activities to document results and will modify conditions as needed (i.e., establish more restrictive dates and times, restrict numbers of participants, restrict geographical area open to this activity, implement closure) to assure minimal and acceptable levels of disturbance, and thus impacts.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. All field trial activities conducted on the refuge will be fully sanctioned by a recognized sponsoring organization, such as UKC or PKC.
2. All sanctioning organization rules governing field trial activities will be implemented and will be a requirement of a Special Use Permit.
3. Field trial activities will be restricted to designated areas and to designated date(s) in order to minimize conflict with wildlife and with other user groups. All raccoon field activities must end at 1 a.m..
4. Refuge staff will not issue repetitive permits or more than three permits per year to the same organization in order to minimize the number of events taking place.
5. Further restrictions as to the number of events authorized will be implemented, if warranted, based on requests for these types of activities and upon results of monitoring.
6. All refuge regulations, including restrictions on possession of firearms, will be strictly enforced. Access is limited to existing designated primary refuge roads; ATV's will not be allowed.
7. No wildlife may be taken (killed) during these events; wildlife may not be brought in, released, or removed from the refuge.
8. A limit of one cast per unit of the refuge will be imposed for each event on the refuge. Due to topography and access limitations, this refuge can be divided into four distinct units.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Sanctioned field trials are traditional recreational activities in this part of the United States. The trials are used to judge a dog's performance, not for the taking of wildlife, and are conducted under carefully controlled conditions imposed by the sanctioning organization to assure fair competition. These field trials promote and encourage sound conservation practices and ethics with minimal impacts on other wildlife or their habitats. Establishing authorities for this refuge and refuge purposes statements direct that refuge public use programs be as liberal as possible without materially impacting wildlife resources and wildlife habitats. Field trials conducted under the conditions outlined above are clearly wildlife-dependent activities that do not materially impact other users or other resources and, therefore, are viewed as compatible with the purposes for which this refuge was established. The activity, as described above, has been conducted at this refuge for many years.

Mandatory 10-Year Re-evaluation Date:_____

Use: *Firewood Cutting*

Description of Use: Firewood cutting and/or picking up firewood for personal (noncommercial) use is permitted via individually issued firewood cutting permits. Only downed trees may be utilized; no cutting of standing, live trees permitted. Access is restricted to existing designated roads or trails open to motorized vehicle use. No fee schedule is established for this activity.

Availability of Resources: The land needed for firewood collection has been open to public use since it was acquired. Other than minor amounts of compliance checks, Felsenthal NWR staff will not be involved in the collection of firewood.

Anticipated Impacts of the Use: Collection of firewood for personal use under the conditions stipulated will have a negligible impact on forest and wildlife resources. Minor amounts of potential habitat for insects that routinely colonize down/rotting forest debris and the fauna that feeds on this insect life may be lost. However, within floodplain forest communities, this is absolutely not a limiting factor in that the forest floor is routinely heavily littered with downed/decaying wood from the stand overstory. No adverse impacts are anticipated at the current level of use and with the stipulations of the firewood cutting permit.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. A specified time limit to cut/collect firewood is clearly stated on each permit (normally 14 days).
2. All wood removed must be for personal (noncommercial) use only.
3. Only tops, or downed timber in designated areas may be removed.
4. Vehicles may be driven off of designated roads and trails to remove firewood only with site specific authorization by the refuge manager (vegetation and ground conditions present at any given time/place will determine appropriateness so as to minimize any rutting or forest vegetation damage).
5. Wood may be removed during daytime hours only.
6. All refuge regulations apply and will be strictly enforced.
7. Failure to comply with any condition of the permit may result in immediate revocation, prosecution and fine, and be cause for refusal of future refuge permits.
8. All debris must be removed from roads, road shoulders, and ditches.
9. Maximum volume removed without charge will be three cords per permittee per year.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement (516 DM 2, Appendix 1, 1.4 B.(2) - is a routine recurring management activity which results in no changes in the use and has negligible environmental effects on-site or in the vicinity of the site)

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification:

Properly regulated firewood cutting allows the use of a renewable natural resource, potentially can serve as a forest management tool to enhance wildlife habitat, and results in positive public relations for the refuge. Impacts to refuge resources are negligible, nor is there the potential for developing a use activity which could lead to long-term impacts given the stipulations listed above.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Forest Management*

Description of Use: The most significant and inexpensive tool for the enhancement of wildlife habitat is active forest management. In fact, forest management is the only tool realistically that is available to enable achievement of refuge wildlife objectives given the fact that the entire refuge is forested. Wildlife scientists and management professionals within forested ecosystems have long viewed an active forest management program as the tool of choice. Of necessity, accomplishment of habitat improvement targets (the only reason for doing active forest management) heavily utilizes the commercial sale of refuge forest products (timber sales) to accomplish needed habitat improvements

since funding and staffing never has and never will be at a level to achieve force account (refuge staff) conducted actions only.

Active forest management consists of mechanical removal of commercial and noncommercial forest products by refuge personnel or contractors utilizing conventional logging equipment or nonmechanized equipment such as draft animals. The refuges are subdivided into manageable size compartments that are selected for forest management activities based on the greatest need for wildlife habitat improvement, tempered with considerations for spatial, temporal and area constraints stated in the Wildlife-Timber Management Plan. Once selected, vegetative/wildlife data is collected and analyzed to determine the extent of treatment needed, then expressed in a step-down document (Habitat Management Prescription) that details the specific silvicultural strategies necessary to obtain specific wildlife habitat objectives. Vegetation is identified for removal by "spotting" with lead free paint or ink or described in detail using criteria such as diameter, height, species, spacing, location, basal area, etc. Special Use Permits, detailing specific environmental, fiscal, physical and administrative constraints, are issued to contractors that have bid the highest for the forest products or through the negotiation process, if applicable. All state and federal permits, clearances, and consultations, such as State Historic Preservation Office cultural resource clearance, permits associated with the Clean Waters Act, and Intra-Service Section 7 consultation are obtained prior to implementing the Special Use Permit. Conducting active forest management on Felsenthal NWR, in accordance with the approved forest management plan, is absolutely essential for meeting refuge wildlife objectives.

Availability of Resources: Most forest management activities will be administered by Felsenthal NWR staff and will not exceed the general operational costs of the refuge. Recent management staff losses due to inadequate operational funding is and will continue to impact the refuge's ability to implement habitat management actions at a level needed to maintain and improve habitat conditions. Yet, this activity is perhaps the single highest priority for the refuge due to its critical nature in achieving wildlife objective and staff will continue to make every effort to address forest stand improvements needed. Specialized activities, such as timber extraction, will be contracted to private companies or individuals. Utilizing contract loggers to achieve forest habitat management goals is the only way to achieve improvements given inadequate staff to implement force account harvest activities. Receipts generated from the sale of forest products removed from the refuge are deposited into the Refuge Revenue Sharing Account. The funds collected annually from all refuges are distributed to the counties on a prorated basis (acreage of refuge land within each county and appraised value of this land) as an 'in-lieu-of taxes' payment as directed by the Refuge Revenue Sharing Act.

Anticipated Impacts of the Use: No adverse long-term impacts are anticipated. For a more detailed analysis, refer to the approved Wildlife-Timber Management Plan, associated Environmental Assessment, and Section 7 Endangered Species Evaluation.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Ensure adherence to the currently approved Wildlife-Timber Management Plan.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification:

Forest management is compatible with the purposes for which the refuge was established, is the single tool enabling meeting refuge wildlife objectives, and is absolutely essential to meet the needs of wildlife that utilize the refuge.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Furbearer Trapping*

Description of Use: Trapping of furbearers by the public for recreational purposes is allowed on portions of the refuge via a $35.00 Special Use Permit (SUP). Species classified as furbearers by the State include: badger, beaver, mink, bobcat, civet cat (spotted skunk), coyote, gray fox, muskrat, nutria, opossum, raccoon, river otter, skunk, and weasel. Raccoon, mink, beaver, and opossum are the primary target species for trapping on Felsenthal NWR based upon reports required from each permittee annually. Trappers are required to maintain detailed records of take as a condition of the SUP and provide this information to the refuge. Very little trapping actually takes place at the current time due to low fur values for virtually all species. The refuge trapping season will open with the state season (mid- to late-November) and close January 31 of each year. Having the refuge season correspond with surrounding areas will alleviate many administrative and law enforcement problems.

Availability of Resources: The land used for furbearer trapping has been open to public use (and trapping) since it was acquired. The bottomland hardwood forests of the refuge are dissected by an intricate system of rivers, creeks, lakes, beaver ponds and sloughs that support abundant and diverse furbearer populations. The habitat is able to support a sustained harvest of furbearers far in excess of current levels. Trappers will provide necessary equipment and resources to administer the trapping. Thus, furbearer trapping activities will require minimal effort from Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Conducted under conditions imposed by the refuge special use permit, no adverse long-term impacts are anticipated from furbearer trapping. The animals taken by trappers serve as a positive population control mechanism for problem species such as raccoon and beaver, thus protecting several thousand acres of prime bottomland hardwood habitat and other

wildlife species. Research had identified nest destruction of ground and understory nesting birds at relatively high levels by species such as raccoons and skunk. Trapping can supplement population control mechanisms already in place at the refuge and assists in keeping furbearer numbers to acceptable population levels.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. All trapping by the public requires an SUP; annual fee charged is $35.
2. The refuge trapping season will open with the state-wide trapping season and close January 31.
3. Trappers must meet all local, state, and federal license/permit requirements and comply with subject regulations.
4. The waterfowl sanctuary areas are closed to all public entry.
5. The use of any form of sight bait (visual attractant) is prohibited.
6. Traps must be checked daily during daylight hours.
7. A written report of total harvest (target and nontarget species) must be reported to the Refuge Manager following the end of the trapping season.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Furbearer trapping is a longstanding traditional activity in this area. Commitments were made during public meetings held just prior to establishment of this refuge that such uses would continue even though they may be regulated. This activity is compatible with the purposes for which the refuge was established, provides wildlife-oriented recreational opportunities and serves as a scientifically accepted wildlife population control and habitat management tool. Overall, the total furbearer harvest and trapping pressure has declined dramatically over the past few years. Encouraging increased furbearer trapping will provide additional removal of problem species, such as raccoon and beaver, and will assist in reducing overpopulated species to acceptable levels. As described above, this action would not change this use as conducted on this refuge since establishment.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Horseback Riding*

Description of Use: Horseback riding occurs on a limited scale throughout the refuge and is permitted only on designated roads and ATV trails open to motorized use. Horses can be used as a mode of transportation to reach remote areas open to wildlife dependent activities such as hunting and fishing; recreational horseback riding in and of itself is not permitted. Approximately 65 miles of ATV trails are present on Felsenthal NWR; 8 miles of trails are open year-round providing access to remote lakes for fishing; and the remainder are open only during hunting season each year (September - January 31). These trails are marked with signs and paint and are identified on maps in refuge publications. Horses may also be used on primary gravel refuge roads open to conventional vehicle use.

Availability of Resources: Felsenthal NWR staff maintains the trails by removing debris and repainting marked trees. Supervision and enforcement of horseback riding is also administered by Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Horseback riding results in minor amounts of disturbance to wildlife. However, negligible impacts to endangered species are anticipated because the designated trails are located to intentionally avoid red-cockaded woodpecker colony areas. Since many of the trails become inundated and impassible during the wintering waterfowl season, disturbance to waterfowl is minimal. Minimal ground vegetation disturbance and minor rutting may occur if multiple horses concurrently tread on the same area. These impacts will be confined to the designated trails, though, and most are temporary. Nature tends to “heal” any scars from one year to the next. Since “designated' horse trails are not provided, level of horse use has remained low across the years, occasionally used by some individuals as a preferred method of transportation particularly during late fall/early winter conditions when ground saturation routinely impedes use of motorized vehicles.

The refuge has received requests for development of designated “horse” trails from riding clubs or individuals interested in developing riding clubs or “trail rides.” These requests have and will be consistently denied since the type use proposed is not wildlife dependent (is simply recreational horseback riding) and providing for this use would likely result in development of incompatible impacts to priority uses/users due to anticipated high levels of demand.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is cwith the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Horseback riding is allowed as a mode of transportation while involved in on-refuge, wildlife dependent activities. Use is restricted to designated roads and trails open to motorized vehicle use, and is not allowed during quota deer/turkey hunts for safety reasons.
2. Most trails are open only from October 1 – January 31.
3. Horse trailers must be parked in designated parking areas and no more than five horse trailers are allowed to simultaneously park in a given area.
4. Overnight camping with horses is prohibited.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement (516 DM 2, Appendix 1, 1.4 B. (2) - is a routine management activity which results in no changes in the use and has negligible environmental effects on-site or in the vicinity of the site)

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Horseback riding, as a form of transportation while involved in wildlife dependent activities, is a low impact use that can enhance a visitor's outdoor experience. Horseback riding causes much less damage to roads and trails relative to conventional and four-wheel drive vehicles. Horseback riding, at its current level of use, provides access to traditionally used portions of the refuge with minimal disturbance to wildlife and damage to the environment. This refuge has been open to this use, as described, since its establishment. Should horseback riding substantially increase, however, unacceptable levels of disturbance to wildlife, vegetation, and/or other user groups could result and this compatibility determination would need to be revisited.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Bicycling, Boating (nonmotorized), Swimming/Beach Use, and Hiking/Backpacking*

Description of Use: Outdoor recreation activities, including bicycling, boating (nonmotorized), swimming/beach use and hiking/backpacking occur on a very limited basis throughout the refuge. Because of the very limited use associated with these secondary activities (nonwildlife-dependent activities) and the fact that virtually all this type use is incidental, they are being considered within one compatibility document. Collectively, these secondary uses do occasionally occur, normally in conjunction with visits to the refuge for other purposes such as hunting and fishing. A family member may decide to take a walk along a secondary road or along an ATV trail closed to motorized use while another member of the party is involved in some priority public use activity. Similarly, a member of a group may decide to paddle a small john boat down a waterway or a member of the group ride a bicycle down a primary gravel road while most of the group is involved in another activity. The refuge and its floodplain habitat in the lower Mississippi Valley simply does not contain sites that are conducive to these type activities so no expectation exists for expansion of these uses. Total visits annually for all these activities probably do not collectively exceed 1000. These activities are simply incidental events that take place in conjunction with priority wildlife dependent activities.

It should be noted, for reference purposes, that swimming/beach use were significant uses in years past within this area. Visitors heavily utilized the sand bars along the Ouachita River created by maintenance dredging spoil depositions. Since the completion of the Felsenthal Lock and Dam by the U.S. Corps of Engineers, water levels were raised 7 feet resulting in virtually all sand bars along the river being permanently flooded. This use has virtually ceased with the loss of these sand bars. Some minimal amounts of swimming in the river does still take place, but again, is completely

incidental to other activities such as fishing, and generally is nothing more than a kid cooling off during a hot summer day while out fishing.

Availability of Resources: The areas used for these activities have been open to public use since they were acquired. Supervision and enforcement of these activities will be administered by Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: These activities may result in some minor disturbance to wildlife, minimal disturbance to vegetation, and perhaps increased litter. At current and anticipated future use levels, impacts are negligible.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Seasonal closure of sanctuary areas to minimize disturbance to waterfowl.
2. These type uses are closed during deer gun quota hunts along with all other public use activities for safety and administrative purposes.
3. At current and anticipated future levels of use, no other stipulations are deemed necessary.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: These activities are generally incidental to other wildlife dependent recreational visits and occur at very low levels. There is no expectation for additional use levels to develop due to the fact that conditions present in this predominately bottomland hardwood forest area are not conducive to these activities. The refuge will not develop facilities or improvements designed to perpetuate these secondary activities. They are low impact, low cost activities that enhance the visitor's outdoor experience.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Recreational Hunting*

Description of Use: Most of the refuge area is a contiguous forest of mature bottomland hardwoods, mixed pine-hardwood stands, and pine plantations. The Ouachita and Saline river basins contain a great variety of bottomland hardwood species, including certain hickories, swamp white oak, cow oak, southern red oak, sweetgum, black gum, water oak, willow oak, cherrybark oak, hackberry, cypress, willow, green ash, Nuttal oak, bitter pecan, tupelo gum, sycamore, and cottonwood. This predominately forested wetland provides good habitat for a number of game species including white-tailed deer, turkey, squirrel, raccoon, and waterfowl (Fish and Wildlife Service 1994).

Many of the local residents enjoy an informal, rural lifestyle that includes frequent recreational use of the area's natural resources. Hunting and fishing have been and are popular uses of refuge lands.

The floodplain hardwood forest of the area support high squirrel populations and have for a number of years. As a result, fall squirrel hunting is one of the most popular activities on the refuge. Squirrel dogs are occasionally used in mid- to late-winter following leaf fall.

The raccoon population appears to be very high throughout the area, and in the absence of predators, raccoon populations rapidly build to levels resulting in disease problems and impacts to the reproduction of wild turkeys and nongame girds. Therefore, in addition to providing hunting opportunities, an effective hunting program for raccoon is particularly important to keep the raccoon population in check.

The traditional method for hunting raccoons is the use of dogs at night to tree raccoons. According to state law in Arkansas, dogs must be used to legally hunt raccoons. The use of dogs typically occurs with a single, well-trained dog under high level of control by the hunter and rarely, if ever, results in unacceptable levels of disturbance to other wildlife. Many years of experience, on multiple refuges across the Southeast Region, indicate that traditional methods of take for these species, conducted under controlled conditions of carefully regulated and enforced seasons on large forested land areas, do not negatively or cumulatively affect other wildlife or users. As with all hunts on the refuge, results would be carefully monitored and changes implemented as needed across time to minimize the impacts and maintain compatibility.

Duck hunting is limited to sloughs and beaver ponds until overbank flooding provides additional habitat usually accompanied by substantial increases in refuge duck populations and hunter effort. Dabbler species such as mallard, gadwall, wigeon, wood duck, and teal are the dominant species present by number and thus tend to make up most of the hunter bag.

Harvest management for big game (white-tailed deer and turkey) is the art of combining wildlife science and landowner objectives for the attainment of a specific management goal. Harvest management strategies should be based on objectives established as part of hunting plans developed for the area. The objective-setting process must be based on a complete analysis of biological data. Specific objectives allow the setting of hunting regulations. Results of each hunting season would be evaluated thoroughly so the harvest management program remains dynamic responsive to an ever-changing management environment (Bookhout 1994).

Harvest management for upland game and furbearers (squirrel, rabbit, raccoon, opossum, and beaver) is considerably different from that of both big game and migratory birds. Current literature suggests that user take (when less than 50 percent of total mortality) of most upland game is compensatory; that factors such as immigration from adjacent areas and density-dependent production operate in most upland game populations, and that hunting does not significantly impact

populations. Hunting is substituted for natural mortality. Production of large, annual surpluses of young allows for lengthy seasons and generous bag limits with little concern for over-harvest and minimal chance of population impacts in most areas (Bookhout 1994).

Harvest management for migratory birds (ducks, woodcock) is more difficult to assess. Migratory bird regulations are established at the federal level each year following a series of meetings involving both federal and state biologists. Harvest guidelines are based on population survey data with regulations that are subject to change each year, including bag limits, season lengths, and framework dates (Bookhout 1994). Schmidt (1993) states, "In general, all studies have demonstrated a high degree of compensation of hunting mortality by other 'natural' mortality factors for harvest levels experienced to date." He also reports, "The proportion of waterfowl populations subject to hunting on refuges is very low, thus hunting is not likely to have an adverse impact on the status of any recognized waterfowl population in North America."

The refuge's great variety and abundance of high quality wetland areas provide outstanding habitat for a variety of wading birds. Primary species include the great blue heron, little blue heron, green heron, cattle egret, snowy egret, great egret, anhinga, and night heron (Fish and Wildlife Service 1994). The potential of disturbance, especially during the nesting season, does exist for these rookeries; however, this potential would be virtually nonexistent due to no overlap of hunting season(s) with nesting season.

Similar to wading birds, the area's habitat for neotropical migratory birds is outstanding (Fish and Wildlife Service 1994). Neotropical migrants use the interior hardwood forested areas and edges. Disturbance to neotropicals would be minimal and temporary as the habitat would not be altered.

Based on available information, no threatened or endangered species, other than the bald eagle, have been documented on Felsenthal National Wildlife Refuge. Small numbers of bald eagles, a threatened species, are sighted annually during the winter as they follow migrating waterfowl. Based on available information, it is anticipated that the current levels and future levels of hunting or other wildlife-dependent recreations activities would not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species or designated/proposed critical habitat. Data gathered from future biological surveys regarding the presence or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened, endangered or critical habitat), could result in changes to public use activities across time; however, these changes would have no effect on listed species.

Incidental takes of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels for this program, this incidental take would be very small and would not directly or cumulatively impact current or future population levels of other wildlife species either on this refuge or in the surrounding area. Implementation of an effective law enforcement program and development of site specific refuge regulations/special conditions for these use(s) would eliminate most incidental take problems. In fact, implementation of refuge regulations during the 1997 hunting season virtually eliminated many long-term uses that would be incompatible (i.e., uncontrolled use of dogs on a year-round basis, use of deer chase dogs, off-road vehicle use, etc.).

The estimated current level and anticipated future level of hunting is considered to be compatible with the purpose for which the refuge was established.

Availability of Resources: The areas used for these activities have been open to public use since they were acquired. Supervision and enforcement of these activities will be administered by Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: These activities may result in some minor disturbance to wildlife, minimal disturbance to vegetation, and perhaps increased litter. At current and anticipated future use levels, impacts are negligible.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Seasonal closure of sanctuary areas to minimize disturbance to waterfowl.
2. All other public uses are closed during deer gun quota hunts for safety and administrative purposes.
3. At current and anticipated future levels of use, no other stipulations are deemed necessary.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: The National Wildlife Refuge System Improvement Act of 1977 identifies compatible wildlife dependent recreational uses as legitimate and appropriate uses of the National Wildlife Refuge System. The Act further recognizes hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation as the priority general public uses of the System.

As described earlier, one of the purposes of this refuge is to give "...full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation and for fish and wildlife enhancement and that, wherever any such project can reasonably serve either or both of these purposes consistently with the provisions of this Act, it shall be constructed, operated, and maintained accordingly..."

Thus, hunting is compatible with the refuge's purpose and meet one of the refuge's objectives to provide for compatible wildlife dependent recreation. Providing a public use program that allows quality user opportunities, including hunting, follows current Service policy to expand and enhance opportunities for high quality hunting on refuges. Allowing hunting to continue also helps to maintain and build support for the Service and other wildlife conservation efforts.

Mandatory 15-Year Re-evaluation Date: _____

Use: *Recreational Fishing*

Description of Use: The refuge has a multi-faceted fishery. Both the Ouachita and Saline rivers are high quality forested watersheds. These two rivers, along with Jones Lake, and numerous small oxbow lakes, sloughs and beaver ponds, provide excellent public fishing opportunities. One of the more notable features of refuge is its abundant water resources (Fish and Wildlife Service 1994).

Fishing is the most common form of public use on the refuge. Fishing for largemouth bass, bream, crappie and catfish is excellent and extremely popular with local anglers. Sport fishing in this rural region is considered to be a traditional form of wildlife-dependent recreation (Fish and Wildlife Service 1994).

All refuge waters are currently open to public fishing in accordance with State of Arkansas regulations. Bass and several species of sunfish and catfish are the principal species pursued Fishing in the oxbow lakes and ponds from bridges and along the river bank is a common activity. A series of small borrow pits along Highway 82 are popular fishing areas.

The refuge maintains 8 boat ramps, Pine Island, Shallow Lake, Deep Slough, Jones Lake, Prairie Island, Eagle lake, Pereogeethe Lake) And the U.S. Corp Of Engineers maintains two ramps (Upper and Lower Lock and Dam ramps, Union County Arkansas (Grand Marais) and the city of Crossett maintain the Crossett Harbor ramp. All these ramps provide for excellent access to the Ouachita and Saline rivers.

Recreational fishing should not have any adverse impacts on the fisheries resource, wildlife resource, endangered species, or other natural resources on the refuge. There may be some limited disturbance to certain species of wildlife and some trampling of vegetation; however, this should be short-lived and relatively minor and would not negatively impact the wetland values of the refuge. Known bird rookery sites do not occur at locations currently popular for fishing activities; therefore, disturbances should not be a problem. If disturbance at these sites is identified as a problem in future years, closed areas would be established during nesting season to eliminate this concern. Problems associated with littering and illegal take of fish (undersized fish, over-bag limit) would be controlled through law enforcement activities.

The public is a strong advocate of fishing in the area. Allowing the public to continue to fish on the refuge would have a positive effect on public opinion and would help build support for the Service and for natural resource issues. Providing fishing opportunities would also allow the use of a renewable natural resource without adversely impacting other resource values.

The estimated current level and the anticipated future level of fishing are considered to be compatible with the purpose for which the refuge was established.

Availability of Resources: The areas used for these activities have been open to public use since they were acquired. Supervision and enforcement of these activities will be administered by Felsenthal NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: These activities may result in some minor disturbance to wildlife, minimal disturbance to vegetation, and perhaps increased litter. At current and anticipated future use levels, impacts are negligible.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Seasonal closure of sanctuary areas to minimize disturbance to waterfowl.
2. At current and anticipated future levels of use, no other stipulations are deemed necessary.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

____ Categorical Exclusion without Environmental Action Statement

____ Categorical Exclusion and Environmental Action Statement

__X__Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: The National Wildlife Refuge System Improvement Act of 1977 identifies compatible wildlife dependent recreational uses as legitimate and appropriate uses of the National Wildlife Refuge System. The Act further recognizes hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation as the priority general public uses of the System.

As described earlier, one of the purposes of this refuge is to give "...full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation and for fish and wildlife enhancement and that, wherever any such project can reasonably serve either or both of these purposes consistently with the provisions of this Act, it shall be constructed, operated, and maintained accordingly ..."

Thus, fishing is compatible with the refuge's purpose and meet one of the refuge's objectives to provide for compatible wildlife dependent recreation. Providing a public use program that allows quality user opportunities, including fishing, follows current Service policy to expand and enhance opportunities for high quality fishing on refuges. Allowing fishing to continue also helps to maintain and build support for the Service and other wildlife conservation efforts.

Mandatory 15-Year Re-evaluation Date: _____

Use: *Wildlife Observation, Photography, Environmental Education, and Interpretation*

Description of Use: The area's habitat for neotropical migratory birds is outstanding. The area also provides good waterfowl habitat and has a long tradition of waterfowl use. It is geographically positioned in an area near Mississippi flyways, a traditional waterfowl migration corridor (Fish and Wildlife Service 1994),

Nonconsumptive uses such as hiking, bird watching, nature photography, and picnicking are minimal at this time due to the area's distance from large metropolitan areas. People are regularly seen driving the primary interior roads to observe wildlife. While precise figures of this type of use are not available, it is estimated that approximately 7,200 visits to the refuge were for this kind of activity in 2009. The majority of public use visits to the refuge, as indicated earlier, is associated with hunting or fishing.

It is anticipated that an increase in nonconsumptive wildlife-dependent use would occur over the next few years as facilities are provided and the public and conservation groups become aware of the excellent birding opportunities.

Wildlife observation/photography activities might result in some disturbance to wildlife, especially if visitors venture too close to one of the bird rookeries. Refuge road systems and all-terrain vehicle trails opened to public use would be routed to minimize disturbance that might occur to these sensitive areas. If unacceptable levels of disturbance are identified at any time in future years, rookery sites would be closed to public entry during nesting season. Some minimal trampling of vegetation also may occur.

Environmental education/interpretation activities have been minimal in prior years due to the lack of public use staff. Refuge efforts to develop this program would be forthcoming and would usually be associated with structured activities conducted by refuge staff or trained volunteers. Disturbance from environmental education activities is expected to be minimal and to have an insignificant effect on refuge resources, including fish and wildlife and their habitats and wetland values.

In view of previous considerations, the current and anticipated future levels of wildlife observation, photography, and environmental education and interpretation, activities are compatible with the purpose for which the refuge was established.

Availability of Resources: All areas of the refuge are available for these activities, especially the areas around the Visitor Center where there is an accessible trail and pond.

Anticipated Impacts of the Use: These activities may result in some minor disturbance to wildlife, minimal disturbance to vegetation, and perhaps increased litter. At current and anticipated future use levels, impacts are negligible.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

___X___ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Seasonal closure of sanctuary areas to minimize disturbance to waterfowl.
2. At current and anticipated future levels of use, no other stipulations are deemed necessary.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X___ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: The National Wildlife Refuge System Improvement Act of 1977 identifies compatible wildlife dependent recreational uses as legitimate and appropriate uses of the National Wildlife Refuge System. The Act further recognizes hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation as the priority general public uses of the System.

As described earlier, one of the purposes of this refuge is to give "... full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation and for fish and wildlife enhancement and that, wherever any such project can reasonably serve either or both of these purposes consistently with the provisions of this Act, it shall be constructed, operated, and maintained accordingly ..."

Thus, Wildlife Observation/ Photography/ Environmental Education/ Interpretation are compatible with the refuge's purpose and meet one of the refuge's objectives to provide for compatible wildlife dependent recreation. Providing a public use program that allows quality user opportunities, including Wildlife Observation/ Photography/ Environmental Education/ Interpretation fishing, follows current Service policy to expand and enhance opportunities for high quality wildlife dependent recreation on refuges. Allowing these uses to continue also helps to maintain and build support for the Service and other wildlife conservation efforts.

Mandatory 15-Year Re-evaluation Date: _____

APPROVAL OF COMPATIBILITY DETERMINATIONS
FELSENTHAL NATIONAL WILDLIFE REFUGE

The signature of approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for Felsenthal National Wildlife Refuge. If one of the descriptive uses is considered for compatibility outside of the comprehensive conservation plan, the approval signature becomes part of that determination.

Refuge Manager: _____
(Signature/Date)

Regional Compatibility Coordinator: _____
(Signature/Date)

Refuge Supervisor: _____
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: _____
(Signature/Date)

OVERFLOW NATIONAL WILDLIFE REFUGE COMPATIBILITY DETERMINATIONS

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the Refuge System and the purposes of the refuge.

1. Furbearer trapping
2. All-terrain vehicle use
3. Cropland management
4. Field trials
5. Firewood cutting
6. Horseback riding
7. Power boating
8. Hunting
9. Fishing
10. Wildlife observation, photography, environmental education, and interpretation

Refuge Name: Overflow National Wildlife Refuge.

Date Established: November 6, 1980.

Establishing and Acquisition Authority(ies):

- 16 U.S.C. § 715d (Migratory Bird Conservation Act)
- 16 U.S.C. § 460k-
- 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended)
- 16 U.S.C. § 668dd(a)(2) (National Wildlife Refuge System Administration Act)

On August 8, 1990, the Service received fee title to the 2263 acre Oakwood Unit from the Farmers Home Administration (FmHA). This transaction represents the largest contiguous tract of land transferred to the Service by FmHA.

Refuge Purposes:

- Provide a diversity of habitat types for migratory waterfowl and other birds.
- Provide habitat and protection for endangered and threatened.
- Provide opportunities for environmental and ecological research.
- Provide a variety of recreational opportunities consistent with primary wildlife objectives.
- Expand the public's understanding of and appreciation for the environment with special emphasis on natural resources.

1. "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act).

2. "...suitable for - (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. 460k-1 (Refuge Recreation Act).

National Wildlife Refuge System Mission: The mission of the Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997, is:

> *... to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.*

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” and the succeeding section “Approval of Compatibility Determinations” are only written once within the plan, they are part of each descriptive use and become part of that compatibility determination if considered outside of the comprehensive conservation plan.

Use: *Furbearer Trapping*

Description of Use: Trapping of furbearers by the public for recreational purposes is allowed on portions of the refuge via a $35.00 Special Use Permit (SUP). Species classified as furbearers by the Arkansas Game and Fish Commission include: Badger, beaver, skunk, civet cat (spotted skunk), raccoon, opossum, mink, muskrat, nutria, river otter, weasel, bobcat, coyote, red fox, and gray fox. Trappers are required to maintain detailed records of take as a condition of the SUP and provide this information to the refuge seasonally. Very little trapping takes place at the current time due to low fur values for virtually all furbearer species. Most activity is directed toward the highly abundant raccoon and beaver. Over the last 5-8 years, the refuge has issued roughly 1-3 SUPs annually. The opening date of the refuge trapping season is the same as the opening day for the statewide season which generally begins in late November. The season closes on January 31 with the closure of all refuge hunting activities.

Availability of Resources: The land utilized for furbearer trapping has been open to public use and to trapping since it was acquired in the early 1980s. The productive complex of bottomland hardwoods, beaver ponds, sloughs, creeks and moist soil units supports abundant and diverse furbearer populations that easily support sustained take far in excess of current levels. Trappers will provide the necessary equipment and resources and minimal effort is required from the Overflow staff to carry out the program and therefore will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Conducted under conditions imposed by the SUP, no adverse long term impacts are anticipated from furbearer trapping. The animals taken by trappers serve as a positive population control mechanism for overpopulated species such as beaver and raccoon, thus assisting in habitat protection and prevention of disease outbreaks. Additionally, research has identified nest destruction of ground and understory nesting birds at relatively high levels by species such as raccoons and skunk. Refuge staff annually reviews overall take and refuge population levels and adjusts the program, if needed, to ensure long-term furbearer population maintenance. Trapping by the public supplements nuisance animal control activities at the refuge and assists in keeping these animals at acceptable population levels.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination (check one below):

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. All trapping by the public requires an SUP; annual fee charged is $35.
2. The refuge trapping season will open on the same day as the statewide trapping season and close January 31.
3. Trappers must meet all local, state, and federal license/permit requirements and comply with subject regulations.
4. Waterfowl sanctuaries are closed to all public entry.
5. The use of any form of sight bait (visual attractant) is prohibited.
6. Traps must be checked daily during daylight hours.

7. A written report of total harvest (target and nontarget species) must be reported to the Refuge Manager following the end of the trapping season.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion with Environmental Action Statement

___X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Furbearer trapping is a longstanding traditional activity in the southeastern United States. This activity is compatible with the purposes for which the refuge was established, providing both wildlife oriented recreational activity and serving as a scientifically accepted wildlife population control and a habitat management and protection tool. Overall, the furbearer harvest and trapping pressure has declined dramatically over the past 10 years. Encouraging increased furbearer trapping will assist in reducing overpopulated species to acceptable population levels.

Mandatory 10-Year Re-evaluation Date: _____

Use: *All-terrain Vehicle Use*

Description of Use: The use of high-flotation all-terrain vehicles (ATVs) is permitted only on designated roads and trails to reach remote areas open to hunting, fishing, and trapping. ATV engine size is restricted to 700cc displacement and ATV tires are restricted to those having a maximum pressure of 5 p.s.i. and a centerline lug depth not greater than one inch. Approximately 17 miles of specifically marked trails exist in the forested parts of the refuge and are marked with yellow paint. They are open two days prior to the opening of the refuge hunting and trapping seasons and close at the end of hunting and trapping season. The levees and roads in the north waterfowl sanctuary are open to ATV use for the first month of hunting season. ATVs are not allowed on any improved or gravel road open to conventional vehicles.

Availability of Resources: The Overflow Refuge staff maintains the trails marked for ATV use by repainting the marked trees on the trail and keeping trails clear of debris. Supervision and enforcement of ATV use is also administered by the staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: The use of ATVs does result in some disturbance to wildlife. Disturbance to waterfowl is minimal because trails in the vicinity of waterfowl use are inundated during the wintering waterfowl season. Despite the fact that ATVs are high flotation vehicles with tire thread restrictions, there is some ground vegetation is impacted and some rutting occurs on saturated soils. These impacts are confined to the designated trails and the ruts generally fill back in from one year to the next.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination (check one below):

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Only standard manufacturer's high flotation ATVs such as 4-wheelers and hustlers with an engine size not greater than 700cc displacement, with maximum tire pressure of 5 p.s.i., and tire centerline tread depth not to exceed one inch are allowed.
2. ATVs are restricted to designated trails only.
3. ATVs may be used only to reach areas open to hunting and trapping.
4. Trails are open only during the fall hunting seasons.
5. ATVs may not be used on improved roads or gravel roads open to conventional vehicles.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion with Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: ATVs cause much less damage to roads and trails than do conventional and four-wheel drive vehicles. ATVs provide access to traditionally used portions of the refuge with minimal disturbance to wildlife and damage to the environment. Use of ATVs facilitates hunter distribution which provides a more balanced harvest on a larger land base and reduces hunter crowding.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Cropland Management*

Description of Use: Cropland management is conducted via the use of a Cooperative Farming Agreement. The farming operation at Overflow NWR has two principle purposes: (1) waste grain resulting from harvest operations and/or grain left in the field as a crop share for the refuge provides an important food source for waterfowl; and (2) most importantly, the incorporation of active cropland management with refuge managed moist soil units on a systematic, rotational basis sets back plant succession within impoundment units, perpetuating desirable plants that are important to waterfowl and other migratory birds. The primary purpose of the cropland management program is to maintain fields in early successional vegetation stages. Of the 2,500 acres of open land on Overflow, only

about 400 are farmed in any given year which is about the minimum acreage feasible to achieve the purposes set forth above given the acreage involved. Principal crops grown are rice, corn, and soybeans in rotation with moist soil management.

Availability of Resources: Approximately 2,500 acres of land are classified as open land on Overflow NWR. For the small farming operation, the cooperative farmers will provide the necessary equipment and resources and minimal effort is required from the Overflow staff to carry out the program and therefore will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Conducted under conditions imposed by the Cooperative Farming Agreement, no adverse impacts have been experienced or are anticipated in the future. Rotational farming is a sound management tool for successful moist soil vegetation management. In fact, current staff considers maintaining the ability to incorporate rotational farming into the overall open land management as a critical element enabling achievement of refuge migratory bird objectives - the primary purpose for establishment of this refuge. While seasonal disturbances such as discing does accomplish some improvement in moist soil unit plant compositions of desirable species, discing by itself across years has proven to be less effective than when used in conjunction with occasional years of cropping on a rotational basis (every 3-5 years). No chemicals are used that pose any threat to wildlife. The impacts from active cropland management are positive from a refuge management standpoint.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination (check one below):

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. A Cropland Management Plan which includes an Integrated Pest Management Plan has been prepared and approved by the Regional Office. This is a requirement for cropland management activities.
2. An appropriate share (generally 20-25%) of the crop revenue is received by the refuge in the form of unharvested crops or the site preparation of moist soil seedbeds or a combination of both.
3. Application of herbicides must be approved by the appropriate U.S. Fish and Wildlife Service personnel using the Department of Interior's Pest Management Policy.
4. Except as specified in the Cooperative Farming Agreement, all refuge regulations apply and are strictly enforced.
5. The cooperative farmer bears all costs associated with the production and harvest of crops produced including furnishing all supplies and equipment required. Needed repair and maintenance of all refuge facilities including roads, levees, wells, irrigation systems, and water control structures resulting from the cooperative farming program is the responsibility of the farmer.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion with Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Cropland management, including mechanical soil disturbance, planting of agricultural crops or wildlife foods such as Japanese Millet is essential to meet the needs of wildlife (particularly wintering waterfowl) in accordance with refuge objectives. Research has shown that stress is placed on ducks when they have to fly in excess of 12 miles to ingest all of the required foods necessary for the birds to sustain and prepare themselves for basic life processes such as molting, reproduction, and survival in winter. To supply all of the required foods for waterfowl, a complex of habitat types is needed on the refuge, including moist soil units, flooded bottomlands, freshwater marshes such as beaver ponds, and agricultural croplands. Cropland use on the refuge is a vital link in achieving the production of the required variety of critical waterfowl food availability and enabling an effective rotational management approach essential to obtaining optimum moist soil unit productivity on an annual basis.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Field Trials*

Description of Use: PKC/UKC-sanctioned field trials are allowed on the forested areas of Overflow NWR via a Special Use Permit (SUP). Fee schedules utilized are $25 for each permit where no entry fee (simply friendly competition) to participate is charged and $50 for each permit where entry fees are charged. These fee schedules may be adjusted as needed to be commensurate with prevailing rates for such use within the area. This activity is viewed as a “secondary” use of the national wildlife refuge system and is administered in a fashion to eliminate any impacts to priority uses.

Availability of Resources: Overflow staff will have minimal involvement in the field trial activities other than compliance checks to ensure activities are conducted according to special conditions and sanctioning organization rules.

Anticipated Impacts of the Use: Conducted under carefully controlled conditions typically imposed by the sanctioning organizations and the refuge special use permit, very few if any impacts occur as a result of these infrequently held field trial activities. Permits were issued for two such events (one night each) in the last five years on Overflow. If frequency of the activity increased to a high level (weekly), the level of cumulative impacts to priority uses due to disturbance could become unacceptable.

As with any activity, some disturbance to other wildlife species will probably occur as a result of this activity. However, based upon years of experience in administering this type of activity, this disturbance will be minimal and will not result in unacceptable impacts to refuge wildlife resources or other refuge visitors at the current low levels of occurrence. Refuge staff carefully monitors all such activities to document results and will modify conditions through time and space zoning as needed to assure minimal

and acceptable levels of disturbance (egg. establish more restrictive dates and times, restrict numbers of participants, reduce or implement closure of certain areas identified as vulnerable to disturbance).

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination (check one below):

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. All field trial activities conducted on the refuge will be fully sanctioned by a nationally recognized sponsoring organization, such as UKC or PKC. All activities will be conducted in accordance with sanctioning organization rules with qualified judges present at all times.
2. All sanctioning organization rules governing field trial activities will be a requirement of the Special Use Permit.
3. Field trial activities will be restricted to designated areas and to designated date(s) in order to minimize conflict with wildlife and with other user groups. All raccoon field trial activities must end at 1 a.m.
4. Refuge staff will not issue repetitive permits or more than three permits per year to the same organization in order to minimize the number of events taking place.
5. Further restrictions as to the number of events authorized will be implemented, if warranted, based on requests for these types of activities and upon results of monitoring.
6. All refuge regulations, including prohibiting possession of firearms, will be strictly enforced.
7. No wildlife may be taken (killed) during these events; wildlife may not be brought in, released, or removed from the refuge.
8. A limit of two casts (for raccoon trials) will be imposed for each event on the refuge.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion with Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Sanctioned field trials are a traditional recreational activity in the southeastern United States. The trials are used to judge a dog's performance, not for the taking of wildlife, and are conducted under carefully controlled conditions imposed by the sanctioning organization to assure fair competition. These field trials promote and encourage sound conservation practices and ethics with minimal impacts on other wildlife or their habitats. Field trials conducted under the conditions outlined above are clearly wildlife dependent activities that do not materially impact other users or other resources and, therefore are viewed as a compatible use.

Mandatory 10-Year Re-evaluation Date:_____

Use: *Firewood Cutting*

Description of Use: Firewood cutting and/or picking up wood for personal (noncommercial) use is permitted via individually issued firewood cutting permits. Only downed trees may be utilized; no cutting of standing, live trees permitted. Access is restricted to existing designated roads or trails open to motorized vehicle use. No fee schedule is established for this activity.

Availability of Resources: The land needed for firewood cutting and collection has been open to public use since it was acquired. Other than minor amounts of compliance checks, Overflow staff will not be involved in the collection of firewood.

Anticipated Impacts of the Use: Collection of firewood for personal use under the conditions stipulated will have a negligible impact on forest and wildlife resources. Minor amounts of potential habitat for insects that routinely colonize down/rotting forest debris and the fauna that feeds on this insect life may be lost. However, within floodplain hardwood forest communities, this is absolutely not a limiting factor due to the fact that the forest floor is heavily littered with downed/decaying wood from the stand overstory. Existing use by firewood cutters is extremely limited - only perhaps one - two individuals requesting permits per year. No adverse impacts are anticipated at the current level of use and with the stipulations of the firewood cutting permit.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the draft CCP. All comments will be addressed in the final determination.

Determination (check one below):

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. A specified time limit to cut or collect firewood is clearly stated on each permit (normally 14 days).
2. All wood removed must be for personal (noncommercial) use only.
3. Only tops or downed trees at designated locations may be removed.
4. Vehicles may be driven off of designated roads and trails to remove firewood only with site specific authorization by the refuge manager (vegetation and ground conditions present at any given time/place will determine appropriateness so as to minimize any rutting or forest vegetation damage).
5. Wood may be removed during daylight hours only.
6. All refuge regulations, including restrictions on possession of firearms, will be strictly enforced.
7. Failure to comply with any condition of the permit may result in immediate revocation of the permit, prosecution, and a fine. In addition, application for future refuge permits will be refused.
8. All debris must be removed from roads, road shoulders, and ditches.
9. Maximum volume removed without charge will be three cords per permittee per year.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion with Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification:

Properly regulated firewood cutting allows the use of a renewable natural resource, potentially can serve as a forest management tool to enhance wildlife habitat, and results in positive public relations for the refuge. Impacts to refuge resources are negligible, nor is there the potential for developing a use activity which could lead to long term impacts given the stipulations listed above.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Horseback Riding*

Description of Use: Horseback riding is permitted only as a mode of transportation on designated roads and trails open to motorized vehicle traffic for wildlife dependent recreational activities such as hunting. Approximately 17 miles of specifically marked trails exist in the forested parts of the refuge and are marked with yellow paint. They are open two days prior to the opening of the refuge hunting and trapping seasons and close at the end of hunting and trapping season. The levees and roads in the north waterfowl sanctuary are open for the first month of hunting season; therefore, horses may also be used at that time except during the muzzle-loader deer hunt when horses are prohibited for safety reasons.

Availability of Resources: The Overflow Refuge staff maintains the designated trails by repainting the trees and keeping trails clear of debris. Supervision and enforcement of horseback riding is also administered by the staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Horseback riding can occasionally result in some disturbance to wildlife. However, it is probably the least intrusive form of transportation used on the refuge, next to walking. There will be minimal impacts to ground vegetation and soil disturbance would be minimal.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the draft CCP. All comments will be addressed in the final determination.

Determination (check one below):

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Horseback riding is restricted to designated public roads and trails as a mode of transportation for wildlife dependent recreational activities. Horses are not allowed during the muzzle-loader deer hunts for safety reasons.
2. Any firearm must be unloaded and encased.
3. Trails are open only during the fall hunting seasons.
5. Horse trailers must be parked in designated parking areas and no more than five trailers are allowed to simultaneously park in the same area.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion with Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Horseback riding, as a form of transportation, is a low impact activity that can enhance a visitor's outdoor experience. Horseback riding causes much less damage to roads and trails than ATVs, resulting in less disturbance to wildlife and damage to the environment. At current levels, horseback riding impacts are negligible. Trails designated specifically for only horseback riding will not be developed because this likely would encourage development of nonwildlife-dependent "recreational" trail rides which is not the purpose of the public use program at Overflow Refuge. Should the use of horses increase substantially, resulting in adverse impacts, this compatibility determination would need to be revisited.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Power Boating*

Description of Use: The use of motor powered boats is primarily associated with waterfowl hunting where access to much of the area open to hunting is only possible by using power boats. When water levels are adequate for waterfowl hunting, powerboats can navigate the main access ditch, Overflow Creek, Hill Slough, and Flat Slough. With high water levels, motorized boats can be utilized in the minor sloughs, drainages, and flooded ATV trails. At normal (within stream bank) water levels, use of motor powered boats is not possible due to shallow, debris filled, water conditions.

Availability of Resources: The areas used for power boating have been open to public use since they were acquired. Supervision and enforcement of these activities will be administered by the refuge law enforcement staff as part of normal public use compliance checks and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: Use of powerboats to access waterfowl hunting areas has been an approved activity since refuge establishment and found to be compatible by multiple refuge staff across multiple review cycles. The impact of this use is one of minimal disturbance to wildlife. Due to the narrow waterways, dense vegetation, and safety issues, powerboat motor size is limited to 25 horsepower. Virtually all use is restricted to existing waterways which, coupled with small motor sizes, minimizes disturbance. Certainly, the level of disturbance occurring is not a limiting factor to wildlife use or other user groups. No adverse impacts to wildlife or vegetation are anticipated at the current level of use.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination (check one below):

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Enforcement of refuge regulations and federal and state boating regulations is conducted by refuge enforcement personnel.
2. Continued seasonal closure of waterfowl sanctuaries will minimize disturbance to wildlife.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion with Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: Motorized boating is a longstanding traditional method to access waterfowl hunting areas when they are adequately flooded. It allows hunters to spread out and promotes quality hunting experiences. In fact, at certain water levels, this activity is essential in order to conduct a hunting program. The nature of the waterways and vegetation limits the use to small boats and motors minimizing the occurrence of significant fuel spills or high speed accidents.

Mandatory 10-Year Re-evaluation Date: _____

Use: *Recreational Hunting*

Description of Use: Most of the refuge area is a contiguous forest of mature bottomland hardwoods, hardwood stands, and one small pine plantation. The Overflow Creek basin contain a great variety of bottomland hardwood species, including certain hickories, swamp white oak, cow oak, southern red oak, sweetgum, black gum, water oak, willow oak, cherrybark oak, hackberry, cypress, willow, green ash, Nuttal oak, bitter pecan, tupelo gum, sycamore, and cottonwood. This predominately forested wetland provides good habitat for a number of game species including white-tailed deer, turkey, squirrel, raccoon, and waterfowl (Fish and Wildlife Service 1994).

Many of the local residents enjoy an informal, rural lifestyle that includes frequent recreational use of the area's natural resources. Hunting and fishing have been and are popular uses of refuge lands.

The floodplain hardwood forest of the area support high squirrel populations and have for a number of years. As a result, fall squirrel hunting is one of the most popular activities on the refuge. Squirrel dogs are occasionally used in mid- to late-winter following leaf fall.

The raccoon population appears to be very high throughout the area, and in the absence of predators, raccoon populations rapidly build to levels resulting in disease problems and impacts to the reproduction of wild turkeys and nongame girds. Therefore, in addition to providing hunting opportunities, an effective hunting program for raccoon is particularly important to keep the raccoon population in check.

The traditional method for hunting raccoons is the use of dogs at night to tree raccoons. According to state law in Arkansas, dogs must be used to legally hunt raccoons. The use of dogs typically occurs with a single, well-trained dog under high level of control by the hunter and rarely, if ever, results in unacceptable levels of disturbance to other wildlife. Many years of experience, on multiple refuges across the Southeast Region, indicate that traditional methods of take for these species, conducted under controlled conditions of carefully regulated and enforced seasons on large forested land areas, do not negatively or cumulatively affect other wildlife or users. As with all hunts on the refuge, results would be carefully monitored and changes implemented as needed across time to minimize the impacts and maintain compatibility.

Duck hunting is limited to sloughs and beaver ponds until overbank flooding provides additional habitat usually accompanied by substantial increases in refuge duck populations and hunter effort. Dabbler species such as mallard, gadwall, wigeon, wood duck, and teal are the dominant species present by number and thus tend to make up most of the hunter bag.

Harvest management for big game (white-tailed deer and turkey) is the art of combining wildlife science and landowner objectives for the attainment of a specific management goal. Harvest management strategies should be based on objectives established as part of hunting plans developed for the area. The objective-setting process must be based on a complete analysis of biological data. Specific objectives allow the setting of hunting regulations. Results of each hunting season would be evaluated thoroughly so the harvest management program remains dynamic responsive to an ever-changing management environment (Bookhout 1994).

Harvest management for upland game and furbearers (squirrel, rabbit, raccoon, opossum, and beaver) is considerably different from that of both big game and migratory birds. Current literature suggests that user take (when less than 50 percent of total mortality) of most upland game is compensatory; that factors such as immigration from adjacent areas and density-dependent production operate in most upland game populations, and that hunting does not significantly impact populations. Hunting is substituted for natural mortality. Production of large, annual surpluses of

young allows for lengthy seasons and generous bag limits with little concern for over-harvest and minimal chance of population impacts in most areas (Bookhout 1994).

Harvest management for migratory birds (ducks, woodcock) is more difficult to assess. Migratory bird regulations are established at the federal level each year following a series of meetings involving both federal and state biologists. Harvest guidelines are based on population survey data with regulations that are subject to change each year, including bag limits, season lengths, and framework dates (Bookhout 1994). Schmidt (1993) states, "In general, all studies have demonstrated a high degree of compensation of hunting mortality by other 'natural' mortality factors for harvest levels experienced to date." He also reports, "The proportion of waterfowl populations subject to hunting on refuges is very low, thus hunting is not likely to have an adverse impact on the status of any recognized waterfowl population in North America."

The refuge's great variety and abundance of high quality wetland areas provide outstanding habitat for a variety of wading birds. Primary species include the great blue heron, little blue heron, green heron, cattle egret, snowy egret, great egret, anhinga, and night heron (Fish and Wildlife Service 1994). The potential of disturbance, especially during the nesting season, does exist for these rookeries; however, this potential would be virtually nonexistent due to no overlap of hunting season(s) with nesting season.

Similar to wading birds, the area's habitat for neotropical migratory birds is outstanding (Fish and Wildlife Service 1994). Neotropical migrants use the interior hardwood forested areas and edges. Disturbance to neotropicals would be minimal and temporary as the habitat would not be altered.

Based on available information, no threatened or endangered species, other than the bald eagle, have been documented on Overflow National Wildlife Refuge. Small numbers of bald eagles, a threatened species, are sighted annually during the winter as they follow migrating waterfowl. Based on available information, it is anticipated that the current levels and future levels of hunting or other wildlife-dependent recreations activities would not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species or designated/proposed critical habitat. Data gathered from future biological surveys regarding the presence or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened, endangered or critical habitat), could result in changes to public use activities across time; however, these changes would have no effect on listed species.

Incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels for this program, this incidental take would be very small and would not directly or cumulatively impact current or future population levels of other wildlife species either on this refuge or in the surrounding area. Implementation of an effective law enforcement program and development of site specific refuge regulations/special conditions for these use(s) would eliminate most incidental take problems. In fact, implementation of refuge regulations during the 1997 hunting season virtually eliminated many long-term uses that would be incompatible (i.e., uncontrolled use of dogs on a year-round basis, use of deer chase dogs, off-road vehicle use, etc.).

The estimated current level and anticipated future level of hunting is considered to be compatible with the purpose for which the refuge was established.

Availability of Resources: The areas used for these activities have been open to public use since they were acquired. Supervision and enforcement of these activities will be administered by South Arkansas Refuge Complex NWR staff and will not exceed the general operational costs of the refuge.

Anticipated Impacts of the Use: These activities may result in some minor disturbance to wildlife, minimal disturbance to vegetation, and perhaps increased litter. At current and anticipated future use levels, impacts are negligible.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Seasonal closure of sanctuary areas to minimize disturbance to waterfowl.
2. All other public uses are closed during deer gun quota hunts for safety and administrative purposes.
3. At current and anticipated future levels of use, no other stipulations are deemed necessary.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: The National Wildlife Refuge System Improvement Act of 1977 identifies compatible wildlife dependent recreational uses as legitimate and appropriate uses of the National Wildlife Refuge System. The Act further recognizes hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation as the priority general public uses of the System.

As described earlier, one of the purposes of this refuge is to give "... full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation and for fish and wildlife enhancement and that, wherever any such project can reasonably serve either or both of these purposes consistently with the provisions of this Act, it shall be constructed, operated, and maintained accordingly ..."

Thus, hunting is compatible with the refuge's purpose and meets one of the refuge's objectives to provide for compatible wildlife dependent recreation. Providing a public use program that allows quality user opportunities, including hunting, follows current Service policy to expand and enhance opportunities for high quality hunting on refuges. Allowing hunting to continue also helps to maintain and build support for the Service and other wildlife conservation efforts.

Mandatory 15-Year Re-evaluation Date: _____

Use: *Fishing*

Description of Use: Overflow NWR falls within the Mississippi Alluvial Plain (Bayou Bartholomew)-Ouachita River Ecobasin, as defined by the Arkansas State Wildlife Plan (2007). This basin in characterized by meandering flat channels with extensive flood-plain benches. Few streams, excepting Bayou Bartholemew itself, flow or carry water year-round. This is indicative of the waterways of Overflow NWR which experience extensive backflooding in winter and yet become low and barely flowing in summer. The aquatic habitats of Overflow NWR host a diverse assemblage of fisheries species. When springtime backwater flooding occurs, the bottomlands of Overflow NWR function as a nursery for spawning fish; the most abundant are bowfin, gar, carp and both largemouth and smallmouth buffalo. Additionally, large numbers of largemouth bass and crappie are trapped in the moist soil units each year. Grinnel, or bowfin, are very abundant in the sloughs and beaver ponds. Fisheries sampling has not been conducted in refuge waters.

The AGFC recognizes 11 Species of Greatest Conservation Need (7 fishes and 4 mussels) that are associated with waters of this basin and therefore might occur on Overflow NWR: crystal darter, alligator gar, bluehead shiner, lake chubsucker, goldeye, taillight shiner, goldstripe darter, southern mapleleaf mussel, pyramid pigtoe mussel, rock pocketbook mussel, and tapered pondhorn mussel.

The location of refuge lands on both sides of Overflow Creek create a key buffer from inputs from neighboring agricultural and commercial forest lands. The MAV- Bayou Bartholemew ecobasin ranks poorly (2/5) among Arkansas ecobasins relative to a key measure of aquatic habitat health, in having a low percentage (29%) of forested areas within riparian zones (State Wildlife Action Plan, 2007). The effects of agriculture to the north and east, and timber harvesting practices in the coastal plain on the west side have created severe siltation problems along overflow creek. In addition, impoundment of irrigation runoff by beavers along with siltation has resulted in a significant loss of bottomland hardwoods and prolific weed growth in the creek channel. The beaver dams and vegetation have brought drainage to a standstill in several locations. When the refuge was under initial acquisition, a Level II Contaminant Survey was conducted and numerous fish of all species were found to harbor various levels of farm chemicals and other potentially toxic substances. A recreational fishing program was therefore never initiated (Overflow Biological Review 2008).

Availability of Resources: Due to the high levels of chemicals and other potential toxins this activity is restricted and not permitted.

Anticipated Impacts of the Use: None since activity is not allowed.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

___X___ Use is NOT compatible.

_____ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Seasonal closure of sanctuary areas to minimize disturbance to waterfowl.
2. At current and anticipated future levels of use, no other stipulations are deemed necessary.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____Categorical Exclusion without Environmental Action Statement

____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Mandatory 15-Year Re-evaluation Date: _____

Use: *Wildlife Observation, Photography, Environmental Education, and Interpretation*

Description of Use: The area's habitat for neotropical migratory birds is outstanding. The area also provides good waterfowl habitat and has a long tradition of waterfowl use. It is geographically positioned in an area near Mississippi flyways, a traditional waterfowl migration corridor (Fish and Wildlife Service 1994).

Nonconsumptive uses such as hiking, birdwatching, nature photography and picnicking are minimal at this time due to the area's distance from large metropolitan areas. People are regularly seen driving the primary interior roads to observe wildlife. While precise figures of this type of use are not available, it is estimated that approximately 300 visits to the refuge were for this kind of activity in 2009. The majority of public use visits to the refuge, as indicated earlier, is associated with hunting.

It is anticipated that an increase in nonconsumptive wildlife-dependent use would occur over the next few years as facilities are provided and the public and conservation groups become aware of the excellent birding opportunities.

Wildlife observation/photography activities might result in some disturbance to wildlife, especially if visitors venture too close to one of the bird rookeries. Refuge road systems and all-terrain vehicle trails opened to public use would be routed to minimize disturbance that might occur to these sensitive areas. If unacceptable levels of disturbance are identified at any time in future years, rookery sites would be closed to public entry during nesting season. Some minimal trampling of vegetation also may occur.

Environmental education/interpretation activities have been minimal in prior years due to the lack of public use staff. Refuge efforts to develop this program would be forthcoming and would usually be associated with structured activities conducted by refuge staff or trained volunteers. Disturbance from environmental education activities is expected to be minimal and to have an insignificant effect on refuge resources, including fish and wildlife and their habitats and wetland values.

In view of previous considerations, the current and anticipated future levels of wildlife observation, photography, and environmental education and interpretation, activities are compatible with the purpose for which the refuge was established.

Availability of Resources: All areas of the refuge are available for these activities, especially the areas around the Visitor Center where there is a accessible trail and pond..

Anticipated Impacts of the Use: These activities may result in some minor disturbance to wildlife, minimal disturbance to vegetation, and perhaps increased litter. At current and anticipated future use levels, impacts are negligible.

Public Review and Comment: The draft compatibility determination will be available for review and comment during the public review period established for the Draft CCP/EA. All comments will be addressed in the final determination.

Determination: (check one below)

_____ Use is NOT compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Seasonal closure of sanctuary areas to minimize disturbance to waterfowl.
2. At current and anticipated future levels of use, no other stipulations are deemed necessary.

NEPA Compliance for Refuge Use Decision: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Justification: The National Wildlife Refuge System Improvement Act of 1977 identifies compatible wildlife dependent recreational uses as legitimate and appropriate uses of the National Wildlife Refuge System. The Act further recognizes hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation as the priority general public uses of the System.

As described earlier, one of the purposes of this refuge is to give "...full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation and for fish and wildlife enhancement and that, wherever any such project can reasonably serve either or both of these purposes consistently with the provisions of this Act, it shall be constructed, operated, and maintained accordingly..."

Thus, Wildlife Observation/ Photography/ Environmental Education/ Interpretation are compatible with the refuge's purpose and meet one of the refuge's objectives to provide for compatible wildlife dependent recreation. Providing a public use program that allows quality user opportunities, including Wildlife Observation/ Photography/ Environmental Education/ Interpretation fishing, follows current Service policy to expand and enhance opportunities for high quality wildlife dependent recreation on refuges. Allowing these uses to continue also helps to maintain and build support for the Service and other wildlife conservation efforts.

Mandatory 15-Year Re-evaluation Date: _____

APPROVAL OF COMPATIBILITY DETERMINATIONS
OVERFLOW NATIONAL WILDLIFE REFUGE

The signature of approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for Overflow National Wildlife Refuge. If one of the descriptive uses is considered for compatibility outside of the comprehensive conservation plan, the approval signature becomes part of that determination.

Refuge Manager: _____
(Signature/Date)

Regional Compatibility Coordinator: _____
(Signature/Date)

Refuge Supervisor: _____
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: _____
(Signature/Date)

Appendix G. Intra-Service Section 7 Biological Evaluation

REGION 4
INTRA-SERVICE BIOLOGICAL EVALUATION FORM

Originating Person: Bernie Petersen, Refuge Manager, South Arkansas Refuge Complex

Telephone Number: 870-364-3167 **E-Mail:** Bernie_Petersen@fws.gov

Date: August 4, 2009

PROJECT NAME (Grant Title/Number): Comprehensive Conservation Plan for Felsenthal/Overflow NWRs

I. Service Program:
___ Ecological Services
___ Federal Aid
___ Clean Vessel Act
___ Coastal Wetlands
___ Endangered Species Section 6
___ Partners for Fish and Wildlife
___ Sport Fish Restoration
___ Wildlife Restoration
___ Fisheries
_X_ Refuges/Wildlife

II. State/Agency: USFWS

III. Station Name: Felsenthal/Overflow NWR

IV. Description of Proposed Action (attach additional pages as needed):
Implement the Comprehensive Conservation Plan for Felsenthal/Overflow NWRs by adopting the proposed alternative. This plan directs the management of the refuge for the next 15 years.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map: (see attachment)

A. Complete the following table:

SPECIES	CRITICAL HABITAT	STATUS1
Red-cockaded woodpecker	none	endangered
Interior least tern	none	endangered

STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species

VI. Location:

A. Ecoregion Number and Name: Ecosystem 29 Lower Mississippi River

B. County and State: Ashley, Union, and Bradley Counties, Arkansas

C. Latitude and longitude: Felsenthal (33^{00} 04' 00" North, 92^{0} 10' 00" West), Overflow (33^{0} 04' 45" North, 91^{0} 41' 00" West).

D. Distance (miles) and direction to nearest town: Felsenthal NWR is located in southeast Arkansas, approximately eight miles west of the town of Crossett. Overflow NWR is located in Ashley County, about five miles west of Wilmot.

E. Species/habitat occurrence:

Interior Least Tern (*Sterna antillarum anthalassos*) – Interior least terns are known to nest on sand bars of the Arkansas River, which is near the Oakwood Unit, but there is no suitable nesting habitat on the refuge. The refuge also does not provide significant foraging habitat; however, interior least terns have been occasionally documented at the Oakwood Unit.

Red-cockaded woodpecker (*Picoides borealis*) – Felsenthal NWR harbors one of the highest-known concentrations (per acre of available habitat) of red-cockaded woodpeckers (RCW) in Arkansas.

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item V. B (attach additional pages as needed):

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Red-cockaded woodpecker	Positive. Increased habitat quality and management. Increased information. Decreased predators. Potential for additional clusters on the refuge.
Interior least tern	Neutral to positive. Increased information.

B. Explanation of actions to be implemented to reduce adverse effects:

SPECIES/ CRITICAL HABITAT	ACTIONS TO MINIMIZE IMPACTS
Red-cockaded woodpecker	Allow pines to grow old enough to develop cavities. Manage understory to maintain height below cavities. Conduct prescribed burns away from nest sites or during nonnesting seasons.
Interior least tern	No mitigation measures needed unless nesting is observed, implement buffer zone around nesting area.

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION [1]			RESPONSE REQUESTED [1]
	NE	NA	AA	
Red-cockaded woodpecker		X		
Interior least tern		X		

[1]DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence."

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation." Response Requested for proposed or candidate species is "Conference."

_____ _____

Signature (originating station) **Date**

_____

Title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence ___ Nonconcurrence ____

B. Formal consultation required ___

C. Conference required ___

D. Remarks (attach additional pages as needed): ___

_____ _____
signature ***date***

_____ _____
title ***office***

Appendix H. Wilderness Review

The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural conditions and which:

- generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- has outstanding opportunities for solitude or primitive and unconfined types of recreation;
- has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition; or is a roadless island, regardless of size;
- does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and
- may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The lands within the Felsenthal and Overflow national wildlife refuges were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964. None of the lands in the two refuges were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this plan.

Appendix I. Refuge Biota

Felsenthal and Overflow Bird List

This list contains those species of birds thought to occur on Felsenthal and Overflow National Wildlife Refuges according to various literature sources, surveys, and observations.

(Source: "Felsenthal National Wildlife Refuge - Bird Checklists of the United States," Northern Prairie Wildlife Research Center, U.S. Geological Survey, http://www.npwrc.usgs.gov/resource/birds/chekbird/r4/felsenth.htm)

Grebes

Common Loon (*Gavia immer)*
Eared Grebe (*Podiceps nigricollis)*
Pied-billed Grebe (*Podilymbus podiceps)*
Horned Grebe (*Podiceps auritus)*

Pelicans, Cormorants, and Darters

American White Pelican (*Pelecanus erythrorhynchos)*
Double-crested Cormorant (*Phalacrocorax auritus)*
Anhinga (*Anhinga anhinga)*

Bitterns, Herons, and Egrets

American Bittern (*Botaurus lentiginosus)*
Great Blue Heron (*Ardea herodias)*
Great Egret (*Ardea alba)*
Snowy Egret (*Egretta thula)*
Little Blue Heron (*Efretta caerulea)*
Tricolored Heron (*Egretta tricolor)*
Cattle Egret (*Bubulcus ibis)*
Green Heron (*Butoroides virescens)*
Black-crowned Night-heron (*Nycticorax nycticorax)*
Yellow-crowned Night-heron (*Nyctanassa violacea)*

Ibises, Spoonbills, and Storks

White Ibis (*Eudocimis albus)*
Wood Stork (*Mycteria americana)*

Waterfowl

Tundra Swan (*Cygnus colombianus)*
Snow Goose (*Chen caerulescens)*
Canada Goose (*Branta canadensis*)
Wood Duck (*Aix sponsa)*
Green-winged Teal (*Anas crecca)*
American Black Duck (*Anas rubripes)*
Mallard (*Anas platyrhynchos)*
Northern Pintail (*Anas acuta)*
Blue-winged Teal (*Anas discors)*
Northern Shoveler (*Anas clypeata)*
Gadwall (*Anas strepera)*
American Wigeon (*Anas americana)*
Canvasback (*Aythya valisineria)*
Redhead (*Aythya americana)*
Ring-necked Duck (*Aythya collaris)*

Felsenthal and Overflow Bird List (Continued)

Waterfowl, continued

Lesser Scaup (*Aythya affinis)*
Long-tailed duck (*Clangula hyemalis)*
Bufflehead (*Bucephala albeola)*
Hooded Merganser (*Lophodytes cucullatus)*
Common Merganser (*Mergus merganser)*
Red-breasted Merganser (*Mergus serrator)*
Ruddy Duck (*Oxyura jamaicensis)*

Vultures, Hawks, and Allies

Black Vulture (*Coragyps atratus)*
Turkey Vulture (*Cathartes aura)*
Osprey (*Pandion haliaetus)*
Mississippi Kite (*Ictinia mississippiensis)*
Bald Eagle (*Haliaeetus leucocephalus)*
Northern Harrier (*Circus cyaneus)*
Sharp-shinned Hawk (*Accipiter striatus)*
Cooper's Hawk (*Accipiter cooperii)*
Red-shouldered Hawk (*Buteo lineatus)*
Broad-winged Hawk (*Buteo platypterus)*
Red-tailed Hawk (*Buteo jamaicensis)*
Golden Eagle (*Aquila chrysaetos)*
American Kestrel (*Falco sparverius)*
Peregrine Falcon (*Falco peregrinus)*

Gallinaceous Birds (Quail, Turkey, and Allies)

Wild Turkey (*Meleagris gallopavo)*
Northern Bobwhite (*Colinus virginianus)*

Rails, Gallinules, Coots, and Cranes

King Rail (*Rallus elegans)*
Virginia Rail (*Rallus limicola)*
Sora (*Porzana carolina)*
American Coot (*Fulica americana)*

Shorebirds

Killdeer (*Charadrius vociferous)*
Greater Yellowlegs (*Tringa melanoleuca)*
Ring-billed Gull (*Larus delawarensis)*
Herring Gull (*Larus argentatus)*
Lesser Yellowlegs (*Tringa flavipes)*
Caspian Tern (*Sterna caspia)*
Forster's tern (*Sterna forsteri)*
Least Tern (*Sterna antillarum)*
Black Tern (*Chlidonias niger)*
Solitary Sandpiper (*Tringa solitaria)*
Spotted Sandpiper (*Actitis macularia)*
Upland Sandpiper (*Bartramia longicauda)*
Semipalmated Sandpiper (*Calidris pusilla)*
Western Sandpiper (*Calidris mauri)*
Least Sandpiper (*Calidris minutilla)*
Pectoral Sandpiper (*Caladris melanotos)*

Felsenthal and Overflow Bird List (Continued)

Shorebirds, continued

Wilson's/Common Snipe (*Gallinago gallinago)*
American Woodcock (*Scolopax minor)*

Doves

Rock Dove (*Columba livia)*
Mourning Dove (*Zenaida macroura)*
Eurasian Collared Dove *(Streptopelia decaocta)*

Cuckoos

Black-billed Cuckoo (*Coccyzus erythropthalmus)*
Yellow-billed Cuckoo (*Coccyzus americanus)*
Greater Roadrunner (*Geococcyx californianus)*

Owls

Barn Owl (*Tyto alba)*
Eastern Screech-Owl (*Otus asio)*
Great Horned Owl (*Bubo virginianus)*
Barred Owl (*Strix varia)*

Nightjars

Common Nighthawk (*Chordeiles minor)*
Chuck-will's-widow (*Caprimulgus carolinensis)*
Whip-poor-will (*Caprimulgus vociferous)*

Swifts and Hummingbirds

Chimney Swift (*Chaeura pelagica)*
Ruby-throated hummingbird (*Archilochus colubris)*

Kingfishers

Belted Kingfisher (*Ceryle alcyon)*

Woodpeckers

Red-headed Woodpecker (*Melanerpes erythrocephalus)*
Red-bellied Woodpecker (*Melanerpes carolinus)*
Yellow-bellied Sapsucker (*Sphyrapicus varius)*
Downy Woodpecker (*Picoides pubescens)*
Hairy Woodpecker (*Picoides villosus)*
Red-cockaded Woodpecker (*Picoides borealis)*
Northern Flicker (*Colaptes auratus)*
Pileated Woodpecker (*Dryocopus pileatus)*

Flycatchers

Eastern Wood-Pewee (*Contopus virens)*
Olive-sided Flycatcher *(Contopus cooperi)*
Acadian Flycatcher (*Empidonax virescens)*
Least Flycatcher (*Empidonax minimus)*
Eastern Flycatcher (*Sayornis phoebe)*
Great Crested Flycatcher (*Myiarchus crinitus)*
Eastern Kingbird (*Tyrannus tyrannus)*
Scissor-tailed Flycatcher *(Tyrannus forficatus)*

Martins, Swallows and Larks

Horned Lark (*Eremophila alpestris)*
Purple Martin (*Progne subis)*
Tree Swallow (*Tachycineta bicolor)*
N. Rough-winged Swallow (*Stelgidopteryx serripennis)*
Bank Swallow (*Riparia riparia)*

Felsenthal and Overflow Bird List (Continued)

Martins, Swallows and Larks, continued
- Barn Swallow (*Hirundia rustica)*
- Cliff Swallow *(Petrochelidon pyrrhonota)*

Jays and Crows
- Blue Jay (*Cyanocitta cristata)*
- American Crow (*Corvus brachyrhynchos)*
- Fish Crow (*Corvus ossigragus)*

Chickadees and Titmice
- Carolina Chickadee (*Poecile carolinensis)*
- Tufted Titmouse (*Baeolophus bicolor)*

Nuthatches
- Red-breasted Nuthatch (*Sitta canadensis)*
- White-breasted Nuthatch (*Sitta carolinensis)*
- Brown-headed Nuthatch (*Sitta pusilla)*

Creepers
- Brown Creeper (*Certhia americana)*

Wrens
- Carolina Wren (*Thryothorus ludovicianus)*
- Bewick's Wren (*Thryomanes bewickii)*
- House Wren (*Troglodytes aedon)*
- Winter Wren (*Troglodytes troglodytes)*
- Sedge Wren (*Cistothorus platensis)*
- Marsh Wren *(Cistothorus palustris)*

Kinglets and Gnatcatchers
- Golden-crowned Kinglet (*Regulus satrapa)*
- Ruby-crowned Kinglet (*Regulus calendula)*
- Blue-gray Gnatcatcher (*Polioptila caerulea)*

Thrushes
- Eastern Bluebird (*Sialia sialis)*
- Veery (*Catharus fuscescens)*
- Gray-cheeked thrush (*Catharus minimus)*
- Swainson's Thrush (*Catharus ustulatus)*
- Hermit Thrush (*Catharus guttatus)*
- Wood Thrush (*Hylocichla mustelina)*
- American Robin (*Turdus migratorius)*

Mockingbirds and Thrashers
- Gray Catbird (*Dumetella carolinensis)*
- Northern Mockingbird (*Mimus polyglottos)*
- Brown Thrasher (*Toxostoma rufum)*

Pipits
- American Pipit (*Anthus rubescens)*

Waxwings
- Cedar Waxwing (*Bombycilla garrulous)*

Shrikes
- European Starling (*Sturnus vulgaris)*
- Loggerhead Shrike (*Lanius ludovicianus)*

Vireos
- White eyed Vireo (*Vireo griseus)*

Felsenthal and Overflow Bird List (Continued)

Vireos, continued

Yellow throated Vireo (*Vireo flavifrons)*
Warbling Vireo (*Vireo gilvus)*
Philadelphia Vireo (*Vireo philadephicus)*
Blue headed/Solitary Vireo (*Vireo solitarius)*
Red-eyed Vireo (*Vireo olivaceus)*
Bell's Vireo *(Vireo bellii)*

Wood Warblers

Blue-winged warbler (*Vermivora pinus)*
Tennessee Warbler (*Vermivora peregrine)*
Orange-crowned Warbler (*Vermivora celata)*
Nashville Warbler (*Vermivora ruficapilla)*
Northern Parula (*Parula americana)*
Yellow Warbler (*Dendroica petechia)*
Chestnut-sided Warbler *(Dendroica pensylvanica)*
Magnolia Warbler (*Dendroica magnolia)*
Yellow-rumped Warbler (*Dendroica coronata)*
Black-throated Green Warbler (*Dendroica virens)*
Blackburnian Warbler (*Dendroica fusca)*
Yellow-throated Warbler (*Dendroica dominica)*
Pine Warbler (*Dendroica pinus)*
Prairie Warbler (*Dendroica discolor)*
Palm Warbler (*Dendroica palmarum)*
Bay-breasted Warbler (*Dendroica castanea)*
Blackpoll Warbler (*Dendroica striata)*
Cerulean Warbler (*Dendroica cerulean)*
Black-and-white Warbler (*Mniotilta varia)*
American redstart (*Setophaga ruticilla)*
Prothonotary Warbler (*Protonotaria citrea)*
Worm-eating Warbler (*Helmitheros vermivorus)*
Swainson's warbler (*Limnothlypsis swainsonii)*
Ovenbird (*Seiurus aurocapillus)*
Northern Waterthrush (*Seiurus noveboracensis)*
Louisiana Waterthrush (*Seiurus motacilla)*
Kentucky Warbler (*Oporornis formosus)*
Mourning Warbler (*Oporornis philadelphia)*
Common Yellowthroat (*Geothlypis trichas)*
Hooded Warbler (*Wilsonia citrine)*
Wilson's Warbler (*Wilsonia pusilla)*
Canada Warbler (*Wilsonia canadensis)*
Yellow-breasted Chat (*Icteria virens)*

Tanagers

Summer Tanager (*Piranga rubra)*
Scarlet Tanager (*Piranga olivacea)*
Dickcissel (*Spiza americana)*

New World Finches

Northern Cardinal (*Cardinalis cardinalis)*
Rose-breasted Grosbeak (*Pheuticus ludovicianus)*

Felsenthal and Overflow Bird List (Continued)

New World Finches, continued

Blue Grosbeak (*Passerina caerulea)*
Indigo Bunting (*Passerina cyanea)*
Painted Bunting (*Passerina ciris)*

Sparrows

Eastern/Rufous-sided Towhee (*Pipilo erythrophthalmus)*
Bachman's Sparrow (*Aimophila aestivalis)*
Chipping Sparrow (*Spizella passerine)*
Field Sparrow (*Spizella pusilla)*
Vesper Sparrow (*Pooecetes gramineus)*
Lark Sparrow (*Chondestes grammacus)*
Savannah Sparrow (*Passerculus sandwichensis)*
Le Conte's Sparrow (*Ammodramus leconteii)*
Fox Sparrow (*Passerella iliaca)*
Song Sparrow (*Melospiza melodia)*
Lincoln's Sparrow (*Melospiza lincolnii)*
Swamp Sparrow (*Melospiza georgiana)*
White-throated Sparrow (*Zonotrichia albicollis)*
White-crowned Sparrow (*Zonotrichia leucophrys)*
Dark-eyed Junco (*Junco hyemalis)*
Lapland Longspur (*Calcarius lapponicus)*

Blackbirds

Red-winged Blackbird (*Agelaius phoeniceus)*
Eastern Meadowlark (*Sturnella magna)*
Rusty Blackbird (*Euphagus carolinus)*
Brewer's Blackbird (*Euphagus cyanocephalus)*
Common Grackle (*Quiscalus quiscula)*
Brown-headed Cowbird (*Molothrus ater)*
Orchard Oriole (*Icterus spurious)*
Baltimore Oriole (*Icterus galbula)*

Old World Finches and House Sparrow

Purple Finch (*Carpodacus purpureus)*
House Finch *(Carpodacus mexicanus)*
Red Crossbill (*Loxia curvirostra)*
Pine Siskin (*Carduelis pinus)*
American Goldfinch (*Carduelis tristis)*
Evening Grosbeak (*Coccothraustes vespertinus)*
House Sparrow *(Passer domesticus)*

A Proposed Working List of Mammals on Felsenthal and Overflow National Wildlife Refuges

This list contains those species of mammals thought to occur on Felsenthal and Overflow National Wildlife Refuges according to various literature sources, surveys, and observations.

(Source: Adapted from "D'Arbonne National Wildlife Refuge Comprehensive Conservation Plan," U.S. Fish and Wildlife Service, Southeast Region, October 2006.)

Didelphiidae (Opossums)
- Opossum (*Dedelphis virginiana*)

Soricidae (Shrews)
- Southern Short-tailed Shrew (*Blarina carolinensis*)
- Least Shrew (*Cryptotis parva*)

Talpidae (Moles)
- Eastern Mole (*Scalopus aquaticus*)

Bats (Chiroptera)
- Silver-haired Bat *(Lasiurus noctivagans)*
- Southeastern Myotis (*Myotis austroriparius*)
- Eastern Pipistrel (*Pipistrellus subflavus*)
- Big Brown Bat (*Eptesicus fuscus*)
- Red Bat (*Lasiurus borealis*)
- Seminole Bat (*Lasiurus seminolus*)
- Hoary Bat (*Lasiurus cinereus*)
- Evening Bat (*Nycticeius humeralis*)
- Rafinesque's Big-eared Bat (*Coryrhincus rafinesquii*)
- Brazilian Free-tailed Bat (*Tadarida brasiliensis*)

Dasypodidae (Armadillos)
- Nine-banded Armadillo (*Dasypus novemcinctus*)

Leporidae (Hares Rabbits)
- Eastern Cottontail (*Sylvilagus floridanus*)
- Swamp Rabbit (*Sylvilagus aquaticus*)

Sciuridae (Squirrels)
- Eastern Gray Squirrel (*Sciurus carolinensis*)
- Fox Squirrel (*Sciurus niger*)
- Southern Flying Squirrel (*Glaucomys volans*)

Geomyidae (Pocket Gophers)
- Baird's Pocket Gopher (*Geomys breviceps*)

Castoridae (Beaver)
- Beaver (*Castor canadensis*)

Cricetidae (Mice, Rats, Lemmings, Voles)
- Marsh Rice Rat (*Oryzomys palustris*)
- Fulvous Harvest Mouse (*Reithrodontomys fulvescens*)
- White-footed Mouse (*Peromyscus luecopus*)
- Cotton Mouse (*Peromyscus gossypinus*)
- Golden Mouse (*Peromyscus nuttalli*)
- Hispid Cotton Rat (*Sigmodon hispidus*)
- Eastern Woodrat (*Neotoma floridana*)
- Pine Vole (*Microtus pinetorum*)

Felsenthal and Overflow Mammal List (Continued)

Cricetidae (Mice, Rats, Lemmings, Voles) (Continuedu)
- Muskrat (*Ondatra zibethica*)
- Southern Bog Lemming *(Synaptomys cooperi)*

Muridae (Old World Rats and Mice)
- Black Rat (*Rattus rattus*)
- Norway Rat (*Rattus norvegicus*)
- House Mouse (*Mus musculus*)

Capromyidae (Nutria)
- Nutria (*Myocastor coypus*)

Canidae (Dogs, Wolves, Foxes)
- Red Wolf (*Canis rufus*) (extirpated)
- Coyote (*Canis latrans*)
- Red Fox (*Vulpes vulpes*)
- Gray Fox (*Urocyon cinereoargenteus*)

Ursidae (Bears)
- Black Bear (*Ursus americanus*)

Procyonidae (Racoons)
- Raccoon (*Procyon lotor*)

Mustelidae (Weasels, Skunks)
- Long-tailed Weasel (*Mustela frenata*)
- Mink (*Mustela vison*)
- Striped Skunk (*Mephitis mephitis*)
- Eastern Spotted Skunk *(Spilogale puterius)*
- River Otter (*Lutra canadensis*)

Felidae (Cats)
- Bobcat (*Lynx rufus*)
- Mountain Lion (*Felis concolor*) (extirpated)

Suidae (Hogs)
- Feral Hog (*Sus scrofa*)

Cervidae (Deer)
- White-tailed Deer (*Odocoileus virginianus*)

A Proposed Working List of Reptiles and Amphibians on Felsenthal and Overflow National Wildlife Refuges

This list contains those species of reptiles and amphibians thought to occur on Felsenthal and Overflow National Wildlife Refuges according to various literature sources, surveys, and observations.

(Source: Adapted from "D'Arbonne National Wildlife Refuge Comprehensive Conservation Plan," U.S. Fish and Wildlife Service, Southeast Region, October 2006.)

Alligatoridae (Alligators)
American Alligator (*Alligator mississippiensis*)
Chelydridae (Snapping Turtles)
Common Snapping Turtle (*Chelydra serpentina*),
Alligator Snapping Turtle (*Macroclemys temminckii*),
Kinosternidae (Musk and Mud Turtles)
Common Musk Turtle (*Sternotherus odoratus*)
Razorback Musk Turtle (*Sternotherus carinatus*)
Mississippi Mud Turtle (*Kinosternon subrubrum hippocrepis*)
Emydidae (Box and Water Turtles)
Threetoed Box Turtle (*Terrapene carolina triunguis*)
Mississippi Map Turtle (*Graptemys pseudogeographica kohnii*),
Ouachita Map Turtle (*Graptemys ouachitensis*)
Common Map Turtle *(Graptemys geographica)*
Redeared Slider (*Trachemys scripta elegans*),
Eastern River Cooter (*Pseudemys concinna*)
Southern Painted Turtle (*Chrysemys picta dorsalis*),
Western Chicken Turtle (*Deirochelys reticularia miaria*)
Trionychidae (Softshell Turtles)
Midland Smooth Softshell (*Apalone mutica mutica*)
Spiny Softshell (*Apalone spinifera*)
Iguanidae (Anoles and Fence Lizards)
Northern Green Anole (*Anolis carolinensis carolinensis*)
Northern Fence Lizard (*Sceloporus undulatus hyacinthinus*)
Teiidae (Racerunners)
Prairie Racerunner (*Cnemidophorus sexlineatus viridis*)
Scincidae (Skinks)
Ground Skink (*Scincella lateralis*)
Fivelined Skink (*Eumeces fasciatu*s)
Broadhead Skink (*Eumeces laticeps*),
Southern Coal Skink (*Eumeces anthracinus pluvialis*)
Anguidae (Glass and Alligator Lizards)
Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*)
Colubridae (Snakes)
Midland Water Snake (*Nerodia sipedon pleuralis)*
Mississippi Green Water Snake (*Nerodia cyclopion*)
Diamondback Water Snake (*Nerodia rhombifer rhombifer*)
Yellowbelly Water Snake (*Nerodia erythrogaster flavigaster*)
Broadbanded Water Snake (*Nerodia fasciata confluens*)
Graham's Crayfish Snake (*Regina grahamii*)

Felsenthal and Overflow Reptile and Amphibian List (Continued)

Colubridae (Snakes) (Continued)

Gulf Glossy Crayfish Snake (*Regina rigida sinicola*)
Midland Brown Snake (*Storeria dekayi wrightorum*)
Florida Redbelly Snake (*Storeria occipitomaculata obscura*)
Eastern Garter Snake (*Thamnophis sirtalis sirtalis*)
Western Ribbon Snake (*Thamnophis proximus proximus*)
Western Smooth Earth Snake (*Virginia valeriae elegans*)
Rough Earth Snake (*Virginia striatula*)
Eastern Hognose Snake (*Heterodon platirhinos*)
Mississippi Ringneck Snake (*Diadophis punctatus stictogenys*)
Western Worm Snake (*Carphophis vermis*)
Western Mud Snake (*Farancia abacura reinwardtii*)
Eastern Racer (*Coluber constrictor anthicus* or *C. c. latrunculus or C. c. priapus* or intergrades)
Eastern Coachwhip (*Masticophis flagellum flagellum*)
Rough Green Snake (*Opheodrys aestivus*)
Slowinski's Corn Snake (*Pantherophis slowinkii*)
Black Rat Snake (*Pantherophis obsoleta obsoleta*)
Speckled King Snake (*Lampropeltis getula holbrooki*)
Louisiana Milksnake (*Lampropeltis triangulum amaura*)
Prairie King Snake (*Lampropeltis calligaster calligaster*)
Northern Scarlet Snake (*Cemophora coccinea copei*)
Flathead Snake (*Tantilla gracilis*)

Elapidae (Coral Snakes)

Texas Coral Snake (*Micrurus tener tener*)

Viperidae (Vipers & Pit Vipers)

Southern Copperhead (*Agkistrodon contortrix contortrix*)
Western Cottonmouth (*Agkistrodon piscivorus leucostoma*),
Western Pygmy Rattlesnake (*Sistrurus miliarius streckeri*)
Timber Rattlesnake (*Crotalus horridis*)

Proteidae (Waterdogs and Mudpuppies)

Red River Mudpuppy (*Necturus maculosus louisianensis*)

Amphiumidae (Amphiumas)

Threetoed Amphiuma (*Amphiuma tridactlyum*)

Sirenidae (Sirens)

Western Lesser Siren (*Siren intermedia nettingi*)

Ambystomatidae (Salamanders)

Mole Salamander (*Ambystoma talpoideum*)
Marbled Salamander (*Ambystoma opacum*)
Smallmouth Salamander (*Ambystoma texanum*)
Spotted Salamander (*Ambystoma maculatum*)

Salamandridae (Newts)

Central Newt (*Notophthalmus viridescens*)

Plethodontidae (Lungless Salamanders)

Ouachita Salamander (*Desmognathus brimleyorum*)
Dwarf Salamander (*Eurycea quadridigittata*)
Louisiana Slimy Salamander (*Plethodon kisatchie)*

Bufonidae (Toads)

Fowler's Toad (*Bufo fowleri*)

Felsenthal and Overflow Reptile and Amphibian List (Continued)

Bufonidae (Toads) (Continued)

Dwarf American Toad (*Bufo americanus charlesmithi)*
Coastal Plain Toad (*Bufo nebulifer*)

Hylidae (Treefrogs and Their Allies)

Northern Cricket Frog (*Acris crepitans crepitans*)
Green Tree Frog (*Hyla cinerea*)
Gray Treefrog (*Hyla versicolor*)
Cope's Gray Treefrog (*Hyla chrysoscelis*)
Squirrel Treefrog (*Hyla squirella*)
Bird-voiced Treefrog (*Hyla avivoca*)
Northern Spring Peeper (*Pseudacris crucifer*)
Western Chorus Frog (*Pseudacris triseriata*)

Microhylidae (Narrowmouth Toads)

Eastern Narrowmouth Toad (*Gastrophryne carolinensis*)

Ranidae (True Frogs)

Bullfrog (*Rana catesbeiana*)
Bronze Frog (*Rana clamitans clamitans*)
Southern Leopard Frog (*Rana sphenocephala*)
Pickerel Frog (*Rana palustris*)
Crawfish Frog (*Rana aereolata)*

A Proposed Working List of Fish on Felsenthal and Overflow National Wildlife Refuges

(Source: Adapted from "D'Arbonne National Wildlife Refuge Comprehensive Conservation Plan," U.S. Fish and Wildlife Service, Southeast Region, October 2006.)

Petromyzontidae (Lampreys)
- Chestnut Lamprey (*Ichthyomyzon castaneus*)
- Southern Brook Lamprey (*Ichthyomyzon gagei*)

Polydontidae (Paddlefishes)
- Paddlefish (*Polydon spathula*)

Acipenseridae
- Shovelnose Sturgeon (*Scaphirhychus platorynchus)*

Lepisosteidae (Gars)
- Spotted Gar (*Lepisosteus oculatus*)
- Longnose Gar (*Lepisosteus osseus*)
- Shortnose Gar (*Lepisosteus platostomus*)
- Alligator Gar (*Atractosteus spatula*)

Amiidae (Bowfin)
- Bowfin (*Amia calva*)

Anguillladae (Eels)
- American eel (*Anguilla rostrata*)

Clupeidae (Shads)
- Skipjack Herring (*Alosa chrysochloris*)
- Gizzard Shad (*Dorosoma cepedianum*)
- Threadfin Shad (*Dorosoma petenense*)

Hiodontidae (Mooneyes)
- Mooneye (*Hiodon tergisis*)
- Goldeye (*Hiodon alosoides*)

Esocidae (Pikes)
- Grass Pickeral (*Esox americanus*)
- Chain Pickeral (*Esox niger*)

Cyprinidae (Minnows)
- Central Stoneroller (*Campostoma anomalum)*
- Goldfish (*Carassius auratus)*
- Common Carp (*Cyprinus carpio*)
- Grass Carp (*Ctenopharyngodon idella)*
- Cypress Minnow (*Hybognathus hayi*)
- Silvery Minnow (*Hybognathus nuchalis*)
- Speckled Chub (*Hybopsis aestivalis*)
- Silver Chub (*Hybopsis storeriana*)
- Golden Shiner (*Notemigonus crysoleucas*)
- Pallid Shiner (*Notropis amnis*)
- Emerald Shiner (*Notropis atherinoides*)
- Bigeye Shiner (*Notropis boops*)
- Ghost Shiner (*Notropis buchanani*)
- Ironcolor Shiner (*Notropis chalybaeus*)
- Striped Shiner (*Luxilus chrysocephalus*)
- Ribbon Shiner (*Notropis fumeus*)

Felsenthal and Overflow Fish List (Continued)

Cyprinidae (Minnows) (Continued)

Bluehead shiner (*Notropis hubbsi*)
Taillight Shiner (*Notropis maculatus*)
Weed Shiner (*Notropis texanus*)
Redfin Shiner (*Lythrurus umbratilis*)
Blacktail Shiner (*Cyprinella venusta*)
Mimic Shiner (*Notropis volucellus*)
Steelcolor Shiner (*Notropis whipplei*)
Pugnose Minnow (*Opsopoeodus emiliae*)
Bluntnose Minnow (*Pimephales notatus*)
Flathead Minnow (*Pimephales promelas*)
Bullhead Minnow (*Pimephales vigilax*)
Creek Chub (*Semotilus atromaculatus*)

Catostomidae (Suckers)

River Carpsucker (*Carpiodes carpio*)
Creek Chubsucker (*Erimyzon oblongus*)
Lake Chubsucker (*Erimyzon sucetta*)
Smallmouth Buffalo (*Ictiobus bubalus*)
Bigmouth Buffalo (*Ictiobus cyprinellus*)
Black Buffalo (*Ictiobus niger*)
Spotted Sucker (*Minytrema melanops*)
Blacktail Redhorse (*Moxostoma poecilurum*)

Ictaluridae (Catfishes)

White Catfish (*Ictalurus catus)*
Blue Catfish (*Ictalurus furcatus*)
Black Bullhead (*Ameiurus melas*)
Brown Bullhead (*Ameiurus nebulosus*)
Yellow Bullhead (*Ameiurus natalis*)
Channel Catfish (*Ictalurus punctatus*)
Tadpole Madtom (*Noturus gyrinus*)
Brindled Madtom (*Noturus miurus*)
Freckled Madtom (*Noturus nocturnus*)
Flathead Catfish (*Pylodictis olivaris*)

Aphredoderidae (Pirate Perch)

Pirate Perch (*Aphredoderus sayanus*)

Cyrinodontidae (Topminnows)

Golden Topminnow (*Fundulus chrysotus*)
Blackstripe Topminnow (*Fundulus notatus*)
Starhead Topminnow (*Fundulus notti*) listed as N. starhead F. dispar
Blackspotted Topminnow (*Fundulus olivaceus*)

Peociliidae (Livebearers)

Mosquitofish (*Gambusia affinis*)

Atherinidae (Silversides)

Brook Silverside (*Labidesthes sicculus*)

Percicthyidae (Temperate Basses)

White Bass (*Morone chrysops*)
Yellow Bass (*Morone mississippiensis*)
Striped Bass (*Morone saxatilis*)

Felsenthal and Overflow Fish List (Continued)

Centrarchidae (Sunfishes)

Flier (*Centrarchus macropterus*)
Green Sunfish (*Lepomis cyanellus*)
Warmouth (*Lepomis gulosus*)
Orangespotted Sunfish (*Lepomis humilis*)
Bluegill (*Lepomis macrochirus*)
Dollar Sunfish (*Lepomis marginatus*)
Longear Sunfish (*Lepomis megalotis*)
Redear Sunfish (*Lepomis microlophus*)
Spotted Sunfish (*Lepomis punctatus*)
Bantam Sunfish (*Lepomis symmetricus*)
Spotted Bass (*Micropterus punctulatus*)
Largemouth Bass (*Micropterus salmoides*)
White Crappie (*Pomoxis annularis*), BBL
Black Crappie (*Pomoxis nigromaculatus*)

Elassomatidae (Pygmy Sunfishes)

Banded Pygmy Sunfish (*Elassoma zonatum*)/s

Percidae (Perches)

Crystal Darter (*Ammocrypta aspella)*
Scaly Sand Darter (*Ammocrypta vivax*)
Western Scaly Sand Darter (*Ammocrypta clara*)
Mud Darter (*Etheostoma asprigene*)
Bluntnose Darter (*Etheostoma chlorosomum*)
Creole Darter (*Etheostoma collettei*)
Swamp Darter (*Etheostoma fusiforme*)
Slough Darter (*Etheostoma gracile*)
Harlequin Darter (*Etheostoma histrio*)
Goldstripe Darter (*Etheostoma parvipinne*)
Cypress Darter (*Etheostoma proeliare*)
Speckled Darter (*Etheostoma stigmaeum*)
Redfin Darter (*Etheostoma whipplei*)
Logperch (*Percina caprodes*)
Channel Darter (*Percina copelandi*)
Blackside Darter (*Percina maculata*)
Ouachita Darter (*Percina ouachitae*)
Dusky Darter (*Percina sciera*)
River Darter (*Percina shumardi*)
Sauger (*Stizostedion canadense*)
Walleye (*Stizostedion vitreum*)

Sciaenidae (Drums)

Freshwater Drum (*Aplodinotus grunniens*)

A Proposed Working List of Trees and Woody Plants on Felsenthal and Overflow National Wildlife Refuges

Pine Family: Pinaceae
Loblolly Pine (*Pinus taeda*)
Shortleaf Pine (*Pinus echinata*)

Bald Cypress Family: Taxodiaceae
Bald Cypress (*Taxodium distichum*)

Cedar Family: Cupressaceae
Eastern Red Cedar (*Juniperous virginiana*)

Greenbrier Family: Liliaceae
Greenbriers (*Smilax spp.*)

Willow Family: Salicaceae
Eastern Cottonwood (*Populus deltoids*)
Swamp Cottonwood (*Populus heterophylla*)
Black Willow (*Salix nigra*)

Walnut Family: Juglandaceae
Water Hickory, Bitter Pecan (*Carya aquatica*)
Sweet Pecan(*Carya illinoensis*)
Nutmeg Hickory (*Carya myristiciformis*)
Shagbark Hickory (*Carya ovata*)
Black Hickory (*Carya texana*)
Mockernut Hickory (*Carya tomentosa*)

Birch Family: Betulaceae
River Birch (*Betula nigra*)
Ironwood, Blue Beech (*Carpinus caroliniana*)
Hop Hornbeam (*Ostrya virginiana*)

Beech Family: Fagaceae
Beech (*Fagus grandifolia*)

Oaks, White Oak Group
White Oak (*Quercus alba*)
Overcup Oak (*Quercus lyrata*)
Cow Oak (*Quercus michauxii*)
Delta Post Oak (*Quercus stellata var. paludosa*)

Red Oak Group
Southern Red Oak (*Quercus falcate var. falcate*)
Cherrybark Oak (*Quercus falcate var. pagodafolia*)
Blackjack Oak (*Quercus marilandica*)
Water Oak (*Quercus nigra*)
Willow Oak (*Quercus phellos*)
Shumard Oak (*Quercus shumardii*)

Felsenthal and Overflow Trees and Woody Plants List (Continued)

Red Oak Group, Continued
Nuttall's Oak (*Quercus nuttallii*)
Black Oak (*Quercus velutina*)

Elm Family: Ulmaceae
Sugarberry (*Celtis laevigata*)
Water elm, Planer Tree (*Planera aquatica*)
Winged elm (*Ulmus alata*)
American elm (*Ulmus Americana*)
Slippery elm (*Ulmus rubra*)

Mulberry Family
Red Mulberry (*Morus rubra*)

Mistletoe Family
Mistletoe (*Phoradendron serotinum*)

Buckwheat Family: Polygonaceae
Ladies eardrop vine, redvine (*Brunnichia ovata*)

Custard Apple family: Annonaceae
Pawpaw (*Asimina triloba*)

Moonseed Family: Menispermaceae
Sassafras (*Sassafras albidum*)

Witch Hazel Family: Hamamelidaceae
Sweet gum (*Liquidambar styraciflua*)

Plane Tree Family: Platanaceae
Sycamore (*Platanus occidentalis*)

Rose family: Rosaceae
Hawthorn (*Crategus spp*.)
Black Cherry (*Prunus serotina*)
Prairie Rose and similar species (*Rosa spp*.)
Blackberry (*Rubus spp*.)
Dewberry (*Rubus flagellaris*)

Pea Family: Fabaceae
Indigo Bush (*Amorpha fruiticosa*)
Redbud (*Cercis Canadensis*)
Water Locust (*Gleditsia aquatica*)
Honey Locust (*Gleditsia triacanthos*)

Cashew Family: Anacardiaceae
Winged Sumac (*Rhus copallina*)
Smooth Sumac (*Rhus glabra*)
Poison Ivy (*Toxicodendron radicans*)

Felsenthal and Overflow Trees and Woody Plants List (Continued)

Holly Family: Aquifoliaceae
Deciduous Holly, Possum-Haw (*Ilex decidua*)
American Holly (*Ilex opaca*)

Bladder-Nut family: Staphyleaceae
Red Maple (*Acer rubrum*)
Box Elder (*Acer negundo*)
Southern Sugar Maple (*Acer saccharum var. floridanum*)

Buckeye Family: Hippocastanaceae
Red Buckeye (*Aesculus pavia*)

Buckthorn Family: Rhamnaceae
Carolina Buckthorn (*Rhamnus caroliniana*)

Grape Family: Vitaceae
Rattan Vine (*Berchemia scandens*)
Peppervine (*Ampelopsis arborea*)
Virginia creeper (*Parthenocissus quinquefolia*)
Summer Grape, Possum Grape (*Vitis aestivalis*)
Riverbank Grape (*Vitis riparia*)
Muscadine (*Vitis rotundifolia*)

Ginseng Family: Araliaceae
Devil's Walking Stick (*Aralia spinosa*)

Dogwood Family: Cornaceae
Flowering Dogwood (*Cornus florida*)

Tupelo Family: Nyssaaceae
Water Tupelo (*Nyssa aquatica*)
Black Gum (*Nyssa sylvatica*)

Heath Family: Ericaceae
Blueberries/Huckleberries (*Vaccinium spp.*)

Sapodilla Family: Sapotaceae
Gum Bumelia, Chittim-Wood (*Bumelia lanuginose*)

Ebony Family
Persimmon (*Diospyros virginiana*)

Ash Family: Oleaceae
Green Ash (*Fraxinus pennsylvanica*)
Common privet (*Ligustrum vulgare*)

Vervain Family: Verbenaceae
French Mulberry, Beauty Berry (*Callicarpa Americana*)

Felsenthal and Overflow Trees and Woody Plants List (Continued)

Trumpet Creeper Family: Bignoniaceae
Cross Vine (*Bignonia capreolata*)
Trumpet Creeper (*Campsis radicans*)

Madder Family: Rubiaceae
Buttonbush (*Cephalanthus occidentalis*)

Honeysuckle Family: Caprifoliaceae
Japanese Honeysuckle (*Lonisera japonica*)
Trumpet Honeysuckle (*Lonisera sempervirens*)
Elderberry (*Sambucus Canadensis*)

Sunflower or Composite Family: Asteraceae
Groundsel tree, Sea Myrtle, Salt Bush (*Baccharis halimifolia*)
Climbing hempweed (*Mikania scandens*)

FEDERALLY LISTED ANIMAL AND PLANT SPECIES IN ARKANSAS

(Source: "Rare Species of Arkansas," Arkansas Heritage Program, Arkansas Natural Heritage Commission, http://www.naturalheritage.org/program/rare-species/.)

Animals

Scientific Name	Common Name	Federal Status	Date Listed
INVERTEBRATES			
CLASS: MALACOSTRACA (Crayfish)			
Cambarus aculabrum	Benton County cave crayfish	LE	04.27.1993
Cambarus zophonastes	Hell Creek crayfish	LE	04.07.1987
CLASS: INSECTA (Insects)			
Nicrophorus americanus	American burying beetle	LE	08.14.1989
CLASS: GASTROPODA (Snails)			
Inflectarius magazinensis	Magazine Mountain shagreen	LT	04.17.1989
CLASS: BIVALVIA (Mussels)			
Arkansia wheeleri	Ouachita rock pocketbook	LE	10.23.1991
Cumberlandia monodonta	Spectaclecase	C	09.12.2006
Epioblasma florentina curtisi[1]	Curtis pearlymussel	LE	06.14.1976
Epioblasma turgidula[1]	Turgid blossom	LE	06.14.1976
Lampsilis abrupta	Pink mucket	LE	06.14.1976
Lampsilis powellii	Arkansas fatmucket	LT	04.05.1990
Lampsilis rafinesqueana	Neosho Mucket	C	09.12.2006
Lampsilis streckeri	Speckled pocketbook	LE	02.28.1989
Leptodea leptodon	Scaleshell	LE	11.08.2001
Potamilus capax	Fat pocketbook	LE	06.14.1976
Quadrula fragosa	Winged mapleleaf	LE	06.20.1991
CLASS: OSTEICHTHYES (Fishes)			
Alosa alabamae	Alabama shad	C	06.23.1999
Amblyopsis rosae	Ozark cavefish	LT	11.01.1984
Etheostoma cragini	Arkansas darter	C	10.25.1999
Etheostoma moorei	Yellowcheek darter	C	09.12.2006
Macrhybopsis gelida	Sturgeon chub	C	10.25.1999
Macrhybopsis meeki	Sicklefin chub	C	10.25.1999

Notropis girardi[1]	Arkansas River shiner	LT	11.28.1998
Percina pantherina	Leopard darter	LT	01.27.1978
Scaphirhynchus albus	Pallid sturgeon	LE	06.09.1990
CLASS: AMPHIBIA (Amphibians)			
Cryptobranchus alleganiensis bishopi	Ozark hellbender	C	09.12.2006
CLASS: AVES (Birds)			
Campephilus principalis[2]	Ivory-billed woodpecker	LE	06.02.1970
Charadrius melodus[2]	Piping plover	LT	12.11.1985
Mycteria americana[2]	Wood stork	LE	02.28.1984
Picoides borealis	Red-cockaded woodpecker	LE	10.13.1970
Sterna antillarum athalassos	Interior least tern	LE	05.28.1985
Vermivora bachmanii[1]	Bachman's warbler	LE	06.02.1970
CLASS: MAMMALIA (Mammals)			
Corynorhinus townsendii ingens	Ozark big-eared bat	LE	11.30.1979
Myotis grisescens	Gray bat	LE	04.28.1976
Myotis sodalis	Indiana bat	LE	03.11.1967
Puma concolor coryi[1]	Florida panther	LE	03.11.1967

Plants

Scientific Name	Common Name	Federal Status	Date Listed
Geocarpon minimum	Geocarpon	LT	06.16.1987
Lesquerella filiformis	Missouri bladderpod	LT	10.15.2003
Lindera melissifolia	Pondberry	LE	07.31.1986
Ptilimnium nodosum	Harperella	LE	09.28.1988
Trifolium stoloniferum[1]	Running Buffalo Clover	LE	06.05.1987

Legend:

LE - Listed Endangerd
LT - Listed Threatened
LT-PDL - Listed Threatened, Proposed for De-listing
PT - Proposed Threatened
PE - Proposed Endangered
C - Candidate, Under review for possible listing as Endangered or Threatened
T(S/A) - Listed Threatened because of similarity of appearance

[1] *These species may be of historic occurrence in Arkansas*
[2] *These species occur in Arkansas only as rare transients or uncommon visitors*

Note: Species believed to no longer be extant in Arkansas do not appear on this list.

Species of Greatest Conservation Need – Arkansas Central Plains and Mississippi Alluvial Plains

(Sources: "South Central Plains Species and Habitats," Ecoregions, Arkansas Wildlife Action Plan, http://www.wildlifearkansas.com/southplains.html;
"Mississippi Alluvial Valley Species and Habitats," Ecoregions, Arkansas Wildlife Action Plan, http://www.wildlifearkansas.com/plain.html)

		Central Plains	Mississippi Alluvial Plains
Amphibians			
Bird-voiced Treefrog	*Hyla avivoca*	X	X
Dwarf Salamander	*Eurycea quadridigitata*	X	X
Eastern Spadefoot	*Scaphiopus holibrookii*		X
Great Plains Narrowmouth Toad	*Gastrophryne olivacea*	X	
Hurter's Spadefoot	*Scaphiopus hurterii*	X	
Illinois Chorus Frog	*Pseudacris illinoensis*		X
Louisiana Slimy Salamander	*Plethodon kisatchie*	X	
Mole Salamander	*Ambystoma talpoideum*	X	X
Southern Crawfish Frog	*Rana areolata areolata*	X	
Spotted Dusky Salamander	*Desmognathus conanti*	X	X
Birds			
American Avocet	*Recurvirostra Americana*	X	X
American Bittern	*Botaurus lentiginosus*	X	X
American Black Duck	*Anas rubripes*	X	X
American White Pelican	*Pelecanus erythrorhynchos*	X	X
American Woodcock	*Scolopax minor*	X	X
Anhinga	*Anhinga anhinga*	X	X
Bachman's Sparrow	*Aimophila aestivalis*	X	
Bald Eagle	*Haliaeetus leucocephalus*	X	X
Barn Owl	*Tyto alba*	X	X
Bell's Vireo	*Vireo bellii*	X	X
Black-bellied Plover	*Pluvialis squatarola*	X	X
Black-crowned Night-heron	*Nycticorax nycticorax*	X	X
Brown-headed Nuthatch	*Sitta pusilla*	X	
Buff-breasted Sandpiper	*Tryngites subruficollis*	X	X
Cerulean Warbler	*Dendroica cerulean*	X	X
Chimney Swift	*Chaetura pelagica*	X	X
Chuck-will's-widow	*Caprimulgus carolinensis*	X	
Common Moorhen	*Gallinula chloropus*	X	X
Dunlin	*Calidris alpine*	X	X
EasternTowhee	*Pipilo erythrophthalmus*	X	X
Grasshopper Sparrow	*Ammodramus savannarum*	X	X
Greater Yellowlegs	*Tringa melanoleuca*	X	X
Henslow's Sparrow	*Ammodramus henslowii*	X	
Hooded Warbler	*Wilsonia citrine*	X	X
Hudsonian Godwit	*Limosa haemastica*	X	X
Interior Least Tern	*Sterna antillarum athalassos*	X	X
Kentucky Warbler	*Oporornis formosus*	X	X
King Rail	*Rallus elegans*	X	X
Lark Sparrow	*Chondestes grammacus*	X	
Le Conte's Sparrow	*Ammodramus leconteii*	X	X
Least Bittern	*Ixobrychus exilis*	X	X
Least Sandpiper	*Calidris minutilla*	X	X
Lesser Yellowlegs	*Tringa flavipes*	X	X
Little Blue Heron	*Egretta caerulea*	X	X

Species of Greatest Conservation Need – Arkansas Central Plains and Mississippi Alluvial Plains (Continued)

		Central Plains	Mississippi Alluvial Plains
Birds			
Migrant Loggerhead Shrike	*Lanius ludovicianus migrans*	X	X
Mississippi Kite	*Ictinia mississippiensis*	X	X
Northern Bobwhite	*Colinus virginianus*	X	X
Northern Harrier	*Circus cyaneus*	X	X
Northern Pintail	*Anas acuta*	X	X
Osprey	*Pandion haliaetus*	X	X
Painted Bunting	*Passerina ciris*	X	X
Pied-billed Grebe	*Podilymbus podiceps*	X	X
Piping Plover	*Charadrius melodus*	X	X
Prairie Warbler	*Dendroica discolor*	X	X
Prothonotary Warbler	*Protonotaria citrea*	X	X
Purple Gallinule	*Porphyrio martinica*	X	X
Red-cockaded Woodpecker	*Picoides borealis*	X	X
Red-headed Woodpecker	*Melanerpes erythrocephalus*	X	X
Rusty Blackbird	*Euphagus carolinus*	X	X
Sanderling	*Calidris alba*	X	X
Sedge Wren	*Cistothorus platensis*	X	X
Semipalmated Sandpiper	*Calidris pusilla*	X	X
Short-billed Dowitcher	*Limnodromus griseus*	X	X
Short-eared Owl	*Asio flammeus*	X	X
Smith's Longspur	*Calcarius pictus*	X	X
Snowy Egret	*Egretta thula*	X	X
Solitary Sandpiper	*Tringa solitaria*	X	X
Stilt Sandpiper	*Calidris himantopus*	X	X
Swainson's Warbler	*Limnothlypis swainsonii*	X	X
Swallow-tailed Kite	*Elanoides forficatus forficatus*		X
Trumpeter Swan	*Cygnus buccinator*		X
Upland Sandpiper	*Bartramia longicauda*	X	X
Western Sandpiper	*Calidris mauri*	X	X
Willow Flycatcher	*Empidonax trallii*		X
Wilson's Phalarope	*Phalaropus tricolor*	X	X
Wood Stork	*Mycteria Americana*	X	X
Wood Thrush	*Hylocichla mustelina*	X	X
Worm-eating Warbler	*Helmitheros vermivorus*	X	
Yellow-billed Cuckoo	*Coccyzus americanus*	X	X
Yellow-crowned Night-heron	*Nyctanassa violacea*	X	X
Crayfish			
crayfish	*Procambarus ferrugineus*		X
crayfish	*Procambarus regalis*	X	
crayfish	*Procambarus parasimulans*	X	
crayfish	*Fallicambarus gilpini*	X	
crayfish	*Fallicambarus strawni*	X	
crayfish	*Fallicambarus petilicarpus*	X	
crayfish	*Bouchardina robisoni*	X	
crayfish	*Fallicambarus strawni*	X	
crayfish	*Faxonella blairi*	X	
Fish			
Alabama Shad	*Alosa alabamae*	X	
Alligator Gar	*Atractosteus spatula*	X	X
Blackspot Shiner	*Notropis atrocaudalis*	X	
Blue Sucker	*Cycleptus elongates*	X	X
Bluehead Shiner	*Pteronotropis hubbsi*	X	X
Brown Madtom	*Noturus phaeus*	X	
Crystal Darter	*Crystallaria asprella*	X	X

Species of Greatest Conservation Need – Arkansas Central Plains and Mississippi Alluvial Plains (Continued)

		Central Plains	Mississippi Alluvial Plains
Fish			
Flathead Chub	*Platygobio gracilis*		X
Goldeye	*Hiodon alosoides*	X	X
Goldstripe Darter	*Etheostoma parvipinne*	X	X
Lake Chubsucker	*Erimyzon sucetta*	X	X
Lake Sturgeon	*Acipenser fulvescens*	X	X
Paddlefish	*Polyodon spathula*	X	X
Pallid Sturgeon	*Scaphirhynchus albus*		X
Peppered Shiner	*Notropis perpallidus*	X	
Red River Shiner	*Notropis bairdi*	X	
Sabine Shine Shiner	*Notropis sabinae*		X
Shorthead Redhorse	*Moxostoma macrolepidotum*		X
Sicklefin Chub	*Macrhybopsis meeki*		X
Slenderhead Darter	*Percina phoxocephala*	X	
Sturgeon Chub	*Macrhybopsis gelida*		X
Stargazing Darter	*Percina uranidea*	X	
Suckermouth Minnow	*Phenacobius mirabilis*		X
Swamp Darter	*Etheostoma fusiforme*	X	X
Taillight Shiner	*Notropis maculates*	X	X
Western Sand Darter	*Ammocrypta clara*	X	X
Insects			
anthophorid bee	*Tetraloniella albata*	X	
Ant-like Tiger Beetle	*Cicindela cursitans*		X
Beach-dune Tiger Beetle	*Cicindela hirticollis*		X
Big Sand Tiger Beetle	*Cicidela Formosa pigmentosignata*		X
Cow Path Tiger Beetle	*Cicindela purpurea*	X	
Diana	*Speyeria Diana*	X	
Duke's Skipper	*Euphyes dukesi*	X	X
Georgia Satyr	*Neonympha areolata areolata*	X	
Giant Stag Beetle	*Lucanus elephus*	X	X
King's Hairstreak	*Satyrium kingi*	X	
Ouachita Shore Bug	*Pentacora ouachita*	X	
Ozark Clubtail Dragonfly	*Gomphus ozarkensis*	X	
Prairie Mole Cricket	*Gryllotalpa major*		X
Red milkweed beetle	*Tetraopes texanus*	X	X
Robberfly	*Microstylum morosum*	X	
Sandy Stream Tiger Beetle	*Cicindela macra*	X	
Six-banded Longhorn Beetle	*Dryobius sexnotatus*		X
stonefly	*Leuctra paleo*	X	
Texas Frosted Elfin	*Callophrys irus hadros*	X	
Twelve-spotted Tiger Beetle	*Cicindela duodecimguttata*	X	X
winter stonefly	*Allocapnia malverna*	X	X
winter stonefly	*Allocapnia ozarkana*	X	
Yehl Skipper	*Poanes yehl*	X	
Mammals			
American Black Bear	*Ursus americanus americanus*	X	X
Desert Shrew	*Notiosorex crawfordi*	X	
Eastern Harvest Mouse	*Reithrodontomys humulis*	X	X
Eastern Spotted Skunk	*Spilogale putorius*	X	
Long-tailed Weasel	*Mustela frenata*	X	X
Rafinesque's Big-Eared Bat	*Corynorhinus rafinesquii*	X	X
Seminole Bat	*Lasiurus seminolus*	X	
Southeastern Bat	*Myotis austroriparius*	X	X
Southern Bog Lemming	*Synaptomys cooperi*		X
Western Harvest Mouse	*Reithrodontomys megalotis*		X

Species of Greatest Conservation Need – Arkansas Central Plains and Mississippi Alluvial Plains (Continued)

		Central Plains	Mississippi Alluvial Plains
Mussels			
Arkansas Fatmucket	*Lampsilis powellii*	X	
Black Sandshell	*Ligumia recta*	X	X
Butterfly	*Ellipsaria lineolata*	X	X
Creeper	*Strophitus undulates*	X	X
Elktoe	*Alasmidonta marginata*	X	X
Fat Pocketbook	*Potamilus capax*		X
Fatmucket	*Lampsilis siliquoidea*	X	X
Fawnsfoot	*Truncilla donaciformis*	X	X
Flat Floater	*Anodonta suborbiculata*	X	X
Flutedshell	*Lasmigona costata*	X	
Gulf mapleleaf	*Quadrula nobilis*	X	X
Hickorynut	*Obovaria olivaria*	X	X
Little Spectaclecase	*Villosa lienosa*	X	X
Louisiana Fatmucket	*Lampsilis hydiana*	X	X
Louisiana Pearlshell	*Margaritifera hembeli*	X	
Ohio Pigtoe	*Pleurobema cordatum*	X	X
Ouachita Creekshell	*Villosa arkansasensis*	X	
Ouachita Kidneyshell	*Ptychobranchus occidentalis*	X	X
Ouachita Rock Pocketbook	*Arkansia wheeleri*	X	
Pink Heelsplitter	*Potamilus alatus*		X
Pink Mucket	*Lampsilis abrupta*	X	X
Pondhorn	*Uniomerus tetralasmus*	X	X
Purple Lilliput	*Toxolasma lividus*	X	X
Purple Wartyback	*Cyclonaias tuberculata*		X
Pyramid Pigtoe	*Pleurobema rubrum*	X	X
Rabbitsfoot	*Quadrula cylindrical*	X	X
Rainbow	*Villosa iris*		X
Rock Pocketbook	*Arcidens confragosus*	X	X
Round Hickorynut	*Obovaria subrotunda*	X	
Round Pearlshell	*Glebula rotundata*	X	
Round Pigtoe	*Pleurobema sintoxia*	X	X
Salamander Mussel	*Simpsonaias ambigua*		X
Scaleshell	*Leptodea leptodon*	X	X
Southern Hickorynut	*Obovaria jacksoniana*	X	
Southern Mapleleaf	*Quadrula apiculata*	X	X
Southern Pocketbook	*Lampsilis ornate*	X	
Spectaclecase	*Cumberlandia monodonta*	X	
Tapered Pondhorn	*Uniomerus declivis*	X	X
Texas Lilliput	*Toxolasma texasiensis*	X	X
Undescribed Lampsilis species B	*Lampsilis sp. B*	X	
Western Fanshell	*Cyprogenia aberti*	X	X
Winged Mapleleaf	*Quadrula fragosa*	X	
Reptiles			
Graham's Crayfish Snake	*Regina grahamii*	X	X
Gulf Crayfish Snake	*Regina rigida sinicola*	X	X
Midwest Worn Snake	*Carphophis amoenus helenae*		X
Ornate Box Turtle	*Terrapene orata ornate*		X
Texas Coral Snake	*Micrurus tenere tenere*	X	
Texas Horned Lizard	*Phrynosoma cornutum*	X	
Western Chicken Turtle	*Deirochelys reticularia miaria*	X	X
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*	X	X

Appendix J. List of Preparers

Core Planning Team

U.S. Fish and Wildlife Service

- Bernie Petersen, Team Leader, South Arkansas NWR Complex
- Calvin Guthrie, Deputy Project Leader, South Arkansas NWR Complex
- Ame New, Forestry Tech, South Arkansas NWR Complex
- Lake Lewis, Refuge Manager, South Arkansas NWR Complex
- Larry Threet, Administrative Forester, South Arkansas NWR Complex
- Williams Courson, Forestry Tech, South Arkansas NWR Complex
- Ruth McDonald, Refuge Forester, South Arkansas NWR Complex
- Elizabeth Day, Administrative Support Assistant, South Arkansas NWR Complex
- Ricky Eastridge, Wildlife Biologist, South Arkansas NWR Complex
- Monica Harris, Regional Planner, Jacksonville, NC
- Mike Dawson, Regional Planner, Jackson, MS ES Office
- Evelyn Nelson, Writer/Editor, Southeast Regional Office
- Chevales Williams, Contractor, Tennessee Valley Authority

Interagency Coordination Planning Team

U.S. Fish and Wildlife Service

- Bernie Petersen, Team Leader, South Arkansas NWR Complex
- Calvin Guthrie, Deputy Project Leader, South Arkansas NWR Complex
- Ame New, Forestry Tech, South Arkansas NWR Complex
- Lake Lewis, Refuge Manager, South Arkansas NWR Complex
- Larry Threet, Administrative Forester, South Arkansas NWR Complex
- Williams Courson, Forestry Tech, South Arkansas NWR Complex
- Ruth McDonald, Refuge Forester, South Arkansas NWR Complex
- Elizabeth Day, Administrative Support Assistant, South Arkansas NWR Complex
- Ricky Eastridge, Wildlife Biologist, South Arkansas NWR Complex
- Bobby Schat, Felsenthal Tech, South Arkansas NWR Complex
- Thad Willaims, Biotech, South Arkansas NWR Complex
- Ray Woods, Engineer Operator, South Arkansas NWR Complex
- Monica Harris, Regional Planner, Jacksonville, NC
- Mike Dawson, Regional Planner, Jackson, MS ES Office
- Williams Smith, Asst. Planner
- Evelyn Nelson, Writer/Editor, Southeast Regional Office
- Chevales Williams, Contractor, Tennessee Valley Authority
- Mark Sattelberg, FWS, Arkansas Ecological Services
- Jason Phillips, FWS, Arkansas Ecological Services

Friends of Felsenthal NWR

- Ronnie Greer

Arkansas Game and Fish Commission

- Brady Barker, Arkansas Game and Fish Commission
- Don Turman, Arkansas Game and Fish Commission
- Susan Gregory, Regional Supervisor, Arkansas Game and Fish Commission
- Eric Brinkman, Fisheries Management, Arkansas Game and Fish Commission

Bioreview Team

The Biological and Habitat Review Teams consisted of Service staff and invited participants. The invited participants included local and regional experts, researchers, and individuals with intimate knowledge of and expertise in the biological resources of the refuge. The Felsenthal NWR review took place on June 16-18, 2008 and the Overflow NWR review took place on November 13-15, 2007. Members of these review teams included:

Felsenthal NWR Bioreview Team

Lynn Askins, USFWS, Carolina Sandhills NWR, Project Leader
Eric Brinkman, Arkansas Game and Fish Commission, Fisheries Biologist
Eddie Courson, USFWS, South Arkansas Refuge Complex, Fire Technician
Phil Covington, Ducks Unlimited, Inc., Biologist
Jeff Denman, USFWS, White River NWR, Administrative Forester
Rick Eastridge, Arkansas Game and Fish Commission, Bear Biologist
Tom Edwards, USFWS, Division of Migratory Birds, Biologist
Janet Ertel, USFWS, National Wildlife Refuge System - Southeast Region, Biologist
Jim Guldin, USDA Forest Service, Supervisory Ecologist
Dale Guthrie, USFWS, South Arkansas Refuge Complex, Deputy Project Leader
Richard Hines, USFWS, White River NWR, Biologist
Laura Housh, USFWS, National Wildlife Refuge System, Southeast Region, Planner
Chuck Hunter, USFWS, Chief, SE Refuge System, Div. of Planning and Resource Mgmt.
Ruth McDonald, USFWS, South Arkansas Refuge Complex, Forester
Bernie Petersen, USFWS, South Arkansas Refuge Complex, Project Leader
Dan Scheiman, Audubon Arkansas, Ornithologist
Larry Threet, USFWS, South Arkansas Refuge Complex, Administrative Forester
Don Turman, Arkansas Game and Fish Commission, District Fisheries Supervisor

Overflow NWR Bioreview Team

Ray Aycock, USFWS, Ecological Services, Mississippi Field Office, Leader
Jeff Denman, USFWS, White River National Wildlife Refuge, Administrative Forester
Tom Edwards, USFWS, Division of Migratory Birds, Biologist
Janet Ertel, USFWS, National Wildlife Refuge System - Southeast Region, Biologist
Lake Lewis, USFWS, Overflow National Wildlife Refuge, Manager
Bernie Petersen, USFWS, South Arkansas Refuges Complex, Project Leader
Catherine Rideout, AGFC, Ornithologist
Timmy R. Walker, USFWS, Overflow National Wildlife Refuge, Biological Technician

VISITOR SERVICES REVIEW TEAM

The Visitor Services Review Teams consisted of staff from the Service's Southeast Regional Office and the South Arkansas National Wildlife Refuge Complex. The Felsenthal review took place in December 2007 and the Overflow NWR review took place in September 2007. Members of the review team included:

Felsenthal NWR Visitor Services Review Team

Deborah Jerome, Visitor Services and Outreach, R4-RO
Diane Borden-Billiot, Southwest Louisiana NWR
Durwin Carter, Grand Bay NWR

Overflow NWR Visitor Services Review Team

Garry Tucker, Visitor Services and Outreach, R4-RO
Gay Brantley, Black Bayou Lake NWR
Doug Hunt, SELA Refuges Complex