

WILDLAND FIRE MANAGEMENT PLAN

MIDDLE MISSISSIPPI RIVER NATIONAL WILDLIFE REFUGE



2003

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INTRODUCTION

NEED AND REASON FOR FIRE MANAGEMENT PLAN

This document establishes a Fire Management Plan (FMP) for the Middle Mississippi National Wildlife Refuge (Refuge). The plan is written as an operational guide for managing the Refuge's wildland fire program. It defines levels of protection needed to (1) ensure safety of employees, visitors, and adjacent landowners and (2) protect resources, given current understanding of the complex relationships in natural ecosystems. It is written to comply with both Departmental and Service-wide requirements that units with burnable vegetation develop a fire management plan (620 DM 1).

This FMP outlines a program of most cost efficient and ecologically responsible suppression of all wildland fires. There is some potential for the use of prescribed fires on the Refuge.

Following the devastation brought by the flood of 1993, Congress appropriated money for the Emergency Wetland Reserve Program of the Department of Agriculture and for the Fish and Wildlife Service to assist with purchasing property from landowners who had been plagued by flooding and wanted to dispose of their flood prone property. In 1995, four locations in the uncontrolled portion of the Upper Mississippi River (Middle Mississippi) were designated for purchase by the Mark Twain Refuge. A regional Mississippi River flood plain assessment evaluated the restoration and preservation of 11,400 acres of floodplain habitat containing unprotected wetlands, croplands, and aquatic areas along the Middle Mississippi River between St. Louis, Missouri and Cairo, Illinois. The Middle Mississippi River NWR is managed under the Mark Twain Refuge Complex. In 2000, the Mark Twain Divisions were reorganized into five separate Refuges, and the Middle Mississippi River Divisions became the Middle Mississippi River NWR (MMR). In 2002, the MMR NWR headquarters was co-located with the Crab Orchard NWR in Southern Illinois.

To date, the Service has purchased a total of 4,075 acres (1,224 acres on Harlow Island, 2,770 acres on Wilkinson Island and less than 100 acres on Meissner Island). The Refuge is likely to acquire other flood prone parcels in the vicinity of these three sites and other units over time.

HOW FMP ACHIEVES LAND MANAGEMENT PLAN OBJECTIVES

The Middle Mississippi Divisions contribute to Refuge goals and objectives by restoring fish and wildlife habitat conditions on lands that also restore floodplain function and ecological integrity of the river. Acquisition of the Divisions has allowed flood-damaged agricultural lands to return to a more natural state by minimizing reliance on levees and restoring the natural functions of the Mississippi River floodplain through re-connection with the river. Suppression actions discussed in the FMP will assist in protecting habitat where necessary, and prescribed fire, where it can be applied, will contribute to the maintenance of quality wildlife habitat needed to achieve Refuge land management goals and objectives.

MEETING REGULATORY REQUIREMENTS

As no new Federal actions that would affect the environment are included in this plan, the plan is deemed a categorical exclusion and requires no additional environmental documentation under the National Environmental Policy Act (NEPA). It is the policy of the FWS to provide opportunities for public participation in management planning. This document will be available for a thirty day comment period following completion of the draft plan.

An informal Section 7 consultation will be conducted to ensure no adverse effects on Federally threatened or endangered (T&E) species that may be present. Table 3 listing Federal T&E species is found in Appendix D.

There are no historic buildings located on the three divisions of the Refuge. No detailed surveys of cultural sites have been conducted on Refuge divisions. Concurrence with this plan by the appropriate State Historic Preservation Officer will be obtained.

Documentation showing compliance with these and any other legal requirements are found in Appendix C.

COLLABORATIVE DEVELOPMENT PROCESS FOR LMP AND FMP

The Comprehensive Conservation Plan (CCP) for the Mark Twain Complex guides management of five separate Refuges along the river. During preparation of the CCP, Illinois, and Missouri, other Federal entities, private individuals and organizations were involved. This FMP has also received input from interested parties including state agencies in both Illinois and Missouri, adjacent landowners and other interested parties.

Continuing opportunities exist for future collaboration as acquisition of additional lands, and management planning for those lands, occurs.

AUTHORITIES FOR FMP DEVELOPMENT

Authority and guidance for developing and implementing this plan are found in:

- Protection Act of September 20, 1922 (42 Stat. 857; 16 U.S.C.594): authorizes the Secretary of the Interior to protect from fire, lands under the jurisdiction of the Department directly or in cooperation with other Federal agencies, states, or owners of timber.
- Economy Act of June 30, 1932: authorizes contracts for services with other Federal agencies.
- Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1856a and b): authorizes reciprocal fire protection agreements with any fire organization for mutual aid with or without reimbursement and allows for emergency assistance in the vicinity of agency lands in suppressing fires when no agreement exists.
- Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C. 5121): authorizes Federal agencies to assist state and local governments during emergency or major disaster by direction of the President.
- Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C.2201): provides for reimbursement to state or local fire services for costs of firefighting on federal property.
- Wildfire Suppression Assistance Act of 1989 (P.L. 100-428, as amended by P.L. 101- 11, April 7, 1989).
- Departmental Manual (Interior), Part 620 DM, Chapter 1, Wildland Fire Management: General Policy and Procedures (April 10, 1998): defines Department of Interior fire management policies.
- Service Manual, Part 621, Fire Management (February 7, 2000): defines U.S. Fish and Wildlife Service fire management policies.
- National Wildlife Refuge System Administrative Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd et seq.: defines the National Wildlife Refuge System as including wildlife refuges, areas for the protection and conservation of fish and wildlife which are threatened with extinction, wildlife ranges, game ranges, wildlife management areas and waterfowl production areas. It also establishes a conservation mission for the Refuge System, defines guiding principles and directs the Secretary of the Interior to ensure that biological integrity and environmental health of the system are maintained and that growth of the system supports the mission.

- National Environmental Policy Act of 1969: regulations implementing the National Environmental Policy Act encourage the combination of environmental comments with other agency documents to reduce duplication and paperwork (40 CFR 1500.4(o) and 1506.4).
- Clean Air Act (42 United State Code (USC) 7401 et seq.): requires states to attain and maintain the national ambient air quality standards adopted to protect health and welfare. This encourages states to implement smoke management programs to mitigate the public health and welfare impacts of Wildland and prescribed fires managed for resource benefit.
- Endangered Species Act of 1973.
- U.S. Fish & Wildlife Service Fire Management Handbook.
- National Fire Plan, Departments of Interior and Agriculture, 2001.
- 10-Year Comprehensive Strategy Implementation Plan, Departments of Interior and Agriculture, 2002.
- Draft Cohesive Strategy for Protecting People and Sustaining Resources in Fire-Adapted Ecosystems, Departments of Interior and Agriculture, 2001.

RELATIONSHIP TO LAND MANAGEMENT PLANNING/FIRE POLICY

AGENCY SPECIFIC FIRE MANAGEMENT POLICY

Fish and Wildlife Service fire management policy is based on the Departmental Manual (620 DM 1) and the 2001 Federal Wildland Fire Policy. **Firefighter and public safety is the first priority.** All Fire Management Plans and activities must reflect this commitment. With the possible exception of instances where the life of another is threatened, no Service employee, contractor, or cooperators will be purposely exposed to life-threatening conditions or situations (See 241 FW 7).

Only trained and qualified people will be assigned to fire management duties. Fire management personnel will meet training and qualification standards established or adopted by the Service for the position they occupy. Agency Administrators will meet training standards established or adopted by the Service for the position they occupy. Employees who are trained and certified for fire positions will participate in the wildland fire management program as the situation demands. Non-certified employees with operational, administrative, or other skills will support the wildland fire management program as needed. Agency Administrators will be responsible, be held accountable, and make employees available to participate in the wildland fire management program.

Fire management planning, preparedness, wildland and prescribed fire operations, monitoring, and research will be conducted on an interagency basis with the involvement of all partners when appropriate. Every area with burnable vegetation must have an approved Fire Management Plan. Fire Management Plans must provide for firefighter and public safety, identify values to be protected, support land, natural, and cultural resource management plans, and address public health issues. Fire Management Plans must also address all potential wildland fire occurrences and may include the full range of appropriate management responses. Fire Management Plans must be coordinated, reviewed, and approved by the responsible agency administrator, to ensure consistency with approved land management plans.

Fire, as an ecological process, will be integrated into resource management plans and activities on a landscape scale, across jurisdictional boundaries, and will be based upon best available science. All use of fire for natural and cultural resource management requires an approved plan which contains a formal prescription. Wildland fire will be used to meet identified resource management objectives when appropriate.

The Service will employ prescribed fire whenever it is an appropriate tool for managing Service resources and to protect against unwanted wildland fire whenever it threatens human life, property and natural/cultural resources. Once people have been committed to an incident, these human resources become the highest value to be protected. If it becomes necessary to prioritize between property and natural/cultural resources, this is done based on relative values to be protected, commensurate with fire management costs.

Regions will ensure their capability to provide safe, cost-effective fire management programs in support of land, natural, and cultural resource management plans through appropriate planning, staffing, training, and equipment.

Management actions taken on wildland fires must consider firefighter and public safety, be cost effective, consider benefits and values to be protected, and be consistent with natural and cultural resource objectives. Refuges will work with their local cooperators and the public to prevent unauthorized ignition of wildland fires on Service lands.

Structural firefighting is not the functional responsibility of the Service. Service assistance in structure protection should only be performed on an emergency basis to save lives. (See Fire Management Handbook, 1.5.4) Fire management policies and procedures for safety, training and equipment are mandatory. See 241 FW 7 (Safety Operations - Firefighting), 232 FW 6 (Firefighting Training), and 241 FW 3 (Personal Protective Equipment).

Further clarification and interpretation of policy may be found in Section 1.1.2 of the FWS Fire Management Handbook.

RELATIONSHIP OF FMP TO ENABLING LEGISLATION AND PURPOSE OF UNIT

The Emergency Wetland Reserve Program provides the framework for the establishment of this Refuge and the lands for which this plan is written. As a result of the floods in the Mississippi River Basin in 1993, Congress provided funding to enhance acquisition of flood-prone properties along the river.

This plan provides a framework for protection of wetlands containing both grasslands and forest, and agricultural lands reverting to forest or grasslands. It also provides an opportunity to manage and, as necessary, restore vegetation using prescribed fire as a tool.

SUMMARY OF SIGNIFICANT RESOURCES AND VALUES

From the Emergency Wetland Reserve Program standpoint, restoration of floodplain function of the purchased land is the most significant value of the Refuge. Lands included in the Refuge provide nesting, brood rearing, and resting habitat for waterfowl and other migratory birds as well as habitat for other wildlife species in a landscape generally dominated by agriculture.

BROAD MANAGEMENT PLAN DIRECTION PERTINENT TO FMP

Management will continue to focus on providing high quality wetlands, forests and grasslands to benefit waterfowl, other migratory birds, and other resident wildlife species. Fire management, particularly the use of prescribed fire, can contribute to this management direction by providing early successional stages of vegetation.

Land Management Goals

The Refuge strives to protect, enhance and restore a natural diversity of habitat types sufficient to maintain healthy populations of native wildlife within the ecosystem. The goals of the refuge land management program include the following:

1. Restore, enhance, and manage refuge wetland and aquatic areas to provide quality diverse habitat for waterfowl, shorebirds, big river fish, and other wetland-dependant species.
2. Conserve and enhance floodplain forest to meet the needs of migrating and nesting neotropical birds and other forest-dependant wildlife.
3. Protect, enhance, and restore other terrestrial habitats to benefit grassland birds, waterfowl and neotropical migrants.
4. Identify and reduce the impacts of sedimentation and other water quality factors, such as contaminants, on fish and wildlife resources.
5. Enhance floodplain functions and, where practicable, mimic historical water level fluctuations in the river corridor.

6. Provide wildlife-dependant recreation opportunities where appropriate, and improve the quality and safety of the recreational experience. Enhance environmental education and interpretive efforts consistent with the vision statement in the CCP.
7. Develop and implement a wildlife, habitat , and public use monitoring program, integrated with interagency efforts along the river corridor, to evaluate the effectiveness of refuge management programs and to provide information for adaptive management strategies.

Land Management Objectives

- 1.B. Protect, enhance, and maintain isolated backwaters and ephemeral wetlands, providing seasonal and semi-permanently flooded wetland vegetation types in unveeved areas of the refuge with little water level control for the benefit of migratory birds and other wetland-dependant species.
- 1.C. Protect, enhance, and maintain contiguous backwater and side channel habitat in unveeved areas of the Refuge for migratory birds and fish. Increase bathymetric diversity and wetland plant growth in these areas as feasible by 2015 where little or no local water level control exists.
- 2.A. Maintain existing tracts of floodplain forest on the refuge.
- 2.B. Plant hard mast (mesic bottomland) trees on suitable sites.
3. Terrestrial habitat objectives have not yet been established for the refuge.
- 4.A. Continue current and develop new partnerships with government agencies and private landowners to reduce effects of erosion and contaminant runoff affecting fish and wildlife resources in the Upper Mississippi River watershed.
- 4.B. Reduce sedimentation and improve overall water quality on refuge system lands by 2010 for the benefit of fish and wildlife populations.
- 5.A. Conduct activities and promote partnerships and interagency coordination which encourage a balanced floodplain management program .
- 5.B. Manage refuge lands for wildlife first, while considering UMR floodplain functions and contributing to improve those values.
6. Enhance visitor experiences involving wildlife observation, photography, interpretation and environmental education, hunting and fishing. This will be accomplished in part by constructing facilities such as observation platforms, trails, and kiosks, where appropriate. Enhanced law enforcement for the protection of refuge visitors, natural resources and facilities will be provided.
- 7.A. Monitor habitat communities within the refuge to evaluate the effects of current management actions and gather data to improve future management practices.
- 7.B. Monitor wildlife use to verify a response to habitat management efforts, and to contribute to systematic scale evaluations on the Mississippi River with our partners.

- 7.C. Monitor public use and environmental education programs to ensure compatibility with wildlife purposes, visitor satisfaction/safety and outreach effectiveness.
- 7.D. Work with partners to monitor systemic fish, wildlife, and habitat resources of the floodplain and gather data to assist with resource management decision-making.
- 7.E. Develop and implement an effective record-keeping and data analysis system, compatible with HNA, to facilitate adaptive management decision making.

Desired Future Condition

The Harlow and Meissner Island divisions do not include grassland or early successional components in their desired future condition. The use of prescribed fire on these units is unlikely. Wilkinson island however, may provide an opportunity to maintain grasslands and early successional habitats on approximately 600 acres within the riparian forest that will enhance migratory bird diversity. On these acres, prescribed fire may be one management tool used to establish and maintain grasslands, wet meadow or shrub-scrub wetlands and other flood tolerant early successional species.

WILDLAND FIRE MANAGEMENT STRATEGIES

GENERAL MANAGEMENT CONSIDERATIONS

Area-wide Considerations

Interagency Relationships

There is an ongoing coordination between FWS, state agencies and the Corps of Engineers (COE) related to management of these lands. This relationship is expected to continue and may be strengthened as additional acquisition occurs. As these lands are not in areas traditionally affected by naturally occurring fires, local cooperative efforts related to wildland fire suppression have been negligible.

Regional Strategies

No regional strategies related to fire management exist.

Other Collaborative Processes

Some opportunities will result from the Region's public review requirements while others derive from local user groups. This plan will be placed out for public review and input for a thirty day period to insure local concerns are addressed and any misconceptions related to use of prescribed fire or wildland suppression actions cleared.

10 Year Comprehensive Strategy Core Principles

Collaboration

For this FMP, collaboration at the local level includes the Illinois Department of Natural Resources, Missouri Department of Conservation, COE, county and town governments. Adjacent landowners (representative stakeholders) will also be involved.

Collaboration at a regional level is not likely as individual divisions are relatively small, not adjacent to each other and do not, in aggregate, contribute a critical acreage at risk to wildland fire occurrence.

Priority Setting

Project proposals, primarily related to prescribed fire, will be rated locally for initial priorities. Overall priorities for funding fuel management projects on the Refuge will be established at the federal regional level with appropriate input from state and local officials in the immediate refuge area.

Accountability

Accountability for achieving objectives developed in this plan will be accomplished by reporting results of projects or activities to the National Fire Plan Operations and Reporting System (NFPORS) as it is implemented. For objectives related to suppression, the annual report of fire activity, available from the Zone Fire Management Officer at Mark Twain National Wildlife Refuge Complex in Quincy, IL will document results of suppression or prescribed fire actions taken on the Refuge.

WILDLAND FIRE MANAGEMENT GOALS

Fire Management Goals in Context of LMP

The primary fire management goal on the Refuge is to protect wildlife habitat from degradation as a result of unwanted wildland fire. A secondary goal is the reestablishment of fire as the management tool of

choice to maintain and enhance existing fire-adapted communities. Accomplishing the second goal would also reestablish the expected fire regime and maintain affected communities in a Condition Class 1. Tables explaining fire regimes and condition class are found under the Fire Management Unit (FMU) descriptions on page 8.

FMP Contribution to Achieve LMP Goals

Effective appropriate management responses, taken quickly, will reduce potentially extensive damage (i.e. loss of preferred vegetation to invasive species or loss of soil organic components, etc.) to Refuge habitats. The application of prescribed fire will safely and effectively work to achieve stated management goals.

Contribution of Wildland Fire Goals to Regional/National Plans

National Fire Plan

Due to the relatively small size of the individual Divisions and lack of fire history since acquisition, wildland fire operations will not contribute significantly to any of the National Fire Plan goals.

Restore Fire-Adapted Communities

Prescribed fire application would be beneficial in restoring the role of fire in maintaining natural habitat conditions. Current acreages involved are insignificant in both Illinois and Missouri and have no measurable effect on National Fire Plan Goals.

10 Year Comprehensive Strategy

Priorities to Protect Communities and High Risk Watersheds

There are no Federally identified communities at risk (Federal Register, Vol. 66, No. 160, August 17, 2001, pp. 43384-43435) near any of the three Refuge Divisions. However, with the conversion from agriculture to bottomland forest, shrub and grasslands, an increased risk from wildland fire escaping from Meissner Island could potentially affect a number of homes and the community of Harrisonville, IL. Lands involved in this Plan are classed as floodplain and are not high risk watersheds.

Collaboration among Governments and Representative Stakeholders

Collaboration will occur between the Illinois DNR, Missouri Department of Conservation, county and local governments, and adjacent landowners (representative stakeholders). Collaboration will be in the form of opportunities for review and input into this Plan.

Performance Measures and Results Monitoring

The primary performance measure applicable to the Refuge involves effective protection of life and adjacent privately owned property. Proactive use of prescribed fire or management of hazardous fuels by other means would be tools used. Results would be based on values protected.

Cohesive Strategy Elements (Draft from USFS accepted by Interior agencies)

Institutional Objectives and Priorities

There are numerous refuge units in the Great Lakes-Big Rivers Region of FWS that support large fire-adapted communities. These areas will receive priority attention. Middle Mississippi NWR does not currently contain fire-adapted vegetative communities

so application of prescribed fire will be addressed when the Refuge reaches a higher level of priority.

Program Management Budgets and Authorities

At the present time, with only one fire reported on Harlow Island in January of 2002, and its status as a small unit in regards to acreage, the Refuge fails to generate any support from the FIREBASE fire planning and budgeting tool.

Social Awareness and Support

Due to the small size of the Refuge and the scattered nature of the Divisions, the areas are mostly known only to local residents. As staff has only recently been assigned to the Refuge no extensive public support for Refuge operations has been generated..

WILDLAND FIRE MANAGEMENT OPTIONS

Wildland Fire Management Options to be Implemented

Due to the scattered nature and small size of the Divisions and the proximity of adjacent landowners and improvements, full suppression is the appropriate management response. Firefighter safety and that of neighbors and visitors is of primary concern.

Use of foam or retardants will be in accordance with the guidelines found in Appendix B. This will protect any fisheries present and wetland water quality. In addition, mechanized equipment, when used, will produce the least environmental damage possible.

Rationale for Strategies to be Applied to Each FMU

With the scattered locations of Divisions, suppression is the reasonable fire management strategy. Actual suppression tactics could range from full, aggressive, suppression to containment between levees, roads, plowed agricultural fields or other fuel breaks created by human activity. Wildland fire use is not an option.

DESCRIPTION OF WILDLAND FIRE MANAGEMENT STRATEGIES BY FMU

FMU Descriptions

All Divisions will be treated as one FMU. Three different fuel complexes exist: upland forest, wetlands (forest, shrub, grass), and grasslands. Topographically the lands involved are generally flat to gently rolling. The upland forest is hardwood falling in Fire Regime Group V (as defined in the 10-Year Comprehensive Strategy, see Table 1). Grasslands are considered to be in Fire Regime Group I. Wetlands within the Refuge may also classify as Fire Regime Group I although modification of the adjacent river channel may affect vegetation enough that classification as Fire Regime Group III may be appropriate.

Table 1 – Fire Regime Groups

Fire Regime Group	Frequency (Fire Return Interval)	Severity
I	0-35 years	low severity
II	0-35 years	stand replacement severity
III	35-100+ year	mixed severity
IV	35-100+ year	stand replacement severity
V	>200 years	stand replacement severity

Additional physical and biological descriptive information for the Refuge is found in Appendix D.

The Refuge is generally considered to be 100% Condition Class 3, as defined in Table 2. Lightning is not normally a factor along the middle reach of the Mississippi River. Pre-settlement fire occurrence was likely to have been anthropogenic in nature. Fire occurrence today is likely to result from human causes. Careless public use is the most likely cause for wildland fires.

Table 2 – Condition Class Explanation

Condition Class	Fire Regime Example Management Options
Condition Class 1	Fire regimes are within an historical range and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within an historical range. Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.
Condition Class 2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.
Condition Class 3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Where appropriate, these areas may need high levels of restoration treatments, such as hand or mechanical treatments, before fire can be used to restore the historical fire regime.

FMU Objectives, Standards, Guidelines or Desired Future Condition with Strategies

The primary fire management objective for this FMU is the protection of adjacent private property from wildland fire. Wildland fire suppression is the strategy to be applied. As needs are evaluated and funding becomes available, proactive reduction of hazardous fuels will supplement suppression actions.

As agricultural fields regenerate, prescribed fire may be applied to the habitat to benefit waterfowl and migratory birds. Prescribed fire application will be accomplished using standards described in the FWS Fire Management Handbook Chapter 2.

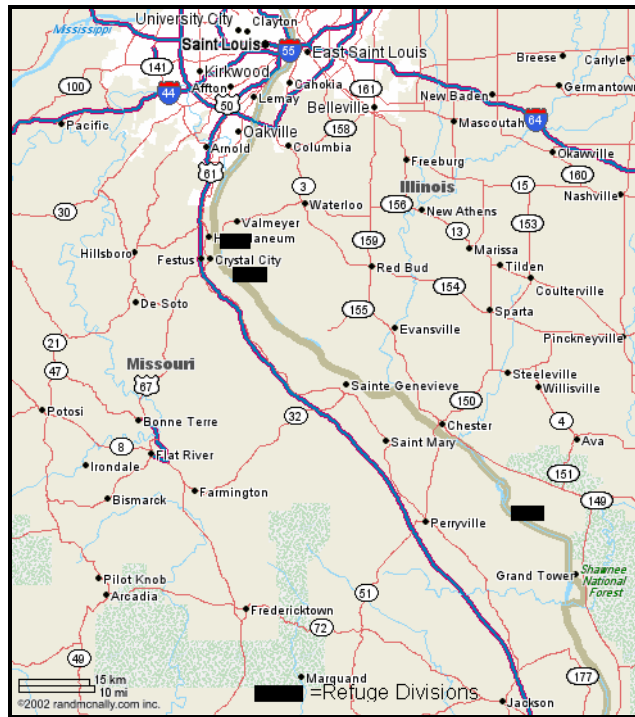
WILDLAND FIRE MANAGEMENT COMPONENTS

WILDLAND FIRE SUPPRESSION

Program Direction

Because this Refuge is scattered along the middle reach of the Mississippi River, initial attack suppression action will be provided by local fire departments, ILDNR, or MODOC. Figure 1 shows the relative location of the Divisions.

Figure 1 – Middle Mississippi NWR Location Map



Preparedness

Prevention and Community Education

Prevention and community education will not be undertaken solely by the Refuge. Any efforts will be coordinated with ILDNR, MODOC or local fire departments. They have the contacts and local infrastructure to deliver prevention and education programs.

Community Assistance and Grant Programs

When additional lands are purchased consideration will be given to providing local fire departments access to both Rural Fire Assistance and grant programs. There are no agreements in place to facilitate assistance currently.

Training and Qualifications

Departmental and FWS policy requires that all personnel engaged in suppression and prescribed fire duties meet the standards set by the National Wildfire Coordinating Group (NWCG). As suppression will be supplied by either state agencies or local fire departments, their qualification requirements will be accepted in accordance with existing national level agreements/guidance.

Readiness

As no suppression can be furnished by FWS, readiness will be the responsibility of either state agencies or local fire departments providing that protection.

Detection

With the proximity of adjacent landowners and public access, detection is expected to be by means of public contact with appropriate authorities. A lack of fire history since initial acquisition indicates wildland fire is a rare occurrence and additional detection means are not necessary.

Initial Attack

Initial attack operations would be undertaken by either MODOC, ILDNR or local fire departments. The wetland nature of the properties limits effectiveness of local fire department equipment. On both sides of the river, Refuge Divisions are generally bounded by levees, roads and cultivated lands providing multiple man-made barriers to fire spread.

Extended Attack

With the relatively small size of the existing parcels, it is not likely that active suppression operations would exceed the initial burning period. Second burning period operations would generally be mop-up operations.

Other Management Considerations

Clean Air Act

The areas surrounding the Refuge are Class II air quality areas. Wildland fires are expected to be of short duration with minimal effects on long-term air quality. Should prescribed fire become a usable tool on the Refuge, it is not expected to reduce air quality.

Endangered Species Act

A total of five Federally listed Threatened and Endangered (T&E) species are known to occur over the entire Mark Twain Complex. The Refuge has only recently been staffed with one individual so T&E species occurrence on the specific Divisions covered by this Plan is not known. Table 6 in Appendix G contains a list of the Federal T&E species. Table 7 in the same Appendix contains a list of species considered threatened or endangered under the laws of Missouri and Illinois. All actions taken under this Plan will consider effects of fire and fire suppression operations on listed species.

Other Legislation or Codified Rules

There have been no cultural resource surveys conducted on acquired lands. Should suppression operations uncover sites with potential, FWS personnel will be notified and the regional direction for cultural resource protection, found in Appendix A, will be followed.

WILDLAND FIRE USE

There will be no wildland fire use on the Refuge.

PRESCRIBED FIRE

Long-Term Program Objectives

The primary program objective will be the reduction of hazardous fuels in the vicinity of refuge boundaries to protect adjacent improvements. As land management objectives are developed, prescribed fire may be applied if it is deemed an effective tool to achieve those objectives.

Annual Preparation

Planning for each burn season begins the year prior to that season. Prescribed fire projects will be planned by the unit's biologist with assistance from the Zone FMO based on the goals and objectives in this plan and the land management objectives in the CCP. Budget requests will be prepared and submitted, by assigned deadlines, into FIREBASE. The Prescribed Burn Boss will conduct a field reconnaissance of the proposed burn location with the FMO, and appropriate staff to discuss objectives, special concerns, and gather all necessary information to write the burn plan. After completing the reconnaissance, a Prescribed Burn Boss qualified at the expected level of complexity will write the prescribed burn plan.

Both neighbors and cooperators will have opportunities for input into the planning process. As can be seen in Figure 2, the Meissner Island Division, on the Illinois side of the river, is landlocked and due to its' small size (78 acres) no active management is anticipated. Former agricultural fields in the Division are regenerating to bottomland hardwoods and are not expected to pose a significant threat to adjacent landowners as the potential for wildland fire is low.

Figure 2 – Meissner Island Division

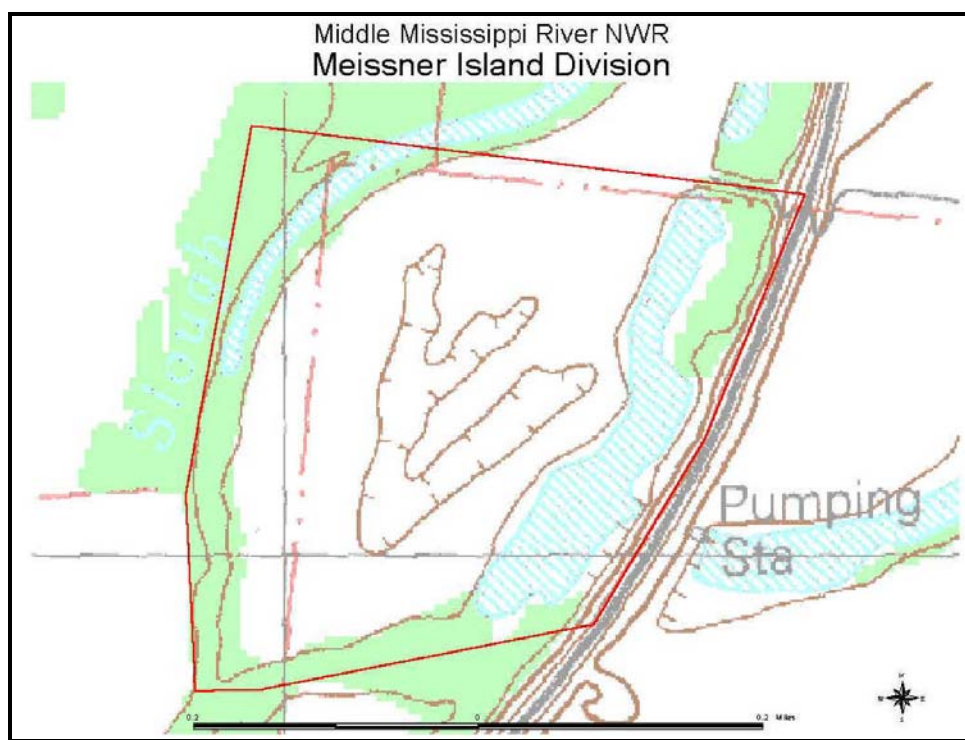


Figure 3 shows Harlow Island Division. This 1,224 acre unit on the Missouri side of the river is generally isolated by levees, the river, and Burlington Northern-Santa Fe railroad to the west. Adjacent lands at risk are found at the north end of the island and to the west of the railroad. Most of this unit was used for agriculture and that portion, as it regenerates, will create extensive areas of fine fuels that could be a risk to adjacent property owners.

The fourth figure shows the Wilkinson Island Division. This is the largest of the three Divisions covering 2,770 acres. There is one agricultural inholding. Damage to this parcel from wildland fire is not likely as the nature of the agricultural operations creates firebreaks on the boundary. A large part of the island is

covered by bottomland hardwoods and not generally susceptible to wildland fire. A levee protects the adjacent landowners east of the Division.

Figure 3 – Harlow Island Division

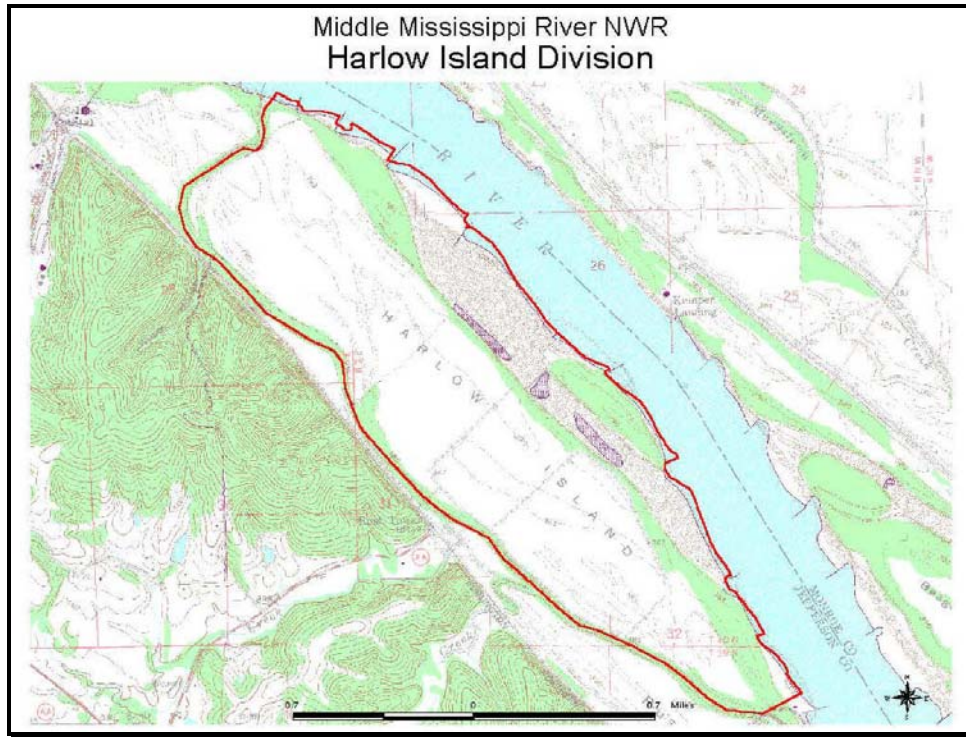
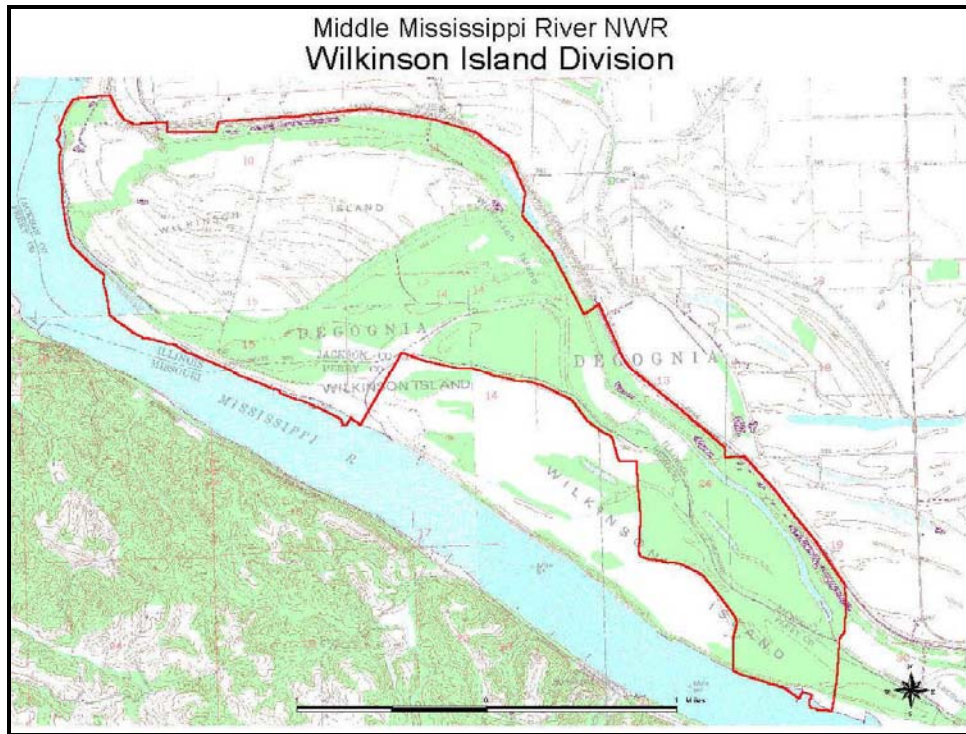


Figure 4 – Wilkinson Island Division



Required Staffing

Personnel needed to conduct the prescribed fires on the Refuge will come from other FWS units. In addition, ILDNR or MODOC staff members have training, experience, resources, and local contacts to conduct, or assist with, a prescribed fire operations. As part of the planning process, the prescribed burn boss will determine for each individual burn, the numbers and types of positions required. Depending on qualifications and the nature of current and future cooperative agreements or MOUs, both state agency and local fire department personnel may be participants.

Sensitive Resource Considerations

There are no surveyed cultural or historic sites on the Refuge. The reconnaissance conducted as part of the planning process will identify potential cultural sites and they will be surveyed in accordance with Regional Office guidance found in Appendix A.

Federally listed and State listed threatened or endangered species (T&E) are likely to be found on the Refuge. Should the pre-burn reconnaissance indicate T&E presence, an intra-Service Section 7 consultation will be initiated. Efforts will be made to determine fire effects on any T&E species present using literature searches, biological consultation and review of existing on-line databases. Lists of Federal and state T&E species potentially present are found in Tables 6 and 7 in Appendix G.

Prescription Requirements

Prescription elements in each individual prescribed fire plan should describe in detail the acceptable ranges of fire behavior and parameters of weather and fuel moisture content or other site variables. Smoke management requirements including duration of production and dispersal patterns are also required. The use of fire behavior and smoke management prediction aids (e.g., BEHAVE, RXWINDOW, nomograms, SASSEM) is recommended. Measures of desired results should also be included, i.e. percent of litter removed, number of brush stems killed etc.

Prescribed Fire Plan Elements

The prescribed fire plan is a site specific action plan describing the purpose, objectives, prescription, and operational procedures needed to prepare and safely conduct the burn. The treatment area, objectives, constraints, and alternatives will be clearly outlined. No burn will be ignited unless all prescription parameters of the plan are met. Fires not within those parameters will be suppressed. As part of the plan, minimum contingency resources will be listed.

Prescribed Fire Plans will follow the format contained in the FWS Fire Management Handbook. This format is reproduced in Appendix C. Each burn plan will be reviewed by the Biologist, Zone FMO, and Burn Boss. The Project Leader has the final authority to approve the burn plan. The term burn unit refers to a specific tract of land to which a prescribed burn plan applies. Smoke management will be addressed in accordance with state regulations.

Documentation and Reporting

Effects Monitoring

Monitoring of prescribed fires is intended to provide information for quantifying and predicting fire behavior and its ecological effects on refuge resources while building a historical record. Monitoring measures the parameters common to all fires: fuels, topography, weather and observed fire behavior. In addition, ecological changes such as species composition and structural changes in vegetation will be monitored after a fire. This information will be very useful in fine-tuning the prescribed burn program. During prescribed burning, monitoring should include mapping, weather, site and fuel measurements and direct observation of fire characteristics such as flame length, rate of spread and fire intensity. Operational monitoring provides a check to insure that the fire remains in prescription and serves as a basis for evaluation

and comparison of management actions in response to measured, changing fire conditions, and changes such as fuel conditions and species composition. Monitoring actions are addressed in the Prescribed Fire Plan as illustrated in Appendix C.

Cost Accounting

All costs of planning, implementation and first order, post-fire, monitoring will be charged to the appropriate cost code. This data may be tracked in several locations including FIREBASE, the National Fire Plan Operations and Reporting System as well as the Federal Financial System. Detailed cost tracking provides for constantly improving cost estimates for budget purposes.

Public Information/Interaction

In order to support and improve the efficacy of the prescribed fire program, it is necessary to insure that the surrounding public is well informed as to the purposes of prescribed fire activities. Early contact with local residents, community leaders and neighbors and providing an opportunity for planning process input through public meetings and review goes a long way towards reducing burn day questions and concerns.

NON-FIRE FUEL TREATMENTS

Long-term Program Objectives

The primary program objective is the reduction of hazardous fuels to protect adjacent landowners and values at risk. No non-fire treatments have been applied on Refuge lands. As regeneration of agricultural areas continues, annual reviews will be conducted to determine necessity of treatment.

Annual Preparation

There is little preparation needed for mechanical treatments. Review of proposed projects to ensure that damage would be minimal will be part of the planning process. As Harlow and Wilkinson Divisions have breached dikes and are subject to normal ebb and flow of river waters, timing of any proposed mechanical operations will be difficult.

Required Staffing

As there is only one staff member assigned to the Refuge, mechanical operations are likely to be conducted under contract.

Sensitive Resource Considerations

Depending on the type of mechanical operation, disking, mowing, etc., ground disturbance may occur. Mowing does not disturb the ground so no effects are expected on potential, undiscovered, cultural sites.

Federally listed and State listed threatened or endangered species are likely to be found on the Refuge. Should reconnaissance prior to treatment indicate T&E presence, an intra-Service Section 7 consultation will be initiated. Depending on access conditions, mechanical treatments can usually be timed to mitigate adverse effects on listed species. Lists of Federal and state T&E species potentially present are found in Tables 6 and 7 in Appendix G.

Air quality is not expected to be affected by mechanical fuels treatments. Some fugitive dust may be generated over the immediate area. It is not expected to be of a quantity or duration to contribute to regional haze conditions.

Restrictions

Equipment

There are no restrictions on types of equipment that may be used. Common agricultural equipment and implements would generally be used in fuel management operations.

Seasonal

Depending on the season and river water levels, operations would be timed to reduce potential for ground disturbance. The only other seasonal restriction involves delay of operations until ground nesting is essentially complete.

Documentation and Reporting

Effects Monitoring

Monitoring of mechanical operations is intended to provide information for quantifying and predicting ecological effects on refuge resources while building a historical record. In addition, ecological changes such as species composition and structural changes in vegetation should be monitored after each operation. Operational monitoring provides a basis for evaluation and comparison of management actions. Possible monitoring actions addressed in the Prescribed Fire Plan as illustrated in Appendix C are usable for mechanical operations as well.

Cost Accounting

All costs of planning, implementation and first order, post-operation, monitoring will be charged to the appropriate cost code. This data may be tracked in several locations including FIREBASE, the National Fire Plan Operations and Reporting System as well as the Federal Financial System. Detailed cost tracking provides for constantly improving cost estimates for budget purposes.

Public Information/Interaction

Since initial acquisition, there have been no management operations conducted. As needed, opportunities for public input should be made available to reduce public concern about increases in fuels, potential use of fire for management and potential for mechanical treatment of fuels.

EMERGENCY REHABILITATION AND RESTORATION

Burned Area Emergency Stabilization and Rehabilitation Handbook

While wildland fire may occur on the Refuge, the flat to rolling topography is not likely to require stabilization or rehabilitation. There is potential for damage to access roads during suppression operations. These needs would be addressed during or immediately following suppression operations. All other rehabilitation needs would be addressed following the guidance found in the Burned Area Emergency Stabilization and Rehabilitation Handbook.

Frequent and severe flooding is more likely to be an issue on these lands. Any proposed stabilization or rehabilitation resulting from wildland fire will fully consider the potential for seasonal flooding adversely affecting burned area operations.

Pre-Identified Areas with Restoration Needs

There are no pre-identified areas with restoration needs within the Refuge.

ORGANIZATION AND BUDGET

STAFFING

Current Level

Current staffing consists of one individual located in the Crab Orchard NWR Office (Marion, IL) and supporting staff at the Mark Twain NWR Complex Office in Quincy, IL. The Zone FMO at Quincy will provide fire management oversight on the Refuge.

Level Needed to Achieve Wildland Fire Management Goals

Due to the lack of fire history since acquisition, and location in the Mississippi River bottoms, no additional staffing is needed for wildland fire suppression operations at this time. Staff borrowed from other stations for prescribed fire operations should be adequate to accomplish stated objectives. It may also be possible to work cooperatively with trained, experienced MODOC or ILDNR staff from the local area to complete prescribed fire operations. Most mechanical operations would be accomplished under contract and would require only occasional monitoring to ensure contract requirements were being met.

FUNDING

Current Level

No fire funding is currently available for the Refuge.

Level Needed to Achieve Wildland Fire Management Goals

To achieve wildland fire management goals, especially prescribed fire application, additional funding for contract services, or to pay salary and travel costs of FWS employees would be necessary. Under current conditions, needed project funding can be requested through FIREBASE.

Additional Support

No additional support is needed under current conditions.

COOPERATIVE AGREEMENTS

No known agreements exist for fire suppression. If suppression agreements are pursued, it will be helpful to explore suppression goals with local entities. This may help to minimize environmental impacts associated with suppression efforts.

MOUs with MODOC and ILDNR, if developed, should address cooperative fire management efforts including suppression and application of prescribed fire.

MONITORING AND EVALUATION

MONITORING

Prescribed Fire

Minimum Levels

At the least, permanent photo points should be installed and documented. Before and after photos will document the overall visual changes following prescribed fire operations.

Intermediate Levels (NPS Fire Monitoring Handbook, 2001)

The National Park Service Fire Monitoring Handbook is scheduled to become the de facto monitoring guidance for all Federal land management agencies. Monitoring at levels 1 and 2 is preferred as a minimum level. A full PDF file version can be downloaded from the internet or a hardcopy can be obtained by contacting the National Park Service in Boise, ID.

Maximum Levels

If and when it becomes feasible, fire monitoring should become part of a comprehensive refuge monitoring program. All monitoring, (i.e. species surveys, water level monitoring, vegetation changes, fire effects and others) would be integrated into one program supporting adaptive management.

Non-Fire Treatments

Minimum Levels

At the least, permanent photo points should be installed and documented. Before and after photos will document the overall visual changes following mechanical operations.

Volume/Weight Removed Measures

At a higher level, information about the volume or weight of biomass removed is valuable to quantify treatment effects.

EVALUATION

Wildland Fire Suppression Operations

Review of Outside Resource Performance

Evaluation of outside resources (state agencies, other overhead or resources) will occur in accordance with guidance in the Fire Management Handbook, Section 3.6, Reviews.

Review of Internal Refuge Actions

Evaluation of Refuge suppression actions, if any, will be handled the same as the review of outside resource performance. Again the guidance found in the Fire Management Handbook, Section 3.6, Reviews will be followed.

Effectiveness of Prescribed Fire Operations

The effectiveness of prescribed fire operations will be judged using the monitoring results developed in the section on monitoring above.

NATIONAL WILDLAND FIRE PERFORMANCE MEASURES

As there is only one documented wildland fire on this Refuge, there are no reductions in acres or costs to be achieved. Projects or activities that relate to the National Fire Plan would be entered into NFPORS and reported through that system. It is expected that pre-settlement a Fire Regime III, probably with most

ignitions anthropogenic in nature, existed. The current condition class of the Refuge is estimated as 100 % Condition Class 3.

APPENDICES

APPENDIX A: REGIONAL REQUIREMENTS FOR NHPA

Preparation for prescribed fires such as constructing fire lines are subject to Section 106 of the National Historic Preservation Act. The procedures in the Notice dated December 8, 1999, "Historic Preservation Responsibilities," apply to the planning and preparation for conducting prescribed fires.

Efforts to control wildland fires (including prescribed fires that get out of control) are also subject to Section 106 of the National Historic Preservation Act. We will meet our obligations under this act in the following ways:

When the land covered by a wildfire has been inventoried to identify cultural resources, and the cultural resources have been evaluated for significance according to the criteria for the National Register of Historic Places, the Fire Management Officer will direct ground disturbing fire suppression efforts around (will avoid impacting) historic properties. Nevertheless, evidence of a previously undetected cultural resource may be encountered. The project leader shall immediately notify the Regional Historic Preservation Officer (RHPO). The RHPO will take immediate steps to have the cultural resource evaluated and protected, as appropriate, to the extent required by law and policy. This may require arranging for a qualified professional to visit and evaluate the site's importance and recommend a course of action. An evaluation and decision on the disposition of the cultural resource should be made within 48 hours of the discovery unless the project's schedule allows greater flexibility.

When the land covered by a wildfire has not been inventoried for cultural resources and wildfire suppression activities do result in ground disturbing activities, we will take the following action. Soon after fire control, the project leader will contact the RHPO to arrange for an archeologist to investigate the disturbed areas to determine if sites were affected.

Refuge operations and maintenance funds (sub-activity 1261) will pay the cost of these activities unless the action is an emergency archeological and historic property survey in unstable areas prone to further degradation (i.e., erosion) following a wildland fire or in association with an emergency fire rehabilitation treatment. Emergency archeological and historic property surveys in unstable areas prone to further degradation (i.e., erosion) following a wildland fire or in association with an emergency fire rehabilitation treatment, and archeological, historic structure, cultural landscape, and traditional cultural property resource stabilization and rehabilitation can be funded with emergency rehabilitation funding (sub-activity 9262).

APPENDIX B: ENVIRONMENTAL GUIDELINES FOR FOAM/RETARDANT USE

The following guidelines should be followed to minimize the likelihood of retardant chemicals entering a stream or other body of water.

- During training or briefings, inform field personnel of the potential danger of fire chemicals, especially foam concentrates, in streams or lakes.
- Locate mixing and loading points where contamination of natural water, especially with the foam concentrate, is minimal.
- Maintain all equipment and use check valves where appropriate to prevent release of foam concentrate into any body of water.
- Exercise particular caution when using any fire chemical in watersheds where fish hatcheries are located.
- Locate dip operations to avoid run-off of contaminated water back into the stream.
- Dip from a tank rather than directly from a body of water, to avoid releasing any foam into these especially sensitive areas.
- Use a pump system equipped with check valves to prevent flow of any contaminated water back into the main body of water.
- Avoid direct drops of retardant or foam into rivers, streams, lakes, or along shores. Use alternative methods of fire line building in sensitive areas.
- Notify proper authorities promptly if any fire chemical is used in an area where there is likelihood of negative impacts.
- While it is preferable that drops into or along any body of water not occur, it is possible that the fire location and surrounding terrain make it probable that some retardant may enter the water. The person requesting the retardant (such as the incident commander) must balance the impacts on the environment, i.e., potential fish kill, with the resources and values to be protected from the fire.

APPENDIX C: PRESCRIBED FIRE DOCUMENTS

Prescribed Fire Plan Format

COVER PAGE

Refuge or Station:	
Unit:	
Prepared By: Prescribed Fire Planner	Date:
Reviewed By: Refuge Manager	Date:
Reviewed By: Prescribed Burn Boss	Date:
Reviewed By: Regional Fire Management Coordinator	Date:
Reviewed By: (Others)	Date:

The approved Prescribed Fire Plan constitutes the authority to burn, pending approval of Section 7 Consultations, Environmental Assessments or other required documents. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Prescribed burning conditions established in the plan are firm limits. Actions taken in compliance with the approved Prescribed Fire Plan will be fully supported, but personnel will be held accountable for actions taken which are not in compliance with the approved plan.

Approved By:	Date:
--------------	-------

PRESCRIBED FIRE PLAN

Refuge:			Refuge Burn Number:		
Sub Station:			Fire Number:		
Name of Area:			Unit Number:		
Acres to be Burned:			Perimeter of Burn:		
Legal Description:	Lat.:	Long.:	T	R	S
County:					

Is a Section 7 Consultation being forwarded to Fish and Wildlife Enhancement for review ?
Yes No (circle).

(Page 2 of this PFP should be a refuge base map showing the location of the burn on Fish and Wildlife Service land)

The Prescribed Fire Burn Boss/Specialist must participate in the development of this plan.

I. GENERAL DESCRIPTION OF BURN UNIT

Physical Features and Vegetation Cover Types (Species, height, density, etc.):

Primary Resource Objectives of Unit (Be specific. These are management goals):

- 1.
- 2.
- 3.

Objectives of Fire (Be specific. These are different than management goals):

- 1.
- 2.
- 3.

Acceptable Range of Results (Area burned vs. unburned, scorch height, percent kill of a species, range of litter removed, etc.):

- 1.
- 2.
- 3.

II. PRE-BURN MONITORING

Vegetation Type	Acres	%	FBPS Fuel Model

Habitat Conditions (Identify with transect numbers if more than one in burn unit.):

Type of Transects:

Photo Documentation (Add enough spaces here to put a pre-burn photo showing the habitat condition or problem you are using fire to change/correct. A photo along your transect may reflect your transect data.):

Other:

III. PLANNING AND ACTIONS

Complexity Analysis Results:

Site preparation (What, when, who & how. Should be done with Burn Boss):

Weather information required (who, what, when, where, how, and how much):

Safety considerations and protection of sensitive features (Adjacent lands, visitors, facilities, terrain, etc., and needed actions. Include buffer and safety zones. Be specific, indicate on a burn unit map. Map should be a USGS quadrangle if possible, so ridges, washes, water, trails, etc. can be identified.)

Special Safety Precautions Needing Attention (Aerial ignition, aircraft, ignition from boat, etc.):

Media Contacts (Radio stations, newspaper, etc., list with telephone numbers):

Special Constraints and Considerations (Should be discussed with Burn Boss):

Communication and Coordination on the Burn (Who will have radios, frequencies to be used, who will coordinate various activities.):

IV. IGNITION, BURNING AND CONTROL

Scheduling	Planned or Proposed	Actual
Approx. Date(s)		
Time of Day		

Acceptable Range of Prescription Elements - Complete for Each Applicable Fuel Model

BEHAVE Fuel Model:	Low	High	Actual
Temperature			
Relative Humidity			
Wind Speed (20' forecast)			
Wind Speed (mid-flame)			
Cloud Cover %			
Wind Direction	Between:		

BEHAVE Fuel Model:	Low	High	Actual
ENVIRONMENTAL CONDITONS			
Soil Moisture			
1 hr. Fuel Moisture			
10 hr. Fuel Moisture			
100 hr. Fuel Moisture			
Woody Live Fuel Moisture			
Herb. Live Fuel Moisture			
Litter/Duff Moisture			
FIRE BEHAVIOR			
Type of Fire (H, B, F)			
Rate of Spread			
Fireline Intensity			
Flame Length			
Energy Release Component			
NFDRS Fuel Model Used:			

Cumulative effects of weather and drought on fire behavior:

Ignition Technique (Explain and include on map of burn unit. Use of aerial ignition must be identified in this plan. Last minute changes to use aircraft will not be allowed and will be considered a major change to the plan. This will require a resubmission):

Prescribed Fire Organization (See Section VII, Crew and Equipment Assignments. All personnel and their assignments must be listed. All personnel must be qualified for the positions they will fill.)

Other (If portions of the burn unit must be burnt under conditions slightly different than stated above, i.e., a different wind direction to keep smoke off of a highway or off of the neighbors wash, detail here.)

Prescription monitoring (Discuss monitoring procedure and frequency to determine if conditions for the burn are within prescription):

V. SMOKE MANAGEMENT

- Make any Smoke Management Plan an attachment.
- Permits required (who, when):
- Distance and Direction from Smoke Sensitive Area(s):
- Necessary Transport Wind Direction, Speed and Mixing
- Height (Explain how this information will be obtained and used):
- Visibility Hazard(s) (Roads, airports, etc.):
- Actions to Reduce Visibility Hazard(s):
- Residual Smoke Problems (Measures to reduce problem, i.e., rapid and complete mop-up, mop-up of certain fuels, specific fuel moistures, time of day, etc.):
- Particulate emissions in Tons/Acre and how calculated
 - Estimated before the burn:
 - Actual after the burn:

VI. FUNDING AND PERSONNEL

Activity Code:

Costs

	Equipment & Supplies	Labor	Overtime	Staff Days
Administration (planning, permits, etc.)				
Site Preparation Ignition & Control				
Travel, Per Diem				
Total	0	0	0	0

VII. BURN-DAY ACTIVITIES

Public/Media Contacts on Burn Day (List with telephone numbers):

Crew & Equipment Assignments (List all personnel, equipment needed, and assignments. The following is not an all inclusive list for what you may need.)

- Burn Boss/Manager -
- Ignition Specialist -
- Ignition Crew -
- Holding Specialist -
- Holding Crew -
- Aircraft Manager -
- FWBS -
- Dispatcher-
- Other -

Crew Briefing Points (Communications, hazards, equipment, water sources, escape fire actions, etc. To be done by Burn Boss. Refer to Safety Considerations in Planning Actions and points listed below):

Ignition Technique (Methods, how, where, who, and sequence. Go over what was submitted in Section IV and any changes needed for the present conditions.) Attach ignition sequencing map if necessary:

Personnel Escape Plan:

Special Safety Requirements:

Go-No-Go Checklist:

Holding and Control:

- Critical Control Problems:

- Water Refill Points:
- Other:

Contingency Plan:

- Holding Plan Failure (Are there dedicated crews standing by to initial attack or will people doing other jobs be called upon to do initial attack, who must be called in case of an escape, what radio frequencies will be used, etc.)
 - Initial Escape
 - Escape Exceeding 1 Burning Period:
- Smoke Management Plan Failure
- Fire Behavior Outside Prescription
- Other

Mop Up and Patrol:

- Resources needed
- Duration

Rehabilitation Needs:

DI 1202 Submission Date:

Special Problems:

VIII. CRITIQUE OF BURN

Were burn objectives within acceptable range of results? (Refer to Section I):

What would be done differently to obtain results or get better results?

Was there any deviation from plan? If so, why?

Problems and general comments:

IX. POST-BURN MONITORING

Date: Refuge Burn Number:

Length of Time after Burn:

Vegetative Transects:

Comments on Habitat Conditions, etc.:

Photo Documentation:

Other:

X. FOLLOW-UP EVALUATION

Date: Refuge Burn Number:

Length of Time after Burn:

Vegetative Transects:

Comments on Habitat Conditions, etc.:

Photo Documentation:

Other:

Monitoring Plan

Critique of Burn

Were burn objectives within acceptable range of results?

What would be done differently to obtain results or get better results?

Was there any deviation from approved plan? If yes, why?

Problems and general comments:

POST-BURN MONITORING

Date: _____ Refuge FIREBASE Project Number: _____

Length of time since burn: _____

Vegetative Transect:

Comments on Habitat conditions, etc.:

Photo Documentation:

Other:

FOLLOW-UP EVALUATION

Date: _____ Refuge FIREBASE Project Number: _____

Length of time since burn: _____

Vegetative Transect:

Comments on Habitat conditions, etc.:

Photo Documentation:

Other:

Burn Severity Data Matrix

	Unburned (5)	Scorched (4)	Lightly Burned (3)	Moderately Burned (2)	Heavily Burned (1)	Not Applicable (0)
Substrate (litter/duff) (S)	Not burned	Litter partially blackened: duff nearly unchanged; wood/leaf structures unchanged	Litter charred to partially consumed: upper duff layer burned; wood/leaf structures charred but recognizable.	Litter mostly to entirely consumed leaving light colored ash; duff deeply burned; wood/leaf structures unrecognizable	Litter and duff consumed leaving fine white ash; mineral soil visibly altered, often reddish.	Inorganic This may be used in grasslands where there is only sand as a substrate and no organic material or where litter/duff layer is lost due to disturbance (as in a gopher mound, badger/fox den, ant hill, etc.)
Vegetation (understory /brush/herbs) (V)	Not burned	Foliage scorched and attached to supporting twigs. Bases of stems of brush lightly browned with blisters visible, but stems still standing. In grasslands, most cured grasses/forbs still left standing after the burn. Green plants are essentially unaffected.	Foliage and smaller twigs partially consumed. Stems of brush burned at bases with heavy blistering. Many stems burned through and fallen over, but not consumed. Most cured forbs, grasses and sedges are burned but may not all be consumed. In grasslands, cured grasses burned off and fallen over. Most are consumed, but some may lay on the ash unburned. There may still be a small percentage of stems left standing. Green plants are discolored.	Foliage, twigs and small stems consumed. Stems of brush burned off and consumed. There will still be charred "stubs" sticking out of the ground where the brush was growing from. All cured forbs, grasses, sedges are consumed. In grasslands, cured grasses are all consumed. Any plants are brown and shriveled.	All plant parts consumed leaving some or no major stems/trunks. Stems of brush burned off and consumed. "Stubs" where shrubs once grew are burned off the ground line. Cured and green grasses, fobs & sedges are completely consumed.	None present

GO/NO-GO Checklist

**NWCG
PRESCRIBED
FIRE
GO/NO-GO
CHECKLIST**

Yes	No	Questions
		Are ALL fire prescription Elements Met?
		Are ALL smoke management specifications met
		Has ALL required current and projected fire weather forecast been obtained and are they favorable?
		Are ALL planned operations personnel on-site, available and operational?
		Has the availability of ALL contingency resources been checked, and are they available?
		Have ALL personnel been briefed on the project objectives, their assignments, safety hazards, escape routes, and safety zones?
		Have ALL pre-burn considerations identified in the prescribed fire plan been completed or addressed?
		Have ALL the required notifications been made?
		Are ALL permits and clearances obtained?
		In your opinion, can the burn be carried out according to the prescribed fire plan and will it meet the planned objective?

If all questions were answered “YES” proceed with a test fire. Document the current conditions, location, and results.

Prescribed Fire Burn Boss

Date

Refuge Manager

Date

APPENDIX D: FMU PHYSICAL AND BIOLOGICAL ADDENDUM

Meissner Island Division

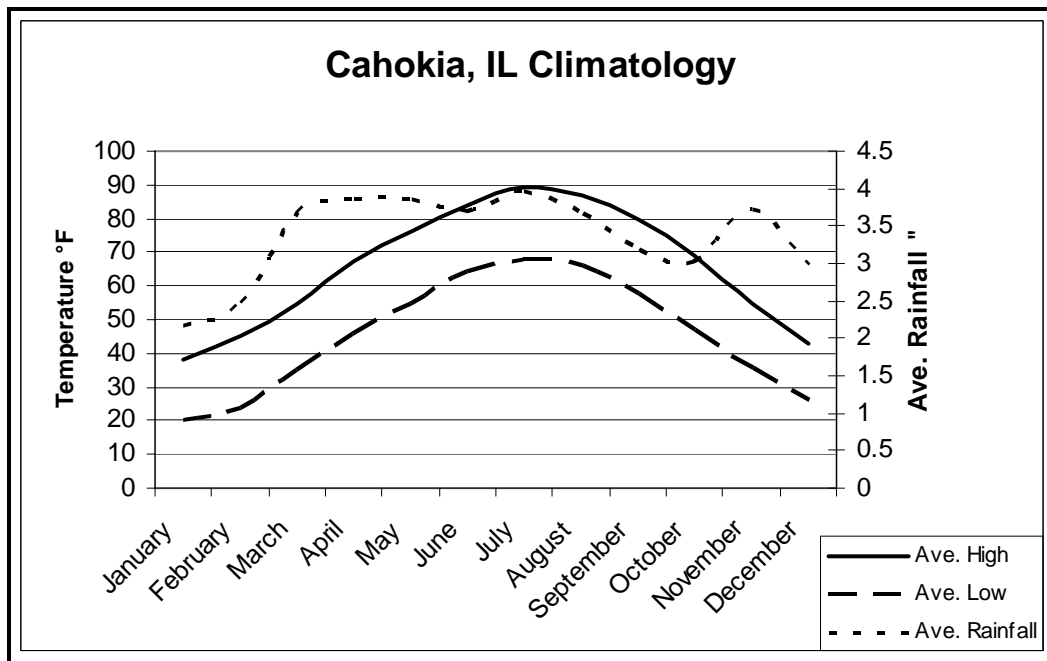
The 78 acre Meissner Island Division is located in Monroe County, Illinois. It is less than 20 river miles from St. Louis' southern suburbs and is encumbered by a perpetual Wetland Reserve Program (WRP) easement. Meissner Island Division is land-locked on all sides by owners who were not interested in selling their property following the 1994 flood.

The physical characteristics of the parcel are consistent with most of the bottomlands of this reach of the Mississippi River. Topographically, the land is flat to gently rolling with an elevational difference of approximately 30 feet. A levee lies along the east boundary of the property. Soils are expected to be silt based with potential ponding in lower areas. The island is no longer a true island as it has accreted to the mainland over time.

Climatologically, the area is subject to cool winters with hot and humid summers. The climatology from Cahokia, IL (approximately 20 miles northeast) is found in the figure below. Rainfall averages just over 40 inches annually. Moisture conditions, both surface and subsurface, are affected by river levels as well as rainfall. Temperature extremes in the St. Louis/Cahokia area have reached 115 °F (1954) and -18 °F (1985).

December, January and February are the driest months. September and October tend to be somewhat dryer than the summer or late fall months. River levels vary as a result of moisture runoff in the Upper Mississippi River and Missouri River Basins.

Figure 5 – Cahokia, IL, MI Climatology



The former cropland acreage is naturally regenerating with silver maple, willow and cottonwood seedlings. Early seral stages of vegetation include grasses with potentially high rates of spread. As forest vegetation gradually dominates the area, litter layer moisture levels should increase and fire potential

should decrease. The exception would be during dry years. Table 3 shows estimated acres of vegetative type based on land cover maps developed in 2000.

Table 3 – Meissner Island Vegetation

Vegetative Type	Acres
Wet Meadow	2.5
Grassland	52.8
Floodplain Forest	22.7
Total	78.0

Management direction is identified in the draft CCP. For the expected duration of this plan, efforts will be made to provide protection from wildland fire to surrounding properties. No formal vegetation surveys have been conducted so no evidence of threatened or endangered plants has been noted.

Harlow Island Division

Harlow Island Division is located in Jefferson County, Missouri just off Interstate Highway 55 and U.S. Highway 61 six miles north of Crystal City, Missouri. This Division is approximately 10 miles down river from Meissner Island. The Service completed purchase of this 1,224 acre tract in 1996. The levee was breached at the time the Service acquired the land and has not been repaired or maintained to allow the land to return to its floodplain function which allows the Mississippi River to ebb and flow naturally.

The physical characteristics of the parcel are consistent with most units of the Mark Twain Complex. Topographically, the land is flat to gently rolling with an elevational difference of approximately 20 feet. Soils are generally silty in nature with some potential ponding in the lowest areas. As is the case with Meissner Island, Harlow Island has become part of the mainland on the Missouri side of the river through accretion.

The cropland fields are reverting to bottomland forests which will be primarily cottonwood, willow, and maple. There may be potential for planting a few hard mast trees on the old levee or higher ground to serve as a seed source for regeneration and a food source for wildlife. Plantings of this type would require some sort of fire protection until established. Table 4 shows estimated acres of vegetative type based on land cover maps developed in 2000.

Table 4 - Harlow Island Vegetation

Vegetative Type	Acres
Floodplain Forest	480
Wet Meadow	82
Grassland	365
Scrub/Shrub	241
Sand/Mud	56
Total	1,224

No major developments are planned for the Division due to its location in the floodplain. Access is by means of an existing earthen road crossing with culverts located at the entrance to the Division near the end of County Road AA. This access is currently substandard and unsafe for vehicles to cross. The feasibility of replacing this crossing with a safe bridge will be examined. While no migratory bird hunting is allowed, the riverside location is expected to draw visitors with a subsequent risk of human-caused fires.

Management direction has been identified in the draft CCP. For the expected duration of this plan, efforts will be made to provide protection from wildland fire to surrounding properties. No formal vegetation surveys have been conducted so no evidence of threatened or endangered plants has been noted.

For the discussion of climate see the section under the Meissner Island Division.

Wilkinson Island Division

The southernmost division of the Refuge is Wilkinson Island comprised of 2,770 acres. This area is about 37 miles north of Cape Girardeau, Missouri, in Jackson County, Illinois and Perry County, Missouri.

Wilkinson Island was protected by a levee which was breached during the 1993 flood. The levee will not be repaired, although there is one significant in holding within the approved refuge boundary. The remaining landowner has an access easement across the island to maintain his cropland. This island, like Harlow and Meissner Islands, was a real island, but through accretion has connected to the mainland.

Natural re-vegetation has resulted in a thick stand of silver maple, willow and cottonwood saplings on abandoned croplands. As described for the other divisions, once the floodplain forest has become established, the litter layer of fuels will maintain moisture and wildland fire occurrence will not be likely except during drier fuel conditions. There will be some increased potential for fire during the fall when public use of the area for hunting increases. Table 5 shows estimated acres of vegetative type based on land cover maps developed in 2000.

Table 5 – Wilkinson Island Vegetation

Vegetative Type	Acres
Mesic Bottomland Forest	1528.5
Wet Meadow	72.9
Grassland	289.6
Scrub/Shrub	623.9
Sand/Mud	109.3
Wetlands	145.8
Total	2,770.0

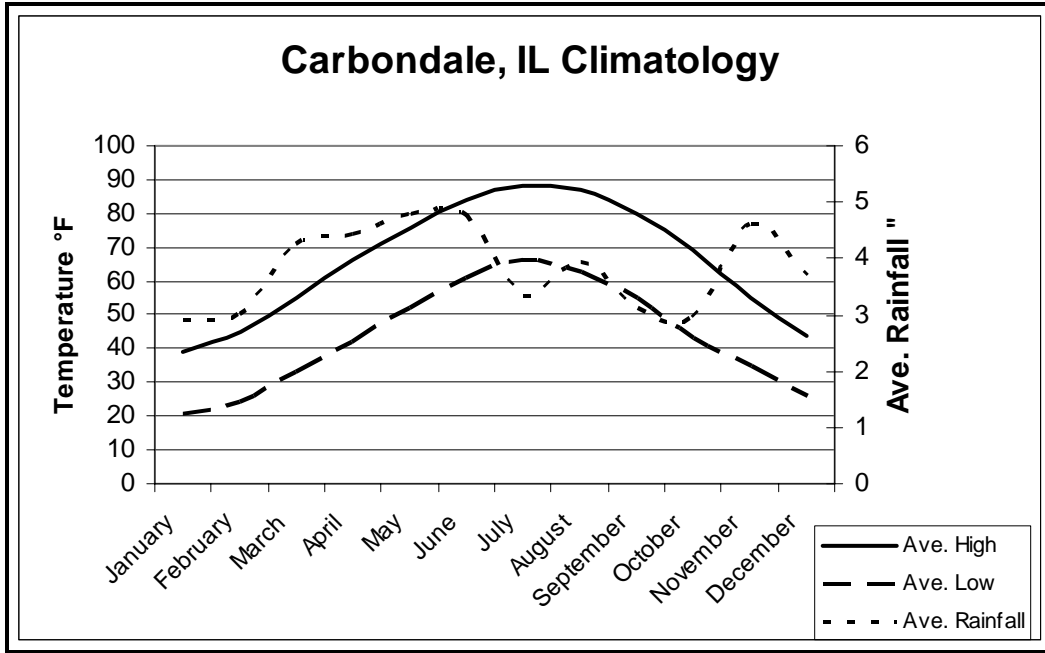
The Missouri/Illinois State line runs through the division, but is unclearly delineated. Due to the location on the Illinois side of the river, suppression action regardless of the state line, will be by ILDNR or local fire departments. No parking lots, kiosks, informational panels or other structures are in place or subject to wildland fire damage.

Management direction has not been determined. For the expected duration of this plan, efforts will be made to provide protection from wildland fire to surrounding properties. No formal vegetation surveys have been conducted so no evidence of threatened or endangered plants has been noted.

Climatologically, the area is subject to cool winters with hot and humid summers. The climatology from Carbondale, IL (approximately 20 miles east) is found in Figure 7, below. Rainfall averages nearly 46 inches annually. Moisture conditions, both surface and subsurface, are affected by river levels as well as rainfall. Temperature extremes in the Carbondale area have reached 113 °F (1930) and -25 °F (1977).

January and February are the driest months. September and October tend to be somewhat dryer than the summer or late fall months. As in the upper divisions, river levels vary as a result of moisture runoff in the Upper Mississippi River and Missouri River Basins.

Figure 6 – Carbondale, IL Climatology



Fire Season

This reach of the Mississippi River Basin typically has a split fire season. The first part is during the dry months in the early spring until vegetation has begun its growth (green-up). This part of the fire season may run from March until early-May. A fall fire season occasionally follows the growing season. The first frost cures remaining fine fuels and this season may run from October through mid-December depending on the unit and weather patterns. Fires outside of these timeframes are possible but unlikely based on an analysis of fire occurrence on nearby refuges.

Wildlife

While no site specific wildlife species lists have been developed, observations along the river within the Mark Twain Complex indicate potential use by approximately 270 bird species in the Middle Mississippi Refuge area. Bird, mammal, fish, reptile, and amphibian lists for the complex are available from the Refuge, Mark Twain Complex office or from the internet (http://midwest.fws.gov/marktwain/species_lists/species_lists.htm).

Table 6 in Appendix G lists Federally Threatened and Endangered species possibly present on the Refuge. Table 7 in Appendix G lists species listed as Threatened or Endangered by the States of Missouri and Illinois under state statutes.

APPENDIX E: COOPERATOR AND LANDOWNER CONTACTS

Cooperator Contacts

MEISSNER ISLAND DIVISION		
ILDNR		
Local Fire Department?	Floyd Floarke (chief)	(618) 935-2221
HARLOW ISLAND DIVISION		
MODOC	Kathy DeJong, Forest Supv.	(636) 926-9125
Local Fire Department	Jay Katzenberger (chief)	(636) 937-6878
WILKINSON ISLAND DIVISION		
ILDNR		
Local Fire Department	Glen Twenhafel (chief)	(618) 763-4240

Adjacent Landowner Contacts

MEISSNER ISLAND DIVISION		
Owner	Address	Phone
Dan Sondag	Old Valmeyer, IL	(618) 935-2398
Bruce Brinkman	Old Valmeyer, IL	(618) 935-2390

HARLOW ISLAND DIVISION		
Owner	Address	Phone
Bill and Ellen Scott	County Road AA	(636) 937-2257
Jeffrey and Sheila Reese	201 Cleremont, Festus, MO	(636) 931-6853

WILKINSON ISLAND DIVISION		
Owner	Address	Phone
Scott Bunselmeier	Jones Ridge, IL	(618) 763-4434
Mike Vasquez	10635 County Farm RD, Chester, IL	(618) 826-3277

APPENDIX F: COOPERATIVE AGREEMENTS

Cooperative agreements, as developed, will be included in this appendix.

APPENDIX G: T & E SPECIES LISTS

Table 6 – Federal Threatened and Endangered Species

BIRDS		
Common Name	Scientific Name	Status
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T
Least Tern	<i>Sterna albifrons</i>	E
Piping Plover	<i>Charadrius melodus</i>	E
MAMMALS		
Bat, Gray	<i>Myotis grisescens</i>	E
Bat, Indiana	<i>Myotis sodalist</i>	E

Table 7 – State Listed Threatened and Endangered Species

BIRDS			
Common Name	Scientific Name	Status IL	Status MO
American Bittern	<i>Botaurus lentiginosus</i>	E	E
Barn Owl	<i>Tyto alba</i>	E	E
Black Tern	<i>Chlidonias niger</i>	E	
Black-Crowned Night Heron	<i>Nycticorax nycticorax</i>	E	
Brown Creeper	<i>Certhia americana</i>	T	
Common Moorhen	<i>Gallinula chloropus</i>	T	
Common Tern	<i>Sterna hirundo</i>	E	
Forster's Tern	<i>Sterna forsteri</i>	E	
King Rail	<i>Rallus elegans</i>	E	E
Least Bittern	<i>Ixobrychus exilis</i>	T	
Little Blue Heron	<i>Egretta caerulea</i>	E	
Loggerhead Shrike	<i>Lanius ludovicianus</i>	T	
Long-eared Owl	<i>Asio otus</i>	E	
Mississippi Kite	<i>Ictinia mississippiensis</i>	E	
Northern Harrier	<i>Circus cyaneus</i>		E
Osprey	<i>Pandion haliaetus</i>	E	
Peregrine Falcon	<i>Falco peregrinus</i>	E	E
Pied-billed Grebe	<i>Podilymbus podiceps</i>	T	
Red-shouldered Hawk	<i>Buteo lineatus</i>	E	
Sandhill Crane	<i>Grus canadensis</i>	T	
Sharp-shinned Hawk	<i>Accipiter striatus</i>	T	
Snowy Egret	<i>Egretta thula</i>	E	E
Upland Sandpiper	<i>Bartramia longicauda</i>	E	
Wilson's Phalarope	<i>Phalaropus tricolor</i>	E	
Yellow-crowned Night-Heron	<i>Nyctanassa violacea</i>	E	
AMPHIBIANS			
Common Name	Scientific Name	Status IL	Status MO
Bird-voiced Treefrog	<i>Hyla avivoca</i>	T	
Eastern Hellbender	<i>Cryptobranchus alleganiensis</i>	E	
Four-toed Salamander	<i>Hemidactylium scutatum</i>	T	
Illinois Chorus Frog	<i>Pseudacris streckeri illinoensis</i>	T	
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	T	

MAMMALS			
Common Name	Scientific Name	Status IL	Status MO
Otter, River	<i>Lutra canadensis</i>	T	
Skunk, Spotted	<i>Spilogale putorius</i>		E
REPTILES			
Common Name	Scientific Name	Status IL	Status MO
Alligator Snapping Turtle	<i>Macrolemys temminckii</i>	E	
Blanding's Turtle	<i>Emydoidea blandingii</i>	T	E
Broad-banded Water Snake	<i>Nerodia fasciata confluens</i>	E	
Chicken Turtle	<i>Deirochelys reticularia</i>		E
Copperhead	<i>Agkistrodon contortrix</i>		
Eastern Coachwhip	<i>Masticophis flagellum flagellum</i>	E	
Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	E	
Flathead Snake	<i>Tantilla gracilis</i>	T	
Fox Snake	<i>Elaphe vulpine</i>		E
Great Plains Rat Snake	<i>Elaphe guttata emoryi</i>	T	
Green Water Snake	<i>Nerodia floridana</i>	T	E
Kirtland's Snake	<i>Clonophis kirtlandii</i>	T	
Massasauga	<i>Sistrurus catenatus</i>	E	E
River Cooter	<i>Pseudemys concinna</i>	E	
Timber Rattlesnake	<i>Crotalus horridus</i>	T	
Yellow (Illinois) Mud Turtle	<i>Kinosternon flavescens</i>	E	E