

U.S. DEPARTMENT OF THE INTERIOR

U.S. FISH AND WILDLIFE SERVICE

ENVIRONMENTAL ASSESSMENT

DRAFT

**For the 2011 Hunting Chapter
Of The
Visitor Service Plan
Big Muddy National Fish and Wildlife Refuge
Columbia, Missouri**

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**ENVIRONMENTAL ASSESSMENT
FOR
PROPOSED AMENDEMENTS TO HUNTING CHAPTER
OF THE
VISITOR SERVICE PLAN
BIG MUDDY NATIONAL FISH AND WILDLIFE REFUGE**

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1.0 PURPOSE OF THE PROPOSED ACTION

The Big Muddy National Fish and Wildlife Refuge(Refuge) was established by Congress in 1994, ...for the development, advancement, management, conservation, and protection of fish and wildlife resources... “[16 U.S.C. 742f(a)(4)] In general, its purposes are to restore portions of the acquired areas to a natural floodplain condition, including bottomland forests, improve and restore wetland values, improve fishery and wildlife resources, and to provide additional public area for fish and wildlife –dependent recreation.

The purpose of this Environmental Assessment (EA) is to evaluate alternatives for the purpose of the Hunting Chapter of the Refuge’s Visitor Service Plan. The Service’s Regional Director will review the recommendations assessed in this EA and select one of the Alternatives presented. In doing so the Regional Director also will determine whether this EA is adequate to support a Finding of No Significant Impact or whether an Environmental Impact Statement (EIS) will need to be prepared.

2.0 NEED FOR THE ACTION

The National Wildlife Refuge Improvement Act of 1997 (Improvement Act) directs refuges to provide six priority public uses when compatible with the purposes of the Refuge and the mission of the National Wildlife Refuge System (System). These priority uses include hunting, fishing, wildlife photography, wildlife observation, environmental education, and interpretation. The need for action, therefore, revolves around hunting as a priority use. Because hunting is one of six priority uses for the Refuge, the 2011 Hunting Chapter (Hunting Plan) seeks to balance all of these uses over time and space.

The refuge continues to grow and each new unit provides hunting opportunities. Most units are open to hunting under statewide hunting regulations and seasons. Some units are more restrictive than state regulations to provide for safety of Refuge visitors or persons using adjacent property. These restrictions consist of restricting the unit to archery hunting only. Changes to the Refuge’s hunting program were published in the Federal Register and the Code of Federal Regulations (50 CFR 32.44) as needed.

Since the first authorization in 1994 the refuge has grown to its current size of 16,743 acres. The current land base within the Refuge is shown on Figure 1. The refuge has the authorization to acquire 60,000 acres of Missouri River floodplain and associated lands. The authorized

acquisition boundary of the refuge consists of the lower reach of the Missouri River from mile 367.5 at the mouth of the Kansas River in Kansas City to mile 0 at the mouth of the Missouri River on the Mississippi River just north of St. Louis. As the Refuge develops, lands are purchased from willing sellers. This has created a patchwork of ownerships in some areas within the authorized acquisition boundary. In many instances the Service has been able to incorporate these lands into Refuge programs via easements or other agreements.

The 2011 Hunting Plan seeks to open all refuge lands to hunting under Service ownership, open hunting for additional species to be consistent with state categories of harvestable species, provide clarity to our hunting public, and to provide expanded public hunting opportunities. As directed by Service Policy (605 FW 2.7) we plan, manage, conduct, and evaluate refuge hunting programs in coordination with State fish and wildlife agencies on a consistent basis, in ways that ensure hunter and visitor safety, conserve fish and wildlife and their habitats, comply with applicable State and Federal laws and regulations, and promote respect for the resource. In addition, our regulations need to be consistent, to the extent practicable, with State regulations.

To initiate or expand hunting programs, the Service must publish in the *Federal Register* any proposed and final refuge-specific regulations pertaining to that use prior to implementing them. The regulations are only one element of a complete opening package, which is comprised of the following documents: hunting plan; compatibility determination; documentation pursuant to compliance with the National Environmental Policy Act of 1969, as amended (NEPA) and appropriate NEPA decision document; Endangered Species Act section 7 evaluation; copies of letters requesting State involvement and the results of the request; draft news release; outreach plan; and the draft refuge-specific regulations.

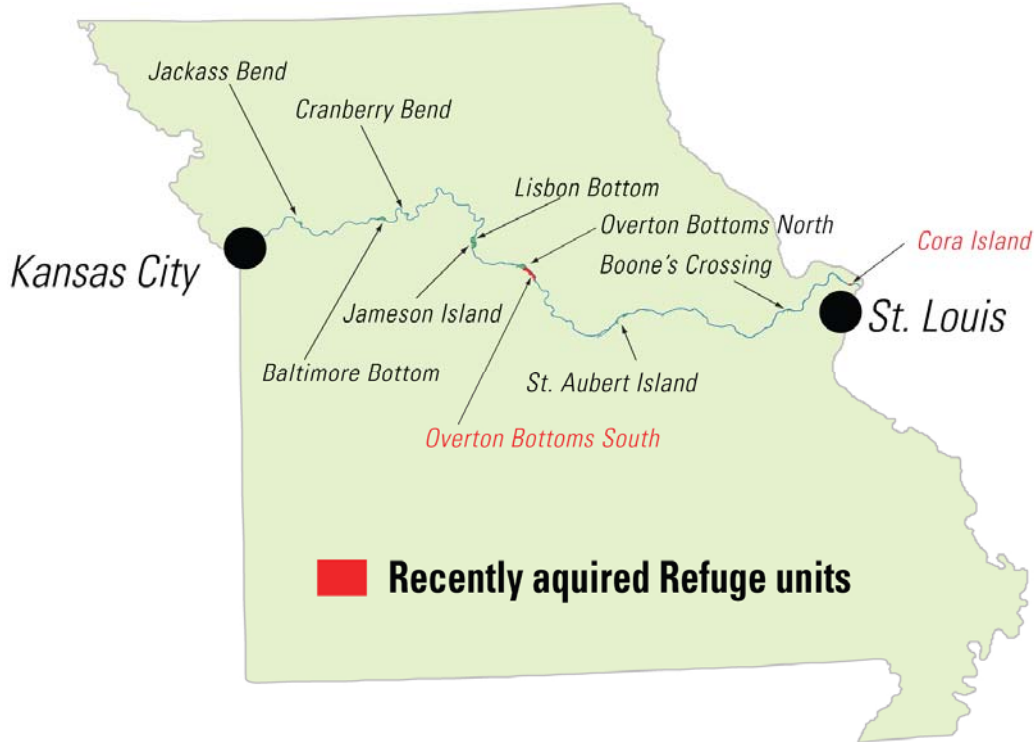
This environmental assessment serves as the NEPA document which analyzes the impacts of the proposed changes to the hunting program at Big Muddy National Fish and Wildlife Refuge. The Hunting Plan which outlines these changes is presented in this document as the preferred alternative. Proposed uses within this plan have been determined to be appropriate and compatible with the mission of the Refuge System and purposes for which the Refuge was established.

3.0 SCOPING AND PUBLIC PARTICIPATION

Previous to this 2011 Hunting Plan, the Refuge's hunting program had been developed in coordination with Missouri Department of Conservations (MDC) regional and area managers as well as with other metropolitan area public land managers and law enforcement officers. This coordination was accomplished through formal and informal meetings as well as through the Refuge soliciting comments on the Environmental Impact Statement (EIS) for developing the refuge.

The Refuge's consultation with MDC and other land managers for the development of this 2011 Hunting Plan dates back to 2007 when the Refuge began a series of listening meetings to develop a vision for Refuge programs via the Comprehensive Conservation Plan (CCP) process. Formal meetings specific to the Refuge's hunting programs began in the summer of 2010 as the Refuge continued to develop a hunting plan.

Figure 1. Big Muddy National Fish and Wildlife Refuge.



Primary hunting needs addressed by refuge employees and public:

- Provide some type of hunting opportunity for the public on all portions of the refuge
- In areas of urban development and adjacent dense public use activities limit hunting opportunities to provide for the safety of adjacent property and non-hunting public uses. Hunting opportunities would be limited to archery only or shotgun. Restriction of the use of single projectile firearms provides for a safer public participation in the higher public use areas occurring in the St. Louis metropolitan area. These conditions are found at the Boone's Crossing Unit and Cora Island Unit.
- Expanding opportunities for "youth hunts" on the Refuge. MDC has increased opportunities for youth hunters by creating specific youth seasons for turkey and deer hunting. The refuge is also open during these youth hunts.
- In recent years, people with disabilities have requested special hunting access to the refuge using motorized vehicles. Currently, these requests are addressed by the Refuge Manager upon determination of need due to a documented disability. These special hunting access privileges will continue to be granted by the use of a special use permit. (FWS form 3-1383)

The Refuge will solicit public comments on the draft 2011 Hunting Plan and EA. The drafts will be available for a 30-day review and comment period. The availability of these documents will be announced via a public notice to print media organizations whose coverage extends beyond the geographic limits of the Refuge. The notice will also be sent directly to legislators, municipal officials, agency contacts, and non-governmental organizations (see Section 1.0). The

availability of the draft Hunting Plan and EA will be announced on the Refuge website and facebook page. During the comment period the Refuge will host a “listening station” event at the Schoettger Conference Building at the USGS Columbia Environmental Research Center at 4200 New Haven Rd. Columbia, Missouri. The conference building is located at the same address as the refuge headquarters. Refuge staff will be available onsite to discuss the proposed Hunting Plan and EA with any interested persons.

Following the Regional Director’s review of the Hunting Plan, this Environmental Assessment, and approval of the Finding of No Significant Impact, and other supporting documentation for opening hunting on the Refuge described as the preferred alternative here, the Service will publish in the Federal Register a Proposed Rule that updates the hunting program on the Refuge if needed. After the comment period closes for the Proposed Rule, a determination will be made whether to implement Refuge hunting as outlined in this Hunting Plan. Subsequently, a Final Rule will be published outlining hunting on the Refuge. Following these approvals, the Refuge manager will annually review refuge-specific hunting regulations and the Hunting Plan to ensure continued compatibility and consistency of the visitor services program with existing laws and regulations.

4.0 PROPOSED ACTION AND THE ALTERNATIVES

One of the purposes of the Refuge is to provide wildlife-dependent recreation which includes the big six priority public uses. These big six uses include hunting, fishing, environmental education, interpretation, photography and wildlife observation. (National Wildlife Refuge System Improvement Act 1997). Hunting is a valuable means to meet this purpose. Toward that end, the Refuge has drafted an updated Hunting Chapter (Hunting Plan) of its Visitor Service Plan. The Hunting Plan seeks to open recently acquired Service lands to hunting, provide expanded opportunities for youth hunters and hunters with disabilities, and clarify refuge specific hunting regulations, locations, and opportunities. Proposed uses within this plan have been determined to be appropriate and compatible with goals of the Refuge System and purposes for which the Refuge was established.

The Service evaluated possible hunting program changes through three alternatives: (1) No Hunting, (2) Hunting programs open to state and federal regulations with no specific refuge hunting regulations, and (3) Open Lands Currently Hunted on Refuge Lands to Additional Species and Open Lands Acquired by the Refuge to Hunting of Migratory Birds, Upland Game, and Big Game with refuge specific regulations (Preferred Alternative)

4.1 Alternatives Considered But Not Developed

A potential alternative was considered but not carried forward for detailed analysis because it would not enable the Refuge to fulfill the purposes for which it was established.

4.1.1 No Hunting

A No Hunting Alternative would require existing hunting to cease on the Refuge. Most lands presently managed as part of the Refuge were hunted prior to being included in the Refuge. With few exceptions those lands continued to be hunted after becoming part of the Refuge. Numerous comments supporting the continuation of hunting were received during the scoping

for the Big Muddy National Fish & Wildlife Refuge EIS which was completed in 1999 and outlined the proposed master plan for Refuge development.

The Improvement Act identifies hunting as one of six priority uses of lands within the Refuge System. To eliminate hunting on Refuge lands where it already has been determined to be compatible with Refuge purposes and the mission of the System would not meet the intent of the Improvement Act.

4.2 Alternatives Developed For Detailed Analysis

Two alternatives were carried forward for detailed analysis.

4.2.1 Elements Common to Developed Alternatives

Under both alternatives, hunting on the Refuge will be consistent with State regulations such as: (1) hunting hours, (2) license requirements, (3) seasons, (4) possession rules and bag limits, (5) hunting equipment requirements, (6) blaze orange requirements and (7) hunter-education requirement.

Regulations pertaining to hunting on all National Wildlife Refuge System Lands would remain in effect with both alternatives subsequently evaluated. These regulations are identified in Title 50 of the Code of Federal Regulations Section 32.2 and in the Refuge Hunting Plan associated with this document. Topics covered by these regulations include, but are not limited to, baiting, possession of alcohol, and use of nontoxic shot.

Refuge-specific regulations also would apply to both alternatives. These regulations are identified in Title 50 of the Code of Federal Regulations Section 32.44 and in the Refuge Hunting Plan associated with this document. Refuge-specific topics include, but are not limited to, Refuge hunting access hours, use of stands and boats, use of hunting dogs, and types of weapons and ammunition allowed for hunting.

4.2.2 Alternative A: Hunting Programs Follow State regulations only (No Restrictions)

Most units of the Refuge support populations of migratory birds, big game, and small game animals. All units of the Refuge are open to the public for some type of recreational use, including hunting.

Under this Alternative, the Refuge is open to hunting for migratory game birds, all small game and big game species that are listed in and consistent with the Missouri Department of Conservation (MDC) regulations. It is closed to hunting for species not listed as open as defined by the State of Missouri. Hunting on the Refuge follows the season dates and bag limits in the State regulations. Areas immediately around government buildings would be closed to hunting for safety and security reasons.

The current hunting program generally allows specific hunting activities on designated units or portions of units. This enables the Refuge to balance species needs and other recreational uses with hunting activities. Hunting is allowed on all portions of the refuge. Maps identifying pertinent landmarks and Refuge unit hunting areas are provided in Appendix B, as noted.

Hunting activities proposed to be allowed on specific Refuge units under this alternative follow:

Cora Island Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Boone's Crossing Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

St. Aubert Island Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.

- Upland Game:
 - Open to Missouri State regulations and seasons.

Overton Bottoms Units

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.
- Area around Government buildings closed to all access.

Lisbon Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Jameson Island Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:

- Open to Missouri State regulations and seasons.

Baltimore Bottom Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Cranberry Bend Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Jackass Bend Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

New Opportunities for 2011 and Beyond

In the Hunting Plan the Service is proposing new public hunting opportunities. These opportunities are comprised of opening newly acquired lands to hunting, opening hunting for additional species and adding types of hunts to provide expanded public hunting opportunities. The Hunting Plan will coincide with state seasons and regulations as appropriate considering the Service's responsibilities. Recently acquired lands have been Cora Island and the southern portion of Overton Bottoms. All of the newly acquired lands proposed to be opened for hunting have been hunted prior to Service ownership.

4.2.3 Alternative B: (No action alternative) Open Lands Currently Hunted on Refuge Lands to all state permitted Species, and Open Lands Acquired by the Refuge to Hunting of Migratory Birds, Upland Game, and Big Game. Restrict some areas to specific hunting methods to provide for safety of hunters, visitors, and adjacent property owners. (Preferred Alternative)

In this Alternative the Service is proposing to open newly acquired lands to hunting, and restrict types of hunting methods to provide for safety of visitors and neighbors by restricting hunting methods on some units. This alternative will also look to broaden opportunities for youth hunters and hunters with disabilities. State seasons and limits would apply for all Refuge specified species on designated areas of the Refuge.

Under this Alternative certain Refuge units and parts of units would be open only to special restrictions. A special restriction is placed to protect hunters and other users from the possibility of hazardous hunting conditions during certain seasons. These restrictions would restrict the type of weapon used. Prohibiting use of single projectile ammunition in firearms will be the most common restriction. This alternative will also allow for managed hunts when the need arise to help control over populations of harvestable game species. These managed hunts may be created to provide additional hunting opportunities. Managed hunts will be open with Refuge specific authorization only in coordination with Missouri Department of Conservation (MDC) on managed hunt applications. They are conducted within the framework of the State seasons and regulations for the species proposed to be hunted. Future managed hunts for people with disabilities and youth hunters could be administered on designated areas of the Refuge that could be outside the hunting season for the general public. In administering managed hunts, the Refuge Manager will consider the biological effect of proposed hunting activities as well as the hunt's potential to conflict with concurrent non-hunting recreational activities.

Hunting activities proposed to be allowed on specific Refuge units follow:

Cora Island Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Archery method only

- Furbearer/ Small Game:
 - Open to shotgun only, following Missouri State regulations and seasons.
- Other Game:
 - Open to shotgun only, following Missouri State regulations and seasons.
- Upland Game:
 - Open to shotgun only, following Missouri State regulations and seasons.

A managed hunt for deer may be considered for this unit if current archery only restriction does not harvest enough deer. This managed hunt will only be implemented with assistance from MDC through their managed hunt application process.

Boone's Crossing Unit

The 130-acre parcel adjacent to the Chesterfield Athletic Complex is restricted to **archery hunting only, no firearms allowed**. This restriction was put in place to provide safety for the adjacent users of the playing fields. These playing fields are used throughout the year.

The other portion of this unit, **Johnson Island**, is open to the following:

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Archery method only
- Furbearer/ Small Game:
 - Open to shotgun only, following Missouri State regulations and seasons.
- Other Game:
 - Open to shotgun only, following Missouri State regulations and seasons.
- Upland Game:
 - Open to shotgun only, following Missouri State regulations and seasons.

A managed hunt for deer may be considered for this unit if current archery only restriction does not harvest enough deer. This managed hunt will only be implemented with assistance from MDC through their managed hunt application process.

St. Aubert Island Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.

- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Overton Bottoms Units

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Area around government buildings closed to all access.

Future restriction may be put in place to include no hunting on approximately 100 acres around proposed visitor center and Refuge office.

Lisbon Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Jameson Island Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.

- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Baltimore Bottom Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Cranberry Bend Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:
 - Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

Jackass Bend Unit

- Migratory Game Birds:
 - Open to Missouri State regulations and seasons.
- Turkey:
 - Open to Missouri State regulations and seasons.
- Whitetail Deer:

- Open to Missouri State regulations and seasons.
- Furbearer/ Small Game:
 - Open to Missouri State regulations and seasons.
- Other Game:
 - Open to Missouri State regulations and seasons.
- Upland Game:
 - Open to Missouri State regulations and seasons.

New Opportunities for 2011 and Beyond

In this Hunting Plan EA the Service is proposing new public hunting opportunities when staff and resources allow. These opportunities are comprised of opening newly acquired lands to hunting and adding types of hunts to broaden opportunities for youth hunters and hunters with disabilities. The Hunting Plan will coincide with state seasons and regulations as appropriate considering the Service’s responsibilities. Recently acquired lands have been Cora Island and the southern portion of Overton Bottoms. All of the newly acquired lands proposed to be opened for hunting have been hunted prior to Service ownership.

4.2.4 Comparison of Developed Alternatives

Table 4.2.4.1 presents a general comparison of the Alternatives. Table 4.2.4.2 presents a unit by unit comparison of hunting activities allowed for the Alternatives.

5.0 AFFECTED ENVIRONMENT

The Service administers the Refuge as a unit of the National Wildlife Refuge System. The Big Muddy National Fish and Wildlife Refuge (Refuge) was established by Congress in 1994, ...for the development, advancement, management, conservation, and protection of fish and wildlife resources... “[16 U.S.C. 742f(a)(4)] In general, its purposes are to restore portions of the acquired areas to a natural floodplain condition, including bottomland forests, improve and restore wetland values, improve fishery and wildlife resources, and to provide additional public area for fish and wildlife dependent recreation.

The Refuge is one of more than 555 refuges in the National Wildlife Refuge System (System). The mission of the System is “to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish and wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (USFWS 1997). National Wildlife Refuges provide important habitat for native plants and many mammals, birds, fish, insects, amphibians, and reptiles. Refuges offer a wide variety of wildlife-dependent recreational opportunities and many have visitor centers, wildlife trails, and environmental education programs. Nationwide, about 40 million visitors annually hunt, fish, observe and photograph wildlife, or participate in educational and interpretive activities on refuge. The National Wildlife Refuge System is the most comprehensive system in the world of lands and waters managed specifically for the protection of wildlife and wildlife habitat.

The current boundary of the Big Muddy National Fish and Wildlife Refuge encompasses 16,743 acres. Some areas are not owned by the Service but are administered through management agreements. Presently, the Refuge under this hunt plan consists of 9 units along a 367 mile

stretch of the Missouri River located between Kansas City, Missouri and the mouth of the Missouri River north of St. Louis, Missouri. Refuge lands are interspersed among lands owned by state agencies, local governments, and private corporations and citizens.

The restoration goals for the refuge include utilizing natural processes in the re-establishment of native species wherever possible. Apart from working to re-establish native species, animal populations and habitats are not presently being manipulated to favor a particular species or group of species. Populations and habitats are allowed to go up and down, within their natural range of variability, in response to biotic and abiotic influences.

5.1 Landscape Setting

The landscape encompassing the Refuge was formed during the Pleistocene epoch, or Ice Age, as continental ice sheets advanced and retreated across northern Missouri. The southern extent of glaciations roughly parallels the Missouri River in Missouri. When the climate warmed again, meltwater from northern glacial ice carried silt into streams and rivers flowing through this region.

The volume of water flowing down the Missouri River during warm summers flooded its valley from bluff to bluff, creating new channels as the main channel flowed from side to side. These floods were a result of melting snowpack from the Rocky Mountains and precipitation from lower elevations. Where water slowed down, suspended particles dropped out and covered the floodplain with silt giving the river its nickname, Big Muddy. Each year, as freezing temperatures returned in winter, glacial melting stopped and reduced the water flow in the river, allowing the floodplain to dry. The Missouri River valley floodplain created from these conditions consisted of a mixture of wetlands, sandbars, wet prairies, and bottomland forests.

Prior to its modification by man, the Missouri River was known for its shifting channels, high turbidity, and periodic floods which provided an important exchange of nutrients between the floodplain and the river. Additionally, periodic floods replenished backwaters and scoured, as well as built, sandbar habitat critical for many wildlife species. While the flooding of the Missouri River served a very important function for the Missouri River valley ecosystem, the River's unpredictable conditions and often destructive force led engineers to channelize the river.

River channelization took hold with the enactment of the Flood Control Act of 1944. The portion of this act that affected the Missouri River was the Pick-Sloan Plan which designated the construction of five dams along the river. An additional Missouri River Bank Stabilization and Navigation Project was enacted by Congress to control the river by building pile dikes to direct flow and prevent bank erosion. Consequently, dams filled reservoirs, the river's meandering habits were straightened out and sediment flow was reduced. Channelization reduced fish and wildlife habitat by separating the river from its floodplain.

Table 4.2.4.1 – General Comparison of Alternatives.

Action	Alternative A (No restriction alternative)	Alternative B (No Action Preferred)
Species to be hunted	All game species open to hunting under Missouri State hunting regulations. Open to all hunting methods and seasons.	All species open to hunting under Missouri State hunting regulations Restriction to Archery only hunting on portion of Boone's Crossing Unit next to Chesterfield Athletic Complex. Restriction to Archery hunting for deer and archery or shotgun for other species at Boone's Crossing Unit (Johnson Island portion) and Cora Island Unit. Provides a safer hunt as these units are in the metro area of St. Louis.
Locations of hunts	Entire refuge open to hunting only closed to hunting around government buildings. Special hunts only: None	Consideration given to future managed hunts if current hunting restriction does not provide enough harvest of certain species. Entire refuge open to hunting only closed to hunting around government buildings. Restrictions above provide for safety. Managed hunts considered: Managed hunts will be considered in order better manage specific game species, or if above restrictions increase game numbers to a size where they are causing resource damage. No managed hunts administered during the development of this EA.
Huntable land base	All other areas of the refuge open to hunting. Closed zones established around government buildings	Closed zones established around government buildings
Conflict between hunting and non-hunting activities	Closing hunting within 100' of trail would help minimize hunting and non-hunting activities.	Occasional comments received from hunters being disturbed by hikers/birders at Boone Crossing Unit. Could occur at other units where trails cross through refuge open to hunting.

Table 4.2.4.2 - Unit by unit comparison of hunting activities allowed for Alternatives.

Unit	Alternative A (No restriction)	Alternative B (No action [current management] - Preferred)
Cora Island Unit	Open to all Missouri Hunting seasons and harvest methods.	Open to deer archery hunting only. Other game open to archery and shotgun hunting.
Boones Crossing Unit	Open to all Missouri Hunting seasons and harvest methods.	131 acres of this unit Archery hunting only. Remainder of unit opens to deer archery hunting only. Other game open to archery and shotgun hunting.
St Aubert Island Unit	Open to all Missouri Hunting seasons and harvest methods.	Open to all Missouri Hunting seasons and harvest methods.
Overton Bottoms Units	Open to all Missouri Hunting seasons and harvest methods. Closed areas around administration buildings and private residences.	Open to all Missouri Hunting seasons and harvest methods. Closed areas around administration buildings and private residences.
Jameson Island Unit	Open to all Missouri Hunting seasons and harvest methods.	Open to all Missouri Hunting seasons and harvest methods.
Lisbon Bottom Unit	Open to all Missouri Hunting seasons and harvest methods.	Open to all Missouri Hunting seasons and harvest methods.
Cranberry Bend Unit	Open to all Missouri Hunting seasons and harvest methods.	Open to all Missouri Hunting seasons and harvest methods.
Baltimore Bottom Unit	Open to all Missouri Hunting seasons and harvest methods.	Open to all Missouri Hunting seasons and harvest methods.
Jackass Bend Unit	Open to all Missouri Hunting seasons and harvest methods.	Open to all Missouri Hunting seasons and harvest methods.

The Great Flood of 1993 provided an opportunity to create a refuge on the Lower Missouri River to help reestablish the floodplain habitat that had been lost due to channelization. The flood induced many private landowners to sell their land to the federal government under the *Public Law 103-75, an Act Making Emergency Supplemental Appropriations for the Relief from Major, Widespread Flooding in the Midwest of 1993*, dated August 12, 1993. Several months later on February 12, 1994, Congress enacted *Public Law 103-211*, “authorizing expenditure of funds provided by *Public Law 103-75* for land acquisition from willing sellers.”

The combination of willing sellers due largely to the flood of 1993, adept planning and funds made available to the Service early on in 1994, resulted in the formation of the Big Muddy National Fish & Wildlife Refuge on September 9, 1994, “... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” [16 U.S.C. § 742f(a)(4)]. As of June 2011 the hunt plan recognizes the refuge as 9 units of land totaling more than 16,743 acres and plans to attain up to 60,000 acres of floodplain and associated land located between St. Louis and Kansas City (Figure 1). The Refuge units provide ideal habitat for floodplain-dependent fish and wildlife species encompassed in chutes, backwaters, scours/ponds, sandbars, bottomland forests, wet prairie/grasslands, and seasonal/permanent wetlands.

5.2 Natural Resources-

5.2.1 Habitats-

The Refuge acquisition boundary spans 367 miles across Missouri from the mouth of the Kansas River in Kansas City to the Missouri River mouth on the Mississippi River north of St. Louis. This reach of the river passes through two distinct geographic regions the Central Dissected Till Plains on the west and the Ozark Highlands to the east. The western reach of the river passes through approximately 140 miles of the glaciated plains and the lower 230 miles of the river to its mouth passes through the Ozark Highlands.

The Big Muddy NFWR currently consists of approximately 16,743 acres of bottomland and upland habitat. Under this hunt plan there are nine refuge units spread along the lower Missouri River between Kansas City, MO and Saint Louis, MO. The terrain of the refuge is characterized by steeply sloping hillsides or bluffs that connect higher elevation uplands to the river floodplain. The refuge is subject to large seasonal variation in river flow and precipitation. These dynamic conditions result in a diversity of floodplain habitat, including sloughs, chutes, oxbow lakes, sandbars, deep pools, marshes, seasonally-flooded bottomland forest, and wet prairies.

5.2.2 Wildlife

Over 300 species of birds have been observed on Big Muddy NFWR since its inception. Refuge lands are important for a variety of migratory birds including waterfowl and neotropical migrants. There are over 100 species of fish that are known to occur in the lower Missouri River, including the federally endangered pallid sturgeon (Funk and Robinson 1974, Galat, et.al. 1998, Grace and Pflieger 1985,). The refuge supports over 40 species of mammals including white-tailed deer, coyote, red fox, raccoon, muskrat, striped skunk, meadow vole, mink and bobcats. There are 133 known species of butterflies and moths, including the regal fritillary.

Over 80 species of reptiles and amphibians occur on the refuge with some of the more common species including southern leopard frog, American toad, small-mouthed salamander. Snapping turtle, red-eared slider turtle, softshell turtle, and the northern water snake are a few of the reptiles that can be found living on the refuge. See Appendix of the Big Muddy Fire Management Plan for a complete species list.

5.3 Threatened, Endangered, and Candidate Species

The lower Missouri River (within Missouri) provides habitat for five federally endangered species. They include the interior least tern, piping plover, gray bat, Indiana bat, and pallid sturgeon. The decurrent false aster is a federally threatened species. The interior least tern and piping plover have not been documented to nest on the refuge and the gray bat and Indiana bat have not been documented to roost on the refuge. The decurrent false aster has also not been documented on Big Muddy NFWR.

5.4 Cultural Resources –

5.4.1 Archeology

Archeological sites are reported in every county in which refuge lands are located. However, very few archeological sites have been identified on the refuge. Some loss of resources can occur as a result of erosion or other natural processes, or from unauthorized collecting and vandalism.

Native American remains and cultural objects found on the refuge are subject to repatriation to descendents and culturally affiliated tribes. At this time, culturally affiliated tribes include the Missouri, Osage, and Kansas tribes. Other artifacts, including any Native American remains and cultural objects not repatriated, collected from refuge lands will be preserved in approved repositories. At this time the approved repository for service lands in Missouri is the University of Missouri at Columbia. Collection and excavation of archeological material on refuge lands is permitted only when conducted in the public interest. The regional director regulates collection and excavation through the issuance of permits.

5.4.2 Historical Sites

The refuge has the potential to contain significant historical artifacts buried under the sediments of the Missouri River. Historical steamships that plied the Missouri River often wrecked on the hidden snags and shoals of the changing river. The amount of sediment carried by the river quickly buried these wrecks and preserved their historic cargo. Three steamships on the Missouri have been successfully excavated. The *Bertrand* a 161 foot steamer was excavated on Desoto National Wildlife Refuge in 1969. A portion of the historic cargo it carried are on display in the refuge museum. These historic steamers, their cargo and passengers were well documented but smaller ships were not well documented and their hidden secrets may be buried under the Missouri River sediments that are part of the refuge.

5.5 Economic Resources

The Refuge lies within a heavily populated urban areas along with suburban and rural development areas. Socioeconomic conditions are wide ranging and reflect the dynamic nature

of development occurring along the Missouri River as it flows across the state of Missouri from Kansas City to St. Louis. The refuge lies primarily in areas dominated by agriculture. In the units near St. Louis the area diversifies into numerous production and service based industries. The St. Louis Metropolitan area is home to about 3 million people, and is the 18th largest metropolitan area in the country (US Census 2010). The area population increased by 2 percent from 2004 to 2009, compared with a 7.0 percent increase for the state of Missouri and a 9.1 percent increase for the U.S. as a whole. Per capita income of the state is about \$46,800 per year. (US Census 2010)

The Refuge itself has an annual budget of about \$1.1 million and currently provides jobs for 12 full-time and part-time staff.

5.6 Recreational Opportunities

A nearly finished study by conservation agencies in Nebraska and Missouri shows the Missouri river holds a substantial economic value for recreation. The Missouri River Public Use Assessment is scheduled to be completed in March 2011.

The Assessment encompassed 811 miles of the Missouri River between Gavins Point and St. Louis. It estimated that 1.1 million people use the river for recreation each year generating an economic impact of about \$68 million per year. It concluded that the most popular recreational activities along the lower stretch are sightseeing, fishing, boating and camping.

The assessment generated data by interviewing river users between Jan. 3, 2004, and Jan. 28, 2005. A total of 111,700 interviews were done, making it the most comprehensive recreational survey ever done on the lower stretch of the Missouri River.

With its mix of landscapes and geography, Missouri has many opportunities for outdoor recreation on its wide system of trails, campgrounds, state, federal and privately owned parks. Missouri provides all kinds of travel, whether scenic driving, biking, hiking or enjoying one of the many water bodies throughout the state including two of North America's greatest rivers, the Missouri and the Mississippi.

History buffs can follow along the same path that Lewis and Clark travelled hundreds of years ago beginning at the gateway arch in St. Louis to Kansas City and on up the river out of Missouri. Another way to travel along the river is by bike or foot on the KATY trail which runs along the river between St. Louis and Boonville. This pathway is a converted rail to trail that crosses the center of the state from east to west through Jefferson City, the longest rails to trails project in the nation.

Beginning in the St. Louis area, refuge units can be found along the Missouri River. Cora Island is located three miles upstream of the confluence of the Missouri and Mississippi rivers. All Refuge units are open to hunting, fishing and wildlife observation but specific hunting regulations apply for each unit. The 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation found that 2.9 million Missouri residents and nonresidents 16 years and older participated in these wildlife recreational activities (U.S. Fish and Wildlife Service 2006).

Of the total number of participants, 1.1 million fished, 608 thousand hunted, and 2.2 million participated in wildlife-watching activities, which include observing, feeding, and photographing wildlife (U.S. Fish and Wildlife Service 2006). The sum of anglers, hunters, and wildlife watchers exceeds the total number of participants in wildlife-related recreation because many individuals engaged in more than one wildlife-related activity (U.S. Fish and Wildlife Service 2006).

Visitors to the Refuge may explore it by foot. Vehicles are restricted to established roadways and parking areas. Visitors to the refuge who cannot access it by foot due to a physical condition must apply for a special use permit to access the refuge by other means. A no-wake policy is also enforced for boat usage on Refuge waters. Some units have more primitive access than others, Cora Island is one of these units. A few units have developed trails and there are often other recreational opportunities nearby. The Ted and Pat Jones - Confluence Point State Park and the Riverlands Migratory Bird Sanctuary are located between Cora Island and the Mississippi River. Across the Missouri River from Cora Island is the Columbia Bottom Conservation Area.

The next Refuge unit stop along the river is Boone's Crossing in Chesterfield, Mo. This unit is set in the most urban location of all the other Refuge units. It lies adjacent to an athletic complex and shopping area. There is also a bike trail on the levee prior to entering the Refuge. Another trail is constructed on the Refuge for visitor use but bikes are not allowed. Farther upstream is St. Aubert Island located just a few miles outside of the Missouri state capital, Jefferson City, near the town of Mokane. This unit can only be accessed by boat from the Missouri River, but ramps are available near the communities of Mokane and Chamois to access this unit.

The Refuge headquarters is located in the USGS complex on the southeast end of Columbia, Missouri. No visitor center is available, but there are plenty of recreational opportunities in the area. Just twenty miles west of Columbia on Interstate Highway 70 is the largest unit of Refuge land, Overton Bottoms North and South. The North unit has numerous trails and both units have several parking lots for visitor access. Across the river are the Manitou Bluffs, the town of Rocheport, and the Les Bourgeois Winery and A-frame.

Farther west are the Jameson Island and Lisbon Bottom units which are located across the river from one another. Jameson Island is located in the town of Arrow Rock, a state historic site offering a variety of recreational activities. In addition to local sight-seeing opportunities, the Refuge offers a one-mile trail along the levee leading visitors to a great view of the Missouri River.

The next stop is Cranberry Bend another primitive area surrounded by agriculture. Baltimore Bottom, is just a few miles further west, and shares an access road and parking area with the Baltimore Bend Conservation Area. The western-most unit of the Refuge is Jackass Bend. It is another primitive but enjoyable site, located near the town of Orrick, and across the river from historic Fort Osage. The fort was built by William Clark in 1808.

5.7 Climate

The climate of Missouri features mild winters and warm summers. Normal precipitation at Kansas City is 37.62 inches and at St. Louis is 37.51 inches. Kansas City reports a normal maximum temperature for January of 35° Fahrenheit (F) and a normal minimum of 17° F; and for July, a normal maximum of 89° F and normal minimum of 68° F. St. Louis reports a normal maximum temperature for January of 38° F and a normal minimum of 21° F; and for July, a normal maximum of 89° F and a normal minimum of 70° F. Extreme temperatures for Kansas City range from a high of 109° F to a low of -23° F while St. Louis reports extremes of 107° F to -18° F.

5.8 Physical Features

The refuge lands are located along the lower Missouri River and within the Central Dissected Till Plains and Ozark Highlands ecoregions. The Central Dissected Till Plains ecoregion is characterized by moderately dissected glaciated plains that slope toward the Missouri and Mississippi Rivers. This ecoregion covers almost all of Missouri north of the Missouri River and extends into southern Iowa, and prairie portions of Kansas, Illinois, and Nebraska. In Missouri, this ecoregion is blanketed with Pleistocene loess over glacial till that varies in thickness from complete absence in peripheral regions to over three hundred feet thick in northern Missouri. The Ozark Highlands ecoregion is a distinct biogeographic region that includes most of southern Missouri and much of northern Arkansas and small parts of Illinois. Geologically, the Ozark Highlands is a low structural dome of essentially horizontally bedded strata that has been undergoing erosion and weathering for a quarter billion years into a thoroughly dissected plateau. The exceptional length of geologic erosion, coupled with a central geographic location in North America and tremendous physiographic diversity, has created a region of unique ecosystems (Nigh and Schroeder 2002).

5.9 Vegetation

The majority of the lands on the Big Muddy NFWR consist of floodplain forest, upland forest, savannas/woodlands, and open grasslands. From 1826 to 1972 the Missouri River floodplain forest coverage between Kansas City and St. Louis decreased approximately 63 percent (Bragg, T.B., and A.K. Tatshi 1977). This reduction has adversely affected wildlife species that depend on forest for shelter, feeding, and breeding habitat. Floodplain forest along the lower Missouri River are characterized by cottonwood (*Populus deltoids*), black willow (*Salix nigra*), silver maple (*Acer saccharinum*), sycamore ([*Platanus occidentalis*](#)), and box elder (*Acer negundo*). Upland forest, woodlands, and savannas are dominated by a suite of oak and hickory species as well as walnut, maple, and elm. Grasslands within the refuge include dry, mesic, and wet prairie. Drier grassland are characterized by Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), while wetter sites contain prairie cordgrass (*Spartina pectinata*), sedges (*Carex spp.* and *Cyperus spp.*), and smartweed (*Polygonum spp.*).

6.0 ENVIRONMENTAL CONSEQUENCES

This section evaluates the foreseeable environmental consequences of the alternatives described in Section 4.

6.1 Environmental Consequences Common to Developed Alternatives

6.1.1 Infrastructure

Providing hunting opportunities under either alternative will not adversely affect, temporarily or permanently, the Services ability to meet land use goals on any of the units open to hunting. Any additional refuge facility development, such as trailheads or parking lots, will not be for the sole use of hunters and would be developed under either alternative. Parking areas and trailheads will be used by all users of the Refuge, including staff conducting day-to-day operations critical to the mission of the Refuge. There will be a change in wildlife habitat where parking lots and trails are developed as those areas are converted to short grass, gravel, or bare soil. Less than one percent of the refuge will be impacted by these changes, and some wildlife species will continue to use these impacted areas.

6.1.2 Natural Resources

6.1.2.1 Habitats

The selection of either alternative would not have significant adverse effects on the quality of wildlife habitat or the natural environment. In either instance, the amount of habitat by type would not change from the current situation. With either alternative, some minor trampling of vegetation from hunters using areas other than established trails is expected.

Access throughout Refuge units for hunting is typically by foot. Occasionally hunters access some Refuge units via boat from the Missouri River. This method of access presents no significant adverse impacts to Refuge lands. On occasion the Refuge allows vehicles beyond parking lots or trailheads to facilitate visitors with physical limitations. This is strictly regulated by Special Use Permit. These permits restrict vehicle use to existing trails, service roads, or designated routes and should not cause any significant impacts to wildlife.

Impacts to Refuge soils and vegetation by hunters are minimal. Hunting is conducted on foot mostly by individuals or small groups. Typically hunter groups travel in dispersed patterns so soil compaction and vegetation trampling will be minimal.

Boating activity on the Refuge may occur with hunting. When hunting by boat, hunters would have limited dispersion and in most cases would stay in close proximity to the watercraft. Because Refuge users, including hunters using motorized boats are minimal the impacts to air quality would be minimal.

Other potential types of habitat damage specifically attributed to hunting activities, such as littering, are not significant. Refuge specific regulations prohibit the cutting of vegetation, and the use of screw-in steps on trees, and the use of campfires.

With the exception of resident Canada geese and white-tailed deer, populations of hunted species are not at levels that could cause habitat damage. The Service has not observed goose damage to habitats on the Refuge. Geese grazing off the Refuge may cause minor problems in isolated areas; however, the Service has not linked Refuge flocks to specific damage or nuisance complaints. Neither Alternative includes actions to significantly change the number of geese taken via hunting.

When populations are high, deer may damage habitat on the Refuge or on nearby public and private lands. Habitat damage on the Refuge and adjacent public lands appears to be localized. The refuge receives very few complaints of deer damage from adjacent landowners. Implementation of either alternative would not change overall impacts on habitat from deer.

6.1.2.2 Wildlife

Hunting may have temporary, localized impacts to populations of game and non-game species. Some individuals and small groups of animals will be disturbed as hunters move through occupied habitat or discharge firearms. Disturbed animals will relocate to avoid hunters or flush and expend more energy than if they had remained at rest. Disturbance is not a long term threat to populations because the relocation is temporary and food is generally not a limiting factor on the refuge. Most animals will be able to readily replace those energy reserves they use to escape from hunters. Individual game animals will be removed from the population by hunter harvest. The impact of harvesting game animals is restricted through bag limits and season length set by the state of Missouri. These harvest limits are designed to meet population management objectives for game species set by the state, or by the flyway counsels in the case of migratory birds.

Hunting is a highly regulated activity compared to non-hunting activities and generally takes place at specific locations, times, and seasons. These regulations reduce the impact to non-hunted species. Hunting is an appropriate wildlife management tool that can be used to manage harvestable game populations on a refuge. Some wildlife disturbance will occur during the hunting season. However, when hunting is implemented with proper zoning, regulations, and seasons, hunting impacts will be minimized to non-hunted wildlife populations using the refuge.

In Missouri, species to be hunted, hunting seasons, and the number of animals taken, are set by the Missouri Department of Conservation (MDC). In developing annual hunting regulations MDC considers species population trends, the number of hunters pursuing species, and hunter success rate. Overall wildlife residing on the refuge exhibit similar population trends and responses to hunting pressure as wildlife throughout the state. For general hunting activities, the refuge has not required, and is not proposing to require, hunters to register to hunt on refuge lands, or to report wildlife taken on the refuge separately from the state tele-check system. Hunter activity on the refuge is monitored through law enforcement and other staff contacts with hunters in the field. This enables us to approximate hunter visits by general hunting categories but not actual number of hunters because not all hunters are contacted and some hunters are contacted multiple times over several visits. Traffic counters, on the most popular units, provide data that can be used to refine estimates of use by hunters.

6.1.2.2.1 Hunted Migratory Birds

The Harvest Information Program (HIP) is an annual program in which hunters provide information that helps biologists manage North America's migratory game bird populations, including woodcock, ducks, geese, rails, snipe, and coots. Hunters' report on the kind and number of migratory birds harvested are used to develop reliable estimates of the total harvest of all migratory birds throughout the country. The information gathered for the harvest surveys assists state and federal biologists make decisions on setting sustainable bag limits for future hunting seasons. Harvest information gathered through HIP helps ensure hunting on the refuge under either alternative will not significantly impact hunted migratory bird populations.

The Mourning dove is the most hunted migratory bird in the U.S. and in Missouri.

Harvest data for Missouri during 2008 showed 32,773 mourning dove hunters harvested 516,369 doves statewide; a 20.0% decrease in hunters and a 29.7% decrease in harvest from 2007. The estimated 2008 dove harvest decreased 31.7% from the 5-year average (2003-07) of 755,581 birds harvested/year (Bonnot, 2011). Weather is the single biggest influence on dove population numbers, and hunter numbers seem to parallel those population numbers. The refuge offers some opportunities for dove hunting, but hunter use and dove numbers tend to be low.

In Missouri, an all-time high of 53,100 waterfowl hunters was recorded in 1977. By the early 1990's, as a result of wetland loss, drought and declining waterfowl populations, hunter numbers shrank to 22,500. Since then, with improved habitat, and increased waterfowl populations, the hunter numbers have rebounded and have been holding steady at about 35,000 to 40,000 since 2000 (Andy Raedeke - MDC. pers. com.) The refuge offers some waterfowl hunting opportunities on a few small permanent water bodies, and along the banks, sandbars and islands of the Missouri River. In very wet years (1998 and 2010), some seasonal wetlands are available to provide increased hunting opportunities. Waterfowl hunting on the refuge is opportunistic and hunter use is incidental.

6.1.2.2.2 Small Game

The harvest and management of small game populations in Missouri includes mammals, such as squirrel, rabbit, raccoon, groundhog, opossum, gray fox, red fox, coyote and bobcat, as well as upland game birds (quail, ruffed grouse and pheasant) and crows. In general, statewide hunter numbers have declined over the past 20 years, from 10% - 40% depending on the species (R. Reitz 2008-2009, MDC 2010). Many small game species produce a large number of young each year, most of which are available for harvest because they would naturally not survive the winter and contribute to the next season's breeding population. Hunting these species is considered a compensatory form of mortality. It allows for a large portion of a small game population to be harvested each fall because, if not taken by hunters, they would likely die prior to the next breeding season from other causes.

Turkeys

Turkey hunting is allowed in the State of Missouri by permit in both the spring and fall seasons. In the spring of 2010, hunters harvested 42,254 birds statewide. A separate youth hunt harvested

an additional 3,945 birds. In the fall 5,928 birds were harvested for a year total harvest of 52,127 birds.

Turkey populations fluctuate primarily based upon weather conditions during hatching and brooding seasons. Overall the Missouri turkey population is stable and on a slight decreasing trend due to several years of poor weather during hatching and brooding. This trend is reflected on all areas of the refuge.

Spring hunting of turkeys is not expected to affect turkey numbers as only male turkeys are harvested and seasons are set after the turkeys have had a chance to breed. Fall turkey harvests are low statewide and account for less than 1 percent of the total turkey population. Fall turkey hunting in Missouri allows for the harvest of male and female. A take of greater than 10% of the total population during the fall season would have a negative effect on the total turkey population. The harvest level is not anticipated to reach 10% as other hunting opportunities reduce the number of turkey hunters during the fall.

Non-hunted Resident Wildlife and Migratory Birds

Non-hunted wildlife include non-hunted migratory birds such as songbirds, wading birds, raptors, and woodpeckers; small mammals such as voles, moles, mice, and shrew; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory butterflies and moths, these species have very limited home ranges and hunting does not effectively impact their populations regionally.

Disturbance to non-hunted wildlife under either alternative is minimal. Small mammals such as voles and mice are generally nocturnal or secretive. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor of cold-blooded reptiles and amphibians also limits their activity during most of the hunting season when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Some species of butterflies and moths are migratory and will not be present for most of the Refuge's hunting season. Resident invertebrates are not active during cold weather and would have few interactions with hunters during the hunting season. Impacts to these species due to habitat disturbance related to hunting are negligible at the local and flyway levels.

Direct impacts to non-hunted non-migratory birds such as most woodpeckers and some songbirds including nuthatches, and chickadees are negligible. Secondary impacts to this group of species is also minimal and does not appreciably reduce their numbers at the population level. Disturbance by hunting to non-hunted migratory birds would not have substantial negative secondary impacts because the majority of hunting does not coincide with the nesting season except in the case of spring turkey hunting. Because turkey hunting is of relatively short duration (20 days) any disturbance to non-hunted species would be minimal. Other disturbance to these species by hunters afield would be temporary in nature.

Migratory birds of prey (eagles, hawks, etc.) are on the Refuge during hunting season but disturbance is minimal. Disturbance to the daily wintering activities, such as feeding and resting,

of residential birds might occur but are insignificant because such interactions are infrequent and of short duration when they do occur. Areas around eagle nests are difficult to access by refuge users, including hunters, during the spring turkey season so there would be negligible adverse impact to eagles raising young at that time.

Overall, hunting impacts to non-hunted species and their habitats and impacts to the biological diversity of the Refuge will be insignificant.

6.1.2.2.3 Big Game

White –tailed deer hunting is by far the number one hunting activity on the Refuge. According to MDC, in 2009, Missouri hunters checked a total of 299,461 deer during the 152 days of hunting. Hunters took most of the deer during the November portion of the season. During those 10 days, 193,155 deer were checked with the department.

Every portion of the season showed an increased harvest from the previous season. Muzzleloader kills went up by 55 percent from last season, and youth kills went up by 44 percent. Both set new state records. Archers took 7,538 more deer than in 2008 (Columbia Missourian, January 21, 2010). Because the refuge follows statewide regulations, the effect of hunting on white-tailed deer populations should be similar to other public land, and much of the private land throughout the state.

6.1.3 Threatened and Endangered Species

It is the policy of the Service to protect and preserve all native species of fish, amphibians, reptiles, birds, mammals, invertebrates, and plants, including their habitats, which are designated threatened or endangered. The four federally listed threatened or endangered species that are known or suspected to occur on the refuge include the decurrent false aster, least tern, piping plover, and pallid sturgeon. All of these species are associated with riverine or floodplain habitat.

Least terns and piping plovers utilize emergent sandbar habitat as nesting sites when river levels drop and expose portions of the floodplain. There are currently no known nesting sites within the acquisition boundary of the refuge. Hunting under both alternatives would unlikely impact these species as there is minimal hunting activity during the migration season and hunters are unlikely to be on the sandbars.

Pallid Sturgeon is an endemic fish species, found in the Mississippi system, including the Missouri River. Hunters would not impact this species under either alternative as the hunting activities do not impact the aquatic habitat where they reside.

6.1.4 Cultural Resources

Impacts to historical or cultural resources would not be significantly different under either Alternative. While historical or cultural resources occur throughout the Refuge units open to hunting, the Refuge has not documented any adverse impacts due to hunting activities. While

most hunters are focused on the hunt itself, it is likely that some hunters come across historical foundations and buildings located on the Refuge. While hunting, they may pause at signs or features that interpret these resources. The cultural resources that occur on the Refuge are below ground and not readily identified. Since hunting activities do not include ground disturbing actions, these resources will remain intact. Artifacts may be found by hunters that are exposed by the natural erosion processes caused by the river. These artifacts will have likely been displaced by the river and not directly connected to any major archeological site on the refuge.

6.1.5 Social and Economic Impacts

Hunting activities on the Refuge can affect the local or regional economy in two ways. First, the Refuge spends monies for staff and resources to enforce regulations related to hunting and other items covered under 50CFR. Second, visitors engaging in hunting activities provided by the Refuge generate economic activity for local businesses.

The 2006 report, “Banking on Nature: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation” identified about 2500 visitor use days were spent hunting on the refuge annually (Carver and Caudill 2007). The expenditures included food, drinks, lodging, transportation, equipment, and other expenses. The average trip-related expenditure per hunter was \$386 (USFWS 2008). Based upon these expenditures and the refuge hunters visitation rates for hunting, it is estimated that hunters spent about \$61,000, in 2006.

Deer-vehicle accidents may be an important economic consideration related to the Refuge’s hunting program. Although deer population density is only one factor in deer vehicle accident rates, Missouri has reduced the number of deer vehicle accidents. Missouri ranks 16th in the nation for the number of car accidents involving deer. Missouri Department of Conservation officials speculate that the high ranking has a lot to do with Missouri’s blend of urban and rural areas, where deer are most likely to run into trouble.

MDC spokesperson Jim Lowe says though the ranking for Missouri is quite high, an increase in the number of hunting days in recent years has helped reduce the frequency of accidents since its peak around 2000. At that time, a deer-related accident occurred once every 1.7 hours.

“In 2007, which is the last year I have statistics for, the frequency was back down to one accident per 2.6 hours; same as it was in 1991.” (KBIA Interview Caitlin Alexander)

The average cost of repair following a deer vehicle collision is about \$3,000 (Associated Press 2010). Because neither Alternative evaluated by this EA is expected to significantly reduce deer numbers, deer vehicle accidents and their associated costs would be unaffected.

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' access to public information and participation in matters relating to human health or the environment. None of the management alternatives described in this EA will disproportionately place any adverse environmental, economic, social or health impacts on minority and low income populations.

6.1.6 Recreational Opportunities

The implementation of either hunting program alternative will have minimal adverse effect on the non-hunting priority public uses for the Refuge (i.e., fishing, wildlife observation and photography, environmental education and interpretation). Non-hunting recreational activities are separated from hunting activities over time because most hunting on the refuge occurs in October, November and December. Although hunting opportunities exist through most of the year for squirrel and some other species the hunting outside the preceding months is limited, except turkey hunting in the spring.

A potential recreational conflict during this spring hunting season would be mushroom hunting. Although not a refuge priority activity, it provides a popular recreation activity and is permitted on the refuge. The spring youth turkey season in Missouri often falls on the peak time for spring mushroom hunting in early April. Youth turkey hunters age 6-15 who have had hunter education may hunt alone during this youth season, though this is rare. Youth hunters are typically less experienced than older hunters which raises the possibility of a potential conflict. Although an accident has never been reported on the refuge, several previous accidents in Missouri have occurred where inexperienced youth hunters mistook another individual for a turkey. At the development of this EA the minor risk to the mushroom hunters does not require the refuge to place a restriction on either activity.

The regular spring turkey season occurs in mid-April usually after the peak of mushroom growth but a cool wet spring could place better mushroom growth into this season which runs for three weeks. A benefit to this season is it ends at 1 pm and many mushroom hunters go out later in the day. Many turkey hunters compliment their outdoor experience by going mushroom hunting after their turkey hunt. The above mentioned impact could occur but the conflict is slight and at the time of this EA it is determined not worthy of taking management actions to restrict either activity. If the conflict between recreational users increases, the proper corrective action would be to restrict mushroom hunting as it is not a refuge priority public use.

Additional hunting activities are separated through space on certain areas of the Refuge. Further, Refuge specific regulations have been established with the intent of reducing conflicts between these user groups and emphasizing safety for all visitors. Brochures and hunting regulation booklets at kiosks allow visitors to know where and when hunting is taking place on the Refuge to allow visitors to make informed choices for their recreational activities. Some visitors may decide to change where they pursue their non-hunting recreational activities or decide to come back outside the hunting season. Another potential direct impact to non-hunting priority public

use occurs during the November portion of the Missouri firearms season. Hunters are concentrated on the refuge especially during the two weekends during the 11 day season. Other recreational activities on the refuge are minimal and no direct conflict exists at this time.

Secondary adverse effects of non-hunting recreational activities are insignificant because neither alternative will significantly reduce the numbers of wildlife available for priority public use. The cumulative effects of either alternative are not significant because of the large amounts of state and municipal parks and other non-hunted public lands available for non-hunting wildlife-dependent recreation.

6.1.7 Cumulative Impacts

The implementation of either alternative has no significant cumulative impacts on the wildlife populations, either hunted or non-hunted species, the natural environment, cultural resources, social and economic resources, or recreational opportunities. This determination is based on an analysis of potential environmental impacts of hunting on the Refuge together with other projects and actions.

6.1.7.1 Infrastructure

No infrastructure, on the Refuge or off the Refuge, will be modified solely to accommodate the Refuge's hunting program. Implementing a hunting program as described in either Alternative A or Alternative B will have minimal direct or indirect impacts on public or private infrastructure. Therefore, there will be negligible cumulative impacts to infrastructure at the local, regional, or national level due to administering the hunting program at the Big Muddy National Fish and Wildlife Refuge as described in either alternative.

6.1.7.2 Natural Resources-

Habitats

The Refuge Act identified the purposes for which the Refuge was established (Section 1.0). The Service conducts habitat management actions that favor healthy and functional ecological communities on Refuge lands. This approach benefits all wildlife species, including species traditionally hunted. Because habitats are not managed to favor hunted species over other species and are managed to maintain healthy populations of all species, the implementation of either alternative does not result in significant direct, indirect, or cumulative effects to habitats at any scale due to hunting activities.

There are only a few localities on the Refuge or in the vicinity of the Refuge where densities of wildlife populations are at a level that could result in habitat damage. These areas potentially damaged by geese or deer, for example, are not significant on the local scale or in the regional or national context. With such minor impacts based on few animals, any change in animal populations on the Refuge will be inconsequential in a larger context. If nuisance populations of geese or deer become managed by a coordinated effort of organizations at all levels of government in the area, then there may be some improvement in habitat conditions at specific targeted locales. It is not likely that such actions, while positive from a habitat perspective, will result in a significant cumulative impact on any area.

Wildlife

Refuges, including Big Muddy National Fish and Wildlife Refuge, conduct hunting programs within the framework of State and Federal regulations. The proposed Refuge hunting program rules will be the same as, or slightly more restrictive than, hunting regulations throughout the State of Missouri. By maintaining hunting regulations that are the same as or more restrictive than the State, individual Refuges ensure that they are maintaining seasons which are supportive of management on a more regional basis. The Refuge consistently coordinates with the State about the hunting program. As a result, changes or additions to hunting on the Refuge will have minor effects on wildlife species in Missouri. Although the Preferred Alternative will decrease hunting opportunities slightly compared to Alternative A, the slight decrease in hunter activity will not cause a significant cumulative effect locally, regionally, or nationally.

Migratory Birds

The Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior. The Service annually promulgates regulations (50 CFR Part 20) establishing the Migratory Bird Hunting Frameworks from which States may select season dates, bag limits, shooting hours, and other options for each migratory bird hunting season. The Frameworks are permissive in that hunting of migratory birds would not be permitted without them. Thus, Federal regulations both allow and limit the hunting of migratory birds.

National Environmental Policy Act (NEPA) (Council on Environmental Quality 1969) considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),’ filed with the Environmental Protection Agency on June 9, 1988. The Service published Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment and Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53776); the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006 as announced in a March 9, 2006, Federal Register notice (71 FR 12216).

Waterfowl populations throughout the United States are managed through an administrative process known as flyways. The Refuge is located in the Mississippi Flyway. In North America, the process for establishing waterfowl hunting regulations is conducted annually. In the United States, the process involves a number of scheduled meetings (Flyway Study Committees, Flyway Councils, Service Regulations Committee, etc) in which information regarding the status of waterfowl populations and their habitats is presented to individuals within the agencies responsible for setting hunting regulations. In addition, public hearings are held and the proposed regulations are published in the Federal Register to allow public comment.

Annual waterfowl assessments are based upon the distribution, abundance, and flight corridors of migratory birds. An Annual Waterfowl Population Status Report is produced each year and includes the most current breeding population and production information available for waterfowl in North America (USFWS 2011). The Report is a cooperative effort by the Service, the Canadian Wildlife Service, various state and provincial conservation agencies, and private conservation organizations. An Annual Adaptive Harvest Management Report (AHM) provides the most current data, analyses, and decision making protocols (USFWS 2010). These reports are intended to aid the development of waterfowl harvest regulations in the United States for each hunting season. In Missouri, the Missouri Department of Conservation selects season dates, bag limits, shooting hours, and other options using guidance in these reports. Their selections can be more restrictive, but cannot be more liberal than the AHM allows. Thus, the level of hunting opportunity afforded each State increases or decreases each year in accordance with the annual status of waterfowl populations.

Hunting of migratory birds other than waterfowl is assessed in a similar manner in that species population trends are monitored throughout their range. Via cooperative efforts of public and private partners, populations are monitored when birds are most effectively surveyed. Depending on the species, this may be while they are in their wintering areas, breeding areas, or while migrating. These data are combined with harvest information, such a HIP, and evaluated to ensure an appropriate annual hunting framework throughout the species range.

Each National Wildlife Refuge considers the cumulative impacts to hunted migratory species through the Migratory Bird Frameworks published annually in the Service's regulations on Migratory Bird Hunting. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations.

Harvest management of upland game is based on the compensatory mortality model. In this model the concept is that these hunted species will not suffer adverse impacts under typical hunting frameworks. Population impacts may become additive, and adverse, if some mortality factor significantly increases. There is no natural or human-induced mortality factor rising to the additive level for upland game to be hunted at the Refuge that would result in significant cumulative impacts in the local or regional context.

Turkey populations are decreasing locally and throughout the state. This decrease is due to poor reproduction during cold wet springs which has occurred the last four years. There is no adverse impact to turkeys due to either hunting or non-hunting factors. Hunting turkeys on Refuge lands will not result in any factors changing in a manner that results in cumulative impacts.

White-tailed deer in the vicinity of the Refuge move freely across property boundaries. In the vicinity of rural Refuge units deer population densities are relatively close to target densities compared to the more urban Refuge units where deer hunting is limited. Hunting on rural units may be contributing to overall population management goals; a desirable cumulative effect. On urban Refuge units deer hunting effects generally are insignificant and thus do not contribute to a cumulative effect. Under either Alternative, it is likely that deer densities will continue to rise as the habitat on the refuge improves for the deer. Although it does not appear at this time that deer

on urban Refuge units are significantly stressed due to overpopulation, an adverse density-dependent population response is possible in the future.

Non-hunted species of vertebrate or invertebrate wildlife are not affected by hunting directly or indirectly. With no direct or indirect adverse impacts to non-hunted species there will be no cumulative impacts resulting from the implementation of either hunting Alternative on the Refuge.

6.1.7.3 Threatened and Endangered Species

The three federally listed threatened or endangered species that are known to occur on the refuge include the Least Tern, Piping Plover, and Pallid Sturgeon. All three of these species are associated with riverine or floodplain habitat.

Least Terns and Piping Plovers utilize emergent sandbar habitat as nesting sites when river levels drop and expose portions of the floodplain. Hunting under both alternatives would unlikely impact these species as there is minimal hunting activity during the nesting season and hunters are unlikely to be on the sandbars.

6.1.7.4 Cultural Resources

Refuge hunting activities do not affect cultural resources under either alternative so there will be no cumulative impacts to such resources.

6.1.7.5 Social and Economic Resources

Increased economic activity estimated at about \$500,000 annually is associated under either alternative. This economic activity, while important to the communities near Refuge units (Section 6.1.5), is minor. The economic activity related to deer-vehicle accidents due to high deer densities in the vicinity of urban Refuge units is uncertain, but again, in the larger context of the local or regional economy it would be minor.

The Refuge's presence in the vicinity of communities increases the quality of life for some area residents. Even though hunting accounts for the second most user visits, it accounts for less than 10% of use activity. There are no other hunting-specific activities undertaken by the Service on the Refuge that have significant beneficial or adverse effects when compared to or combined with other socially important activities in the area. Refuge hunting activities under either Alternative do not produced significant cumulative effects.

6.1.7.6 Recreational Opportunities

A hunting program implemented under either Alternative evaluated by this EA will provide recreational opportunities for Refuge visitors. These opportunities, while fully appreciated by refuge users wishing to hunt, are important in the urban context where hunting opportunities are limited. In a regional or statewide context, hunting on the Refuge units provides only a small percentage of hunting opportunities.

Non-hunting wildlife-dependent recreational opportunities are available on a variety of other public or private lands locally. There are 5 National Wildlife Refuges in Missouri and thousands of other public spaces in the state that provide a variety of wildlife habitat suitable for fishing,

wildlife observation, photography, environmental education, and interpretation activities. Hunting programs at the Refuge under either Alternative will not result in significant adverse effects at any scale, either by themselves or when combined with non-service actions.

6.2 Environmental Consequences of Alternative A: Hunting Programs Follow State regulations only (No Restrictions)

Hunting program follows state regulations with no refuge specific restrictions. All species hunted under state regulations and season hunted on the refuge. Recently acquired lands would be open to hunting. Most refuge lands previously hunted under private or state ownership, or by management agreement will continue to be hunted. No additional special hunts would be provided.

6.2.1 Natural Resources

6.2.1.1 Wildlife

Migratory Birds

Under this alternative migratory bird populations will not change appreciably because little migratory bird hunting takes place on lands currently open to hunting that would be restricted under this alternative. Populations will experience fluctuations from naturally occurring environmental conditions. Impacts include removal of certain numbers of individuals from the populations and minor local disturbances.

Small Game

Populations of the most frequently hunted small game species, (quail, rabbit, squirrel and coyote) are not expected to change appreciably. Populations would experience fluctuations from naturally occurring environmental conditions and changes in land use on the refuge and surrounding lands. Populations would decrease slightly on lands presently open to hunting; however, some individuals not taken by hunting would die from other compensatory mortality factors.

Big Game

The white-tailed deer populations would experience population fluctuations based on weather, land use patterns and other naturally occurring environmental factors. Excessive numbers of individuals may occur in certain areas of the Refuge. Relative to overall Missouri deer population levels, a slightly larger number of deer are taken by hunters under this alternative;

6.2.2 Recreational Opportunities

Under this alternative, hunting across the Refuge would change somewhat. All lands proposed to be opened with this Alternative presently are open to public hunting. This alternative would eliminate some restrictions that take into consideration safety of other refuge visitors. Some non-hunting recreational activities may pose a higher risk for visitor conflict, as the restricted use of firearms is not in place. On most refuge lands conflicts between recreational user groups are minimal and are expected to remain so. At the refuge units in the St. Louis

metropolitan area the potential for user conflicts and accidents increases as the potential for hunters and non-hunters to interact increases. The developed trails and the urban populations, in close proximity to these units, make them more accessible to non-hunting recreational users.

6.2.3 Cumulative impacts

A hunting program implemented under this Alternative will have minor positive and negative direct effects. None the less, such effects are insignificant beyond the local area and immediate timeframe. As presented earlier, the effects will not be significant when added to other expected activities.

6.3 Environmental Consequences of Alternative B: Open Lands Currently Hunted on Refuge Lands. Open Lands acquired by the Refuge to Hunting of Migratory Birds, Upland Game, and Big Game. Restrict some areas to specific hunting methods to provide for safety of hunters, visitors, and adjacent property owners. (Preferred Alternative)

Hunting Program modified to open newly acquired lands to hunting, restrict hunting methods to provide for safety in refuge units in urban areas. Provide future opportunities for youth hunters and hunters with disabilities.

6.3.1 Natural Resources

6.3.1.1 Wildlife

Migratory Birds

Waterfowl populations would not experience a significant increase in hunting mortality because the amount of habitat provided on the refuge does not provide the opportunity for hunters to make a significant take of waterfowl on the refuge.

With this Preferred Alternative only 130 acres would be limited to the take of waterfowl and other migratory birds by an archery only method. Considering that context, the effect of limiting the hunting methods on 130 acres to archery methods and leaving the remainder of the refuge open to statewide seasons and regulations will have an insignificant effect on flyway and national populations of these migratory species.

Small Game

The harvest of small upland game would decrease very slightly over the Refuge as a whole. Less take would occur on the 130 acres that is restricted to archery hunting only as the harvest of upland game with archery methods is limited. These restrictions will have a minimal effect on the overall population of small game in the Boone's Crossing refuge unit. These restrictions provide for safety of the hunter and refuge visitors and are not meant to manage the game species. Small game populations would experience fluctuations from naturally occurring environmental conditions and land use practices on land adjacent to the refuge. The removal of

certain individuals from the populations due to hunting will have very minor effects on these populations.

Wild Turkey

The number of turkeys harvested on the Refuge would probably decrease slightly, because of the archery only restriction on 130 acres at the Boone's Crossing unit. However, this is not expected to appreciably affect the overall number of turkeys harvested on the refuge. This is because the population of wild turkeys in Missouri is relatively stable and effected more by habitat conditions and environmental factors than by the liberal hunting opportunities provided by the state of Missouri.

Big Game

White-tailed deer harvest on the refuge will likely decrease as the restrictions placed on hunting methods would limit the number of deer taken. These restrictions would be put in place, on the Cora Island and Boone's Crossing units, to provide for increased hunter and visitor safety by eliminating the use of single projection firearms. Firearms account for the majority of white-tailed deer taken in Missouri. The number of deer taken refuge-wide would be an insignificant proportion of the overall population which remains high throughout Missouri and especially within the refuge acquisition boundary.

6.3.2 Recreational Opportunities-

Under this alternative, impacts to other wildlife-dependant priority recreational uses on the Refuge are expected to be minimal. Non-consumptive uses are generally highest in spring, early summer and fall when trails and parking lots are clear and accessible, and the heat and humidity are tolerable. The majority of hunting opportunities take place in fall and winter. Hunting is not allowed near or around the administration buildings and private residences on the refuge. The urban units of the Refuge are restricted from the use of single projectile firearms. This restriction provides for safety of the hunting and non-hunting visitors and adjacent property visitors. Archery only hunting areas provide hunting opportunities yet provide improved safety for non-hunting users. These restrictions help to reduce conflicts between hunters and other user groups. However, some impacts to users may occur. Visitor using the refuge during hunting seasons and residents using adjacent recreational facilities may encounter hunters on the refuge. The encounter may be unpleasant for both users depending on the circumstance. Most hunters do not like to be disrupted by people walking through their hunting areas. Because of this most logical hunters will avoid hunting near public use trails where they are likely to encounter people that disrupt their opportunity to take game. Some non-hunting visitors may plan their visits to avoid coinciding with hunting activities, but those visitors may not be aware of the hunting seasons. The refuge will inform the public of hunting occurring by placing state hunting publications at all developed access points. The quality of the visitor experience, including hunter's experiences, would not be significantly altered under this alternative.

The opportunity to develop special hunts for youth, individuals with disabilities or others may increase under this alternative. The restriction of use of single projection firearms in urban areas of the refuge may produce opportunities for a managed hunt for the above users. This restriction may increase the number of deer in the urban portions of the refuge thus producing a better deer

hunting environment to provide a positive hunting experience to some selected youths or disabled hunters through a managed hunt drawing system. These managed hunts could use single projectile firearms as long as they were closely supervised to provide safety for the hunters and others during the managed hunt situation.

6.3.3 Cumulative impacts

A hunting program implemented under the Preferred Alternative will have minor positive and negative direct effects. None the less, such effects are insignificant beyond the local area and immediate timeframe. As presented earlier, the effects will not be significant when added to other expected activities

6.4 Summary of Environmental Consequences by Alternative

A summary of environmental consequences by alternative are presented in Table 6.4

Table 6.4 – Comparison of Environmental Impact by Alternative

Resource Impact	Alternative A (No Action)	Alternative B (Preferred)
Compatible with the goals of the Refuge	Yes.	Yes.
Habitat	Minor impacts such as trampling of vegetation in off-trail areas over smaller area. Amounts of undisturbed, resting and feeding areas for waterfowl and other wetland wildlife would remain the same.	Impacts such as trampling of vegetation in off-trail areas, although minor, would occur over a larger area. No change.
Migratory Birds	Populations fluctuate in response to natural cycles not hunting.	No change.
Small Game	Populations fluctuate in response to natural cycles not hunting.	No change.
Big Game	Populations fluctuate in response to natural cycles, including habitat damage and disease, not hunting.	No change.
	No change in deer numbers.	May cause an increase in deer herd in urban units due to the restricted use of single projection firearms. Could provide for managed hunts for youth or disabled hunters.
Threatened and Endangered Species	No impacts.	No change.
Historic and Cultural Resources	No impact.	No change.
Provides for priority public uses	Yes, satisfies the mandates of the 1997 Refuge Improvement Act.	Yes, satisfies the mandates of the 1997 Refuge Improvement Act.
Provides for simultaneous hunting and non-hunting activities	Yes	Yes

8.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONTACTED

9.0 APPROVALS

Submitted by:

Thomas G. Bell, Project Leader

Date

Concur:

Matt Sprenger, Refuge Supervisor Area 2

Date

Richard D. Schultz, Regional Chief
National Wildlife Refuge System

Date

Approved:

Thomas O. Melius, Regional Director
Region 3, U.S. Fish & Wildlife Service

Date

APPENDIX A – REFERENCES

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APPENDIX B – MAPS

The following maps show landmarks, parking lots, and current hunting activities for Cora Island, Boone’s Crossing, St. Aubert Island, Overton Bottoms, Lisbon Bottom, Jameson Island, Baltimore Bottom, Cranberry Bend, and Jackass Bend Units.

Maps should be used for both Alternatives. Alternative A would remove restrictions on Cora Island Unit and Boone’s Crossing Unit seen on maps below.

Figure B-1 Cora Island Unit Current Hunting Opportunities

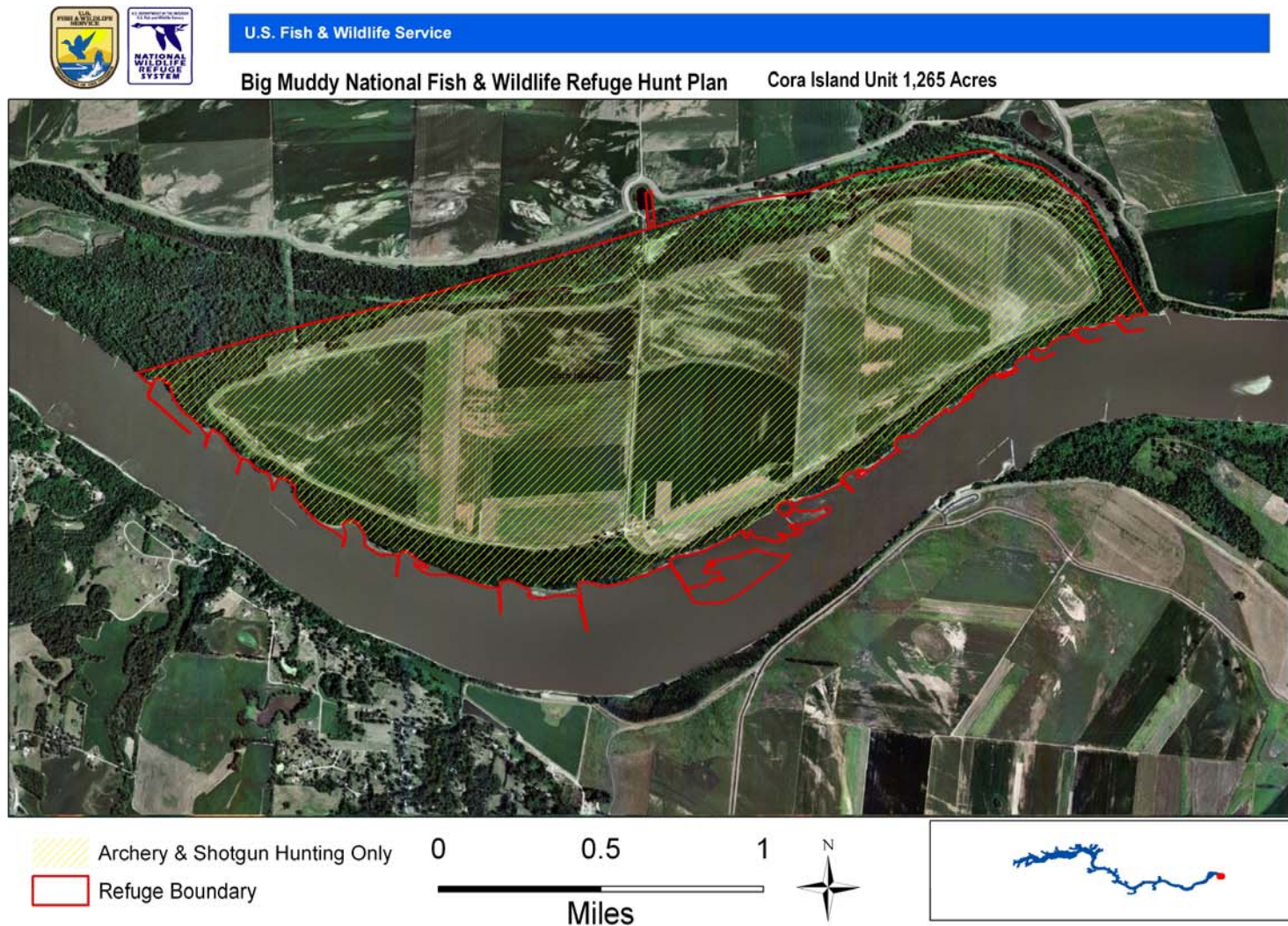


Figure B-2. Boone's Crossing Unit Current Hunting Opportunities

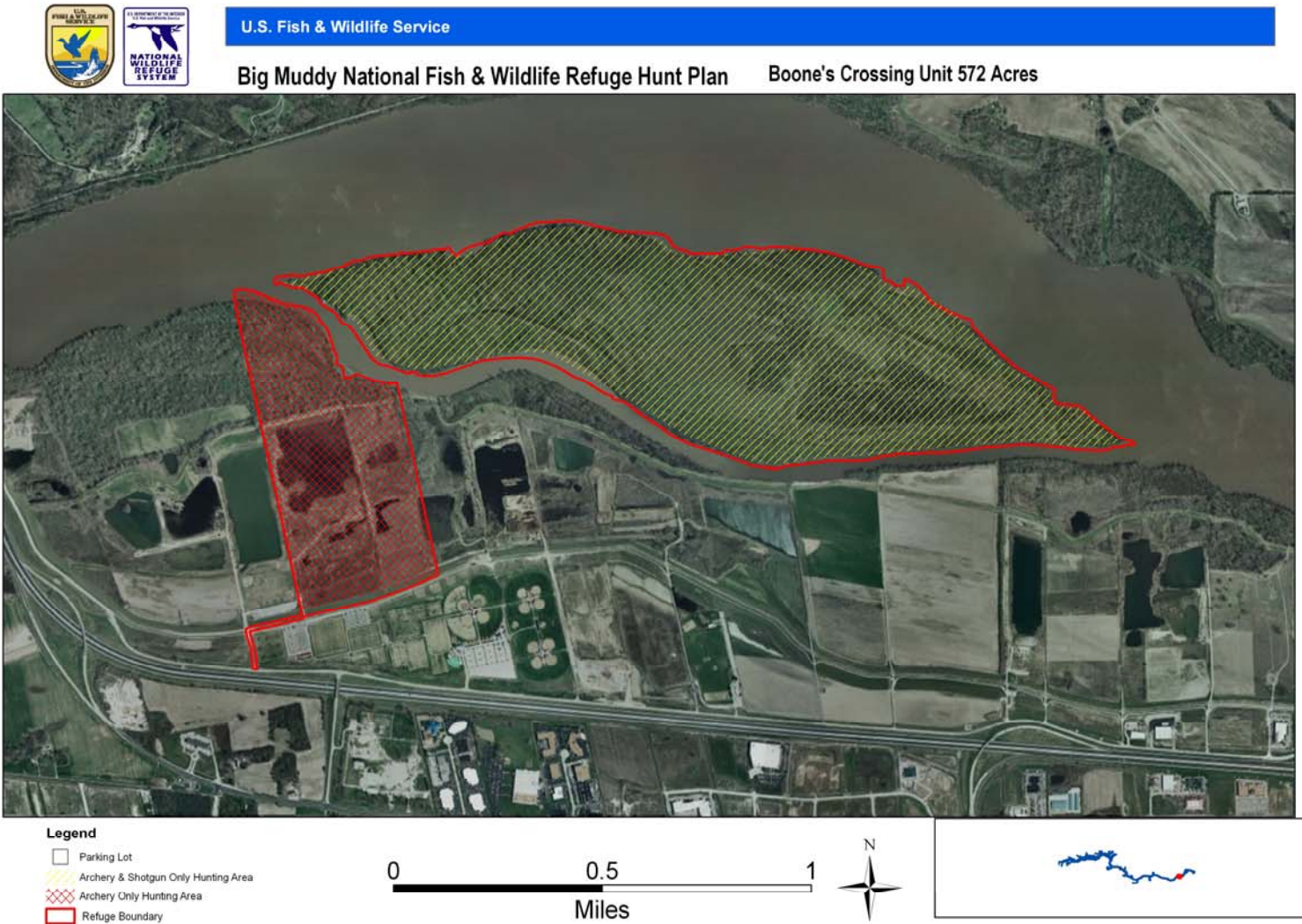


Figure B-3. St. Aubert's Island Unit Current Hunting Opportunities

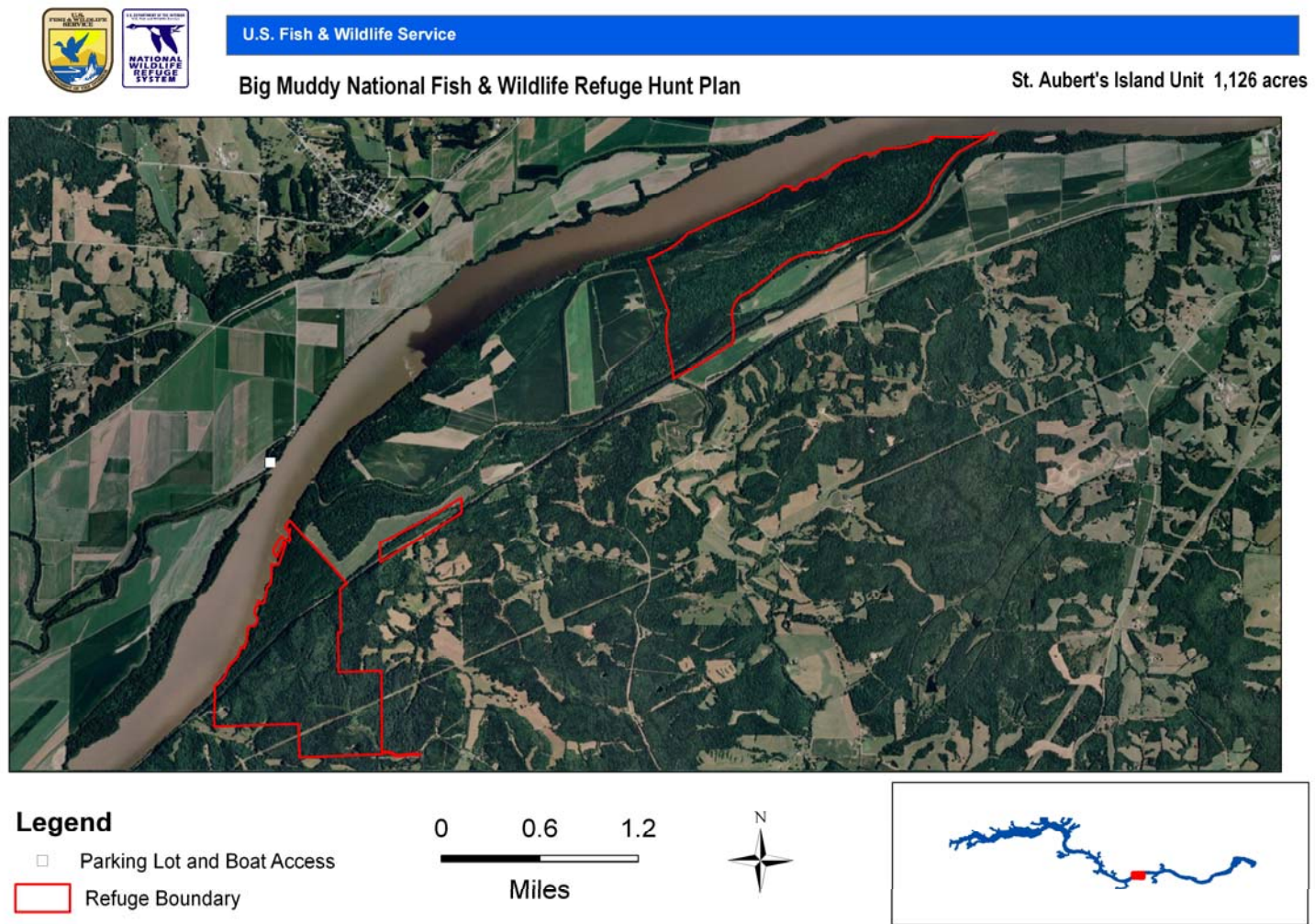


Figure B-4. Overton Bottoms Units Current Hunting Opportunities

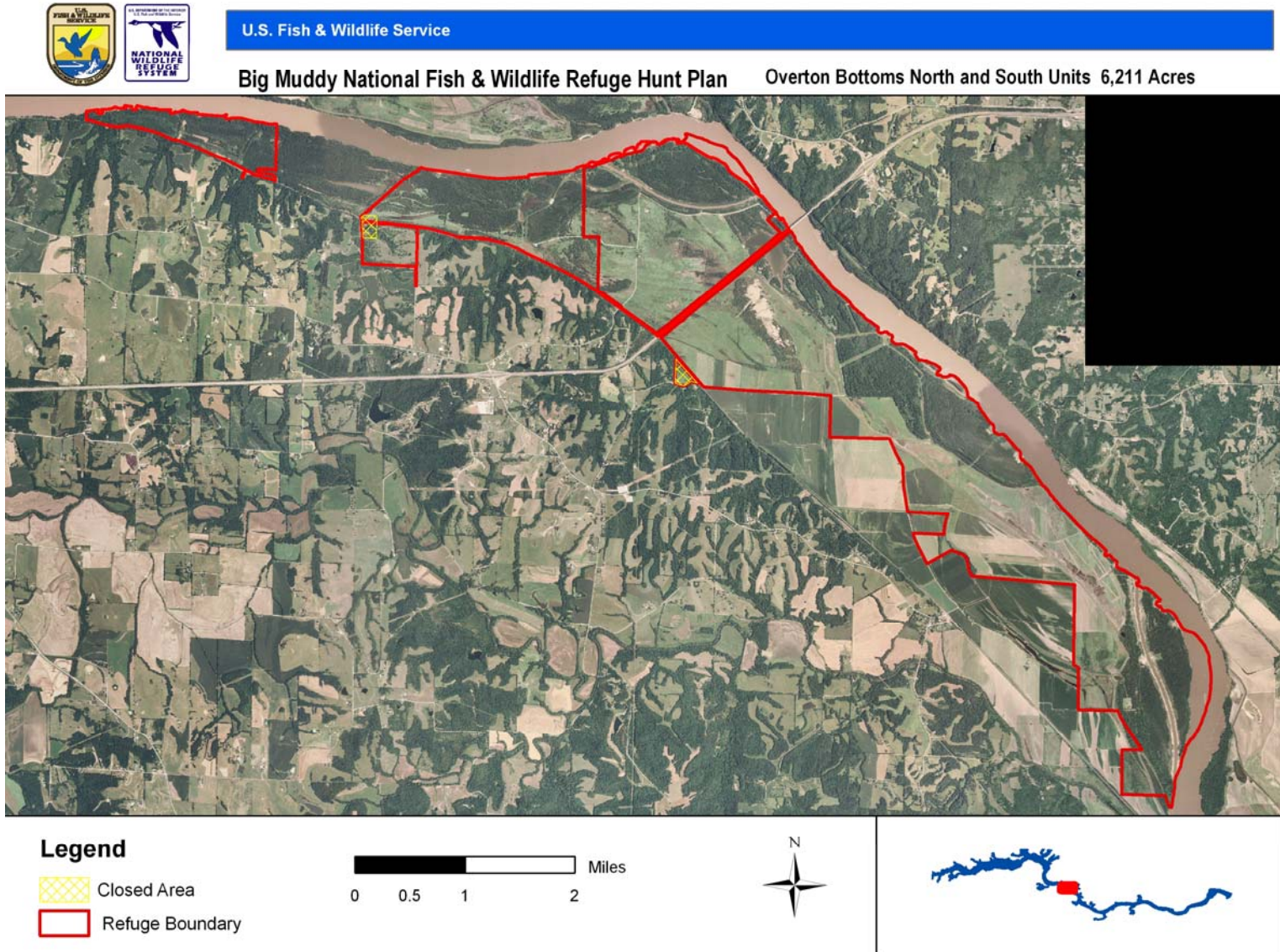


Figure B-5. Lisbon Bottom Unit Current Hunting Opportunities

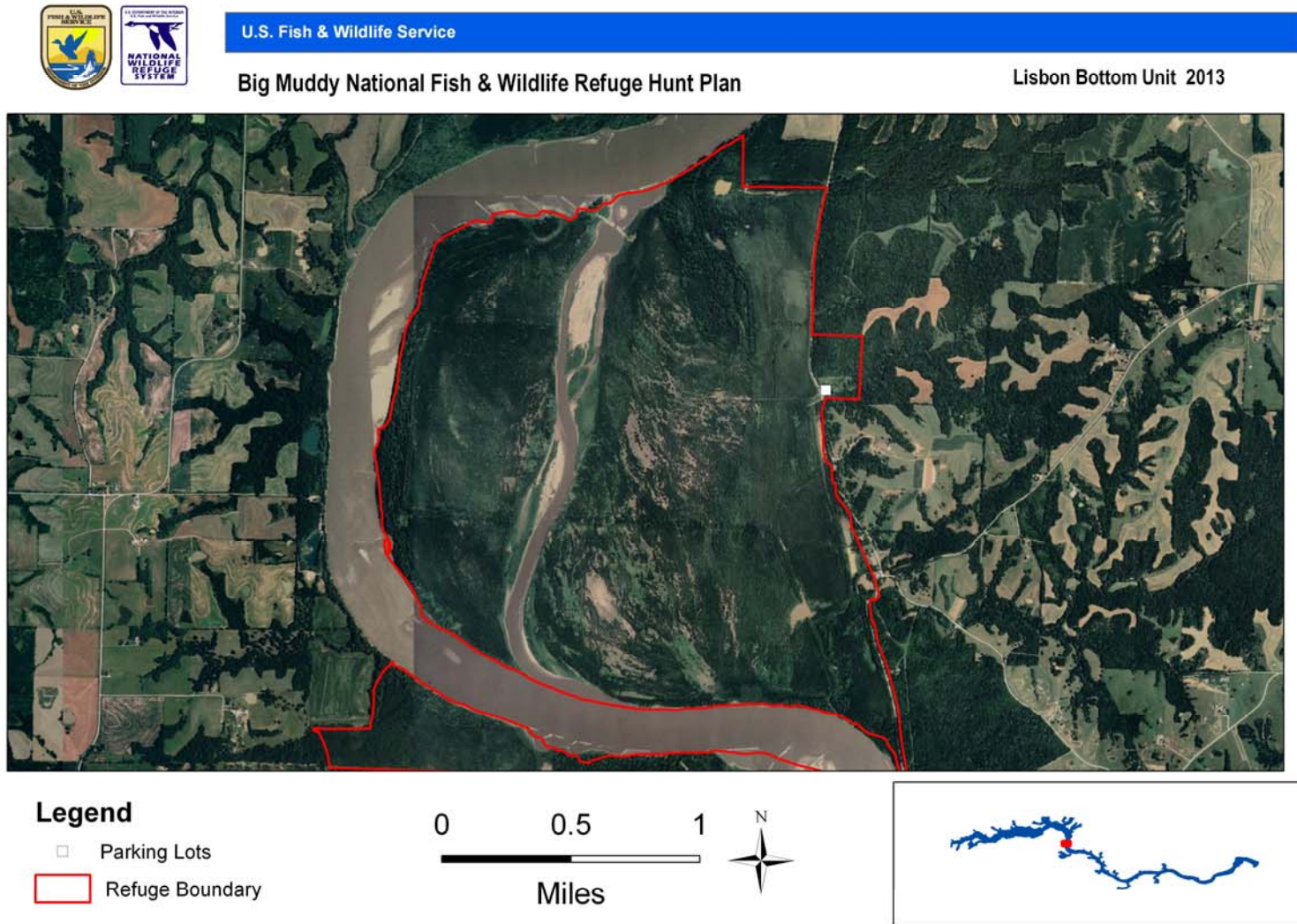


Figure B-6. Jameson Island Unit Current Hunting Opportunities

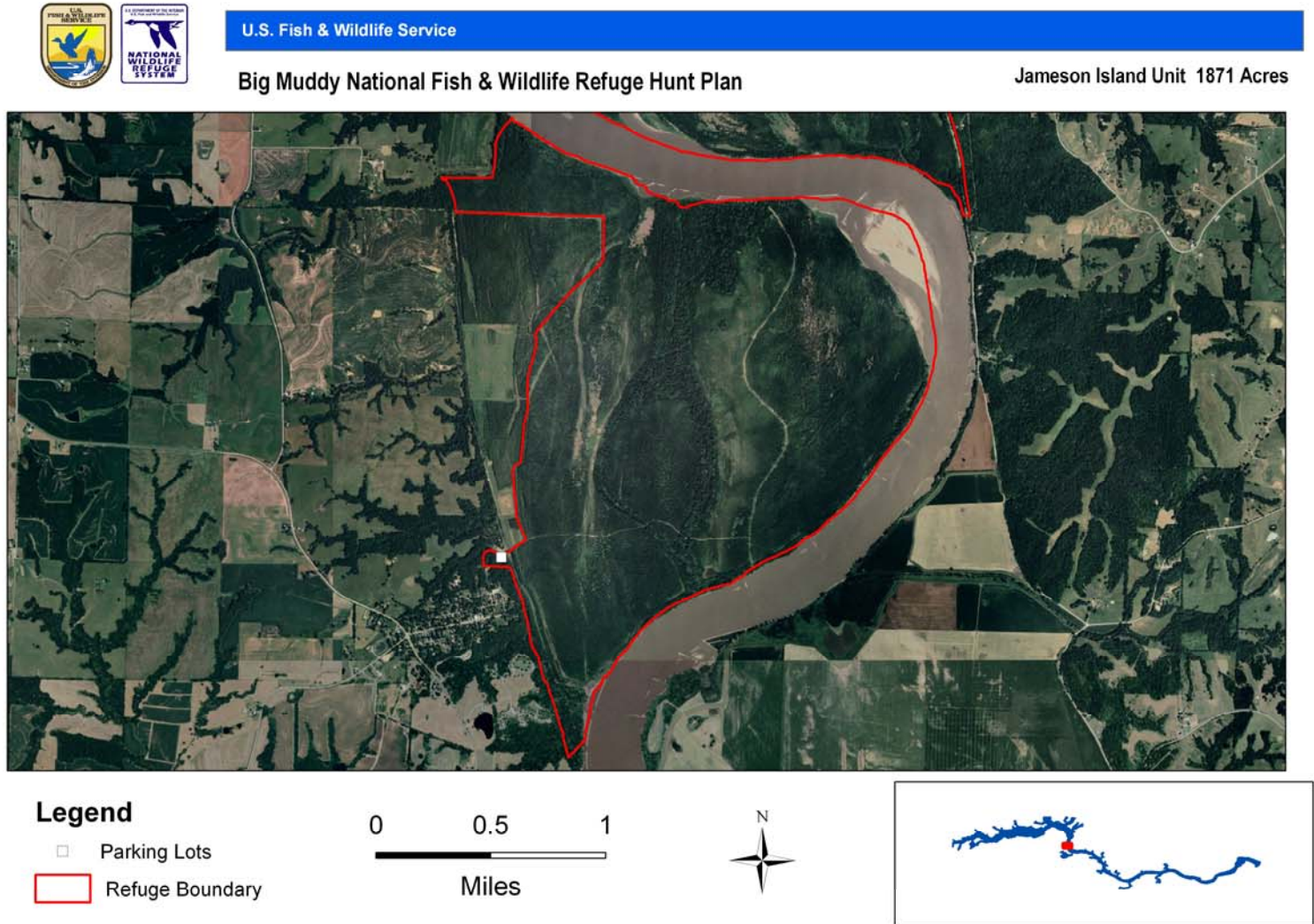


Figure B-7. Baltimore Bottom Unit Current Hunting Opportunities

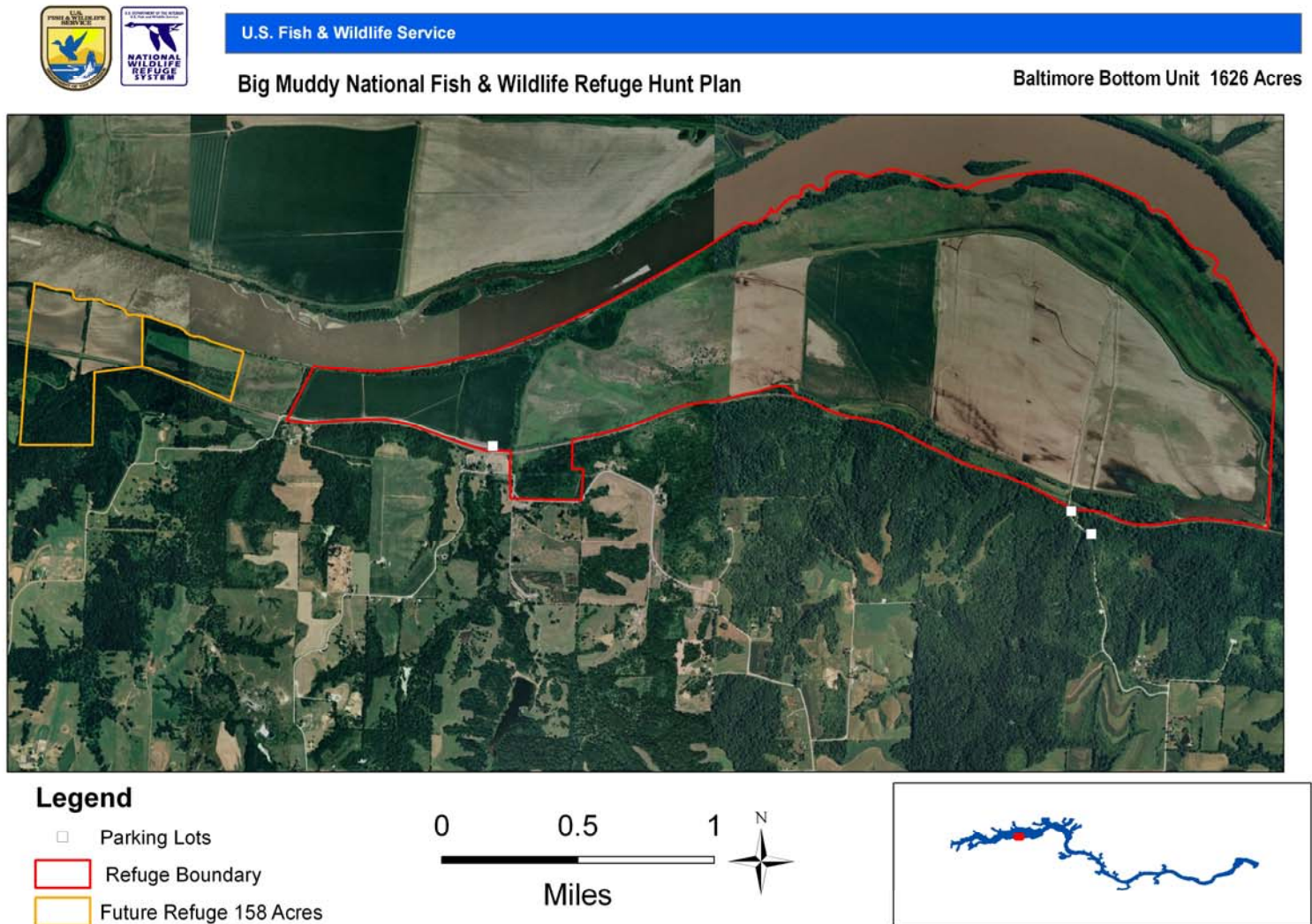


Figure B-8. Cranberry Bend Unit Current Hunting Opportunities

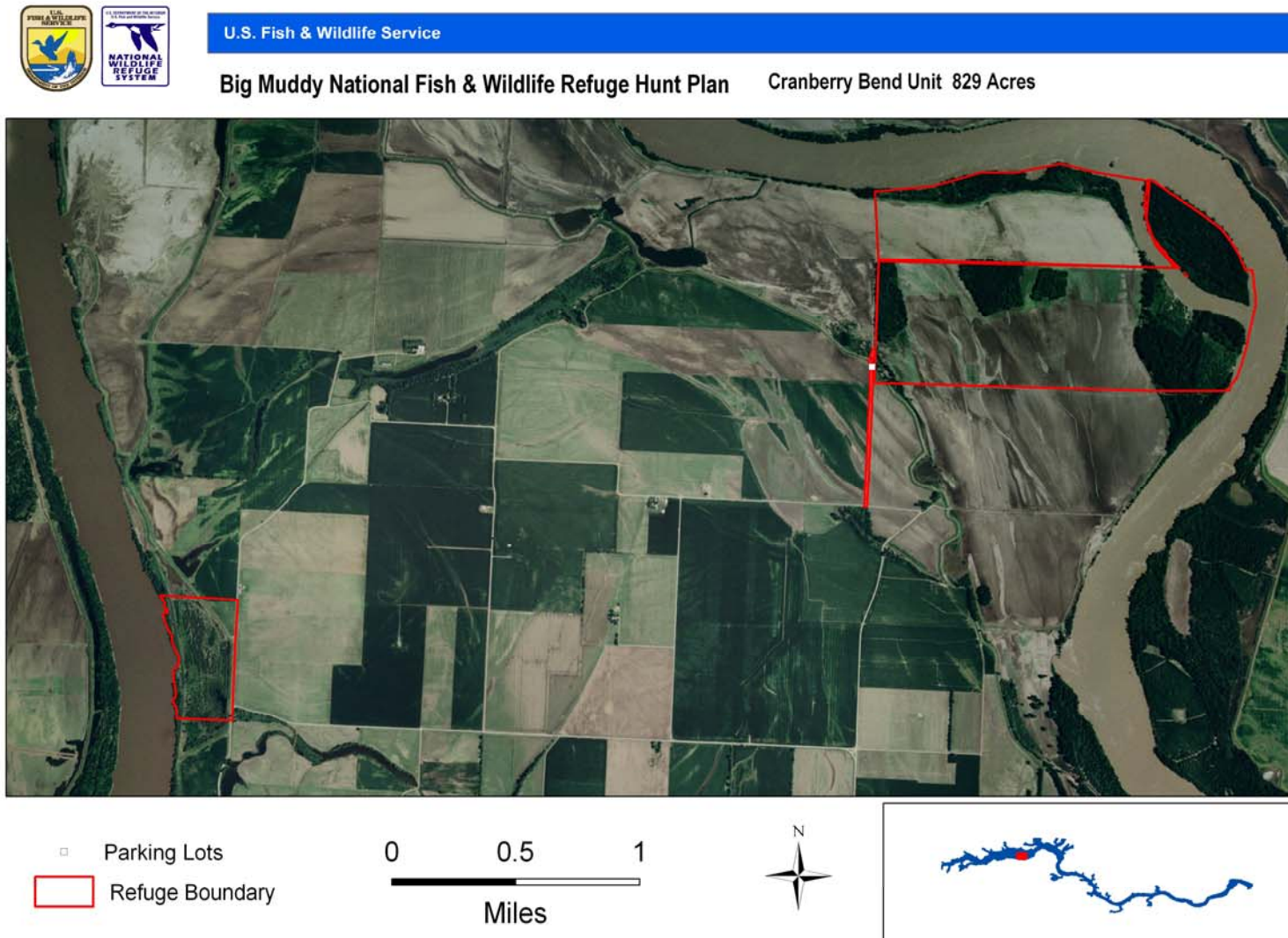
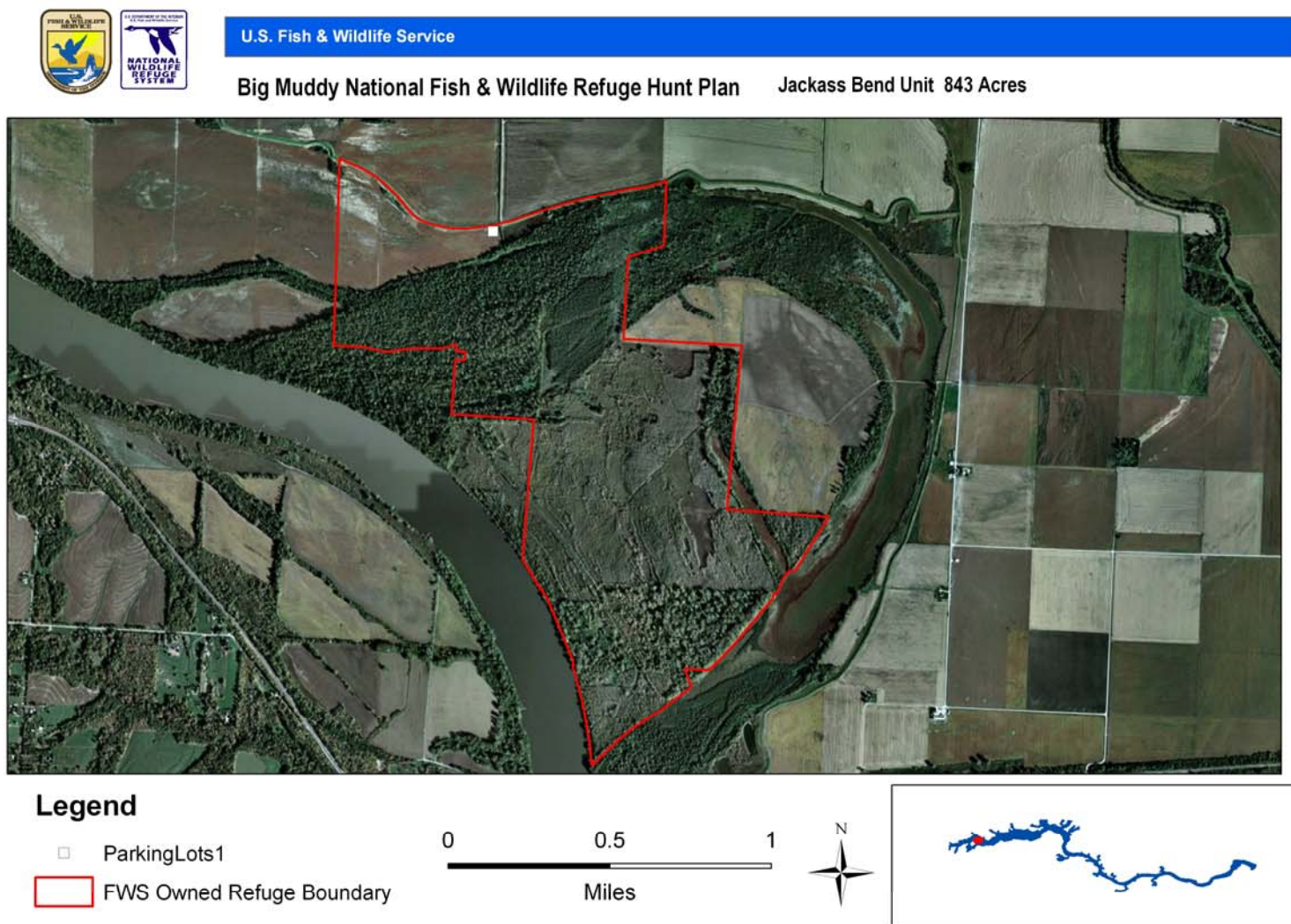


Figure B-9. Jackass Bend Unit Current Hunting Opportunities



APPENDIX C – RESPONSE TO COMMENTS ON THE HUNTING PLAN AND ENVIRONMENTAL ASSESSMENT

The Service solicited public comments for the draft 2010 Hunting Chapter of the Visitor Services Plan for Big Muddy National Fish and Wildlife Refuge its supporting draft Environmental Assessment (EA). A 30-day review period began December 4, 2009 and ended on January 6, 2010. In 2008, the Refuge conducted a series of six public meetings for the Refuge Comprehensive Conservation Plan. No comments were received during those meetings in opposition to allowing hunting on the Refuge.

APPENDIX D – POLICY COMPLIANCE AND SUPPORTING DOCUMENTATION

The Refuge completed an Intra-Service Section 7 evaluation as required by Service policy for compliance with the Endangered Species Act. No Federally listed as threatened or endangered species occur in the areas the Refuge is proposing to hunt.

The Refuge informally consulted with the Regional Archeologist (Kluth 2009) regarding the need to initiate a cultural resources consultation with the State Historic Preservation Officer. Because there are no ground disturbing or construction activities resulting from any alternatives proposed in the 2010 Hunt Plan, no consultation is required.