

**U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE**

ENVIRONMENTAL ASSESSMENT

**For
Proposed Amendments to the 2014 Hunting Chapter
Of The
Visitor Service Plan
Great River National Wildlife Refuge,
Annada, Missouri**

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**ENVIRONMENTAL ASSESSMENT
FOR
PROPOSED AMENDMENTS TO 2014 HUNTING CHAPTER
OF THE
VISITOR SERVICE PLAN
GREAT RIVER NATIONAL WILDLIFE REFUGE**

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1.0 PURPOSE OF THE PROPOSED ACTION

The Great River National Wildlife Refuge (Refuge) was established by Congress in 1958. The purposes of the Refuge are to (1) provide an inviolate sanctuary for migratory birds; (2) conserve, manage and restore fish, wildlife, and plant resources and their habitat; (3) provide for fish and wildlife-oriented recreation; and (4) conserve wetlands.

The purpose of this Environmental Assessment (EA) is to evaluate alternatives for the purpose of updating 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. 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 are hunting, fishing, wildlife photography, wildlife observation, environmental education, and interpretation. The need for action revolves around hunting as a priority use. The U.S. Fish and Wildlife Service (Service) guidance for implementing the Improvement Act not only encourages Refuge Managers to provide hunting where compatible but also to promote use of refuges for special hunts for youth, persons with disabilities, or other underserved hunting populations (605 FW 1.9C, 2.7M, 2.7N, USFWS). Because hunting is one of six priority uses for the Refuge, the 2014 Hunting Chapter seeks to balance all of these uses over time and space.

The latest amendment to the hunting chapter for the Refuge was completed in 1990 which included the addition of the Fox Island Division and changes to the Long Island (formerly known as the Gardner Division) and Delair Divisions of the Great River National Wildlife Refuge (formerly the Annada District of the Mark Twain National Wildlife Refuge Complex) hunt program. 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.

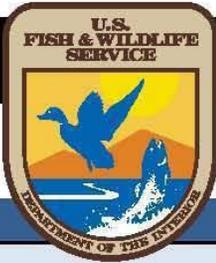
Since the first authorization in 1958 to establish 20,469 acres of land as part of the Mark Twain National Wildlife Refuge Complex, 3,926 acres included the start of the Long Island Division of the Great River National Wildlife Refuge. Since then the approved acquisition boundary has

been revised. Currently approximately 11,000 acres are managed by the Refuge (Figure 1). As the Refuge expands, lands are purchased from willing sellers.

The 2014 Hunting Chapter seeks to open fee title land transferred to the Service through the Farm Service Agency (FSA, formerly the Farmers Home Administration) debt cancellation program and amend existing hunting activities on existing Refuge lands. As directed by Service Policy (605 FW 2.7 USFWS) the station plans, manages, conducts, and evaluates refuge hunting programs in coordination with State fish and wildlife agencies on a consistent basis, in ways that conserve fish and wildlife and their habitats, ensure hunter and visitor safety, comply with applicable State and Federal laws and regulations, and promote respect for the resource. In addition, our regulations are 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 hunting prior to implementing them (605 FW 2.9, USFWS). The regulations are only one element of a complete opening package which is comprised of the following documents: Refuge Hunting Chapter; compatibility determination; documentation pursuant to compliance with the National Environmental Policy Act (NEPA) of 1969, as amended, 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 draft Refuge-specific regulations to be included in 50 CFR.

This Environmental Assessment serves as the NEPA document which analyzes the impacts of the proposed changes to the hunting program at Great River National Wildlife Refuge for 2014 and beyond. The Preferred Alternative, as presented in this EA, outlines proposed changes to the 2014 Hunting Chapter. Proposed uses within the 2014 Hunting Chapter have been determined to be appropriate and compatible with the mission of the Refuge System and purposes for which the Refuge was established.



U.S. Fish & Wildlife Service

Great River National Wildlife Refuge

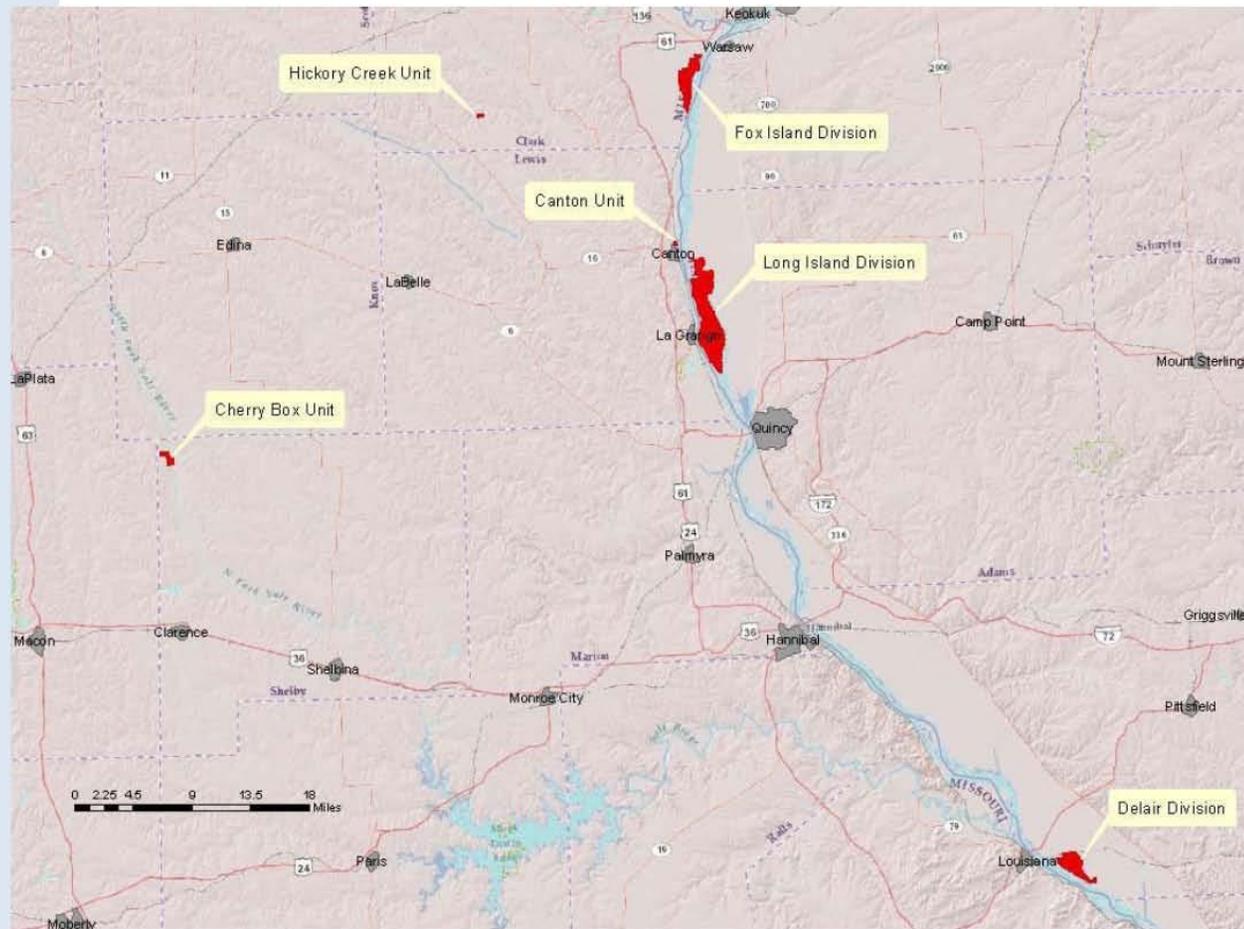
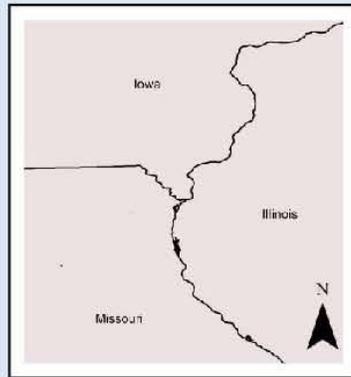


Figure 1: Refuge Units

3.0 SCOPING AND PUBLIC PARTICIPATION

Consultation with MDC and IDNR and other land managers for the development of this 2014 Hunting Chapter dates back to early 2000's when the Refuge began a series of formal and informal meetings to develop a vision for Refuge programs via the Comprehensive Conservation Plan (CCP) (USFWS 2004) process. Since then, the Refuge has continued informally consulting and coordinating with the State regarding Refuge hunting activities until a more formal effort was renewed in 2014 with the notification of the updated hunt plan.

Topics considered for the 2014 hunt plan include the following:

- Expanding opportunities for "youth hunts" at the Fox Island Division.
- Limit hunting activities on the Hickory Creek Unit due to its small size of 80 acres.
- Reduce numbers of hunters at the Delair Division.

In addition to these topics, another issue in the forefront is the inclusion of fee title land transferred to the Service through the Farm Service Agency (FSA, formerly the Farmers Home Administration) debt cancellation program. These lands have been open to hunting while under private ownership. According to Service policy, these lands must be included in an updated Hunting Chapter before they can be hunted under Service ownership.

The Refuge solicited public comments on the Draft 2014 Hunting Chapter and EA. The drafts were made available for a 30 day review and comment period which extended from August 18, 2014 through September 18, 2014. The availability of these documents was announced via a public notice to print media organizations whose coverage extends beyond the geographic limits of the Refuge. The notice also was sent directly to legislators, municipal officials, agency contacts, and non-governmental organizations (see Section 8.0). The availability of the draft Hunting Chapter and EA were announced on the Service's Refuge website. Refuge staff was also available during the comment period to discuss the proposed Hunting Chapter and EA with any interested persons.

Following the Regional Director's review of the Hunting Chapter, this EA, and approval of the Finding of No Significant Impact, and other supporting documentation for opening hunting on the Refuge as described in the Preferred Alternative here, the Service will publish in the Federal Register a Proposed Rule that updates the hunting program on the Refuge. 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. The Refuge is officially open for the hunting opportunities described here only after the effective date of the final rule. Following these approvals, the Refuge Manager will annually review Refuge-specific hunting regulations and the Hunting Chapter 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 main purposes of the Refuge is to provide wildlife-dependent recreation and environmental education (Public Law 94-466; October 8, 1976). Hunting is a valuable means to meet this purpose. Toward that end, the Refuge has drafted an updated Hunting Chapter of its Visitor Services Plan. The 2014 Hunting Chapter seeks to modify existing regulations and open

fee title land transferred to the Service through the Farm Service Agency to hunting. Proposed uses within this Chapter are appropriate and compatible with the mission and goals of the Refuge System and the purposes for which the Refuge was established (CCP, USFWS 2004).

The Service evaluated possible hunting program changes through four Alternatives:

- (1) No Hunting
- (2) Maintain Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Not Open Fee Title Land Transferred to the Service through the Farm Service Agency
- (3) Maintain Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Open Fee Title Land Transferred to the Service through the Farm Service Agency to Hunting
- (4) Modify Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Open Fee Title Land Transferred to the Service through the Farm Service Agency to Hunting.

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 activities to cease on the Refuge. Most lands presently managed as part of the Refuge were hunted upon prior to being included in the Refuge. With few exceptions those lands continued to be hunted upon after becoming part of the Refuge.

Numerous comments supporting the continuation of hunting were received during the scoping meetings for the EA as part of the Comprehensive Conservation Plan for the Mark Twain National Wildlife Refuge Complex (USFWS 2004).

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. The selected Alternative in the Refuge's 2004 CCP (USFWS 2004) identified a hunting program that was expanded yet compatible and balanced with other priority Refuge uses.

4.2 Alternatives Developed For Detailed Analysis

Three Alternatives were carried forward for detailed analysis.

4.2.1 Elements Common to Developed Alternatives

Under these 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 firearms and bow requirements, and (6) blaze orange requirements.

Regulations pertaining to hunting on all National Wildlife Refuge System Lands would remain in effect with each Alternative. These regulations are identified in Title 50 of the Code of

Federal Regulations (Sections 20.21 and 32.2) and in the Refuge Hunting Chapter associated with this document. Topics covered by these regulations include, but are not limited to, baiting, possession of alcohol, and use of non-toxic shot.

Refuge-specific regulations also would apply to all three Alternatives. These regulations are identified in Title 50 of the Code of Federal Regulations Section 32.32 (Illinois) and 32.44 (Missouri) and in the Refuge Hunting Chapter associated with this document. Refuge-specific regulations include, but are not limited to, wildlife species that are open to hunting, hunting access hours, use of stands and boats, use of hunting dogs, and types of weapons and ammunition allowed for hunting. With each Alternative, the Refuge would implement minor changes related to requiring the use of non-toxic shot for turkey hunting.

Under all three Alternatives, parts of certain Refuge units may be open to Refuge-specific special hunts. A Refuge-specific special hunt is an activity with a limited timeframe for hunting, such as the managed deer hunts, or an activity focused on certain populations of hunters to provide them with additional opportunities or methods of hunting through a Refuge approved program. The populations targeted for the latter hunts are youth hunters, hunters with disabilities, or other underserved hunter populations. Refuge-specific special hunts may be allowed for migratory birds, upland game, or big game and will always require Refuge-specific authorization. They are conducted within the framework of the State seasons and regulations for the species proposed to be hunted. Refuge-specific special hunts for people with disabilities and youth hunters will be administered on designated areas of the Refuge. Some of these designated areas would be closed to hunting by the general public during the time of the Refuge-specific special hunt. In administering special hunts, the Refuge Manager will consider the biological effects of proposed hunting activities as well as the hunts potential to conflict with concurrent non-hunting recreational activities.

4.2.2 Alternative A: Maintain Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Not Open Fee Title Land Transferred to the Service through the Farm Service Agency (No Action)

Each Division of the Refuge support populations of migratory birds, big game, and upland game. All Divisions of the Refuge are open to the public for some type of recreational use including hunting.

In the early to mid-1990s, the Service acquired the administrative responsibility of three Farm Service Administration properties. These lands were open to hunting under private ownership. Under Alternative A (No Action), these lands would remain closed to hunting per Service policy that requires an opening package be submitted and approved before newly acquired Refuge land can be open to hunting.

The current hunting program allows specific hunting activities or seasons on designated Divisions. This enables the Refuge to balance species needs and other recreational uses with hunting activities. The Delair Division is closed to general public hunting with the exception of a managed deer hunt authorized for biological purposes. The Fox Island and Long Island Divisions are generally open to hunting by the public with a few exceptions.

Hunting activities currently allowed on specific Refuge divisions and units follow.

Fox Island Division

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland Game
 - Refuge is closed to upland game hunting from October 16 through December 31.
 - Outside of the specified dates, hunting is allowed in accordance with state seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
- Big Game (Deer and Turkey)
 - Open to deer hunting only during the antlerless-only portion of the state firearms hunting season.
 - Turkey hunting allowed only during the state spring season, including the youth season, in accordance with state seasons and regulations.
 - The Refuge is closed to fall turkey hunting.

Long Island Division

- Migratory Birds
 - Waterfowl and coot hunting is allowed in accordance with state seasons and regulations.
 - Hunting only from blinds constructed on sites posted by the Illinois Department of Natural Resources.
 - Only non-toxic shot allowed.
- Upland Game
 - Open to upland game hunting in accordance with state seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
- Big Game (Deer and Turkey)
 - Open to deer and turkey hunting in accordance with state seasons and regulations.

Delair Division

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland game
 - Closed to hunting upland game.
- Big Game (Deer and Turkey)
 - Open only to special state-managed deer hunts with a Refuge permit.
 - Closed to hunting turkey.

FSA Lands

Cherry Box Unit

- Closed to hunting.

Hickory Creek Unit

- Closed to hunting.

Canton Unit

- Closed to hunting.

4.2.3 Alternative B: Maintain Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Open Fee Title Land Transferred to the Service through the Farm Service Agency to Hunting

In this Alternative the Service is proposing to maintain current hunting programs on Refuge lands previously opened to hunting for current species and methods of hunting. In addition, the Service proposes to open fee title land transferred to the Service through the Farm Service Agency (FSA, formerly the Farmers Home Administration) debt cancellation program to hunting.

This Alternative would open 380 acres of fee title lands transferred from FSA to the Refuge hunting program. These units include the Cherry Box Unit in Shelby County and the Hickory Creek Unit in Clark County, both in Missouri. The Canton Unit in Lewis County, Missouri will remain closed due to the size of the unit, only 44 acres, and its location north of the town of Canton, immediately adjacent to residential and public use areas.

The units proposed to be opened for hunting have been hunted prior to Service ownership. With this Alternative, the Service also would have the option of expanding Refuge-Specific special hunts on the Fox Island, Long Island, and Delair Divisions of the Great River National Wildlife Refuge.

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

Fox Island Division

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland Game
 - Refuge is closed to upland game hunting from October 16 through December 31.
 - Outside of the specified dates, hunting is allowed in accordance with state seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
- Big Game (Deer and Turkey)
 - Open to deer hunting only during the antlerless-only portion of the state firearms hunting season.
 - Turkey hunting allowed only during the state spring season, including the youth season, in accordance with state seasons and regulations.
 - The Refuge is closed to fall turkey hunting.

Long Island Division

- Migratory Birds
 - Waterfowl and coot hunting is allowed in accordance with state seasons and regulations.

- Hunting only from blinds constructed on sites posted by the Illinois Department of Natural Resources.
- Only non-toxic shot allowed.
- Upland Game
 - Open to upland game hunting in accordance with state seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
- Big Game (Deer and Turkey)
 - Open to deer and turkey hunting in accordance with state seasons and regulations.

Delair Division

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland game
 - Closed to hunting upland game.
- Big Game (Deer and Turkey)
 - Open only to special state-managed deer hunts with a Refuge permit.
 - Closed to hunting turkey.

FSA Lands

Cherry Box Unit

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland Game
 - Open to upland game hunting with shotgun only in accordance with state seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
 - Only non-toxic shot allowed.
- Big Game (Deer and Turkey)
 - Open to archery deer hunting only in accordance with state seasons and regulations.
 - Open to turkey hunting during the state spring season, including youth season, and the fall archery seasons only.
 - Only non-toxic shot allowed during the spring turkey season.

Hickory Creek Unit

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland Game
 - Open to upland game hunting with shotgun only in accordance with state seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
 - Only non-toxic shot allowed.
- Big Game (Deer and Turkey)
 - Open to archery deer hunting only in accordance with state seasons and regulations.

- Open to turkey hunting during the state spring season, including youth season, and the fall archery seasons only.
- Only non-toxic shot allowed during the spring turkey season.

Canton Unit

- Closed to hunting.

4.2.4 Alternative C: Modify Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Open Fee Title Land Transferred to the Service through the Farm Service Agency to Hunting (Preferred Alternative)

In this Alternative the Service is proposing to modify current hunting programs on Refuge lands previously opened to hunting. In addition, the Service proposes to open fee title land transferred to the Service through the Farm Service Agency (FSA, formerly the Farmers Home Administration) debt cancellation program to hunting.

This Alternative would open 380 acres of fee title lands transferred from FSA to the Refuge hunting program. These units include the Cherry Box Unit in Shelby County and the Hickory Creek Unit in Clark County, both in Missouri. The Canton Unit in Lewis County, Missouri will remain closed due to the size of the unit, only 44 acres, and its location north of the town of Canton, immediately adjacent to residential and public use areas.

The units proposed to be opened for hunting have been hunted prior to Service ownership. With this Alternative, the Service also would have the option of expanding Refuge-Specific special hunts on the Fox Island, Long Island, and Delair Divisions of the Great River National Wildlife Refuge.

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

Fox Island Division

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland game
 - Refuge is closed to upland game hunting from October 16 through December 31.
 - Outside of the specified dates, upland game hunting is allowed in accordance with State seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
 - Only non-toxic shot allowed when using shotgun.
- Big Game (Deer and Turkey)
 - Open to hunting deer during the statewide archery deer and special state-managed hunts.
 - Open to turkey hunting during state spring season, including youth season, and the fall archery season only.
 - Only non-toxic shot is allowed for turkey hunting.

Long Island Division

- Migratory Birds
 - Waterfowl and coot hunting is allowed in accordance with state seasons and regulations.
 - Hunting only from blinds constructed on sites posted by the Illinois Department of Natural Resources.
 - Only non-toxic shot allowed.
- Upland game
 - Open to upland game hunting is allowed in accordance with State seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
 - Only non-toxic shot allowed when using shotgun.
- Big Game (Deer and Turkey)
 - Open to deer hunting in accordance with State seasons and regulations.
 - Open to turkey hunting in accordance with state seasons and regulations
 - Only non-toxic shot allowed for turkey.

Delair Division

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland game
 - Closed to hunting upland game.
- Big Game (Deer and Turkey)
 - Open only to special state-managed deer hunts with a Refuge permit.
 - Closed to turkey hunting.

FSA Lands

Cherry Box Unit

- Migratory Birds
 - Closed to hunting migratory birds.
- Upland Game
 - Open to upland game hunting with shotgun only in accordance with state seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
 - Only non-toxic shot allowed.
- Big Game (Deer and Turkey)
 - Open to archery deer hunting only in accordance with state seasons and regulations.
 - Open to turkey during the state spring season, including youth season, and the fall archery seasons only.
 - Only non-toxic shot allowed for turkey.

Hickory Creek Unit

- Migratory Birds
 - Closed to hunting migratory birds.

- Upland Game
 - Open to upland game hunting with shotgun only in accordance with state seasons and regulations.
 - Refuge is only open from one-half hour before sunrise until one-half hour after sunset.
 - Only non-toxic shot allowed.
- Big Game (Deer and Turkey)
 - Open to archery deer hunting only in accordance with state seasons and regulations.
 - Open to the state spring season, including youth season, and the fall archery seasons only.
 - Only non-toxic shot allowed for turkey.

Canton Unit

- Closed to hunting.

4.2.5 Comparison of Developed Alternatives

Table 4.2.5.1 presents a general comparison of the Alternatives. Table 4.2.5.2 presents a unit by unit comparison of hunting activities allowed for the Alternatives.

Table 4.2.5.1 – General Comparison of Alternatives.

Action	Alternative A (No action)	Alternative B	Alternative C (Preferred)
Species to be hunted	<p>Migratory Birds: waterfowl (i.e., geese and ducks) and American coot</p> <p>Upland Game: ring-necked pheasant, gray partridge, northern bobwhite quail, gray and fox squirrel, rabbit (i.e. cottontail and swamp), woodchuck, raccoon, opossum, gray and red fox, coyote, bobcat, badger and striped skunk</p> <p>Big Game: white-tailed deer and wild turkey</p>	<p>No change</p> <p>No change</p> <p>No change</p>	<p>No change</p> <p>No change</p> <p>No change</p>
Locations of hunts	<p>Areas closed to all hunting: Cherry Box, Hickory Creek and Canton Units (424 ac.)</p> <p>Areas open to Refuge managed hunts only: Delair Division (1,737 ac.)</p> <p>Areas open to general public hunts: Fox Island and Long Island Divisions (8,900 ac.)</p>	<p>Areas closed to all hunting: Canton Unit (44 ac.)</p> <p>10% increase in acreage open to hunting</p> <p>Areas open to Refuge managed hunts only: Delair Division (1,737 ac.)</p> <p>No change</p> <p>Areas open to general public hunts: Fox Island Division, Long Island Divisions, Cherry Box Unit, and Hickory Creek Unit (9,280 ac.)</p> <p>4% increase in acreage open to general hunts</p>	<p>Same as B</p>
Huntable land base	<p>10,637 ac. open to general public or Refuge managed hunts out of 11,061 ac. of Refuge lands</p>	<p>11,017 ac. open to general public or Refuge managed hunts out of 11,061 ac. of Refuge lands</p> <p>Maintain huntable acres at pre-Service ownership levels.</p>	<p>Same as B</p>
Conflict between hunting and non-hunting activities	<p>Potential conflicts with biological, non-hunting public use, or administrative activities mitigated by managed and temporal separation of activities.</p>	<p>No change</p>	<p>No change</p>

Table 4.2.5.2 - Comparison of hunting activities allowed for Alternatives.

Unit	Alternative A (No Action)	Alternative B	Alternative C (Preferred)
Fox Island Division	<ul style="list-style-type: none"> • Migratory Birds <ul style="list-style-type: none"> ○ Closed to hunting migratory birds. • Upland Game <ul style="list-style-type: none"> ○ Refuge is closed to upland game hunting from October 16 through December 31. ○ Outside of the specified dates, hunting is allowed in accordance with state seasons and regulations. ○ Refuge is only open from ½ hour before sunrise until ½ hour after sunset. • Big Game <ul style="list-style-type: none"> ○ Open to deer hunting only during the antlerless-only portion of the state firearms hunting season. ○ Turkey hunting allowed only during the state spring season, including the youth season, in accordance with state seasons and regulations. ○ The Refuge is closed to fall turkey hunting. 	No change	<ul style="list-style-type: none"> • Migratory Birds <ul style="list-style-type: none"> ○ Closed to hunting migratory birds. • Upland game <ul style="list-style-type: none"> ○ Refuge is closed to upland game hunting from October 16 through December 31. ○ Outside of the specified dates, upland game hunting is allowed in accordance with state seasons and regulations. ○ Refuge is only open from ½ hour before sunrise until ½ hour after sunset. ○ Only non-toxic shot allowed when using shotgun. • Big Game <ul style="list-style-type: none"> ○ Open to hunting deer during the statewide archery deer and special state-managed hunts. ○ Open to turkey hunting during state spring season, including youth season, and the fall archery season only. ○ Only non-toxic shot is allowed for turkey hunting.
Long Island Division	<ul style="list-style-type: none"> • Migratory Birds <ul style="list-style-type: none"> ○ Waterfowl and coot hunting is allowed in accordance with state seasons and regulations. ○ Hunting only from blinds constructed on sites posted by the Illinois Department of Natural Resources. ○ Only non-toxic shot allowed. • Upland Game <ul style="list-style-type: none"> ○ Open to upland game hunting in accordance with state seasons and regulations. ○ Refuge is only open from ½ hour before sunrise until ½ hour after sunset. • Big Game <ul style="list-style-type: none"> ○ Open deer and turkey hunting in accordance with state seasons and regulations. 	No change	<ul style="list-style-type: none"> • Migratory Birds <ul style="list-style-type: none"> ○ Waterfowl and coot hunting is allowed in accordance with state seasons and regulations. ○ Hunting only from blinds constructed on sites posted by the Illinois Department of Natural Resources. ○ Only non-toxic shot allowed. • Upland Game <ul style="list-style-type: none"> ○ Open to upland game hunting is allowed in accordance with state seasons and regulations. ○ Refuge is only open from ½ hour before sunrise until ½ hour after sunset. ○ Only non-toxic shot allowed when using shotgun. • Big Game <ul style="list-style-type: none"> ○ Open to deer hunting in accordance with state seasons and regulations. ○ Open to turkey hunting in accordance with state seasons and regulations. ○ Only non-toxic shot allowed for turkey hunting.
Delair Division	<ul style="list-style-type: none"> • Migratory Birds <ul style="list-style-type: none"> ○ Closed to hunting migratory birds. 	No change	No change

	<ul style="list-style-type: none"> • Upland game <ul style="list-style-type: none"> ○ Closed to hunting upland game. • Big Game <ul style="list-style-type: none"> ○ Open only to special state-managed deer hunts with a Refuge permit. ○ Closed to hunting turkey. 		
Cherry Box Unit	Closed to hunting	<ul style="list-style-type: none"> • Migratory Birds <ul style="list-style-type: none"> ○ Closed to hunting migratory birds. • Upland Game <ul style="list-style-type: none"> ○ Open to upland game hunting with shotgun only in accordance with state seasons and regulations. ○ Refuge is only open from ½ hour before sunrise until ½ hour after sunset. ○ Only non-toxic shot allowed. • Big Game <ul style="list-style-type: none"> ○ Open to archery deer hunting only in accordance with state seasons and regulations. ○ Open to turkey hunting during the state spring season, including youth season, and the fall archery seasons only. ○ Only non-toxic shot allowed during the spring turkey season. 	Same as B
Hickory Creek Unit	Closed to hunting	<ul style="list-style-type: none"> • Migratory Birds <ul style="list-style-type: none"> ○ Closed to hunting migratory birds. • Upland Game <ul style="list-style-type: none"> ○ Open to upland game hunting with shotgun only in accordance with state seasons and regulations. ○ Refuge is only open from ½ hour before sunrise until ½ hour after sunset. ○ Only non-toxic shot allowed. • Big Game <ul style="list-style-type: none"> ○ Open to archery deer hunting only in accordance with state seasons and regulations. ○ Open to turkey hunting during the state spring season, including youth season, and the fall archery seasons only. ○ Only non-toxic shot allowed during the spring turkey season. 	Same as B
Canton Unit	Closed to hunting	No change	No change

5.0 AFFECTED ENVIRONMENT

The Refuge is one of more than 556 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 refuges. 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 Refuge was established in 1958 by Congress for the purpose of (1) providing an inviolate sanctuary for migratory birds; (2) conserving, managing and restoring fish, wildlife, and plant resources and their habitat; (3) providing for fish and wildlife-oriented recreation; (4) protecting natural resources; (5) conserving endangered or threatened species; and (6) conserving wetlands.

Over 11,000 acres are owned and managed as part of the Great River National Wildlife Refuge. Presently, the Refuge consists of 3 Divisions and 3 Units. Each Division is located in the floodplain of the Mississippi River located between Alexandria, Missouri and Clarksville, Missouri. The fee title lands acquired through FSA are located inland along riverine systems, with the exception of the Canton Unit, which is found within the Mississippi River floodplain north of the town of Canton.

5.1 Landscape Setting

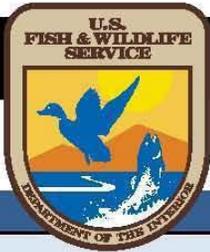
The landscape encompassing Great River National Wildlife Refuge was formed during the Pleistocene epoch, or Ice Age, as continental ice sheets advanced and retreated across northern Missouri and Illinois. The southern extent of glaciations roughly parallels the Missouri River in Missouri. When the climate warmed again, melt-water from northern glacial ice created the present channel of the Illinois and Mississippi Rivers. Soils in the region have formed from wind deposited material that occurred during the ice sheet retreat.

The most dramatic change to the region was the construction of the locks and dams along the Mississippi River in late 1930’s. After the locks and dams were built, water levels in the Mississippi River adjacent to Great River National Wildlife Refuge were raised and stabilized. Prolonged flooding ultimately killed less water tolerant trees in the floodplains.

All current Refuge lands are located within rural areas of Missouri and Illinois. The Refuge provides essential resting and feeding habitat for migrating birds along the Mississippi flyway in North America as they journey long distances to wintering and breeding grounds.

The Refuge is comprised of 3 Divisions (Figures 2, 3, and 4) and 3 Units (Figures 5, 6, and 7) currently totaling over 11,061 acres and spanning 82 miles of the Mississippi River. Of the Refuge’s 11,061 acres, about 10,681 acres lie within the Mississippi River floodplain. The

remaining two Refuge Units, Cherry Box and Hickory Creek, are located along smaller tributaries of the Mississippi River.



U.S. Fish & Wildlife Service

Great River National Wildlife Refuge

Legend

- Refuge Property
- Highway
- Major Road
- Nearest Town

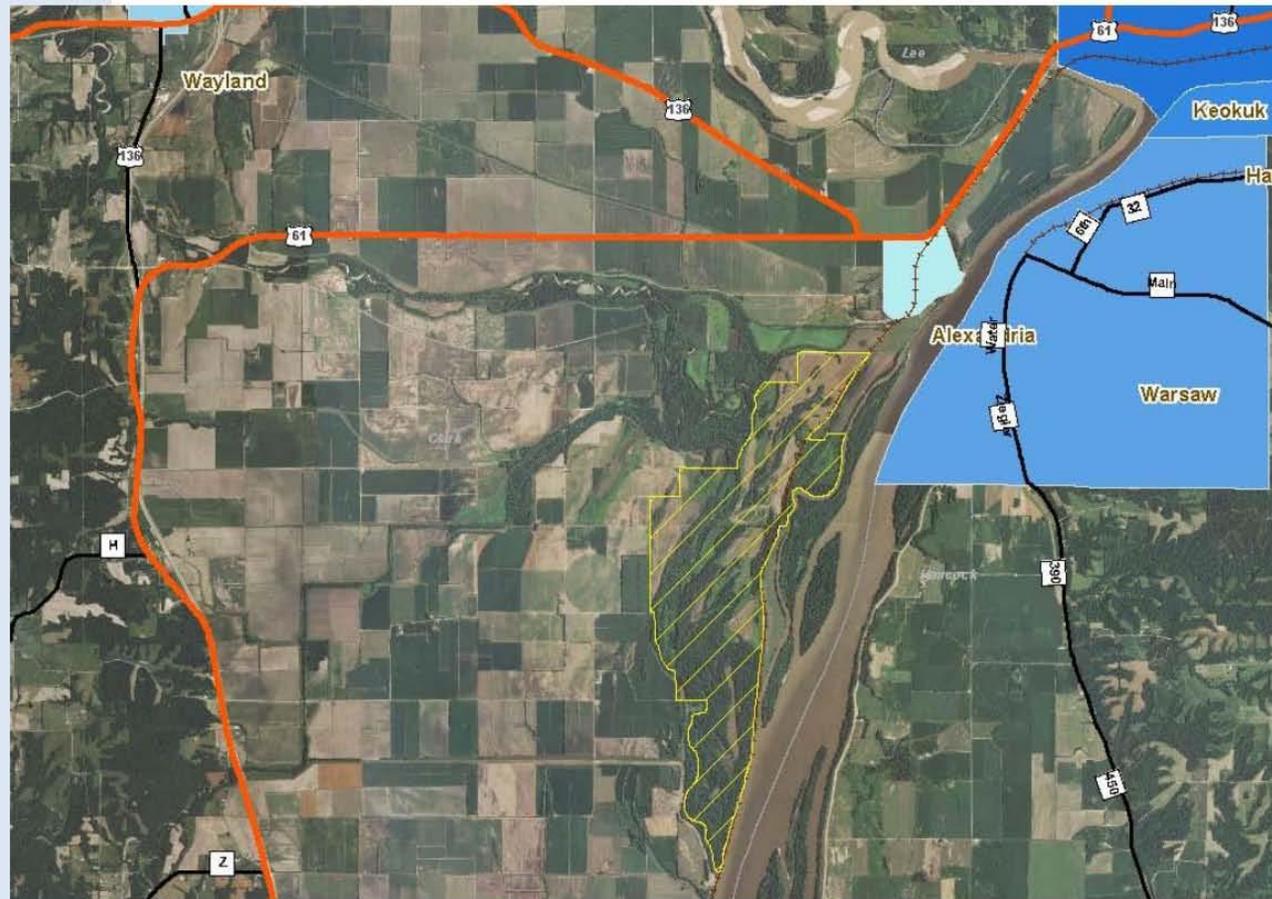
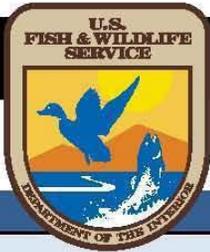


Figure 2: Fox Island Division
2,100 Acres



U.S. Fish & Wildlife Service

Great River National Wildlife Refuge

Legend

- Refuge Property
- Highway
- Major Road
- Nearest Town

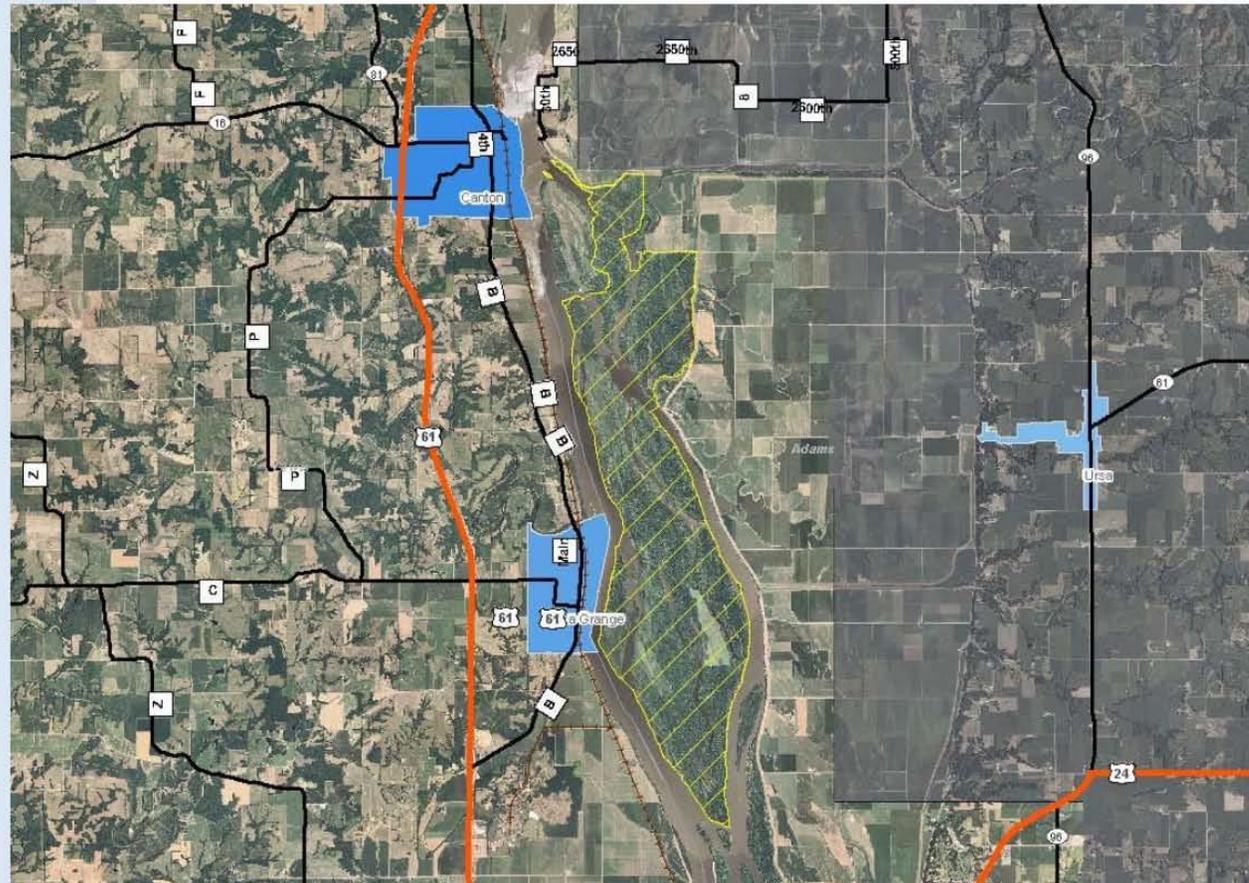
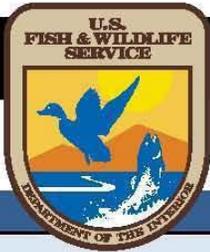


Figure 3: Long Island Division
6,800 Acres



U.S. Fish & Wildlife Service

Great River National Wildlife Refuge

Legend

- Refuge Property
- Highway
- Major Road
- Nearest Town

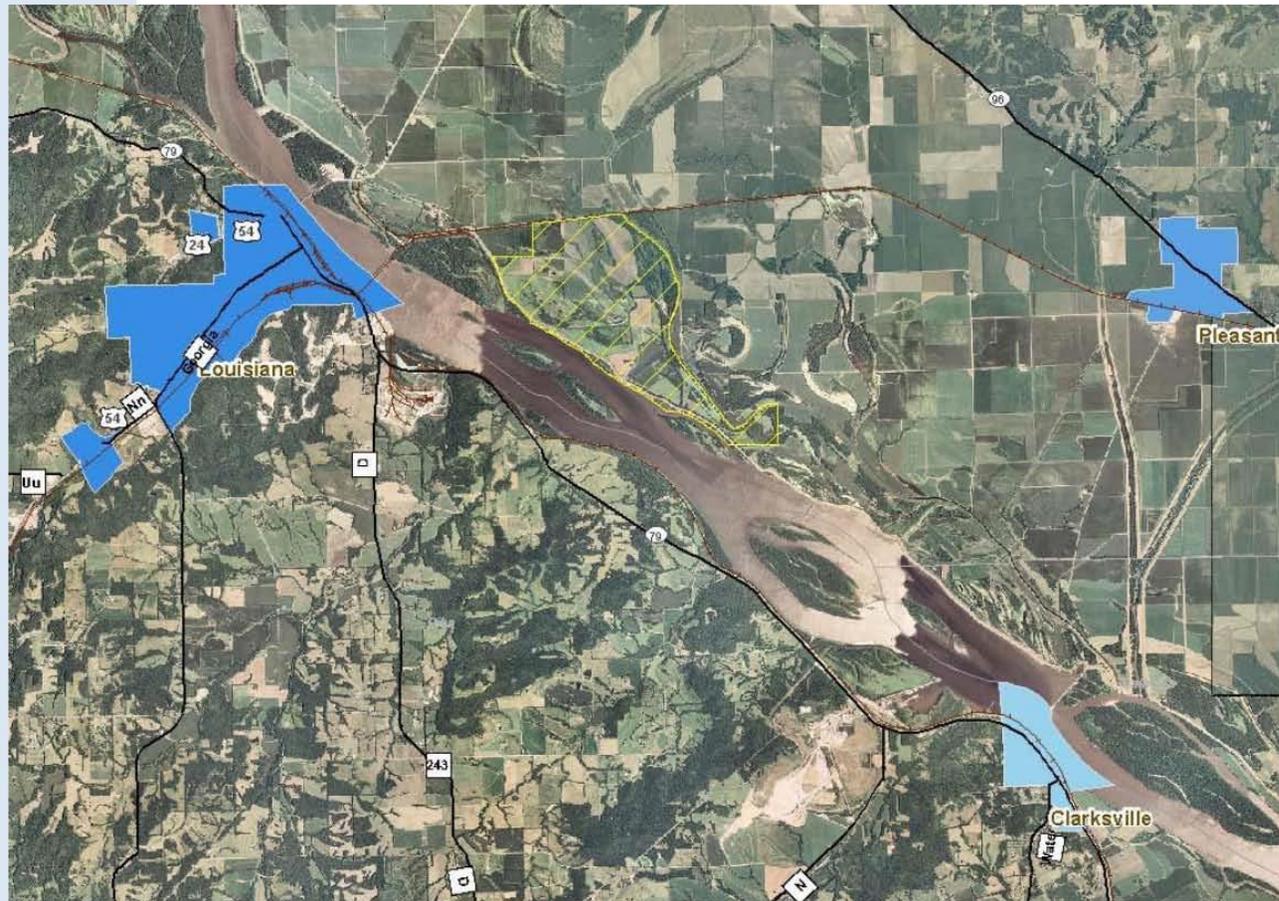
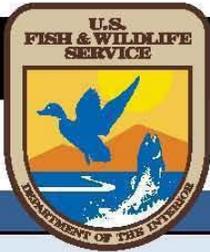


Figure 4: Delair Division
1,737 Acres



U.S. Fish & Wildlife Service

Great River National Wildlife Refuge

Legend

- Refuge Property
- Highway
- Major Road
- Nearest Town

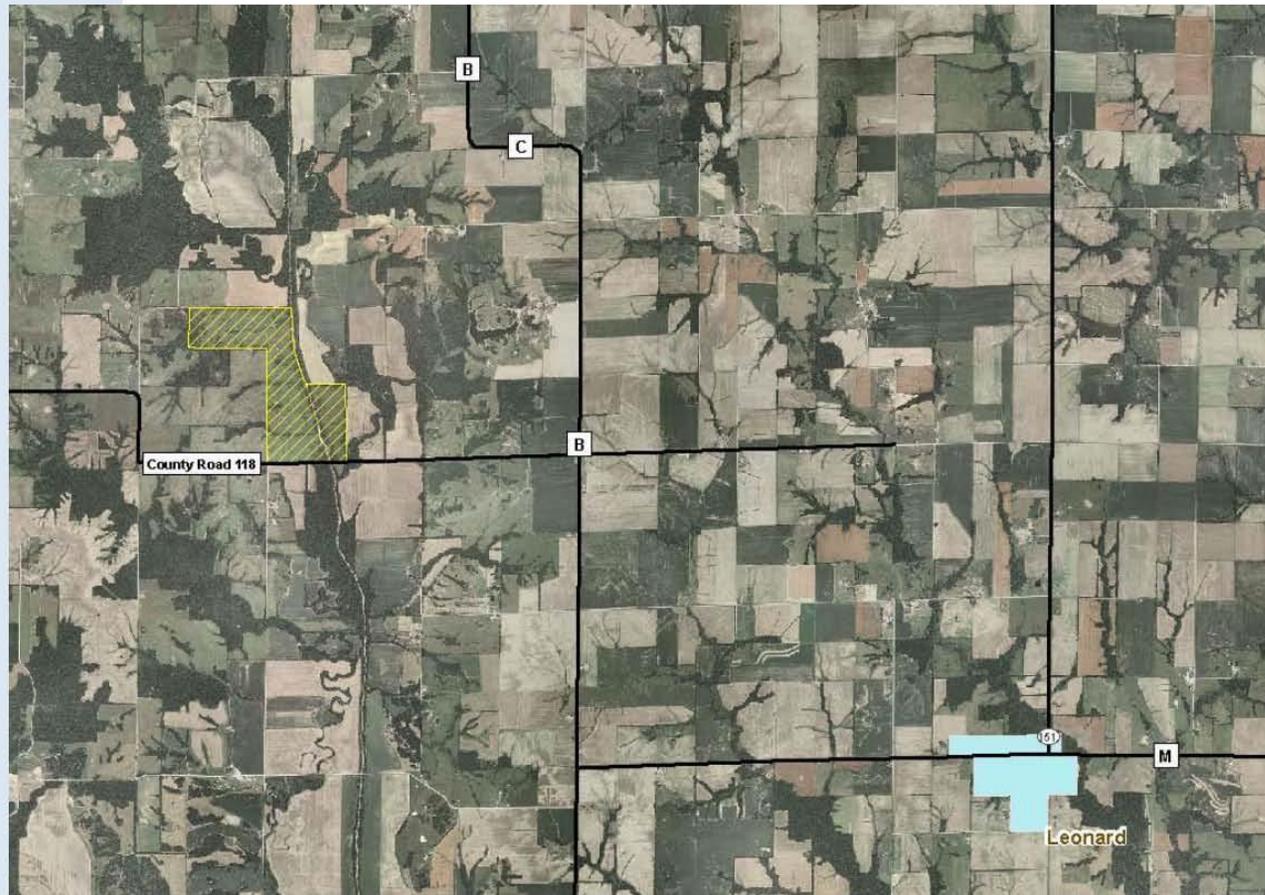
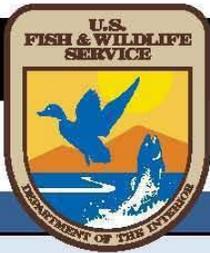


Figure 5: Cherry Box Unit
300 Acres



U.S. Fish & Wildlife Service

Great River National Wildlife Refuge

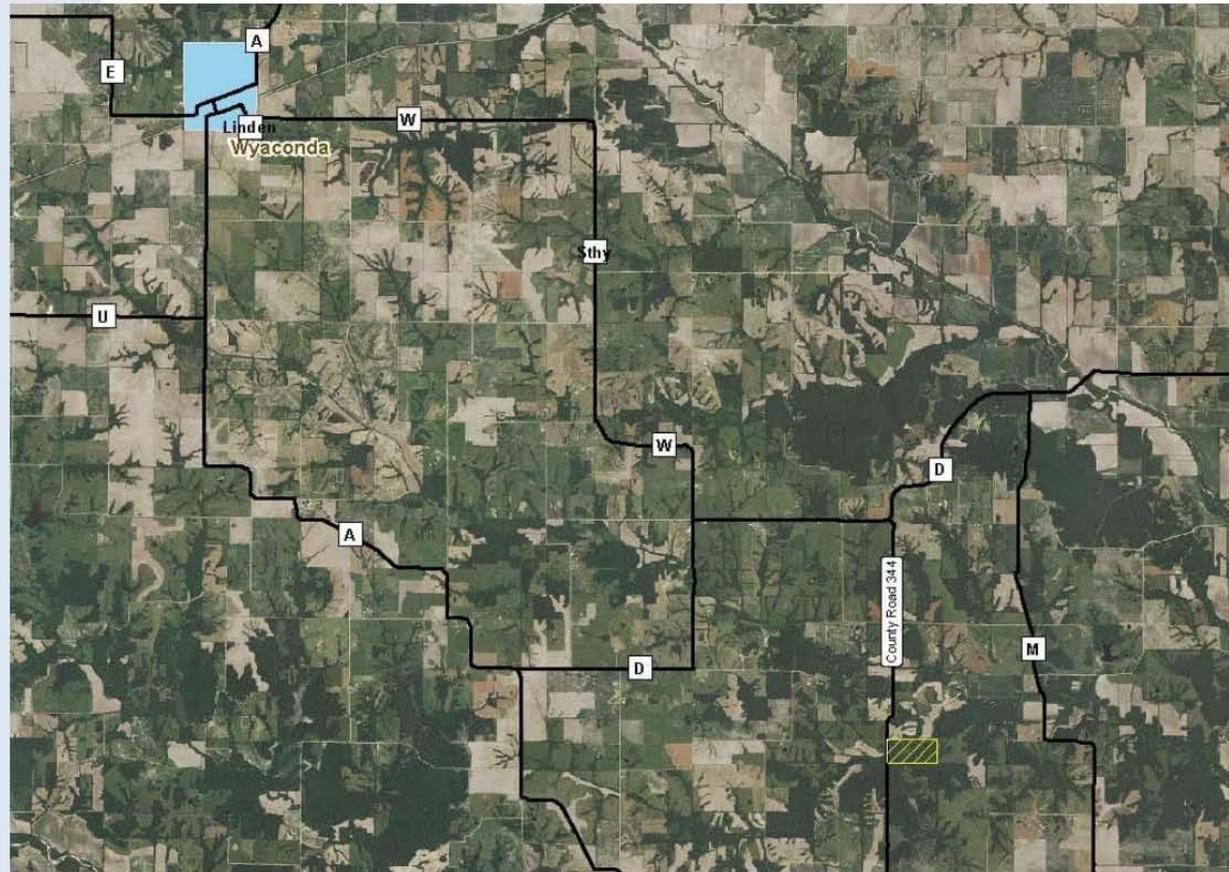
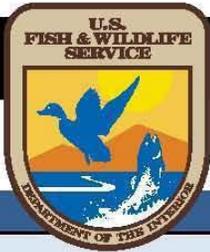


Figure 6: Hickory Creek Unit
80 Acres



U.S. Fish & Wildlife Service

Great River National Wildlife Refuge

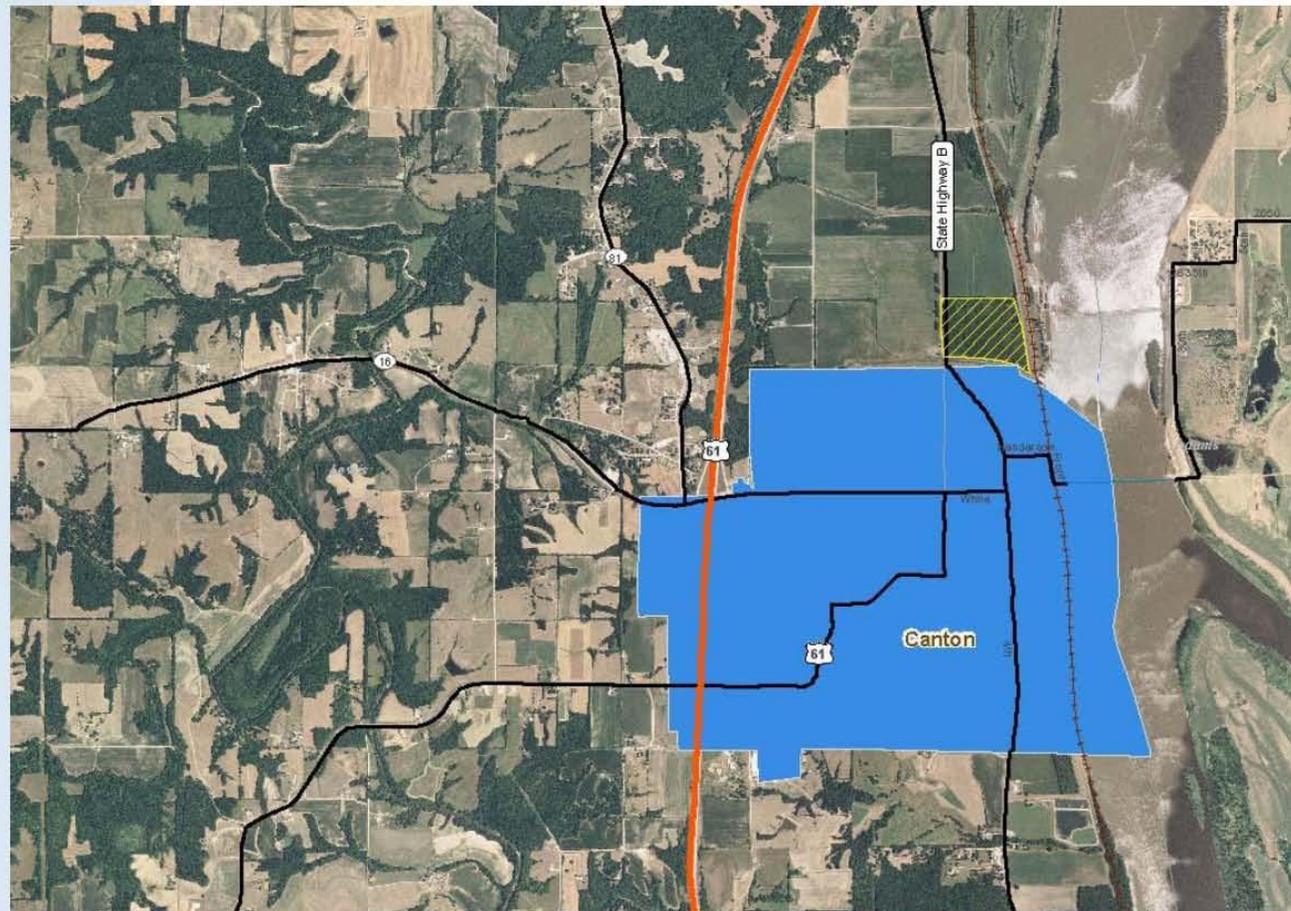


Figure 7: Canton Unit
44 Acres

5.2 Natural Resources

5.2.1 Habitats

The Fox Island, Long Island and Delair Divisions of the Great River National Wildlife Refuge and the Canton Unit are all located within the 100-year floodplain of the Mississippi River. These areas, along with the Cherry Box and Hickory Creek Units, are all found within the Prairie Parkland (Temperate) Province, Central Dissected Till Plains section, Mississippi River and Illinois Alluvial Plains Subsection (251Cf), as defined by Bailey (1983). The natural features include flat to level, moderately dissected rolling plains with historic oak-hickory and prairie vegetation communities. Elm-ash-cottonwood is the primary cover types along rivers.

The Mississippi River historically formed natural levees along the edges of bottomland lakes where floodplain forest vegetation established. The presence of these natural levees allow for the creation of natural wetlands and shallow lakes within the floodplain. In addition to these natural levees, some of the Refuges are separated from the river by man-made levees. In these cases, water levels are managed to restore the function of Refuge lands to conditions existing prior to human disturbance. Whether these wetlands are flooded naturally or with intensive management, they are very productive and important to waterfowl and other waterbirds.

The Refuge units contain a variety of wetlands ranging from shallow wet meadows and seasonally flooded emergent marshes to semi-permanent emergent marshes, scrub-shrub wetlands and bottomland forests. All of these wetlands are either fed by natural pulses of river levels or through management actions which replicate the natural conditions. In situations where water levels are managed to restore the wetland functions, water control structures have been installed on these basins. Many of these wetlands provide good quality production, brood rearing, feeding, or migration habitats for a host of resident and migratory species. They also provide good quality spawning and nursery habitat for fish that inhabit the Mississippi River.

Floodplain forests historically dominated much of the floodplain along the Mississippi River and its tributaries. Today this plant community remains on several of the Refuge river units. Typical tree species found in these seasonally flooded areas include cottonwood (*Populus deltoids*), black willow (*Salix nigra*), silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), pin oak (*Quercus palustris*), persimmon (*Diospyros virginiana*), and pecan (*Carya illinoensis*). In the past several years, former Refuge croplands that were replanted with species typical of this community have been moderately successful.

Wet grassland and forb communities such as wet meadows, as well as seasonally flooded and semi-permanent marshes were also present along the Mississippi River. These areas were drained and converted to agricultural lands due to the rich, fertile soils. Management of these lands restored these natural communities for the benefit of resident and migratory wildlife.

The establishment of the Great River National Wildlife Refuge, in conjunction with the other refuges along the Mississippi River, provides a vital resource for migratory birds. These lands offer important refuges in a sea of developed lands all along the river.

5.2.2 Wildlife

Migratory birds on the Refuge include both game and nongame species. The Mississippi River and adjacent bottomlands and uplands serve as a major migratory corridor for these birds as they travel between their breeding and wintering grounds. Since the inception of the Great River National Wildlife Refuge, more than 280 species of birds have been observed.

This avian diversity is complemented by more than 100 known species of butterflies and moths and more than 60 species of reptiles and amphibians on the Refuge. Some of the more common species include southern leopard frog (*Rana [Lithobates] sphenoccephala*), American toad (*Bufo americanus*), snapping turtle (*Chelydra serpentina*), red-eared slider turtle (*Trachemys scripta elegans*), spiny softshell turtle (*Apalone spinifera*), and the northern water snake (*Nerodia sipedon*). Little is known about herpetofauna populations or their limiting factors on the Refuge.

Upland game at the Great River National Wildlife Refuge includes eastern cottontail rabbits (*Sylvilagus floridanus*), eastern fox squirrel (*Sciurus niger*), eastern gray squirrels (*Sciurus carolinensis*), and bobwhite quail (*Colinus virginianus*).

White-tailed deer (*Odocoileus virginianus*) and the Eastern wild turkey (*Meleagris gallopavo silvestris*) are the only big game species in the vicinity of the Refuge. The white-tailed deer represents one of the most important and popular big game mammals in Illinois and Missouri.

Mammals attracted to river habitats include mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), river otter (*Lontra canadensis*), opossums (*Didelphis virginiana*), coyotes (*Canis latrans*), bobcats (*Lynx rufus*), bats (*Corynorhinus*, *Eptesicus*, *Lasiorycteris*, *Lasiurus*, *Myotis*, *Nycticeius*, *Perimyotis*, *Pipistrellus*, and *Tadarida spp.*), and beaver (*Castor canadensis*). At most refuges, relatively high populations of beaver tend to complicate water management activities. River otter, once nearly eliminated in this area, are now seen utilizing Refuge wetlands and river banks more frequently.

The Mississippi River is inhabited by an array of fish including game species such as sauger (*Sander canadensis*), largemouth bass (*Micropterus salmoides*), walleye (*Sander vitreus*), bluegill (*Lepomis macrochirus*), crappie (*Promoxis spp.*), and catfish (*Ictalurus spp.*). Other species include sturgeon (*Scaphirhynchus spp.*) and paddlefish (*Polyodon spathula*). Like most other fresh water systems in the United States, high populations of Asian carp inhabit the Mississippi River, its tributaries, and adjacent wetlands. The Asian carp are a nuisance since they threaten native species by competing for food and increasing the turbidity of the water they inhabit. Due to regular spring flooding, many of the Refuge wetlands contain a diversity of fish that originate in the river. For some species, such as crappie, these wetlands offer spawning and nursery habitat.

5.3 Threatened and Endangered Species

The Indiana bat (*Myotis sodalis*) and decurrent false aster (*Boltonia decurrens*) are federally listed species which historically inhabited the area. The Great River National Wildlife Refuge (located in Clark, Lewis and Shelby Counties in Missouri, as well as Adams and Pike Counties in Illinois) offer the desired habitat for the Indiana bat, but there are no records of roosting sites

and/or nurseries present on the Refuge to date. Surveys conducted along the Mississippi River near Refuge lands, however, have documented their presence.

The threatened decurrent false aster is considered to have suitable habitat on Refuge lands in Pike County, Illinois. No plants have been found at the Delair Division of the Great River National Wildlife Refuge, but the closely related false aster (*Boltonia asteroides*) has been identified.

5.4 Cultural Resources

5.4.1 Archeology

Archeological sites are reported in every county in which Refuge lands are located. Some loss of resources can occur as a result of erosion or other natural processes, or from unauthorized collecting and vandalism. 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 along the Mississippi and Illinois River. Many artifacts are present at Native American campsites and where steamships wrecked on the hidden snags or shoals of the changing rivers. The amount of sediment carried by the river quickly buried and preserved these artifacts.

The Delair Division of the Great River National Wildlife Refuge is the only area with documented archaeological sites. The Fox Island and Long Island Divisions have no documented sites.

5.5 Economic Resources

The Divisions of the Great River National Wildlife Refuge are spread across 82 miles of the Mississippi River from Louisiana, Missouri to Alexandria, Missouri south of the Iowa border. The closest heavily populated urban area to the Refuge is St. Louis, Missouri which is over 90 road miles to the southern-most Delair Division. Quincy, Illinois is located within 10 miles of the Long Island Division, and Keokuk, Iowa is also within 10 miles from the nearest Refuge, Fox Island Division.

The St. Louis Metropolitan area is home to about 3 million people, and is the 18th largest metropolitan area in the country; Quincy, Illinois includes over 40,000 people and Keokuk, Iowa has over 10,000 residents (2010 US Census). Socioeconomic conditions are wide ranging and reflect the dynamic nature of development occurring along the Mississippi River. The Refuge lies primarily in areas dominated by agriculture.

5.6 Recreational Opportunities

With its mix of landscapes and geography, the divisions of the Great River National Wildlife Refuge have many opportunities for outdoor recreation. The states of Missouri and Illinois, with their wide system of trails, campgrounds, and parks, have ample opportunities for outdoor recreation. Both states provide a diversity of travel, whether scenic driving, biking, hiking or

enjoying one of the many water bodies throughout the state including three of North America's greatest rivers, the Illinois, Missouri and Mississippi.

The headquarters to the Great River National Wildlife Refuge is located one mile east of Annada, Missouri at the Clarence Cannon National Wildlife Refuge. Environmental education and interpretation are conducted from this facility, over 20 miles from the Delair Division. All other wildlife-dependent uses, including wildlife photography, interpretation, hunting, fishing and wildlife observation, are permitted uses on the Fox Island and Long Island Divisions of the Refuge. The Delair Division is closed to the general public, with the exception of a managed deer hunt.

Where permitted, hunting and fishing are the most popular wildlife-dependent uses on the Refuge. Recreational facilities at the Fox Island are non-existent. Construction plans for a parking lot is planned for completion in 2015. The Long Island Division adjoins the Bear Creek recreational area owned by the Corps of Engineers where camping, pit toilets, kiosks and a boat ramp are available for the public. The nearby Canton Chute recreational area, also owned by the Corps of Engineers, is located to the south of the Refuge. Facilities at this location include a pit toilet and boat ramp.

5.7 Climate

The Great River NWR climate is characterized by seasonal variations of hot, humid summers and cold winters. The average summer temperature is approximately 75° F and the average winter temperature is 31° F. Average total precipitation is 37.1" per year. The Refuge annually receives an average of 19.8" of snow. In general, July is the warmest month with an average high temperature of 89° F while January is the coldest and driest month with lows averaging 21° F and only receiving 2.0" of precipitation. May is the wettest month with 3.9" of precipitation on average (www.weatherbase.com). Shallow waters in wetlands in the region typically are frozen from late November through mid-March; the first hard frosts and freezes usually occur in early to mid-October. Growing seasons average about 200 days annually.

Total annual precipitation in the region is slightly over 37 inches. Precipitation generally is low in winter. Summer storms are relatively common and daily rain totals of > 3-4 inches occur occasionally. Snow melt and increasing rain in early spring create local runoff into floodplain habitats. In addition to regular seasonal patterns of regional precipitation, the Mississippi River Valley has longer term patterns in annual precipitation and runoff that suggest peaks and lows that alternate on about a 20-year recurring interval.

Climate change is a concern that, depending on the accuracy of current assessments, could have major influences on the Refuge. Like the rest of the world, much of the Midwest is already experiencing changes in temperature and precipitation. If these predictions are accurate, average temperatures and precipitation could continue to increase, resulting in longer growing seasons and increased flooding.

5.8 Physical Features

The present location of the Mississippi River and the geomorphic land forms reflect numerous channel changes and deposition/scouring events caused by fluvial dynamics and glacial events in

the Quaternary period (Willman 1973, Simons et al. 1975). During pre-glacial times about 1 million years before the present (BP), the Iowa River occupied the current Mississippi River floodplain from about Muscatine, Iowa to Grafton, Illinois and the Mississippi River flowed south from Minnesota to Hennepin, Illinois where it then flowed through the current Illinois River valley. During the Kansas continental glaciation, much of the western drainage area of the current Upper Mississippi River watershed was diverted by ice through the current Illinois River valley and enlarged the valley greatly. Following the Kansas glaciations, the drainage reestablished a pre-glacial pattern with the ancient Mississippi River occupying the Illinois Valley and the ancestral Iowa River occupying the present Mississippi River Valley.

During the Illinoian glaciations the glacial ice sheet advanced from the northeast and forced the ancient Mississippi River west; a lobe of ice advanced west and partly blocked the Mississippi Valley at St. Louis (Simons et al. 1975). This ice dam formed a large glacial lake in the current Mississippi/Illinois River confluence area and caused extensive deposition of alluvial material in the region. Following retreat of the Illinoian ice during the Sangamonian interglacial period, the Mississippi River reoccupied the Illinois Valley and the Iowa River again passed through the present Mississippi River Valley.

The final advance of the Wisconsin ice sheet through the northern half of Illinois forced the Mississippi River into its present valley. The Illinois River, now draining a much reduced area, occupied the valley formed by the ancient Mississippi River. By the end of the Wisconsin glaciations, the current drainage patterns of the Upper Mississippi and Illinois rivers were established.

Great River NWR is located in a large river floodplain and is subject to the extreme water fluctuations associated with a big river system.

5.9 Vegetation

The Refuge supports a variety of riverine, forest, and wetland ecosystems. Many of the ecosystems (and the habitats they support) have been degraded, damaged, or destroyed as a result of the numerous impacts previously cited, most notably the installation of locks and dams up and down the Mississippi River and the building of the levees. Despite these alterations, many of these impacted ecosystems have the potential to be restored through various management actions and specific projects.

The community types present at the Refuge is greatly influenced by the River's hydrology and the topography of the adjacent terrestrial landscape. Figure 1 illustrates how the Refuge's natural communities vary based on the morphology of the River and its surrounding upland areas.

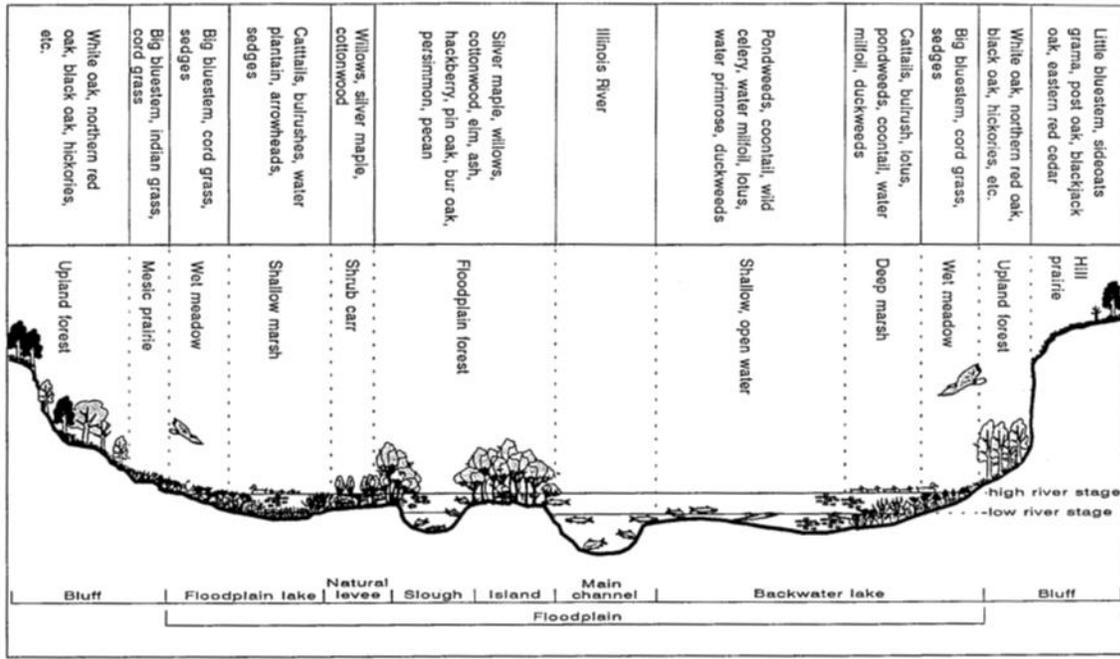


Figure 5. Cross-section of Habitat Types Typical in Mississippi and Illinois River Valleys (from Sparks 1993).

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 Service's ability to meet land use goals on any of the units open to hunting.

No additional infrastructure is required to provide access at this time. Limited access by vehicle is available at the Fox Island and Long Island Divisions.

6.1.2 Natural Resources

6.1.2.1 Habitats

The selection of any Alternative would not have significant adverse effects on the quality of wildlife habitat or the natural environment. In all instances, the amount of habitat by type would not change from the current situation. With any 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 Mississippi 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 accessible hunts. This is strictly regulated by Special Use Permit (SUP). These permits restrict vehicles to existing trails, service roads, or designated routes and, therefore, cause no additional impacts to Refuge habitats.

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 Long Island Division is essential to gain access to the islands for hunting. Impacts to the habitat are insignificant since hunters are limited in their access and disperse throughout the Refuge. Waterfowl hunting is an exception to the relative amount of dispersion due to assigned blinds managed by the State of Illinois. Hunters have no way of expanding beyond the blind and are therefore restricted to their assigned location.

Other potential types of habitat damage specifically attributed to hunting activities, such as littering, are not significant. Refuge-specific regulations limit the adverse impact of activities such as cutting of vegetation and the use of screw in steps, through their prohibition.

Populations of hunted species are not at levels that could cause habitat damage. Implementation of each Alternative would not change overall impacts on the habitat from wildlife. 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 lands appears to be localized. The Refuge receives very few complaints of deer damage from adjacent landowners. Implementation of any Alternative would not change overall impacts on habitat from deer.

6.1.2.2 Wildlife

With any Alternative, hunting may have minor temporary impacts to the general population of animals, both game and non-game species. Some 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 the population because the relocation is temporary and wildlife food is not a limiting factor on the Refuge, so animals should be able to readily replace energy reserves. Individuals of game species will be removed from the population by hunter harvest. The impact of harvesting game animals to the population is regulated through bag limits and season length.

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 to non-hunted wildlife populations using the Refuge will be minimized.

In Missouri and Illinois, species to be hunted, hunting seasons, and the number of animals allowed to be taken are set by the Missouri Department of Conservation and Illinois Department of Natural Resources, respectively. In developing annual hunting regulations each agency considers species population trends, the number of hunters pursuing species, and hunter success

rate. Overall, wildlife residing on the Refuge exhibit the same population trends and respond to hunting pressure in the same manner as wildlife elsewhere throughout the State. Because Refuge lands are interspersed with lands where hunting is regulated by others and individual wildlife range freely across jurisdictions, the effect of hunting species on Refuge lands will follow statewide trends. For general public hunting activities, the Refuge has not required, and is not proposing to require, hunters to register to hunt Refuge lands or to report wildlife taken on the Refuge. The Delair Division is an exception to this as it is a managed hunt.

Hunted Species

Under the proposed Alternatives, opportunities to hunt migratory birds (only waterfowl and coot), upland game (i.e. pheasant, bobwhite quail, cottontail rabbit and gray and fox squirrel), turkey, and white-tailed deer exist at one or more of the divisions and units managed by the Refuge. These species are monitored and regulated at the State, and at times, the Federal level (i.e. migratory birds). Information gathered about available habitats for breeding; breeding success; hunter harvest; and more help to ensure healthy populations throughout the state and/or across the country. Regulations, bag limits, and seasons are set as a result of the information gathered and analyzed annually. This information, along with Refuge specific monitoring and regulations, ensures that hunting on the Refuge under either Alternative will not significantly impact hunted wildlife populations either locally or throughout the flyway, depending on the species.

Non-Hunted Species

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, frogs, 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 any 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, finches, and chickadees are negligible. Secondary impacts to this group of species are also minimal and do not appreciably reduce their numbers at the population level. Shorebirds would not be impacted by hunting, in most cases, since they have already migrated through the area prior to the fall hunting season. 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 strictly apportioned by quotas within a State-operated lottery system and of relatively short duration (30 days) any disturbance to non-hunted species would be minimal. Other disturbance to these species by hunters afield would be temporary in nature. The Refuge has identified important resting and feeding areas for migratory water birds and has designated them as no hunting zones or has limited hunting during the migration period.

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.

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

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 Indiana bat (*Myotis sodalis*), a federally endangered species likely is present in the area of Clark, Lewis and Shelby Counties in Missouri, as well as Adams and Pike Counties in Illinois. Currently there are no documented roosting sites and/or nurseries on the Refuge, but Indiana bats have been observed using habitat along and adjacent to the Mississippi River. If the Indiana bat were to occur on the Refuge, any impacts would be minimal since the earliest hunting season, September archery season, has fewer participants and occurs near the end of the nursery period of April 1 through September 30 when young would likely be susceptible to disturbance.

Decurrent false aster (*Boltonia decurrens*), a federally threatened species, has potential suitable habitat at the Delair Division of the Great River National Wildlife Refuge in Pike County, Illinois. Impacts to this species would also be minimal since hunting at the Delair Division is conducted in the winter, outside of the growing season.

As a result, no Federally-listed species would be affected by either Alternative. The Refuge completed an Intra-Service Section 7 evaluation as required by Service policy for compliance with the Endangered Species Act (Appendix D).

6.1.4 Cultural Resources

Impacts to historical or cultural resources would not be significantly different under any Alternative. Where historical or cultural resources occur on the Refuge units open to hunting, the Refuge has not documented any adverse effect attributed to hunting activities. 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.

There are no historical properties or cultural significant sites document on the Fox Island and Long Island Divisions of the Great River National Wildlife Refuge. No surveys have been conducted on the Cherry Box, Hickory Creek or the Canton units of the Refuge. Only the Delair Division has known archaeological sites. Hunting is not expected to cause ground disturbance or

disturbance to standing structures. Activities that might cause an effect to a historic property would be subject to a case by case Section 106 review.

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 expends funds for staff and resources to implement the hunting program. Second, visitors engaging in hunting activities provided by the Refuge generate economic activity for local businesses.

The annual cost of Refuge activities to maintain the Hunting Program objective is an estimated \$70,000 out of a total budget of \$766,000 or less than 10 percent. This estimate includes Refuge staff activities associated with evaluating resources available for hunting (e.g., annual population estimates of target species); preparing for (e.g., special signage, mowing, and access) hunting activities; law enforcement patrol and monitoring of hunting activities.

The 2006 report, “Banking on Nature: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation” identified average daily expenditures for different types of hunting in the USFWS Midwest Region. The expenditures included food, drinks, lodging, transportation, equipment, and other expenses. Based on the findings of this report, in FY 2006 34.8 million recreational visitors to refuges in the lower 48 states generated almost 1.7 billion dollars of sales in regional economies. This in turn led to the employment of nearly 27,000 people and an estimated 542.8 million dollars in generated employment income (Carver and Caudill 2007).

Deer-vehicle accidents may be an important economic consideration related to the Refuge’s hunting program. In Illinois, deer season bag limits are set based on the number of deer/vehicle collisions the previous year. The average cost of repair following a deer vehicle collision is about \$2,100 (Conover 1995, U.S. Department of Labor 2010). Because no Alternative evaluated by this EA is expected to significantly reduce deer numbers, deer vehicle accidents and their associated costs would continue.

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. Actually, implementation of the proposed action Alternative will provide a benefit to the Southeastern Missouri and Southwestern Illinois economies by drawing in non-local hunters and providing a source of revenue.

6.1.6 Recreational Opportunities

The implementation of any 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). Most non-hunting recreational activities are separated from hunting activities over time for the seven months of the year when hunting is not offered. In addition, hunting activities are separated through space on certain areas of the Refuge. Hunting is not allowed on all Refuge units or on all areas of units that are open to hunting. Refuge-specific regulations have been established with the intent of reducing conflicts between these user groups and emphasizing safety for all visitors. Brochures, interpretive signs and social media outlets, including Facebook and the Refuge website, 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.

Secondary adverse effects to non-hunting recreational activities are insignificant because no Alternative will significantly reduce the numbers of wildlife available for priority public use.

6.1.7 Cumulative Impacts

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 each Alternative 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 Great River National Wildlife Refuge as described in the Alternatives.

6.1.7.2 Natural Resources

Habitats

The Refuge Improvement Act identified the purposes for which the Refuge was established (Section 1.0). The Refuge's CCP (USFWS 2004) and HMP (USFWS 2012) further refines those purposes and identifies goals and strategies that would enable the Refuge to fulfill its mission. In implementing the CCP and the HMP, a step-down plan to the CCP, 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. Refuge habitats are not managed to favor hunted species over other species and are managed to maintain healthy populations of all species. In addition, Refuge regulations are devised to minimize any damage to habitats created by hunters and other Refuge visitors. The implementation of any Alternative does not result in significant direct, indirect, or cumulative effects to habitats at any scale due to hunting activities.

Wildlife

Refuges, including Great River National Wildlife Refuge, conduct hunting programs within the framework of State and Federal regulations. Population estimates of hunted species are

developed at a regional, state, flyway, and continental scale. Hunting frameworks and take limits are set based upon these estimates. The proposed Refuge hunting program rules will be the same as, or more restrictive than, hunting regulations throughout the State of Missouri and Illinois. 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. Such an approach also provides consistency with large scale population status and objectives. 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 or Illinois. Although the Preferred Alternative will increase hunting opportunities slightly compared to the No Action Alternative, the slight increase in hunter activity will not rise to a significant cumulative effect locally, regionally, or nationally.

Non-hunted migratory birds include songbirds, wading birds, raptors, and woodpeckers. Disturbance to non-hunted migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate such as most woodpeckers, and some songbirds including nuthatches, finches, and chickadees. Disturbance from hunting to non-hunted migratory birds should not have cumulative negative impacts since the hunting seasons would not coincide with the nesting season, and disturbance to the daily wintering activities, such as feeding and resting, of birds would probably be similar to that caused by non-consumptive users.

Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs 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 of allowed species would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the “flyway” level should be negligible. These species are in torpor or have completely passed through the Great River NWR by the hunting seasons in late September and late November - December. Any hunter interaction would be similar to that of non-consumptive users.

Disturbance to non-hunted wildlife would be similar to current conditions. However, significant disturbance would be unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

6.1.7.3 Threatened and Endangered Species

The Indiana bat, a Federally-listed endangered species, has not been documented on the Refuge, but has been observed using habitat along and adjacent to the Mississippi River. Hunting on the Refuge would have little or no cumulative impacts due to the time of the year for the activity.

Decurrent false aster (*Boltonia decurrens*), a federally threatened species, has potential suitable habitat at the Delair Division of the Great River National Wildlife Refuge in Pike County, Illinois. Impacts to this species would also be minimal since hunting at the Delair Division is conducted in the winter, outside of the growing season.

6.1.7.4 Cultural Resources

Refuge hunting activities will 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 is associated with each Alternative. This economic activity, while important to the communities near Refuge units (Section 6.1.5), is minor. Hunting activities under either Alternative does not produce significant cumulative effects.

The Refuge's presence increases the quality of life for some area residents. According to Refuge figures, hunting accounts for more user visits than any of the other priority public uses. 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 public 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 seven National Wildlife Refuges in Illinois and eight in Missouri. Thousands of other public spaces in the state 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: Maintain Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Not Open Fee Title Land Transferred to the Service through the Farm Service Agency (No Action)

This Alternative will not alter the current hunting program on Refuge lands. Lands transferred to the Service through the Farm Service Agency will remain closed. Because they have been previously hunted under private ownership, 424 acres of Refuge, in effect, will be closed to hunting. No additional Refuge-specific special hunts would be provided.

6.2.1 Natural Resources

6.2.2.1 Habitats

The selection of this Alternative would not have significant adverse effects on the quality of wildlife habitat or the natural environment. The amount of habitat by type would not change from the current situation. With this 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 Mississippi 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 accessible hunts. This is strictly regulated by Special Use Permit (SUP). These permits restrict vehicles to existing trails, service roads, or designated routes and, therefore, cause no additional impacts to Refuge habitats.

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 Long Island Division is essential to gain access to the islands for hunting. Impacts to the habitat are insignificant since hunters are limited in their access and disperse throughout the Refuge. Waterfowl hunting is an exception to the relative amount of dispersion due to assigned blinds managed by the State of Illinois. Hunters have no way of expanding beyond the blind and are therefore restricted to their assigned location.

Other potential types of habitat damage specifically attributed to hunting activities, such as littering, are not significant. Refuge-specific regulations limit the adverse impact of activities such as cutting of vegetation and the use of screw in steps, through their prohibition.

Populations of hunted species are not at levels that could cause habitat damage. Implementation of this Alternative would not change overall impacts on the habitat from wildlife. 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 lands appears to be localized. The Refuge receives very few complaints of deer damage from adjacent landowners. Implementation of this Alternative would not change overall impacts on habitat from deer.

6.2.1.2 Wildlife

With this Alternative, hunting mortality would be zero on the 424 acres of recently acquired lands. These lands have been hunted under private ownership for decades. Therefore, “zero mortality” is, in effect, a decrease in hunting mortality compared to the when the lands were hunted under private ownership. Some species may increase slightly in local areas; however, it is likely that other compensatory population factors and environmental conditions would prevent significant changes in overall wildlife populations.

Hunted Species

Under this proposed Alternative, opportunities to hunt migratory birds (only waterfowl and coot), upland game (i.e. pheasant, partridge, quail, rabbit, squirrel, woodchuck, raccoon, opossum, fox, coyote, bobcat, badger and skunk), turkey, and white-tailed deer exist at one or more of the divisions and units managed by the Refuge. These species are monitored and regulated at the State, and at times, the Federal level (i.e. migratory birds). Information gathered about available habitats for breeding; breeding success; hunter harvest; and more help to ensure healthy populations throughout the state and/or across the country. Regulations, bag limits, and seasons are set as a result of the information gathered and analyzed annually. This information, along with Refuge specific monitoring and regulations, ensures that hunting on the Refuge under this Alternative will not significantly impact hunted wildlife populations either locally or throughout the flyway, depending on the species.

Under this Alternative the migratory birds, upland game species, turkey and white-tailed deer will not change appreciably. Without additional hunting mortality, populations will experience fluctuations from naturally occurring environmental conditions on the lands not hunted with this Alternative.

Non-Hunted Species

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, frogs, 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 this 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, finches, and chickadees are negligible. Secondary impacts to this

group of species are also minimal and do not appreciably reduce their numbers at the population level. Shorebirds would not be impacted by hunting, in most cases, since they have already migrated through the area prior to the fall hunting season. 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 strictly apportioned by quotas within a State-operated lottery system and of relatively short duration (30 days) any disturbance to non-hunted species would be minimal. Other disturbance to these species by hunters afield would be temporary in nature. The Refuge has identified important resting and feeding areas for migratory water birds and has designated them as no hunting zones or has limited hunting during the migration period.

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.

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

6.2.2 Recreational Opportunities

With the No Action Alternative, lands recently transferred to Service ownership are closed to hunting. Hunters lose the opportunity to hunt the 424 acres of land previously hunted when privately owned.

6.2.3 Cumulative impacts

6.2.3.1 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 this Alternative will have minimal direct or indirect impacts on public or private infrastructure. Therefore, there will be negligible cumulative impacts to the infrastructure at the local, regional, or national level due to administering the hunting program at the Great River National Wildlife Refuge as described in this Alternative.

6.2.3.2 Natural Resources

Habitats

The Refuge Act identified the purposes for which the Refuge was established (Section 1.0). The Refuge's CCP (USFWS 2004) and HMP (USFWS 2012) further refines those purposes and identifies goals and strategies that would enable the Refuge to fulfill its mission. In implementing the CCP and the HMP, a step-down plan to the CCP, 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. Refuge habitats are not managed to favor hunted species over other species and are managed to maintain healthy populations of all species. In addition, Refuge regulations are devised to minimize any damage to habitats created by hunters and other Refuge visitors. The implementation of this

Alternative does not result in significant direct, indirect, or cumulative effects to habitats at any scale due to hunting activities.

Hunted populations

Migratory Birds

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. The Great River NWR is located in the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties.

Because the Service is required to take an abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate framework for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird

hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The waterfowl season on Great River NWR will follow the frameworks set in place for Illinois.

NEPA 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. We published Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment, “Duck Hunting Regulations for 2006-07,” and an August 24, 2006, Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), 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). More information may be obtained from: Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Department of the Interior, MS MBSP-4107-ARLSQ, 1849 C Street, NWR., Washington, DC 20240.

Waterfowl

The Great River NWR primarily provides spring and fall migration habitat for waterfowl. Wood ducks and Canada geese commonly nest in the Great River NWR and there is a small amount of nesting by mallards and other species.

Breeding population estimates are made each year for 10 key species of ducks in the principal breeding areas of Alaska, Canada, and the north central United States. Surveys are conducted in May and early June by the Service, Canadian Wildlife Service, and provincial and state conservation agency personnel. Ducks are counted from fixed-wing aircraft on the same transects each year. Estimates of ducks and ponds seen from the air are corrected for visibility bias by conducting ground counts on a sample of the transects. Although numbers of breeding ducks have fluctuated substantially from year to year, trend analysis suggests that total duck numbers are stable. This stable trend, however, is the result of increasing numbers of some species (e.g., gadwall, green-winged teal, shovelers and blue-winged teal) and decreasing numbers of others (e.g., pintails and scaup). Despite the improvements in duck numbers in the 1990’s, there are still concerns about the long-term loss of both wetland and upland habitat in the prairie pothole region and the long-term outlook for duck populations in the future. Duck populations have fluctuated substantially over time. Duck populations will continue to fluctuate in the future as the numbers of wetlands on the landscape in north-central North America rise and fall with the varying weather. Missouri and Illinois do not report a population index of ducks for the state.

In the Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons report (USFWS 2012), the Service estimates the following:

State	Measure	2010	2011
Missouri	Waterfowl Total Harvest	520,200 ($\pm 19\%$)	493,200 ($\pm 26\%$)
	Active Hunter Total	30,200 ($\pm 11\%$)	29,600 ($\pm 12\%$)
	Seasonal Duck Harvest Per Hunter	17.2	16.7
Illinois	Waterfowl Total Harvest	372,700 ($\pm 18\%$)	507,000 ($\pm 17\%$)
	Active Hunter Total	32,700 ($\pm 11\%$)	34,100 ($\pm 10\%$)
	Seasonal Duck Harvest Per Hunter	11.4	14.9

Summary

The above numbers have been determined to support huntable waterfowl populations in Missouri and Illinois, including the Great River NWR. At the Long Island Division of the Great River NWR, only five blinds managed by the State of Illinois are available to hunters. Those individuals interested in hunting these blinds, must draw for the blinds every three years. Factoring in the Illinois 2011 seasonal duck harvest per hunter with an average of five hunters per blind, an estimate of 375 birds are expected to be harvested annually from the area. Considering these numbers, the No-action Alternative will have no cumulative impacts to the waterfowl population.

Mourning Dove

In 1960, mourning dove management units were established to reflect populations that are largely independent of each other (USFWS 2012). Missouri is located in the Central Management Unit (CMU), while Illinois is considered a part of the Eastern Management Unit (EMU). Population estimates of absolute abundance available since 2003 indicates there are about 308 million doves in the United States. Abundance during the last 5 years shows a stable population in EMU, while the CMU may be declining. Even with the decline, the CMU has the highest population index of the three units.

Summary

During the 2011-12 season, Missouri ranked fourth in the CMU with a harvest of 296,600 doves by 23,800 hunters (Kulowiec 2013). In Illinois, the harvest decreased in the 2011-12 season from the previous year harvest with a total of 492,765 doves taken by 29,742 hunters (INHS 2012).

Only waterfowl hunting is allowed from blinds managed by the State of Illinois at the Long Island Division of the Great River NWR. No other migratory birds are permitted to be hunted at Long Island or any other Division of the Refuge, therefore no cumulative impacts will result.

Other Hunted Migratory Birds

Other migratory birds include rails (sora and Virginia), American woodcock, Wilson's snipe and crow. All species inhabit wetlands and wet meadows found at the Great River NWR either during migration, breeding and/or wintering times. Hunting of these species in Missouri and

Illinois is light compared to other migratory game birds. Harvest of these species on the Great River NWR is not permitted. Only waterfowl hunting from designated blinds at the Long Island Division is authorized, therefore no cumulative impacts will result.

Upland Game

Resident upland game populations are actively managed by the Missouri Department of Conservation and the Illinois Department of Natural Resources. Through surveys and monitoring, the state develops density figures when determining each year's harvest needs to keep populations healthy. Habitat changes and weather may affect population numbers more than harvest. The number of hunters per square mile should stay about the same in the areas where Refuge lands are located. The wildlife populations on Refuge units should continue to reflect densities in the surrounding area.

Ring-necked pheasant

The ring-necked pheasant (*Phasianus colchicus*) is one of the upland game birds in Missouri and Illinois. Each state conducts annual population counts and deems this population huntable. In Missouri, the 2012 Conservation Agents' Roadside Survey showed a statewide decline (49%) in the pheasant population from 2011; a 76% decline in the 5-year average (2007-2011); and a 90% decline for the 10-year average (2002-2012) (MDC 2012). Drought conditions during the survey are considered a factor, while loss of habitat continues to be a concern.

In Illinois, hunter harvest remained light even with an increase of hunters (41.7%) and harvest (6.7%) from the previous year (IDNR 2013). Lack of quality habitat is considered a limiting factor in the low pheasant populations. The 2013 Illinois surveys of the overall number of pheasants and the stops where pheasants were seen or heard were lower from 2012 counts. A combination of cooler than average temperatures and above average precipitation during the peak pheasant nesting season is considered the primary reason for these low counts.

Great River NWR provides very little habitat considered suitable for the ring-necked pheasant, therefore hunting of these species is generally incidental to other hunt opportunities. No more than 1-2 birds are likely to be seen, let alone harvested, throughout the divisions of the Great River NWR. Those seen are more apt to be escaped birds from nearby game farms or hunt clubs rather than wild birds, so the cumulative impacts are minimal.

Bobwhite Quail

The bobwhite quail (*Colinus virginianus*) is another upland game bird in Missouri and Illinois where annual population counts are conducted and the populations are deemed huntable. In Missouri, the Northeast Riverbreaks zoogeographic region is where the Great River NWR is located. Quail surveys in the northeast saw a 5.56% decrease in quail counted from 2011 to 2012 and a 16% reduction throughout the state. The 5-year and 10-year averages were also down by 52% and 60%, respectively. In 2012, the drought was considered a factor with reduced grass and shrub cover, hard and soft mast production, and surface water availability.

Illinois surveys show a slight increase of quail counted and stops where quail were seen or heard in 2012 and 2013 (IDNR 2013). The 2012-13 harvest surveys estimate 11,266 hunters (11.1% decrease) harvested 47,175 quail (1.2% increase). With a relatively light harvest in 2012-13, the primary limiting factor to the low quail populations is the lack of quality habitat.

Great River NWR provides only marginal habitat considered suitable for the bobwhite quail, so hunting of these species is generally incidental to other hunt opportunities. As a result, no more than 10 birds are likely harvested each season resulting in minimal cumulative impacts to the overall population.

Rabbit (cottontail) and Squirrel Populations

Rabbit and squirrel hunting in the 2010-11 Missouri season showed no statistically significant differences compared to 2008-09 (Reitz 2011). Hunter success, estimated by bag per day, was relatively stable for squirrel hunting, but decreased for rabbit, while the average season bag remained relatively stable for all species.

In Illinois, trends over a the 10 year period from 2001 to 2011 shows a steady decline in the number of hunters, harvest and days afield for both rabbit and squirrel hunting (IDNR 2012). In the Mississippi Border-North area, where the Great River NWR lies, rabbit harvests increased by 19%, while fox and gray squirrel harvests were down 15% and 37%, respectively. The only population survey conducted for either of these species is a road-kill index for rabbits (IDNR 2013). In 2013, the index showed a decrease of 4.3% from 2012, which is not considered statistically significant.

Hunting pressure for both rabbit and squirrel populations at the Great River NWR is considered low due to the limitations with access. Only two primitive roads provide access into the Fox Island Division, while the majority of Refuge land at the Long Island Division is only accessible by boat. Therefore take of these species are likely incidental to other game hunting conducted at the Great River NWR. As a result of these issues, it is estimated that no more than 50 of each species are taken from the Refuge.

Coyote, Raccoon, and Fox Populations

Both the state of Missouri and Illinois show stable, huntable populations of these species and has hunting and trapping programs. This Alternative would only allow the hunting of these species. Trapping on the Great River NWR will be treated separately in a trapping management plan. The hunting of these species is dependent on the price of pelts in any given year. Weather also plays a part in harvest. Fox and coyote hunters are more successful during years with snow than in drier years.

In Missouri, coyote hunters increased significantly in the 2010-11 in comparison to 2008-09. No significant changes in hunter numbers were observed for the other species with a total of 129,391 hunters in 2010-11 which is slightly lower than the 133,626 hunters in 2008-09. The raccoon harvest declined 28.1% in 2010-11 from 2009-08. Coyote showed an increase of 29.4%. Red fox increased 53.2% and gray fox showed a 85.4% increase.

In Illinois from the 2010-11 to the 2011-12 seasons, raccoon and red fox harvest increased, while gray fox and coyote declined. Estimated number of hunters, harvest, and days afield over a ten year period (2001-11) showed steady hunter and harvest figures, with a slight decline in the days afield. Raccoon harvests over that same span of years resulted in a change of -67%; for fox

it showed -80% harvest; and -44% for coyote. There's no 10 year information for the gray fox, but the 5 year percentage change was -100%.

The number of hunters targeting these species at the Great River NWR is relatively low. Incidental take is generally the method of harvest. Therefore total harvest would be low with approximately 20 animals of each species taken each season. Missouri and Illinois each monitors these populations to set seasons and limits, thus indicating that the harvest of these species will have no impact to overall populations.

Other Hunted Species

Missouri and Illinois allow the hunting of species covered under their upland/small game regulations. These species include gray partridge, woodchuck, opossum, bobcat, badger and striped skunk. Information by the Missouri Department of Conservation for the woodchuck shows a decline of 2.8% in total hunters for the 2010-2011 season in comparison to the 2008-2009 season. During that time, total harvest of the woodchuck declined by 23.5%. No population information was found for these species by the Illinois Department of Natural Resources. Any take of these species is considered incidental to the hunting of other wildlife at the Great River NWR, similar to harvests on state wildlife areas. Therefore, total harvest of these species is expected to be 20 individuals of each species.

Big Game

The Missouri Department of Conservation and the Illinois Department of Natural Resources actively manages resident big game populations. Through surveys and monitoring, the state develops density figures when determining each year's harvest needs to keep populations healthy. Habitat changes and weather may affect population numbers more than harvest. The number of hunters per square mile should stay about the same in the areas where Refuge lands are located. The wildlife populations on Refuge units should continue to reflect densities in the surrounding area.

Wild Turkey

Turkey populations are stable locally and throughout the state. 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.

Missouri has been conducting wild turkey (*Meleagris gallopavo*) brood surveys annually since 1959 and providing success of each year's hatch (MDC 2012). The northeast region of the survey is where the Great River NWR is located. In 2012, the northeast region reported 29% decrease in the poult-to-hen ratio from 2011; a 25% increase for a 5-year average; 15% increase for 10 years; and a 12% drop in 20 years. Statewide the percentage of change from 2011 was zero; a 42% increase in the 5-year average; 21% increase in 10 years; and a 6% decrease in 20 years.

In the 2011-2012 Illinois Hunter Harvest Report (IDNR 2012), hunters ranked turkey management as one of the top four wildlife programs in the state. Total estimated hunters for all three of the hunts (spring, fall shotgun and fall archery) total a little over 68,000 with a season harvest of 25,703. The University of Illinois Extension (UIE, Undated) estimates the state population at approximately 150,000 birds.

Estimated harvest on the Great River NWR is approximately 50 turkey annually, which will have minimal effects on state turkey populations for Missouri and Illinois.

White-tailed Deer

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.

In the 2012-13 Missouri Deer Population Status Report and Deer Season Summary (MDC 2013) published by the Missouri Department of Conservation reports that white-tailed deer (*Odocoileus virginianus*) populations for northeast Missouri have been slowly declining over the last several years with dramatic declines experienced in Monroe and Shelby counties. Even with the slow decline, resource scientists for MDC noted that Missouri has an abundance of deer with an estimated deer population of 1.4 million (MDC September 2013). The 2012 hemorrhagic disease outbreak is likely a result of the localized reductions in some areas, however recovery is expected to occur after a couple years.

The counties in which the Long Island and Delair Divisions of the Great River National Wildlife Refuge are located (Adams and Pike in Illinois, respectively) provide quality habitat for white-tailed deer. This is apparent by the total deer harvested each year. Pike County consistently has the greatest number of deer harvested, while Adams County harvest ranks in the top three counties annually. As of 2012, state wildlife officials have determined the deer herd to be 700,000 to 750,000 which they consider to be a healthy population (IDNR August, 2012).

With the overall deer populations in the states of Missouri and Illinois considered abundant and healthy, the average harvest of 100 deer on the lands managed by the Great River National Wildlife Refuge will have minimal effect on the populations.

Non-Hunted Species

Non-hunted migratory birds include songbirds, wading birds, raptors, and woodpeckers. Disturbance to non-hunted migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate such as most woodpeckers, and some songbirds including nuthatches, finches, and chickadees. Disturbance from hunting to non-hunted migratory birds should not have cumulative negative impacts since the hunting seasons would not coincide with the nesting season, and disturbance to the daily wintering activities, such as feeding and resting, of birds would probably be similar to that caused by non-consumptive users.

Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs 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 of allowed species would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the “flyway” level should be negligible. These species are in torpor or have completely passed through the Great River NWR by the hunting seasons in late September and late November - December. Any hunter interaction would be similar to that of non-consumptive users.

Disturbance to non-hunted wildlife would be unchanged under this Alternative. Significant disturbance would remain unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blooded reptiles and amphibians also limits their activity when temperatures are low. Hunters rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

6.2.3.3 Threatened and Endangered Species

The Indiana bat, a Federally-listed endangered species, has not been documented on the Refuge, but has been observed using habitat along and adjacent to the Mississippi River. No changes to the hunting on the Refuge would have little or no cumulative impacts due to the time of the year for the activity.

Decurrent false aster (*Boltonia decurrens*), a federally threatened species, has potential suitable habitat at the Delair Division of the Great River National Wildlife Refuge in Pike County, Illinois. Impacts to this species will continue be minimal since hunting at the Delair Division is conducted in the winter, outside of the growing season.

6.2.3.4 Cultural Resources

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

6.2.3.5 Social and Economic Resources

Due to no proposed changes in hunting under this Alternative, there is not an expected increase in economic activity associated with this Alternative. The current economic activity, while important to the communities near Refuge units (Section 6.1.5), is minor. Hunting activities under this Alternative does not produce significant cumulative effects.

The Refuge’s presence increases the quality of life for some area residents. According to Refuge figures, hunting accounts for more user visits than any of the other priority public uses. 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 this Alternative do not produced significant cumulative effects.

6.2.3.6 Recreational Opportunities

A hunting program implemented under this 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 public 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 seven National Wildlife Refuges in Illinois and eight in Missouri. Thousands of other public spaces in the state provide a variety of wildlife habitat suitable for fishing, wildlife observation, photography, environmental education, and interpretation activities. Hunting programs at the Refuge under this Alternative will not result in significant adverse effects at any scale, either by themselves or when combined with non-service actions.

6.2.3.7 Anticipated Impacts if Individual Hunts are Allowed to Accumulate

National Wildlife Refuges, including Great River NWR, conduct hunting programs within the framework of state and federal regulations. By maintaining hunting regulations that are consistent with, or more restrictive than the State, individual refuges are maintaining seasons that are supportive of state and federal resource management goals. This Alternative would not increase the amount of hunting opportunity on Great River NWR, therefore would not have any increased impact.

6.3 Environmental Consequences of Alternative B: Maintain Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Open Fee Title Land Transferred to the Service through the Farm Service Agency to Hunting

The hunting program under this Alternative will allow for the inclusion of some lands transferred to the Service from the Farm Service Agency. Archery deer and shotgun upland game hunting will be permitted on the Cherry Box and Hickory Creek Units for an additional 380 acres. Canton Unit would remain closed due to the small acreage and proximity to the town of Canton. The hunting programs on all other Divisions will remain unchanged, while additional Refuge-specific special hunts may be added at a later time.

6.3.1 Natural Resources

6.3.1.1 Habitats

The selection of any 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 Mississippi 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 accessible hunts. This is strictly regulated by Special Use Permit (SUP). These permits restrict vehicles to existing trails, service roads, or designated routes and, therefore, cause no additional impacts to Refuge habitats.

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 Long Island Division is essential to gain access to the islands for hunting. Impacts to the habitat are insignificant since hunters are limited in their access and disperse throughout the Refuge. Waterfowl hunting is an exception to the relative amount of dispersion due to assigned blinds managed by the State of Illinois. Hunters have no way of expanding beyond the blind and are therefore restricted to their assigned location.

Other potential types of habitat damage specifically attributed to hunting activities, such as littering, are not significant. Refuge-specific regulations limit the adverse impact of activities such as cutting of vegetation and the use of screw in steps, through their prohibition.

Populations of hunted species are not at levels that could cause habitat damage. Implementation of either Alternative would not change overall impacts on the habitat from wildlife. 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 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.

6.3.1.2 Wildlife

In this section we present estimates of hunting mortality (i.e., take) for upland game species, turkey and white-tailed deer. These estimates assume that the opened lands have average numbers of huntable individuals, receive average hunting pressure, and hunters experience average success rates.

These recently acquired lands have been hunted under private ownership for decades. The estimates provided below should be evaluated in the context of hunting under private ownership.

Hunted Species

Under this Alternative, hunting of upland game species (i.e. turkey, rabbit, and squirrel) and archery hunting for big game will be permitted on an additional 380 acres. When using shotguns for upland game species, only non-toxic shot will be permitted. Considering the small size of these areas, Cherry Box with 300 acres and Hickory Creek with 80 acres; their remote locations; and the restricted hunting opportunities available, populations of hunted species will not change appreciably.

Under this Alternative, opportunities to hunt migratory birds (only waterfowl and coot), upland game (i.e. pheasant, bobwhite quail, cottontail rabbit and gray and fox squirrel), turkey, and white-tailed deer exist at one or more of the divisions and units managed by the Refuge. These

species are monitored and regulated at the State, and at times, the Federal level (i.e. migratory birds). Information gathered about available habitats for breeding; breeding success; hunter harvest; and more help to ensure healthy populations throughout the state and/or across the country. Regulations, bag limits, and seasons are set as a result of the information gathered and analyzed annually. This information, along with Refuge specific monitoring and regulations, ensures that hunting on the Refuge under either Alternative will not significantly impact hunted wildlife populations either locally or throughout the flyway, depending on the species.

Non-Hunted Species

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, frogs, 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 this 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, finches, and chickadees are negligible. Secondary impacts to this group of species are also minimal and do not appreciably reduce their numbers at the population level. Shorebirds would not be impacted by hunting, in most cases, since they have already migrated through the area prior to the fall hunting season. 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 strictly apportioned by quotas within a State-operated lottery system and of relatively short duration (30 days) any disturbance to non-hunted species would be minimal. Other disturbance to these species by hunters afield would be temporary in nature. The Refuge has identified important resting and feeding areas for migratory water birds and has designated them as no hunting zones or has limited hunting during the migration period.

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.

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

6.3.2 Recreational Opportunities

Under this Alternative, hunters would gain the opportunity to hunt an additional 380 acres of land under Refuge management. Opening these lands would increase the Refuge's hunting land base by about 4% and would increase the total Refuge-wide. Combined hunter visits on these transferred lands would increase very little due to the types, quality, and accessibility of the habitats. As a result, hunter visits are not likely to increase by more than 100 visits annually.

Impacts to other wildlife-dependent priority recreational uses on the Refuge are expected to be minimal. Non-consumptive uses are not expected to be significant due to the remote location of the transferred lands. Additionally, non-consumptive uses are highest in spring, summer and early fall, therefore limiting the period when both activities would occur concurrently. Some visitors may plan their visits to avoid coinciding with hunting activities. The quality of the visitor experience, including hunter's experiences, would not be significantly altered under this Alternative.

6.3.3 Cumulative impacts

6.3.3.1 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 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 Great River National Wildlife Refuge as described in either Alternative.

6.3.3.2 Natural Resources

Hunted populations

Migratory Birds

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. The Great River NWR is located in the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties.

Because the Service is required to take an abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate framework for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The waterfowl season on Great River NWR will follow the frameworks set in place for Illinois.

NEPA 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. We published Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment, "Duck Hunting Regulations for 2006-07," and an August 24, 2006, Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), 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). More information may be obtained from: Chief, Division

of Migratory Bird Management, U.S. Fish and Wildlife Service, Department of the Interior, MS MBSP-4107-ARLSQ, 1849 C Street, NWR., Washington, DC 20240.

Waterfowl

The Great River NWR primarily provides spring and fall migration habitat for waterfowl. Wood ducks and Canada geese commonly nest in the Great River NWR and there is a small amount of nesting by mallards and other species.

Breeding population estimates are made each year for 10 key species of ducks in the principal breeding areas of Alaska, Canada, and the north central United States. Surveys are conducted in May and early June by the Service, Canadian Wildlife Service, and provincial and state conservation agency personnel. Ducks are counted from fixed-wing aircraft on the same transects each year. Estimates of ducks and ponds seen from the air are corrected for visibility bias by conducting ground counts on a sample of the transects. Although numbers of breeding ducks have fluctuated substantially from year to year, trend analysis suggests that total duck numbers are stable. This stable trend, however, is the result of increasing numbers of some species (e.g., gadwall, green-winged teal, shovelers and blue-winged teal) and decreasing numbers of others (e.g., pintails and scaup). Despite the improvements in duck numbers in the 1990's, there are still concerns about the long-term loss of both wetland and upland habitat in the prairie pothole region and the long-term outlook for duck populations in the future. Duck populations have fluctuated substantially over time. Duck populations will continue to fluctuate in the future as the numbers of wetlands on the landscape in north-central North America rise and fall with the varying weather. Missouri and Illinois do not report a population index of ducks for the state.

In the Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons report (USFWS 2012), the Service estimates the following:

State	Measure	2010	2011
Missouri	Waterfowl Total Harvest	520,200 ($\pm 19\%$)	493,200 ($\pm 26\%$)
	Active Hunter Total	30,200 ($\pm 11\%$)	29,600 ($\pm 12\%$)
	Seasonal Duck Harvest Per Hunter	17.2	16.7
Illinois	Waterfowl Total Harvest	372,700 ($\pm 18\%$)	507,000 ($\pm 17\%$)
	Active Hunter Total	32,700 ($\pm 11\%$)	34,100 ($\pm 10\%$)
	Seasonal Duck Harvest Per Hunter	11.4	14.9

Summary

The above numbers have been determined to support huntable waterfowl populations in Missouri and Illinois, including the Great River NWR. Under this Alternative in which former FSA property will be opened for hunting, no waterfowl hunting will be authorized. Only the Long Island Division of the Great River NWR with five blinds managed by the State of Illinois will remain open to the public. Those individuals interested in hunting these blinds, must draw for the blinds every three years. Factoring in the Illinois 2011 seasonal duck harvest per hunter with an average of five hunters per blind, an estimate of 375 birds are expected to be harvested

annually from the area. Considering these numbers, this Alternative will have no cumulative impacts to the waterfowl population.

Mourning Dove

In 1960, mourning dove management units were established to reflect populations that are largely independent of each other (USFWS 2012). Missouri is located in the Central Management Unit (CMU), while Illinois is considered a part of the Eastern Management Unit (EMU). Population estimates of absolute abundance available since 2003 indicates there are about 308 million doves in the United States. Abundance during the last 5 years shows a stable population in EMU, while the CMU may be declining. Even with the decline, the CMU has the highest population index of the three units.

Summary

During the 2011-12 season, Missouri ranked fourth in the CMU with a harvest of 296,600 doves by 23,800 hunters (Kulowiec 2013). In Illinois, the harvest decreased in the 2011-12 season from the previous year harvest with a total of 492,765 doves taken by 29,742 hunters (INHS 2012).

Under this Alternative, no migratory bird hunting will be permitted at the former FSA property and only waterfowl and coot hunting will remain in effect at the Long Island Division from blinds managed by the State of Illinois. Therefore no harvest of dove will occur resulting in no cumulative impacts.

Other Hunted Migratory Birds

Other migratory birds include rails (sora and Virginia), American woodcock, Wilson's snipe and crow. Hunting of these species in Missouri and Illinois is light compared to other migratory game birds. Harvest of these species on the Great River NWR is not permitted under this Alternative, therefore no cumulative impacts will result.

Upland Game

Resident upland game populations are actively managed by the Missouri Department of Conservation and the Illinois Department of Natural Resources. Through surveys and monitoring, the state develops density figures when determining each year's harvest needs to keep populations healthy. Habitat changes and weather may affect population numbers more than harvest. The number of hunters per square mile should stay about the same in the areas where Refuge lands are located. The wildlife populations on Refuge units should continue to reflect densities in the surrounding area.

Ring-necked pheasant

The ring-necked pheasant (*Phasianus colchicus*) is one of the upland game birds in Missouri and Illinois. Each state conducts annual population counts and deems this population huntable. In Missouri, the 2012 Conservation Agents' Roadside Survey showed a statewide decline (49%) in the pheasant population from 2011; a 76% decline in the 5-year average (2007-2011); and a 90% decline for the 10-year average (2002-2012) (MDC 2012). Drought conditions during the survey are considered a factor, while loss of habitat continues to be a concern.

In Illinois, hunter harvest remained light even with an increase of hunters (41.7%) and harvest (6.7%) from the previous year (IDNR 2013). Lack of quality habitat is considered a limiting factor in the low pheasant populations. The 2013 Illinois surveys of the overall number of pheasants and the stops where pheasants were seen or heard were lower from 2012 counts. A combination of cooler than average temperatures and above average precipitation during the peak pheasant nesting season is considered the primary reason for these low counts.

Great River NWR provides very little habitat considered suitable for the ring-necked pheasant, therefore hunting of these species is generally incidental to other hunt opportunities. No more than 1-2 birds are likely to be seen, let alone harvested, throughout the divisions of the Great River NWR and the former FSA property. Those seen are more apt to be escaped birds from nearby game farms or hunt clubs rather than wild birds, so the cumulative impacts are minimal.

Bobwhite Quail

The bobwhite quail (*Colinus virginianus*) is another upland game bird in Missouri and Illinois where annual population counts are conducted and the populations are deemed huntable. In Missouri, the Northeast Riverbreaks zoogeographic region is where the Great River NWR is located. Quail surveys in the northeast saw a 5.56% decrease in quail counted from 2011 to 2012 and a 16% reduction throughout the state. The 5-year and 10-year averages were also down by 52% and 60%, respectively. In 2012, the drought was considered a factor with reduced grass and shrub cover, hard and soft mast production, and surface water availability.

Illinois surveys show a slight increase of quail counted and stops where quail were seen or heard in 2012 and 2013 (IDNR 2013). The 2012-13 harvest surveys estimate 11,266 hunters (11.1% decrease) harvested 47,175 quail (1.2% increase). With a relatively light harvest in 2012-13, the primary limiting factor to the low quail populations is the lack of quality habitat.

The divisions of the Great River NWR and former FSA property open for hunting under this Alternative provide only marginal habitat considered suitable for the bobwhite quail, so hunting of these species is generally incidental to other hunt opportunities. As a result, no more than 20 birds are likely harvested each season resulting in minimal cumulative impacts to the overall population.

Rabbit (cottontail) and Squirrel Populations

Rabbit and squirrel hunting in the 2010-11 Missouri season showed no statistically significant differences compared to 2008-09 (Reitz 2011). Hunter success, estimated by bag per day, was relatively stable for squirrel hunting, but decreased for rabbit, while the average season bag remained relatively stable for all species.

In Illinois, trends over a the 10 year period from 2001 to 2011 shows a steady decline in the number of hunters, harvest and days afield for both rabbit and squirrel hunting (IDNR 2012). In the Mississippi Border-North area, where the Great River NWR lies, rabbit harvests increased by 19%, while fox and gray squirrel harvests were down 15% and 37%, respectively. The only population survey conducted for either of these species is a road-kill index for rabbits (IDNR 2013). In 2013, the index showed a decrease of 4.3% from 2012, which is not considered statistically significant.

Hunting pressure for both rabbit and squirrel populations at the Great River NWR is considered low due to the limitations with access. Only two primitive roads provide access into the Fox Island Division, while the majority of Refuge land at the Long Island Division is only accessible by boat. At these locations, the take of rabbit and squirrel are likely incidental to other game hunting conducted. The former FSA property will provide greater opportunity for hunting these species, however with only 380 additional acres added under this Alternative, harvests will still remain low. Considering the available hunting area, including the added property, it is estimated that no more than 100 of each species will be taken from the Refuge.

Coyote, Raccoon, and Fox Populations

Both the state of Missouri and Illinois show stable, huntable populations of these species and has hunting and trapping programs. This Alternative would only allow the hunting of these species. Trapping on the Great River NWR will be treated separately in a trapping management plan. The hunting of these species is dependent on the price of pelts in any given year. Weather also plays a part in harvest. Fox and coyote hunters are more successful during years with snow than in drier years.

In Missouri, coyote hunters increased significantly in the 2010-11 in comparison to 2008-09. No significant changes in hunter numbers were observed for the other species with a total of 129,391 hunters in 2010-11 which is slightly lower than the 133,626 hunters in 2008-09. The raccoon harvest declined 28.1% in 2010-11 from 2009-08. Coyote showed an increase of 29.4%. Red fox increased 53.2% and gray fox showed a 85.4% increase.

In Illinois from the 2010-11 to the 2011-12 seasons, raccoon and red fox harvest increased, while gray fox and coyote declined. Estimated number of hunters, harvest, and days afield over a ten year period (2001-11) showed steady hunter and harvest figures, with a slight decline in the days afield. Raccoon harvests over that same span of years resulted in a change of -67%; for fox it showed -80% harvest; and -44% for coyote. There's no 10 year information for the gray fox, but the 5 year percentage change was -100%.

With the opening of former FSA property, the number of hunters targeting these species is likely not to increase a great deal with only 380 acres added. Incidental take is generally the method of harvest. Therefore total harvest would be approximately 20 animals of each species taken each season. Missouri and Illinois each monitors these populations to set seasons and limits, thus indicating that the harvest of these species will have no impact to overall populations.

Other Hunted Species

Missouri and Illinois allow the hunting of species covered under their upland/small game regulations. These species include gray partridge, woodchuck, opossum, bobcat, badger and striped skunk. Information by the Missouri Department of Conservation for the woodchuck shows a decline of 2.8% in total hunters for the 2010-2011 season in comparison to the 2008-2009 season. During that time, total harvest of the woodchuck declined by 23.5%. No population information was found for these species by the Illinois Department of Natural Resources. Any take of these species is considered incidental to the hunting of other wildlife at the Great River NWR and would be similar with the addition of the former FSA property, which

is the case, as well, with harvests on state wildlife areas. Therefore total harvest of these species is expected to be 25 individuals of each species.

Big Game

The Missouri Department of Conservation and the Illinois Department of Natural Resources actively manages resident big game populations. Through surveys and monitoring, the state develops density figures when determining each year's harvest needs to keep populations healthy. Habitat changes and weather may affect population numbers more than harvest. The number of hunters per square mile should stay about the same in the areas where Refuge lands are located. The wildlife populations on Refuge units should continue to reflect densities in the surrounding area.

Wild Turkey

Turkey populations are stable locally and throughout the state. 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.

Missouri has been conducting wild turkey (*Meleagris gallopavo*) brood surveys annually since 1959 and providing success of each year's hatch (MDC 2012). The northeast region of the survey is where the Great River NWR is located. In 2012, the northeast region reported 29% decrease in the poult-to-hen ratio from 2011; a 25% increase for a 5-year average; 15% increase for 10 years; and a 12% drop in 20 years. Statewide the percentage of change from 2011 was zero; a 42% increase in the 5-year average; 21% increase in 10 years; and a 6% decrease in 20 years.

In the 2011-2012 Illinois Hunter Harvest Report (IDNR 2012), hunters ranked turkey management as one of the top four wildlife programs in the state. Total estimated hunters for all three of the hunts (spring, fall shotgun and fall archery) total a little over 68,000 with a season harvest of 25,703. The University of Illinois Extension (UIE, Undated) estimates the state population at approximately 150,000 birds.

Estimated harvest on the Great River NWR with the opening of former FSA property is approximately 60 turkey annually, which will have minimal effects on state turkey populations for Missouri and Illinois.

White-tailed Deer

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.

In the 2012-13 Missouri Deer Population Status Report and Deer Season Summary (MDC 2013) published by the Missouri Department of Conservation reports that white-tailed deer (*Odocoileus virginianus*) populations for northeast Missouri have been slowly declining over the last several years with dramatic declines experienced in Monroe and Shelby counties. Even with the slow decline, resource scientists for MDC noted that Missouri has an abundance of deer with an estimated deer population of 1.4 million (MDC September 2013). The 2012 hemorrhagic

disease outbreak is likely a result of the localized reductions in some areas, however recovery is expected to occur after a couple years.

The counties in which the Long Island and Delair Divisions of the Great River National Wildlife Refuge are located (Adams and Pike in Illinois, respectively) provide quality habitat for white-tailed deer. This is apparent by the total deer harvested each year. Pike County consistently has the greatest number of deer harvested, while Adams County harvest ranks in the top three counties annually. As of 2012, state wildlife officials have determined the deer herd to be 700,000 to 750,000 which they consider to be a healthy population (IDNR August, 2012).

With the overall deer populations in the states of Missouri and Illinois considered abundant and healthy, the average harvest of 120 deer on the lands managed by the Great River National Wildlife Refuge, including the former FSA property, will have minimal effect on the populations.

Non-Hunted Species

Non-hunted migratory birds include songbirds, wading birds, raptors, and woodpeckers. Disturbance to non-hunted migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate such as most woodpeckers, and some songbirds including nuthatches, finches, and chickadees. Disturbance from hunting to non-hunted migratory birds should not have cumulative negative impacts since the hunting seasons would not coincide with the nesting season, and disturbance to the daily wintering activities, such as feeding and resting, of birds would probably be similar to that caused by non-consumptive users.

Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs 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 of allowed species would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the “flyway” level should be negligible. These species are in torpor or have completely passed through the Great River NWR by the hunting seasons in late September and late November - December. Any hunter interaction would be similar to that of non-consumptive users.

Disturbance to non-hunted wildlife would be similar to current conditions. The opening of the additional 380 acres to hunting will have minimal effects on non-hunted species of wildlife. Significant disturbance would be unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blooded reptiles and amphibians also limits their activity when temperatures are low. Hunters would

rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

6.3.3.3 Threatened and Endangered Species

The Indiana bat, a Federally-listed endangered species, has not been documented on the Refuge, but has been observed using habitat along and adjacent to the Mississippi River. Hunting on the Refuge would have little or no cumulative impacts due to the time of the year for the activity.

Decurrent false aster (*Boltonia decurrens*), a federally threatened species, has potential suitable habitat at the Delair Division of the Great River National Wildlife Refuge in Pike County, Illinois. Impacts to this species would also be minimal since hunting at the Delair Division is conducted in the winter, outside of the growing season.

6.3.3.4 Cultural Resources

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

6.3.3.5 Social and Economic Resources

Increased economic activity is associated with each Alternative. This economic activity, while important to the communities near Refuge units (Section 6.1.5), is minor. Hunting activities under this Alternative does not produce significant cumulative effects.

The Refuge's presence increases the quality of life for some area residents. According to Refuge figures, hunting accounts for more user visits than any of the other priority public uses. 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 this Alternative do not produced significant cumulative effects.

6.3.3.6 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 public 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 seven National Wildlife Refuges in Illinois and eight in Missouri. Thousands of other public spaces in the state 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.

6.3.3.7 Anticipated Impacts if Individual Hunts are Allowed to Accumulate

National Wildlife Refuges, including Great River NWR, conduct hunting programs within the framework of state and federal regulations. By maintaining hunting regulations that are consistent with, or more restrictive than the State, individual refuges are maintaining seasons that are supportive of state and federal resource management goals. This Alternative would open an additional 380 acres to hunting. Considering the proposed hunting would be significantly less than when the lands were under private ownership, the results of this Alternative would have minimal impacts.

6.4 Environmental Consequences of Alternative C: Modify Current Hunting Programs on Refuge Lands Previously Opened to Hunting and Open Fee Title Land Transferred to the Service through the Farm Service Agency to Hunting (Preferred Alternative)

With this Alternative the hunting program would be modified to open 380 acres of lands transferred to the Service from the Farm Service Agency. Cherry Box and Hickory Creek Units would be open to selected hunting seasons including archery deer and shotgun upland game hunting. Canton Unit would remain closed due to the small acreage and proximity to the town of Canton.

Fall archery deer and turkey hunting will be added to the Fox Island Division, the antlerless-only firearms season for deer will be closed, and special state-managed firearm deer hunts will be added. All other seasons on the Fox Island Division will remain unchanged. No other changes will be made to the Long Island and Delair Divisions.

6.4.1 Natural Resources

6.4.1.1 Wildlife

Under this Alternative in which transferred lands will be open to limited hunting seasons and hunting opportunities at The Fox Island Division will be modified, we consider the added hunting mortality (i.e. take) for upland game species, turkey and white-tailed deer.

Considerations were made in the context of hunting under private ownership on the transferred lands since this activity was conducted prior to Service ownership. These open lands are expected to have below average numbers of hunted individuals and receive below average hunting pressure due to the remote locations and restricted hunting opportunities available. Hunters should generally experience average success rates during these hunts.

Hunted Species

Hunting of upland game species (i.e. rabbit, and squirrel) using shotguns with non-toxic shot and archery hunting for big game will be permitted on transferred lands. Considering the small size of these areas, Cherry Box with 300 acres and Hickory Creek with 80 acres; their remote locations; and the restricted hunting opportunities available, populations of hunted species will not change appreciably.

The harvest of small upland game would increase very little with an estimate of 75 squirrels and rabbits taken per year due to the slight increase in hunting pressure. However, the size of areas subject to increased hunting pressure is small relative to areas already open, so the increase in

hunting mortality will not be significant. Upland game populations would continue to experience fluctuations from naturally occurring environmental conditions. The removal of certain individuals from the populations due to hunting will have minor effects.

The number of turkeys harvested on the Refuge will increase minimally with an estimated 10 birds taken annually. This is not expected to appreciably affect the overall number of turkeys harvested in Missouri and Illinois or the overall population of turkeys in these areas. Any increase in hunting mortality from Refuge hunting activities will not be significant at the zone, regional, or state levels.

On the Fox Island Division, archery deer and turkey hunting will be added, while antlerless-only firearm hunting will be closed under this Alternative. Special state-managed deer hunts will be added. The restricted hunting opportunities available, along with the remoteness of the area, are expected to have little impact on the populations of the hunted species.

On lands transferred to the Service, white-tailed deer harvested only during the archery season under Service ownership would be at or lower than the rate of harvest when these lands were open to all deer hunting seasons under private ownership.

Non-Hunted Species

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, frogs, 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 this 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, finches, and chickadees are negligible. Secondary impacts to this group of species are also minimal and do not appreciably reduce their numbers at the population level. Shorebirds would not be impacted by hunting, in most cases, since they have already migrated through the area prior to the fall hunting season. 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 strictly apportioned by quotas within a State-operated lottery system and of relatively short duration (30 days) any disturbance to non-hunted species would be

minimal. Other disturbance to these species by hunters afield would be temporary in nature. The Refuge has identified important resting and feeding areas for migratory water birds and has designated them as no hunting zones or has limited hunting during the migration period.

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.

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

6.4.2 Recreational Opportunities

With the addition of 380 acres of transferred lands would increase the Refuge's hunting land base by about 4% and would increase the total Refuge-wide. Combined hunter visits on the transferred lands and with the expansion of hunting activities on Fox Island would vary little due to the types, quality, and accessibility of the habitats. As a result, hunter visits are not likely to increase by more than 100 visits annually.

Under this Alternative, impacts to other wildlife-dependent priority recreational uses on the Refuge are expected to be minimal. Non-consumptive uses are not expected to be significant due to the remote location of the transferred lands and the Fox Island Division. Additionally, non-consumptive uses are highest in spring, summer and early fall, therefore limiting the period when both activities would occur concurrently. Some visitors may plan their visits to avoid coinciding with hunting activities. The quality of the visitor experience, including hunter's experiences, would not be significantly altered under this Alternative.

6.4.3 Cumulative impacts

6.4.3.1 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 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 Great River National Wildlife Refuge as described in either Alternative.

6.4.3.2 Natural Resources

Hunted populations

Migratory Birds

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment,

transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. The Great River NWR is located in the Mississippi Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties.

Because the Service is required to take an abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate framework for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The waterfowl season on Great River NWR will follow the frameworks set in place for Illinois.

NEPA 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. We published Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment, “Duck Hunting Regulations for 2006-07,” and an August 24, 2006, Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), 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). More information may be obtained from: Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Department of the Interior, MS MBSP-4107-ARLSQ, 1849 C Street, NWR., Washington, DC 20240.

Waterfowl

The Great River NWR primarily provides spring and fall migration habitat for waterfowl. Wood ducks and Canada geese commonly nest in the Great River NWR and there is a small amount of nesting by mallards and other species.

Breeding population estimates are made each year for 10 key species of ducks in the principal breeding areas of Alaska, Canada, and the north central United States. Surveys are conducted in May and early June by the Service, Canadian Wildlife Service, and provincial and state conservation agency personnel. Ducks are counted from fixed-wing aircraft on the same transects each year. Estimates of ducks and ponds seen from the air are corrected for visibility bias by conducting ground counts on a sample of the transects. Although numbers of breeding ducks have fluctuated substantially from year to year, trend analysis suggests that total duck numbers are stable. This stable trend, however, is the result of increasing numbers of some species (e.g., gadwall, green-winged teal, shovelers and blue-winged teal) and decreasing numbers of others (e.g., pintails and scaup). Despite the improvements in duck numbers in the 1990’s, there are still concerns about the long-term loss of both wetland and upland habitat in the prairie pothole region and the long-term outlook for duck populations in the future. Duck populations have fluctuated substantially over time. Duck populations will continue to fluctuate in the future as the numbers of wetlands on the landscape in north-central North America rise and fall with the varying weather. Missouri and Illinois do not report a population index of ducks for the state.

In the Migratory Bird Hunting Activity and Harvest During the 2010 and 2011 Hunting Seasons report (USFWS 2012), the Service estimates the following:

State	Measure	2010	2011
Missouri	Waterfowl Total Harvest	520,200 (±19%)	493,200 (±26%)
	Active Hunter Total	30,200 (±11%)	29,600 (±12%)
	Seasonal Duck Harvest Per Hunter	17.2	16.7
Illinois	Waterfowl Total Harvest	372,700 (±18%)	507,000 (±17%)

	Active Hunter Total	32,700 ($\pm 11\%$)	34,100 ($\pm 10\%$)
	Seasonal Duck Harvest Per Hunter	11.4	14.9

Summary

The above numbers have been determined to support huntable waterfowl populations in Missouri and Illinois, including the Great River NWR. Under this Alternative, even with the opening of former FSA property, only the Long Island Division of the Great River NWR with five blinds managed by the State of Illinois will remain open to the public. Those individuals interested in hunting these blinds, must draw for the blinds every three years. Factoring in the Illinois 2011 seasonal duck harvest per hunter with an average of five hunters per blind, an estimate of 375 birds are expected to be harvested annually from the area. Considering these numbers, this Alternative will have no cumulative impacts to the waterfowl population.

Mourning Dove

In 1960, mourning dove management units were established to reflect populations that are largely independent of each other (USFWS 2012). Missouri is located in the Central Management Unit (CMU), while Illinois is considered a part of the Eastern Management Unit (EMU). Population estimates of absolute abundance available since 2003 indicates there are about 308 million doves in the United States. Abundance during the last 5 years shows a stable population in EMU, while the CMU may be declining. Even with the decline, the CMU has the highest population index of the three units.

Summary

During the 2011-12 season, Missouri ranked fourth in the CMU with a harvest of 296,600 doves by 23,800 hunters (Kulowiec 2013). In Illinois, the harvest decreased in the 2011-12 season from the previous year harvest with a total of 492,765 doves taken by 29,742 hunters (INHS 2012).

Under this Alternative, no migratory bird hunting will be permitted at the former FSA property and only waterfowl and coot hunting will remain in effect at the Long Island Division from blinds managed by the State of Illinois. Therefore no harvest of dove will occur resulting in no cumulative impacts.

Other Hunted Migratory Birds

Other migratory birds include rails (sora and Virginia), American woodcock, Wilson’s snipe and crow. Hunting of these species in Missouri and Illinois is light compared to other migratory game birds. Harvest of these species on the Great River NWR is not permitted under this Alternative, therefore no cumulative impacts will result.

Upland Game

Resident upland game populations are actively managed by the Missouri Department of Conservation and the Illinois Department of Natural Resources. Through surveys and monitoring, the state develops density figures when determining each year’s harvest needs to keep populations healthy. Habitat changes and weather may affect population numbers more than harvest. The number of hunters per square mile should stay about the same in the areas

where Refuge lands are located. The wildlife populations on Refuge units should continue to reflect densities in the surrounding area.

Ring-necked pheasant

The ring-necked pheasant (*Phasianus colchicus*) is one of the upland game birds in Missouri and Illinois. Each state conducts annual population counts and deems this population huntable. In Missouri, the 2012 Conservation Agents' Roadside Survey showed a statewide decline (49%) in the pheasant population from 2011; a 76% decline in the 5-year average (2007-2011); and a 90% decline for the 10-year average (2002-2012) (MDC 2012). Drought conditions during the survey are considered a factor, while loss of habitat continues to be a concern.

In Illinois, hunter harvest remained light even with an increase of hunters (41.7%) and harvest (6.7%) from the previous year (IDNR 2013). Lack of quality habitat is considered a limiting factor in the low pheasant populations. The 2013 Illinois surveys of the overall number of pheasants and the stops where pheasants were seen or heard were lower from 2012 counts. A combination of cooler than average temperatures and above average precipitation during the peak pheasant nesting season is considered the primary reason for these low counts.

Great River NWR provides very little habitat considered suitable for the ring-necked pheasant, therefore hunting of these species is generally incidental to other hunt opportunities. No more than 1-2 birds are likely to be seen, let alone harvested, throughout the divisions of the Great River NWR and the former FSA property. Those seen are more apt to be escaped birds from nearby game farms or hunt clubs rather than wild birds, so the cumulative impacts are minimal.

Bobwhite Quail

The bobwhite quail (*Colinus virginianus*) is another upland game bird in Missouri and Illinois where annual population counts are conducted and the populations are deemed huntable. In Missouri, the Northeast Riverbreaks zoogeographic region is where the Great River NWR is located. Quail surveys in the northeast saw a 5.56% decrease in quail counted from 2011 to 2012 and a 16% reduction throughout the state. The 5-year and 10-year averages were also down by 52% and 60%, respectively. In 2012, the drought was considered a factor with reduced grass and shrub cover, hard and soft mast production, and surface water availability.

Illinois surveys show a slight increase of quail counted and stops where quail were seen or heard in 2012 and 2013 (IDNR 2013). The 2012-13 harvest surveys estimate 11,266 hunters (11.1% decrease) harvested 47,175 quail (1.2% increase). With a relatively light harvest in 2012-13, the primary limiting factor to the low quail populations is the lack of quality habitat.

The divisions of the Great River NWR and former FSA property open for hunting under this Alternative provide only marginal habitat considered suitable for the bobwhite quail, so hunting of these species is generally incidental to other hunt opportunities. As a result, no more than 20 birds are likely harvested each season resulting in minimal cumulative impacts to the overall population.

Rabbit (cottontail) and Squirrel Populations

Rabbit and squirrel hunting in the 2010-11 Missouri season showed no statistically significant differences compared to 2008-09 (Reitz 2011). Hunter success, estimated by bag per day, was

relatively stable for squirrel hunting, but decreased for rabbit, while the average season bag remained relatively stable for all species.

In Illinois, trends over a the 10 year period from 2001 to 2011 shows a steady decline in the number of hunters, harvest and days afield for both rabbit and squirrel hunting (IDNR 2012). In the Mississippi Border-North area, where the Great River NWR lies, rabbit harvests increased by 19%, while fox and gray squirrel harvests were down 15% and 37%, respectively. The only population survey conducted for either of these species is a road-kill index for rabbits (IDNR 2013). In 2013, the index showed a decrease of 4.3% from 2012, which is not considered statistically significant.

Hunting pressure for both rabbit and squirrel populations at the Great River NWR is considered low due to the limitations with access. Only two primitive roads provide access into the Fox Island Division, while the majority of Refuge land at the Long Island Division is only accessible by boat. At these locations, the take of rabbit and squirrel are likely incidental to other game hunting conducted. The former FSA property will provide greater opportunity for hunting these species, however with only 380 additional acres added under this Alternative, harvests will still remain low. Considering the available hunting area, including the added property, it is estimated that no more than 100 of each species will be taken from the Refuge.

Coyote, Raccoon, and Fox Populations

Both the state of Missouri and Illinois show stable, huntable populations of these species and has hunting and trapping programs. This Alternative would only allow the hunting of these species. Trapping on the Great River NWR will be treated separately in a trapping management plan. The hunting of these species is dependent on the price of pelts in any given year. Weather also plays a part in harvest. Fox and coyote hunters are more successful during years with snow than in drier years.

In Missouri, coyote hunters increased significantly in the 2010-11 in comparison to 2008-09. No significant changes in hunter numbers were observed for the other species with a total of 129,391 hunters in 2010-11 which is slightly lower than the 133,626 hunters in 2008-09. The raccoon harvest declined 28.1% in 2010-11 from 2009-08. Coyote showed an increase of 29.4%. Red fox increased 53.2% and gray fox showed a 85.4% increase.

In Illinois from the 2010-11 to the 2011-12 seasons, raccoon and red fox harvest increased, while gray fox and coyote declined. Estimated number of hunters, harvest, and days afield over a ten year period (2001-11) showed steady hunter and harvest figures, with a slight decline in the days afield. Raccoon harvests over that same span of years resulted in a change of -67%; for fox it showed -80% harvest; and -44% for coyote. There's no 10 year information for the gray fox, but the 5 year percentage change was -100%.

With the opening of former FSA property, the number of hunters targeting these species is likely not to increase a great deal with only 380 acres added. Incidental take is generally the method of harvest. Therefore total harvest would be approximately 20 animals of each species taken each season. Missouri and Illinois each monitors these populations to set seasons and limits, thus indicating that the harvest of these species will have no impact to overall populations.

Other Hunted Species

Missouri and Illinois allow the hunting of species covered under their upland/small game regulations. These species include gray partridge, woodchuck, opossum, bobcat, badger and striped skunk. Information by the Missouri Department of Conservation for the woodchuck shows a decline of 2.8% in total hunters for the 2010-2011 season in comparison to the 2008-2009 season. During that time, total harvest of the woodchuck declined by 23.5%. No population information was found for these species by the Illinois Department of Natural Resources. Any take of these species is considered incidental to the hunting of other wildlife at the Great River NWR and would be similar with the addition of the former FSA property, which is the case, as well, with harvests on state wildlife areas. Therefore total harvest of these species is expected to be 25 individuals of each species.

Big Game

The Missouri Department of Conservation and the Illinois Department of Natural Resources actively manages resident big game populations. Through surveys and monitoring, the state develops density figures when determining each year's harvest needs to keep populations healthy. Habitat changes and weather may affect population numbers more than harvest. The number of hunters per square mile should stay about the same in the areas where Refuge lands are located. The wildlife populations on Refuge units should continue to reflect densities in the surrounding area.

Wild Turkey

Turkey populations are stable locally and throughout the state. 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.

Missouri has been conducting wild turkey (*Meleagris gallopavo*) brood surveys annually since 1959 and providing success of each year's hatch (MDC 2012). The northeast region of the survey is where the Great River NWR is located. In 2012, the northeast region reported 29% decrease in the poult-to-hen ratio from 2011; a 25% increase for a 5-year average; 15% increase for 10 years; and a 12% drop in 20 years. Statewide the percentage of change from 2011 was zero; a 42% increase in the 5-year average; 21% increase in 10 years; and a 6% decrease in 20 years.

In the 2011-2012 Illinois Hunter Harvest Report (IDNR 2012), hunters ranked turkey management as one of the top four wildlife programs in the state. Total estimated hunters for all three of the hunts (spring, fall shotgun and fall archery) total a little over 68,000 with a season harvest of 25,703. The University of Illinois Extension (UIE, Undated) estimates the state population at approximately 150,000 birds.

Estimated harvest on the Great River NWR with the opening of former FSA property is approximately 60 turkey annually, which will have minimal effects on state turkey populations for Missouri and Illinois.

White-tailed Deer

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.

In the 2012-13 Missouri Deer Population Status Report and Deer Season Summary (MDC 2013) published by the Missouri Department of Conservation reports that white-tailed deer (*Odocoileus virginianus*) populations for northeast Missouri have been slowly declining over the last several years with dramatic declines experienced in Monroe and Shelby counties. Even with the slow decline, resource scientists for MDC noted that Missouri has an abundance of deer with an estimated deer population of 1.4 million (MDC September 2013). The 2012 hemorrhagic disease outbreak is likely a result of the localized reductions in some areas, however recovery is expected to occur after a couple years.

The counties in which the Long Island and Delair Divisions of the Great River National Wildlife Refuge are located (Adams and Pike in Illinois, respectively) provide quality habitat for white-tailed deer. This is apparent by the total deer harvested each year. Pike County consistently has the greatest number of deer harvested, while Adams County harvest ranks in the top three counties annually. As of 2012, state wildlife officials have determined the deer herd to be 700,000 to 750,000 which they consider to be a healthy population (IDNR August, 2012).

With the overall deer populations in the states of Missouri and Illinois considered abundant and healthy, the average harvest of 120 deer on the lands managed by the Great River National Wildlife Refuge, including the former FSA property, will have minimal effect on the populations.

Non-Hunted Species

Non-hunted migratory birds include songbirds, wading birds, raptors, and woodpeckers. Disturbance to non-hunted migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate such as most woodpeckers, and some songbirds including nuthatches, finches, and chickadees. Disturbance from hunting to non-hunted migratory birds should not have cumulative negative impacts since the hunting seasons would not coincide with the nesting season, and disturbance to the daily wintering activities, such as feeding and resting, of birds would probably be similar to that caused by non-consumptive users.

Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

Non-hunted wildlife would include small mammals such as voles, moles, mice, and shrews; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs 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 of allowed species would not affect their populations regionally.

Some species of butterflies and moths are migratory. Cumulative effects to these species at the “flyway” level should be negligible. These species are in torpor or have completely passed

through the Great River NWR by the hunting seasons in late September and late November - December. Any hunter interaction would be similar to that of non-consumptive users.

Disturbance to non-hunted wildlife would be similar to current conditions. The opening of the additional 380 acres to hunting will have minimal effects on non-hunted species of wildlife. Significant disturbance would be unlikely since small mammals are generally inactive during late November and early December and many of these species are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blooded reptiles and amphibians also limits their activity when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted.

6.4.3.3 Threatened and Endangered Species

The Indiana bat, a Federally-listed endangered species, has not been documented on the Refuge, but has been observed using habitat along and adjacent to the Mississippi River. Hunting on the Refuge would have little or no cumulative impacts due to the time of the year for the activity.

Decurrent false aster (*Boltonia decurrens*), a federally threatened species, has potential suitable habitat at the Delair Division of the Great River National Wildlife Refuge in Pike County, Illinois. Impacts to this species would also be minimal since hunting at the Delair Division is conducted in the winter, outside of the growing season.

6.4.3.4 Cultural Resources

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

6.4.3.5 Social and Economic Resources

Increased economic activity is associated with this Alternative. This economic activity, while important to the communities near Refuge units (Section 6.1.5), is minor. Hunting activities under this Alternative does not produce significant cumulative effects.

The Refuge's presence increases the quality of life for some area residents. According to Refuge figures, hunting accounts for more user visits than any of the other priority public uses. 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 this Alternative do not produce significant cumulative effects.

6.4.3.6 Recreational Opportunities

A hunting program implemented under this 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 public 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 seven National Wildlife Refuges in Illinois and eight in Missouri. Thousands of other public spaces in the state provide a variety of wildlife habitat suitable for fishing, wildlife observation, photography, environmental education, and interpretation activities. Hunting programs at the Refuge under this Alternative will not result in significant adverse effects at any scale, either by themselves or when combined with non-service actions.

6.3.3.7 Anticipated Impacts if Individual Hunts are Allowed to Accumulate

National Wildlife Refuges, including Great River NWR, conduct hunting programs within the framework of state and federal regulations. By maintaining hunting regulations that are consistent with, or more restrictive than the State, individual refuges are maintaining seasons that are supportive of state and federal resource management goals. This Alternative would modify the hunting opportunities on currently hunted lands, and open an additional 380 acres to hunting. Considering the proposed hunting would be significantly less than when the lands were under private ownership, the results of this Alternative would have minimal impacts.

6.5 Summary of Environmental Consequences by Alternative
Table 6.5.1 – Comparison of Environmental Impact by Alternative

Resource Impact	Alternative A (No Action)	Alternative B	Alternative C (Preferred)
Compatible with the goals of the Refuge	Yes	Yes	Yes
Habitat	Impacts such as trampling of vegetation in off-trail areas, although minor, would occur over a slightly smaller area due to the elimination of relatively small number of hunters. 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 slightly larger area. Amounts of undisturbed, resting and feeding areas for waterfowl and other wetland wildlife would remain the same.	Same as B
Hunted Species	Populations fluctuate primarily in response to natural cycles not hunting.	No change	No change
Threatened and Endangered Species	No significant impact.	No significant impact.	No significant impact.
Historic and Cultural Resources	No impact.	No impact.	No impact.
Provides for priority public uses	Yes, satisfies the mandates of the 1997 Refuge Improvement Act.	No change.	No change.
Provides for simultaneous hunting and non-hunting activities	Yes	Yes	Yes
Recreational Use	User conflicts are uncommon and mitigated through management actions. Non-hunting recreational use will remain the same. Hunting recreational use will remain the same. Does not meet public desire for increase in overall hunting opportunities. Opportunities (land base) for special hunts remain the same.	User conflicts are uncommon and mitigated through management actions. Non-hunting recreational use will remain the same. Hunting recreational use will increase due to the addition of open lands and potentially more special hunt opportunities. Would slightly increase hunting opportunities for overall hunting opportunities. Opportunities (land base) for special hunts may increase significantly.	Same as B
Meets the needs of partners and desires of the public	Would not meet the preference of the state and hunting public to increase hunting opportunities. Does not increase opportunities for youth and hunters with disabilities.	Would meet the preference of the state and hunting public to increase hunting opportunities. May increase opportunities (land base) for youth and hunters with disabilities.	Same as B

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Public Libraries

Missouri

- Bowling Green Public Library, 201 W. Locust Street, Bowling Green, MO 63334
- Canton Public Library, 403 Lewis Street, Canton, MO 63435
- Elsberry Public Library, 502 Broadway, Elsberry, MO 63343
- Hannibal Public Library, 200 South Fifth Street, Hannibal, MO 63401
- LaGrange Public Library, 114 North Main Street, LaGrange, MO 63448
- Louisiana Public Library, 121 North Third Street, Louisiana, MO 63353

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APPENDIX A – REFERENCES

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APPENDIX B – CONSULTATION AND COORDINATION WITH OTHERS

The draft Environmental Assessment for the Great River NWR hunt plan was released for public comment on August 18, 2014 for 30 days until September 18, 2014. The EA was available to all interested parties through the Great River NWR website (http://www.fws.gov/refuge/great_river/). News releases were sent out to area newspapers, local libraries, and post offices. Letters were sent to other federal and state agencies and state and local officials.