



Restoring a Forest Legacy at Mingo National Wildlife Refuge

A Forestland Restoration Partnership Between the US Fish and Wildlife Service and The Conservation Fund's Go Zero® Program

Project Implementation Report

Prepared by:

The Conservation Fund

With contributions from:

United States Fish and Wildlife Service

TerraCarbon LLC

PROJECT FACT SHEET

Project Name: Mingo NWR Restoration Initiative

Location: Puxico, Missouri, United States

Project Proponent: The Conservation Fund

Project Auditor: SCS Global Services
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Project Start Date: March 2010 (completion of reforestation activities)

Verification Period: March 2010 – October 2014

GHG Accounting Period: 100 years

Project Validation Date – May 12, 2010 - Gold Level

Project Summary: The three primary goals of the project are to decrease the effects of climate change via carbon sequestration, restore southeastern Missouri's bottomland hardwood forest ecosystem and create long-term community benefits in the form of recreational lands under the management of USFWS for hunting, fishing, wildlife photography, wildlife observation, environmental education and environmental interpretation.

Project Standard: Second Edition CCB Standards

Gold Level Validation: The project achieved Gold Level validation by satisfying the Exceptional Biodiversity Benefits criteria set out in GL3.1. One globally threatened species – the Indiana bat – occurs within the Project Zone. An Indiana bat maternity colony was found on the edge of one of the Go Zero Tracts within Mingo NWR. The Go Zero project has increased forest connectivity at Mingo NWR and improved and expanded Indiana bat habitat by increasing the amount of continuous vegetation in riparian zones.

Project Implementation Report: V1 completed October 30, 2014.

EXECUTIVE SUMMARY

This Project Implementation Report is prepared for the Mingo National Wildlife Refuge Restoration Initiative to meet the verification standards of the Climate, Community and Biodiversity (CCB) Alliance. All projects seeking approval under the CCB Standards must be validated to determine that the project design conforms to the Standards, and must subsequently be verified within five years to determine that the project has been successfully implemented, and is generating net positive climate, social and biodiversity benefits in accordance with its design.

The Mingo National Wildlife Refuge Restoration Initiative was validated at the Gold Level on May 12, 2010 under the Second Edition of the CCB Standards. This project was designed to decrease the effects of climate change via carbon sequestration, restore Missouri's bottomland hardwood forest and create long-term community benefits in the form of recreational lands under the management of the US Fish and Wildlife Service for hunting, fishing, wildlife photography, wildlife observation, environmental education and environmental interpretation. The project presented an important opportunity to restore native bottomland hardwood forests that will benefit fish and wildlife, enhance habitat quality for the endangered Indiana bat, create new areas for public recreation and trap carbon dioxide.

On behalf of the US Fish and Wildlife Service, The Conservation Fund used donations from its Go Zero[®] program to restore approximately 367 acres of marginal land within the boundary of the Mingo National Wildlife Refuge located in southeastern Missouri. The newly restored native bottomland hardwood forest is managed by the Service to ensure its long-term protection and stewardship. All carbon accrued from this project is withheld from the carbon market and cannot be sold or banked for future offset purposes.

Since 2005, the Fund's Go Zero program has engaged Fortune 500 companies, their customers and employees, as well as other organizations and individuals seeking a positive response to two of our nation's most pressing environmental challenges: habitat loss and climate change. In a time when public financing for land conservation and habitat restoration is stretched thin, voluntary contributions are providing new private capital to further the Fund's mission to conserve and restore our nation's land and water legacy for current and future generations. From these Go Zero projects, the nation derives—and will continue to receive for many years into the future—significant public benefits, including cleaner air and water, restored wildlife habitat and enhanced areas for public recreation.

The Fund's reforestation-based carbon sequestration activities are conducted exclusively with state and federal natural resource agencies, including the US Fish and Wildlife Service. These organizations employ some of the world's top wildlife biologists, foresters and environmental professionals who serve as long-term stewards of the forests once they are restored. In March of 2007, the Fund and the US Fish and Wildlife Service entered into a Memorandum of Understanding that allowed all 553 of the Service's National Wildlife Refuges to benefit from the Fund's Go Zero program, building upon nearly a decade of partnership between the Fund and the US Fish and Wildlife Service to advance the science of carbon sequestration through reforestation.

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The National Wildlife Refuge System Improvement Act of 1997 requires each refuge to develop a Comprehensive Conservation Plan for achieving refuge objectives consistent with sound principles of fish and wildlife management, conservation, legal mandates and Fish and Wildlife Service policies. The National Environmental Policy Act requires each plan to examine a full range of alternative approaches to refuge management and to involve the public in selecting the approach best suited to each refuge's purposes. This project will implement many of the stewardship and management activities prescribed in the Mingo NWR Comprehensive Conservation Plan.

The Mingo Wildlife Refuge Restoration Initiative also benefits from our partnership with TerraCarbon LLC, an advisory firm specializing in the forestry and land use sector of the carbon markets. TerraCarbon was contracted by the Fund to develop a monitoring plan for the project's ongoing carbon gains.

The Mingo National Wildlife Refuge was established to protect Missouri's unique bottomland hardwood ecosystem. Restoring this area is one of The Conservation Fund's highest priorities, resulting in cleaner air, cleaner water and enhanced biodiversity for wildlife and people alike.

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- A. Memorandum of Understanding Between The Conservation Fund and U.S. Fish and Wildlife Service
- B. USFWS Biological Carbon Sequestration Accomplishments Report 2009-2013
- C. *Wetlands* publication

G1. ORIGINAL CONDITIONS IN THE PROJECT AREA

G1.1 Location and Basic Physical Parameters

Mingo National Wildlife Refuge (“Mingo NWR”) was established in 1944 under the authority of the Migratory Bird Treaty Act to serve as a resting and wintering area for migratory waterfowl. Located in an area known as the Bootheel region of southeastern Missouri, the Refuge spans 21,592 acres across Stoddard and Wayne counties, approximately 150 miles south of St. Louis. The Missouri Department of Conservation’s 6,190-acre Duck Creek Conservation Area borders the Refuge on its north and east boundary. Figure 1 details Mingo NWR’s location within the State of Missouri, which is located within Region 3 of the National Wildlife Refuge System. Figure 2 details the Refuge and the surrounding counties—including Stoddard, Wayne, Bollinger and Butler—which constitute the Project Zone.

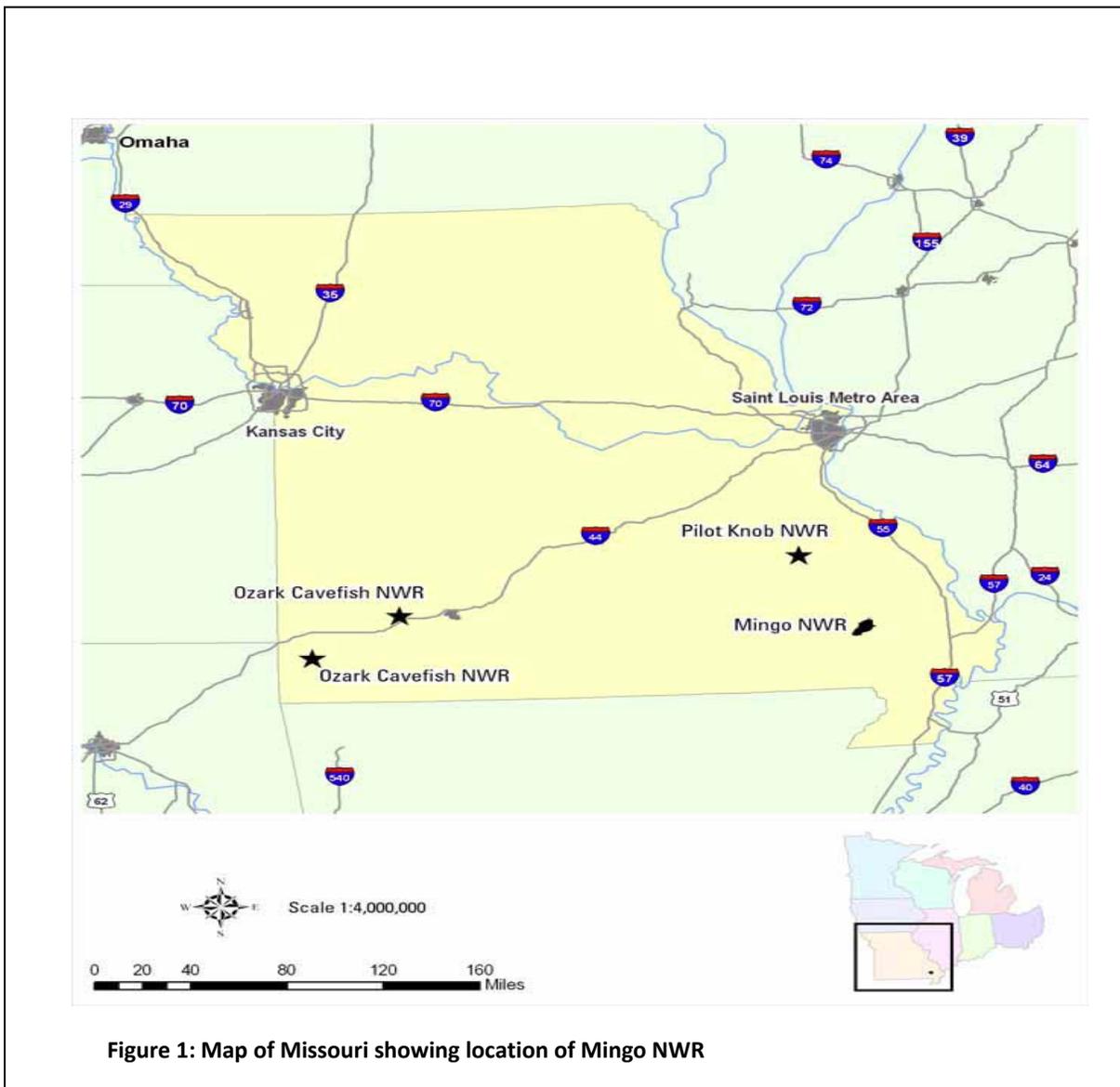
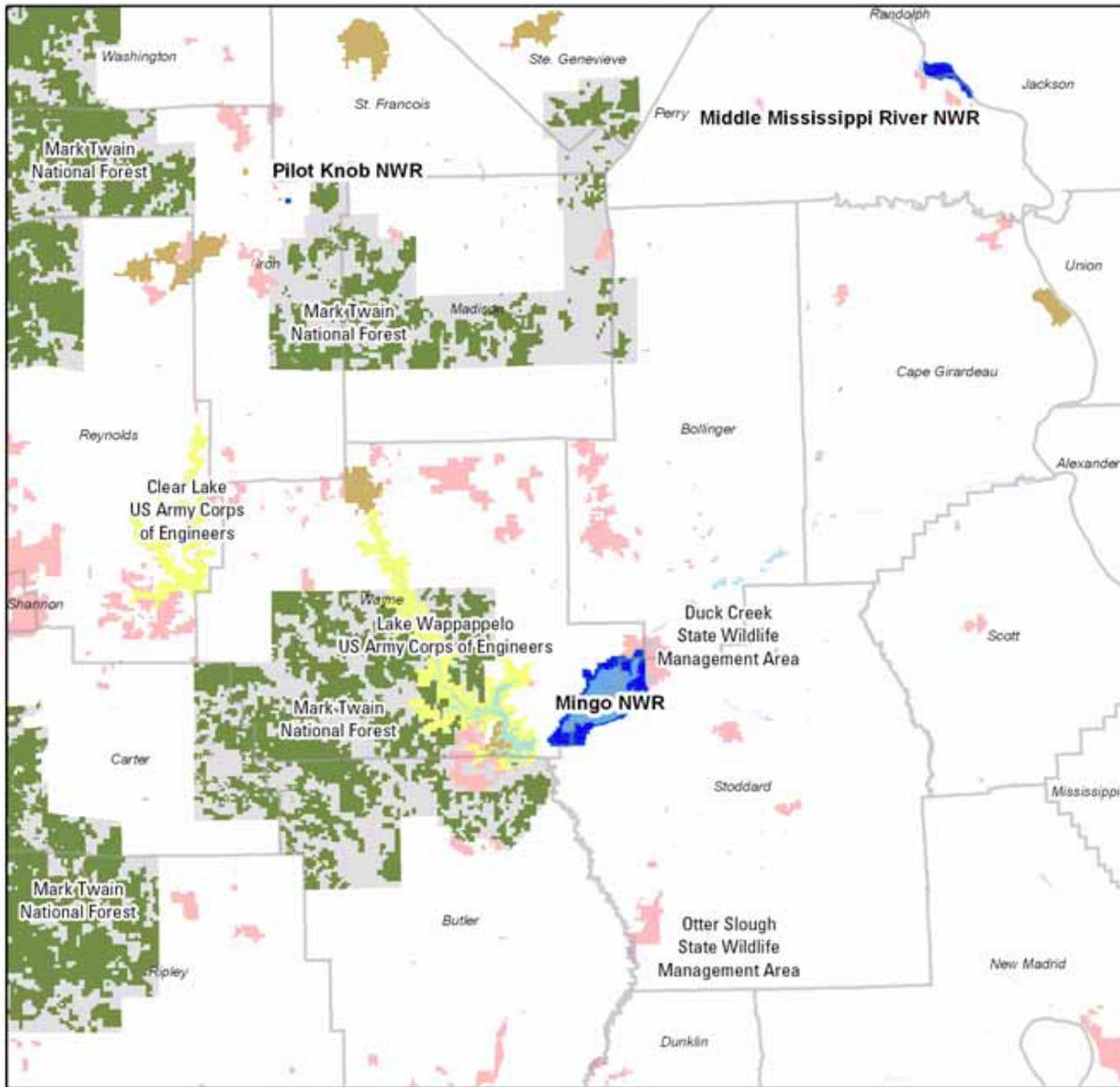


Figure 1: Map of Missouri showing location of Mingo NWR

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Legend

- US Fish & Wildlife Service Lands
- Mark Twain National Forest
- Private Lands within National Forest
- DNR Parks
- US ACE Lands
- DOC Lands
- Counties
- Waterbodies

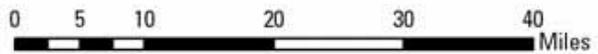
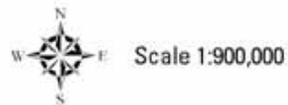


Figure 2: Map showing Project Zone

The Go Zero Tracts

Mingo NWR was established to preserve bottomland hardwood forests as well as provide waterfowl and other migratory birds in the Mississippi Flyway with nesting, feeding, brooding and resting habitat. When settlers first came to the Bootheel region, the area was covered by lush bottomland hardwood forests dominated by giant cypress and tupelo trees. Beginning in the late 1800s, the forests in the Bootheel region were cut for lumber, and by the 1930s, most of the land had been cleared. Lumber companies then looked to drain the swamplands to turn the area into profitable agricultural land. When drainage attempts failed, the land fell into neglect and wild hogs and cattle overran the area. Wildlife such as deer, beaver and wild turkey disappeared from the swamp and indiscriminate shooting of waterfowl became common. When the United States Fish and Wildlife Service (“USFWS” or “the Service”) purchased the land in 1945 to establish Mingo NWR, it was in deplorable condition.

Through careful protection, restoration and management by the Service, the natural forests and wildlife returned. Deer, beaver and wild turkey are now abundant. The western section of the Refuge, which includes the largest remaining tract of original bottomland hardwood forest in the Bootheel region, was designated as the Mingo Wilderness Area by Congress in 1976 and serves as an important wintering area for migratory waterfowl and critical habitat for swamp rabbits, wood ducks, migrating monarch butterflies and other species.

Prior to project implementation, some of the forest landscape at Mingo NWR was still fragmented and these fragmented parcels had little immediate value for wildlife. Restoring this acreage to its natural, forested condition was a high priority for the Refuge but funding for restoration was not available. As described in our Project Design Document (“PDD”) for the Mingo Restoration Initiative, an innovative partnership with the Go Zero program emerged that used private funding to restore the biological integrity of the land, and at the same time, helped sequester carbon dioxide.

In early 2010, The Conservation Fund (“the Fund”) worked with the Service to plant native seedlings across 17 non-contiguous parcels, consisting of 367 acres, within Mingo NWR (the “Go Zero Tracts” or “the Tracts”) using donations from its Go Zero program. The Tracts have been managed by the Refuge as forested habitat for wildlife, including migratory waterfowl and the federally endangered Indiana bat (*Myotis sodolis*). Over their lifetime, these newly restored forests are expected to sequester thousands of tons of carbon dioxide equivalent (CO₂e) from the atmosphere. In addition to the benefits to biodiversity and climate, restoring these lands to their native habitat has helped stabilize the top soil and slow the rate of erosion, thereby reducing the sediment load into the extensive system of ditches and streams that feed into the St. Francis River. These restored lands also provide new recreational areas for public enjoyment.

The map below illustrates the locations of the Go Zero Tracts within the Refuge. These Go Zero Tracts constitute the Project Area.

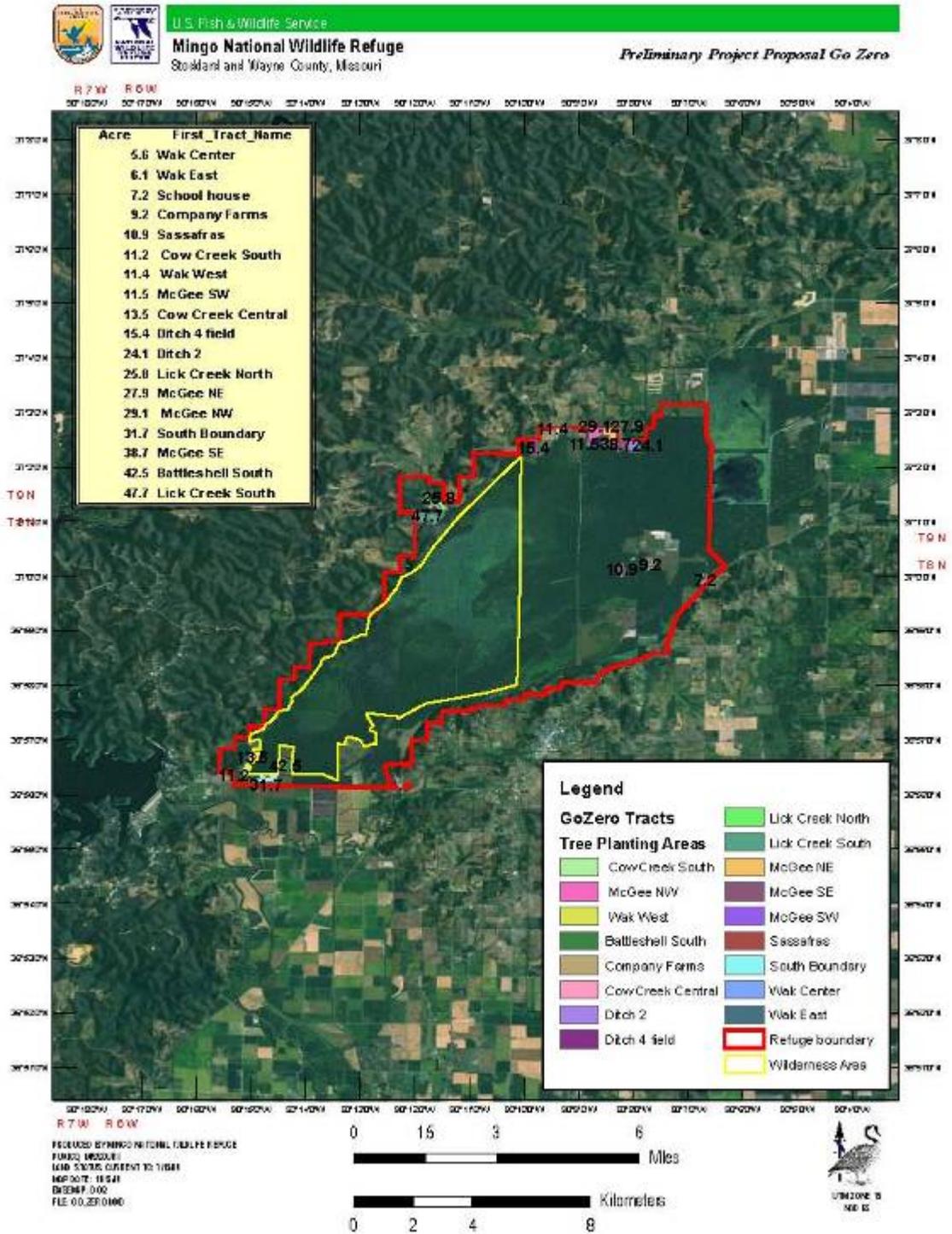


Figure 3: Map of Go Zero Tracts at Mingo NWR

Climate

Mingo NWR's climate is characterized by long, hot summers and fairly cool winters. Precipitation is generally heavy throughout the year and prolonged droughts are rare. Summer precipitation falls mainly in the form of afternoon thunderstorms. Total annual precipitation is 48 inches and about half of this falls between April and September. The average annual snowfall is 11 inches. The average winter temperature is 37 degrees Fahrenheit, and the average daily minimum temperature is 28 degrees. In summer, the average daily temperature is about 78 degrees and the average daily maximum temperature is 90 degrees.¹

There have been some significant weather fluctuations at the Refuge since the trees were planted in March 2010. In the summer of 2010, the Refuge experienced a long period of drought. This was followed by a significant flood event in 2011 and another fairly dry spell in 2012. Despite this atypical weather pattern, the project has yielded very good survival rates.

For additional information, including soil, topography and hydrology information, please refer to this section in the Project Design Document.

G1.2 Vegetation

Please refer to this section in the Project Design Document.

G1.3 Project Boundaries of the Project Area and the Project Zone

The Project Area consists of 17 non-contiguous parcels within Mingo NWR. The locations and boundaries of these parcels are shown in Figure 3 in Section G1.1.

Mingo NWR is located within Stoddard and Wayne Counties and borders Butler and Bollinger Counties, and these four communities make up the Project Zone. The entire Refuge, which spans 21,592 acres, is included within this area. The boundaries and locations of these counties and their relationship to the Refuge are shown in Figure 2 in G1.1.

G1.4 Current Carbon Stocks at the Project Area

The global climate change benefits of reforestation projects are widely recognized. Land use change—especially deforestation—is a significant component of increasing atmospheric CO₂ levels and a cause of global warming.² Thus, restoring forestland represents a natural way to reduce these effects and combat climate change. The climate and soil conditions in the Lower Mississippi River Valley contribute to carbon sequestration rates that are among the highest in the United States.

¹ Mingo NWR Comprehensive Conservation Plan [hereinafter Mingo CCP], pp. 26

² IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

In order to quantify the carbon sequestration for the project, the Fund uses a sampling design that conforms to the methodologies of the Intergovernmental Panel on Climate Change's Good Practice Guidance (IPCC GPG). This sampling plan measures carbon stocks on a 5 year basis starting in year 10 using both fixed radius and variable radius plot designs. At this time, all of the seedlings are less than five years old. The Fund estimates that these lands currently store between 6 to 10 metric tons of CO₂e/acre. The carbon impact of the Mingo Restoration Initiative is estimated at 361 short tons / 327.5 metric tons of carbon dioxide equivalent per acre over one hundred years.³

We assume the soil carbon stocks will increase over time as tilling of the agricultural fields ceases and small and large woody detritus accumulates on the ground and is incorporated into the soil carbon pool. Soil carbon stocks will be estimated using lookup tables with default values. The default estimates of soil carbon conform to IPCC GPG Tier 2 requirements. The changes in soil carbon over the course of the project are expected to be relatively small and using a default approach is both cost-effective and efficient, as noted in CL3.1.

G1.5 Communities Located in the Project Zone

Please refer to this section in the Project Design Document.

G1.6 Current Land Use and Land Tenure in the Project Zone

Prior to restoration, all of the Go Zero Tracts were used for agricultural purposes at one time. Approximately 225 of the acres were managed for crops, primarily soybeans, at the time of planting. The remaining acreage was taken out of cropland by the Service during previous years and those areas were managed for hay production and grazing.

At the time the project was implemented in 2010, the Refuge used a standard contract system to allocate the use of agricultural lands on the Refuge. Farmers signed annual contracts with the Refuge each year in order to plant crops on Refuge lands. Beginning in 2015, the process for allocating farmland at Mingo NWR will change. Farm fields won't be given to the same farmers year after year. Instead, there will be a bid system and each farmer will be able to bid an amount per acre to farm the lands; the highest bid will win the rights to the farmland. There are no restrictions on who can bid, but farmers must agree to adhere to all Refuge rules regarding chemical usage.

These changes to the farming system at Mingo NWR are occurring against the backdrop of region-wide changes to the Refuge farming programs. Farming on Refuge lands has become increasingly controversial as concerns about the use of farming-related chemicals, like fertilizers and pesticides, have grown. Region 3 recently assembled a team to develop new regional policies for the farming program. The Refuge Manager at Mingo NWR was on the team, which looked at current policies across the nation and then created a regional guidance document for farming policy. Overall, land is

³ Shoch, D., Kaster, G., Hohl, A. and R. Souter. Carbon sequestration potential of bottomland hardwood afforestation in the Lower Mississippi Valley, U.S.A. *Wetlands* 29 (2), 535–542.; Smith, J.E., Heath, L.S., Skog, K.E. and R.A. Birdsey. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. USDA Forest Service, Northeastern Research Station. Newtown Square, Pennsylvania, USA. Gen. Tech. Rep. NE-343.

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increasingly being removed from farming programs across Refuges throughout the Region, as agricultural lands no longer fit as well into Refuge management plans.

For additional information on land tenure and land use in the Project Zone, please refer to this section in the Project Design Document.

G1.7 Current Biodiversity in the Project Zone

Please refer to this section in the Project Design Document.

G1.8 High Conservation Values within the Project Zone

Please refer to this section in the Project Design Document.

G2. BASELINE PROJECTIONS

Please refer to these sections in the Project Design Document.

G3. PROJECT DESIGN AND GOALS

G3.1 Project Scope and Summary of Goals

The scope of the Mingo NWR Restoration Initiative included restoring approximately 367 acres of land to bottomland hardwood forest by planting it with native tree species. The three primary goals of the project are to decrease the effects of climate change via carbon sequestration, restore southeastern Missouri's bottomland hardwood forest ecosystem and its biodiversity, and create long-term community benefits in the form of recreational lands under the management of USFWS for hunting, fishing, wildlife photography, wildlife observation, environmental education and environmental interpretation.

G3.2 Description of Project Activities

The project activities listed in our Project Design Document include site preparation, planting, project monitoring and validation/verification.

Site preparation and planting were completed in March 2010. The project was validated against the CCBA standards and received Gold Level validation in May 2010. The Service, along with the Fund and its partners, has been monitoring the climate, community and biodiversity impacts of the project over the course of the project's lifetime. The monitoring results are described in their respective sections below.

G3.3 Project Location

The Project Area consists of 17 non-contiguous parcels within Mingo NWR as shown in Figure 3 in G1.1. The Project Zone consists of the entire Mingo NWR, which spans 21,592 acres. The Refuge is located within Stoddard and Wayne Counties and borders Butler and Bollinger Counties. The boundaries and locations of these counties and their relationship to the Refuge are shown in Figure 2 in Section G1.1.

G3.4 Project Timeframe

As stated in the PDD, the Fund planted the Go Zero Tracts with native bottomland hardwood trees in late winter/early spring 2010. The project start date is March 2010.

USFWS owns the land and will provide long-term management of the land and the trees. The accounting period for the carbon offsets generated on the Go Zero Tracts is 100 years.

G3.5 Risks to Climate, Community and Biodiversity Benefits

Please refer to this section in the Project Design Document.

G3.6 Maintenance of High Conservation Values

The National Wildlife Refuge System Improvement Act of 1997 requires each refuge to develop a Comprehensive Conservation Plan (“CCP”) for achieving refuge objectives consistent with sound principles of fish and wildlife management, conservation, legal mandates, and USFWS policies. Management activities are then selected based on their efficacy in accomplishing refuge objectives. CCPs are reviewed annually, and management activities are modified whenever the annual review or other monitoring indicates that the CCP needs changing to achieve the goals or purpose of the Refuge. The CCP process is designed to generate reliable feedback to help guide management decisions on the Go Zero Tracts and maintain the high conservation values that exist within the Project Zone.

The Mingo NWR CCP specifically listed increasing the bottomland hardwood acreage on the Refuge as part of its overall forest management plan and describes the Refuge’s intent to more actively manage bottomland forest habitat to benefit forest-dependent wildlife, especially migratory waterfowl, neotropical migratory birds and mammals.⁴ In order to accomplish this, Mingo NWR engages in careful and comprehensive conservation planning using the guidance provided by migratory bird conservation initiatives that have developed around the region, including the Lower Mississippi Valley Joint Venture, which strives to increase populations of waterfowl and other wildlife by protecting, restoring and enhancing habitats within the Joint Venture Region.⁵

G3.7 Measures Taken to Enhance Benefits Beyond Project Lifetime

For each Go Zero project, the Fund works with the nation’s leading public natural resource agencies, such as USFWS, to ensure that trees are planted in protected areas that have long-term management plans to ensure accuracy and certainty of carbon sequestration. Under the renewed Memorandum of Understanding (“MOU”) (attached as Exhibit A) between USFWS and the Fund, and described further

⁴ Mingo CCP, pp. 58-59.

⁵ Mingo CCP, pp. 22. Mingo NWR is in the Lower Mississippi Valley Joint Venture, one of 12 habitat-based joint ventures designed to reach its objectives through a combination of efforts by private, state and federal entities within defined geographic areas. The Lower Mississippi Valley Joint Venture strives to provide habitat for over-wintering waterfowl within the Mississippi Alluvial Valley and West Gulf Coastal Plain Bird Conservation Regions.

in Section G5, the Service has agreed to provide long-term protection and management of Go Zero projects under natural conditions and according to best wildlife and habitat management practices.

As described in previous sections, the Go Zero Tracts are owned and managed by USFWS for long-term monitoring and stewardship. USFWS receives federal appropriations to carry out its mission of conserving, protecting and enhancing fish and wildlife and plants and their habitats. These funds ensure the long-term sustainability of the project.

G3.8 Stakeholder Involvement

For each Go Zero project, the Fund works with an array of public and private partners to engage project donors, select and evaluate a project location, conduct site preparation, secure and plant the appropriate seedlings, monitor and measure the carbon accrued over time and facilitate the long-term use of the property (for the community and for wildlife).

The Mingo NWR Restoration Initiative defined these partners, or stakeholders, as those parties who 1) own the Go Zero Tracts (“the landowner”), 2) currently own property near the Go Zero Tracts (“the neighbor”), 3) were using the land prior to its restoration (“the leaseholder”), 4) were directly involved with site selection, acquisition, planting, biological monitoring, carbon monitoring or long-term management (“project implementers”), 5) donated to support the project (the “donors”) and/or 6) are members of local groups who use Mingo NWR (“community members”).

The table below illustrates the list of stakeholders and their roles. The roles have been updated to reflect the current phase of the project. The current stakeholders remain the same as those listed in the PDD, except that TerraCarbon has replaced ESI in the role of carbon sequestration consultant (see Section G4) and the tenant farmers who used to farm on the Refuge are no longer included because the Refuge farming program has been restructured (see Section G1.6).

Refuge management continues to complement the operation of the adjacent Duck Creek Conservation Area, which is managed by the Missouri Department of Conservation. While the Conservation Area and Refuge have distinct missions and management goals, they work cooperatively and communicate often with each other, recognizing that together they present a significant block of public conservation lands, which is beneficial for both wildlife and the public. Coordination between staff of the two properties is important for optimum natural resource management in the area. The Refuge and the Conservation Area do joint monitoring for waterfowl and eagles and assist each other with reptile monitoring.

The Mingo Swamp Friends group, an all-volunteer group dedicated to assisting Mingo NWR with its mission, is a community stakeholder. The Friends group hosts community and educational events on Refuge lands, and its members use the Tracts for events and activities. The Mingo Swamp Friends Group supports habitat management work on the Refuge and its volunteer program supports all aspects of Refuge operations including studies, habitat management, wildlife management, visitor services and outreach, and infrastructure maintenance and improvements.

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Table 1: Mingo NWR Restoration Initiative Stakeholders

NAME OF STAKEHOLDER	CONTACT INFORMATION	ROLE	RATIONALE	PROJECT PHASE
The Conservation Fund	Go Zero Manager 703-525-6300	Project Implementer	Managed restoration of the Tracts. Coordinates monitoring with USFWS and TerraCarbon	Project development and project implementation
The Conservation Fund donors	Confidential	Donors	Financial support of the project	Donations used to support project development and implementation
US Fish and Wildlife Service	Refuge Manager or Assistant Refuge Manager, 573-222-3589	Project Implementer/ Landowner	Directly involved with project planning and implementation; landowner and long-term steward of the forestland	Project development, implementation and long-term project management
TerraCarbon	TerraCarbon President, 1-309-693-9303	Monitoring and analysis	Involved with carbon monitoring and analysis	Project development, implementation and monitoring
Duck Creek Conservation Area (Missouri Dept of Conservation)	Duck Creek Conservation Area Biologist 573-222-3337	Neighbor	Directly involved with habitat management on the Tracts	Project Implementation
Mingo Swamp Friends	Mingo Swamp Friends President 573-837-8567	Local Community	The Friends group, whose mission is to support Mingo NWR, is an advocate for the Go Zero Tracts. Local citizens benefit from the restoration of land in Mingo NWR.	Project Implementation

Since the project was implemented, stakeholders continue to play active roles in the project. USFWS owns and manages all of the Go Zero Tracts. The USFWS, in conjunction with the Fund and its partners including TerraCarbon, performs monitoring on the Tracts. Community members use the Tracts for outdoor recreation and educational opportunities. The Refuge continues to coordinate management decisions with the Duck Creek Management Area. The Mingo Swamp Friends group is very active and the entire acreage of the Go Zero Tracts is open to some form of public recreation -- the areas are popular for hunting, bird watching and wildlife observation.

For additional information on stakeholder participation in project planning, please see this section in the original Project Design Document.

G3.9 Participation in CCBA Comment Period

This Project Implementation Report (PIR) will be made publicly available on the CCBA website and will be open to comments from the public. The PIR will also be available via the Refuge's website and its Facebook site and in hard copy through the Mingo NWR visitor center, ensuring that project documentation is available near the project site and available to local residents who do not have access to the Internet. In addition, all key documentation and information regarding the Mingo NWR Restoration Initiative is available on the Fund's website.

G3.10 Conflict Resolution Tools

Any grievances related to the Mingo NWR Restoration Initiative will be addressed by the US Fish and Wildlife Service. The USFWS is a public agency, and any individual may provide comments, grievances or complaints to public agencies at any time. All significant actions of a public agency are subject to public comment as required by NEPA. During a decision process, public meetings are held and/or public comment is solicited via news media, announcements, etc. As noted in Section G3.6 of the Project Design Document, bottomland hardwood restoration was included in the Refuge's Comprehensive Conservation Plan, which was vetted through the NEPA process. Local community members, including local citizens, non-governmental conservation organizations and employees of tribal, state and local agencies, have already been engaged in the CCP process.⁶ Two public scoping meetings were held to provide an opportunity to discuss issues related to the CCP with Refuge and planning staff, and concerns about Refuge plans were solicited and addressed.

The primary way to file a grievance regarding Refuge action is through the regulatory process outlined in the Code of Federal Regulations. The Refuge has a detailed appeals process that can be utilized by anyone who is adversely affected by any decision of the Refuge manager. If an individual disagrees with a Refuge decision (for example, to take away a permit) he or she has thirty days to notify the Refuge manager in writing that they do not agree with that decision. The Refuge Manager has 30 days to respond to the permit holder. The permit holder then has 30 more days to appeal to the Refuge Supervisor for Region 3 and shall be notified in writing within 30 days of the Supervisor's decision and can further appeal in writing to the appropriate regional director. The regional director's

⁶ Mingo CCP, pp. 10-11

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decision will be considered the final decision, and the appellant shall be provided an opportunity for oral presentation before the area manager or regional director within the respective thirty day appeal periods. In this way, the area manager and regional manager will function as mediators to resolve any conflicts.

It is very rare for community members to file grievances about the Refuge under the regulatory procedure. More commonly, community members will contact their local Congressperson and file a complaint with them. These complaints then filter down to the Refuge and the Congressional office asks for a response, which is provided by the Refuge.

Per communication with the Refuge staff, there have been no formal grievances to date about the Mingo NWR Restoration Initiative. There have been concerns about the changes to the Refuge's farming program, but these have been unrelated to the restoration project itself.

G3.11 Project Financial Support

As stated in the PDD, the Mingo NWR Restoration Initiative is made possible by donations to the Fund's Go Zero program. Before the project was initiated, a budget was developed to ensure that the donations would cover all of the costs of the project, including design, implementation, and long term monitoring.

G4. MANAGEMENT CAPACITY

G4.1 Project Proponent

The Fund and USFWS jointly manage aspects of the Mingo NWR Restoration Initiative. The National Wildlife Refuge System, managed by the USFWS, is the world's premier system of public lands and waters set aside to conserve America's fish, wildlife and plants. The Refuge System has grown to more than 158 million acres, including over 560 refuges and 38 wetland districts. Refuge management is the core business of the Service, and it will manage the Go Zero tracts for the life of the project.

The Fund is one of the nation's foremost environmental nonprofits dedicated to protecting America's most important landscapes and waterways for future generations. Since its founding in 1985, the Fund has helped its partners safeguard wildlife habitat, working farms and forests, community greenspace, and historic sites totaling more than 7 million acres nationwide. The Fund's carbon sequestration programs, including, but not limited to Go Zero, have helped to restore more than 10 million trees across 25,000 acres that will trap an estimated 10 million tons of CO₂e over 100 years. For the Mingo Restoration Initiative, the Fund organized and developed the project, managed the planting and served as the lead to secure all of the project financing.

During the early phases of design and implementation, the Fund worked with Environmental Synergy Inc. (ESI) to provide planting and monitoring services across the Tracts. In Fall 2010, ESI dissolved, and the Fund contracted with TerraCarbon LLC to provide monitoring services for the Mingo Restoration Initiative. TerraCarbon professionals have decades of experience working with federal, state and non-profit partners on state-of-the-art carbon sequestration science and restoration of

ecologically damaged ecosystems. TerraCarbon employs some of the same field team as ESI, as well as some of the same carbon analysts, so continuity has been maintained over the life of the project.

G4.2 Management Capacity and Expertise

The scale of the Mingo Restoration Initiative is well within the management capacity of the Fund, USFWS, and TerraCarbon. As stated above, all of these organizations have a great deal of previous experience managing and monitoring forest carbon projects. In addition to the validation of the Mingo Restoration Initiative, the Fund - in partnership with the USFWS - has four more projects validated under the CCBA standards at the Gold Level. Two of these projects have already successfully completed the five year verification process. TerraCarbon is now providing carbon monitoring services for all five projects.

G4.3 Capacity Building

As noted in the PDD, this project will increase knowledge transfer across the public and private sectors regarding the science of carbon sequestration via reforestation. USFWS employees at both the regional and national levels have been successfully leveraging the private dollars that result from these carbon sequestration projects as a way to facilitate acquisition and restoration of public lands. USFWS employees exchange lessons learned and best management practices for carbon sequestration projects, allowing for the successful replication of projects in other communities. Members of the Go Zero project team have been instrumental in this information exchange and have attended workshops to share lessons learned about conducting carbon projects on Refuge lands. Go Zero team members have also worked with regional Service staff to explore other types of carbon sequestration projects, such as those involving peatlands, on other Refuges.

The Service recently published a Biological Carbon Sequestration Accomplishments Report, highlighting the carbon sequestration projects implemented by, or in partnership with, the Service from 2009-2013 (attached as Exhibit B). The Mingo Restoration Initiative is featured in the report as an example of a successful biological carbon sequestration project that has conferred multiple benefits on the surrounding community including improved water quality, floodwater storage, and public recreation opportunities, in addition to climate change mitigation. This report was intended to increase awareness and capacity throughout the Service regarding the successful implementation of carbon projects.

G4.4 Community Employment Opportunities

The Go Zero projects have provided educational and employment opportunities to the surrounding community, particularly college students and graduate students from the area, including Missouri State University and Southeast Missouri State University. Graduate students from these schools have assisted Refuge staff with implementation and monitoring on the Go Zero Tracts. One recent graduate student from Southeast Missouri State, who was participating in the Fish and Wildlife Pathways Program, recently completed a paid internship at the Refuge and assisted with work on the Tracts. For each of the past two summers, the Refuge has had a graduate student from the National Great River Research Center internship program assist with the breeding bird surveys. These interns are provided with room and board and earn a stipend for their work.

The Forest Service runs the nearby Mingo Job Corps program. The Refuge has not used participants from the Mingo Job Corps recently because they've had other students working on site, but the Mingo Job Corps could provide interns in the future.

Inclusion of Women

While federal laws are in place to protect the ability of all groups to participate in the project, women have been instrumental in project design and implementation. Women make up a significant percentage of the Fund's Go Zero staff.

G4.5 Workers' Rights

Please refer to this section in the Project Design Document.

G4.6 Worker Safety

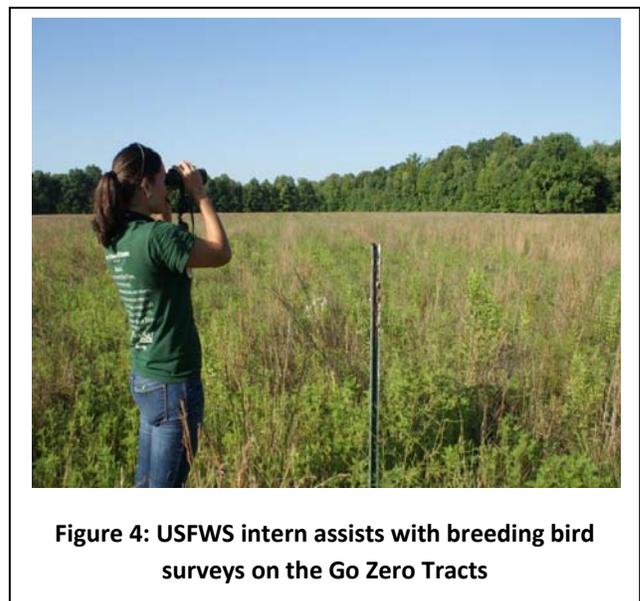
Please refer to this section in the Project Design Document.

G4.7 Financial Health of Implementing Organization

USFWS is a financially stable agency within the United States government, funded through federal appropriations, and does not pose a financial risk to the longevity of the Mingo NWR Restoration Initiative.

The Fund leverages conservation dollars from our public and private partners, saving taxpayers more than \$1 billion in land purchase costs to date on lands valued in excess of \$5 billion. The Fund puts an average of 96 percent of its budget directly into conservation programs and just 1 percent into fundraising. The Fund is recognized as one of the nation's top environmental organizations, and has earned an A+ rating from Charity Watch.

The Fund's work is made possible with generous support from individuals, foundations, corporations and government agencies. Its commitment to accountability and donor transparency remains a



cornerstone of its operations. Copies of the Fund's 2012 and 2013 Consolidated Audit and 2013 990 Tax Return can be found at: http://www.conservationfund.org/who_we_are/financials

G5. LEGAL STATUS AND PROPERTY RIGHTS

G5.1 Compliance with National and Local Laws

Please see this section in the Project Design Document for a description of significant legislation. In addition, a full list of federal laws and compliance requirements is included in the Mingo NWR CCP as Appendix E and included as an attachment to the PDD.

Memorandum of Understanding

In 2007, the Fund and USFWS signed a Memorandum of Understanding (MOU) pursuant to the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661-667e and the Fish and Wildlife Act of 1956, 16 U.S.C. §§ 742a – 742j. The Coordination Act authorizes the Service to “provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat . . .” 16 U.S.C. § 661.

The Fund renewed the MOU with USFWS in 2010 (see Exhibit A) recognizing the Fund's ability to plant and restore land on National Wildlife Refuges.

G5.2 Approval from Appropriate Authorities

As stated in G5.1, the Fund and the Service have an MOU, attached as Exhibit A, allowing Go Zero restoration projects to take place on any National Wildlife Refuge within the United States.

G5.3 Free, Prior, and Informed Consent

Please refer to this section in the Project Design Document.

G5.4 Involuntary Relocations

The Mingo NWR Restoration Initiative did not require the involuntary relocation of people or activities. The Service owned (and still owns) all of the Tracts restored as part of the Mingo NWR Restoration Initiative. The farmers who were previously leasing the Go Zero Tracts were offered new opportunities for farming on some of Mingo's moist soil units and in other areas of the Refuge. They continued farming on these new areas each year through 2013. In 2014, one farmer decided to stop farming on the Refuge altogether. This individual has a good deal of private farmland that he was already farming and the Refuge land was too much on top of it. The other farmer thought the fields were too wet in 2014; he had a permit but declined to do any actual farming. Next season, the farming program at Mingo NWR will be structured differently due to changes in USFWS regional policy (see Section G1.6).

G5.5 Illegal Activities

Please refer to this section in the Project Design Document.

G5.6 Carbon Rights

The Go Zero program was created as a philanthropic approach to offsetting the annual carbon dioxide emitted by a specific activity, business, organization or individual. All carbon accrued by Go Zero projects is withheld from the regulated carbon markets and cannot be banked for future offset purposes, traded, or sold by Go Zero donors in the future. The MOU between the Service and the Fund makes clear that the goal of the Go Zero program and partnership is to generate support for forest restoration projects without generating carbon sequestration credits that can be sold or traded.

CLIMATE SECTION

CL1. NET POSITIVE CLIMATE IMPACTS

CL1.1 Net Change in Carbon Stocks

The original estimation of net changes in carbon stocks for the Mingo Restoration Initiative was drawn from ESI's experience over ten years in measuring carbon accumulation in the Lower Mississippi Valley. ESI was initially contracted by the Fund to plant the project area, to measure the baseline conditions, and to monitor the project's ongoing carbon gains. In 2007, The Nature Conservancy led an extensive research effort to build upon earlier predictive models of carbon sequestration in this



Figure 5: One of the young Go Zero Tracts surrounded by mature forests at Mingo NWR. The Go Zero reforestation project will reduce forest fragmentation on the Refuge. Photo credit: USFWS.

region. The 2007 initiative involved a consortium of leaders in forest science and carbon project development, drawing on expertise from representatives of ESI, Winrock, The Nature Conservancy, the Yale School of Forestry and Environmental Studies, the USDA Forest Service Center for Bottomland Hardwoods Research in Stoneville, Mississippi and the U.S. Geological Survey. The team amassed the most comprehensive dataset of bottomland hardwood stands yet assembled for the region, drawing on 540 biomass plot measurements, and produced the most reliable predictive model to date.

This research is specific to a geographic band within the Lower Mississippi Alluvial Valley. Mingo NWR is on the periphery of this region and USFWS and ESI staff agreed that the bottomland hardwood tree species, soils and growth patterns at Mingo NWR are similar to those in the Alluvial Valley. Due to these ecological similarities, the predictive model was applied to the Mingo NWR Restoration Initiative. The model, using the new empirical biomass data together with forest inventory data represented in USDOE 1605(b) tabular estimates for minor pools (e.g., dead wood, understory and soil carbon), predicts 259 metric tons of CO₂ equivalent per acre (i.e., 286 short tons per acre) at year 50, and 327.5 metric tons of CO₂ equivalent per acre (i.e., 361 short tons per acre) at year 100. The annualized average for the first 50 years is 5.2 metric tons of CO₂ equivalent per acre per year

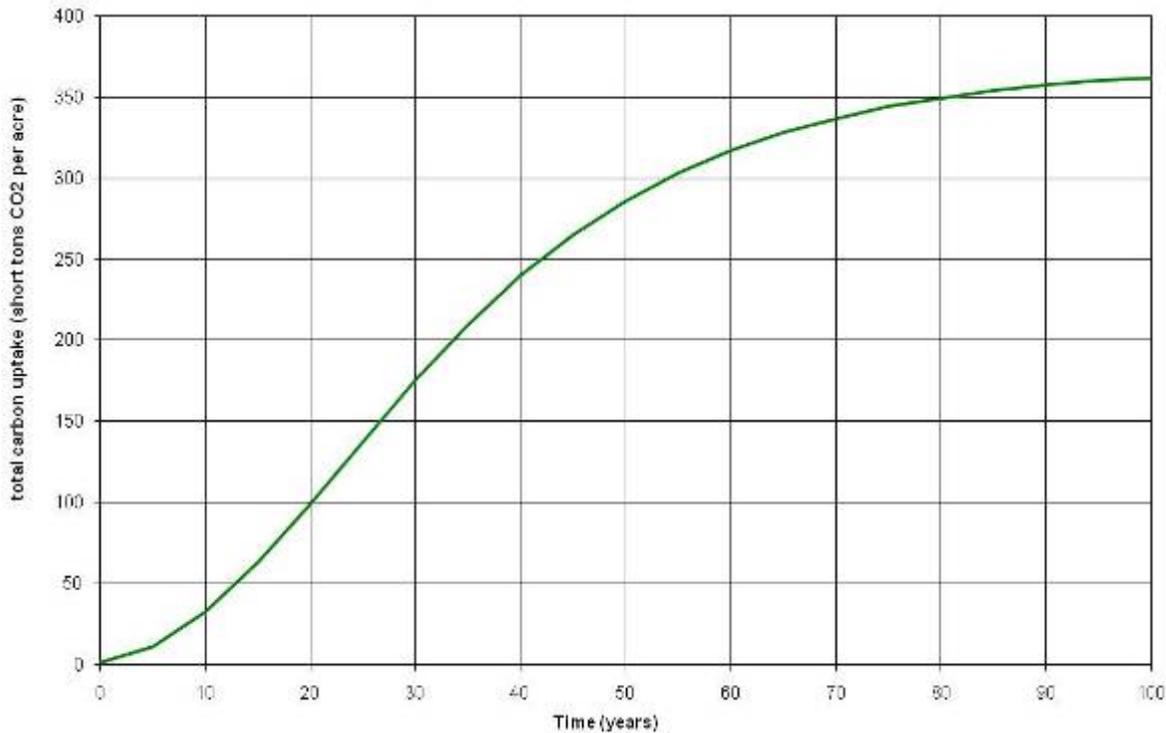
THE CONSERVATION FUND

(i.e., 5.7 short tons of CO₂ equivalent per acre per year). The results were vetted through a rigorous internal peer review process and were published in the journal *Wetlands* (attached as Exhibit C). Table 2 illustrates the results of this research.

Table 2: Tabular data of projected carbon curve over 100 year period of LMV bottomland hardwood forest. (courtesy David Shoch, TerraCarbon LLC)

Shoch et al 2009		USDOE tables			(metric)	(short tons)
Stand age	Live tree Biomass, tC/ha	Soil	Dead Wood and Understory	TOTAL	t CO ₂ -e/ac	t CO ₂ -e/ac
0	0.8	0	0.0	0.8	1	1.4
5	4.8	0.1	1.9	6.8	10	11.2
10	14.4	0.5	5.0	19.9	30	32.6
15	29.8	1.1	7.6	38.5	57	63.0
20	49.3	1.9	9.4	60.6	90	99.0
25	70.4	2.9	10.9	84.2	125	137.6
30	90.9	4	12.1	107.0	159	175.0
35	109.6	5.1	13.3	128.0	190	209.3
40	125.7	6.2	14.6	146.5	217	239.5
45	139.1	7.3	15.5	161.9	240	264.7
50	149.9	8.3	16.6	174.8	259	285.8
55	158.5	9.2	17.6	185.3	275	302.9
60	165.2	10.1	18.4	193.7	287	316.7
65	170.3	10.7	19.4	200.4	297	327.8
70	174.3	11.3	20.2	205.8	305	336.6
75	177.4	11.8	21.0	210.2	312	343.7
80	179.7	12.2	21.6	213.5	317	349.1
85	181.4	12.4	22.4	216.2	321	353.5
90	182.7	12.7	23.2	218.6	324	357.5
95	183.7	13	23.2	219.9	326	359.6
100	184.5	13.3	23.2	221.0	328	361.3

Figure 6: Predictive model for carbon sequestration in bottomland hardwoods in the Lower Mississippi Valley Region



Pre-project carbon stocks

Pre-project carbon stocks (i.e., on the lands prior to reforestation) in woody biomass are zero. Generally, in afforestation or reforestation projects, non-woody (herbaceous) biomass carbon is neglected and assumed to be equal in the baseline and the “with-project” case; hence there is no need to quantify. Thus, the only baseline carbon stock is the soil carbon. Future soil monitoring will not be based on soil measurements but instead will be based on default estimates taken from USDOE 1605(b) tables.

Monitoring Plan and Compliance with the IPCC Good Practice Guidelines⁷

The monitoring plan used by the Fund for bottomland afforestation projects in the Lower Mississippi Valley follows general principles of carbon accounting provided in Chapter 4 (AFOLU; Agriculture, Forestry and Other Land-use) of the IPCC 2006 Guidelines for National Greenhouse Gas Inventories and IPCC Good Practice Guidance (IPCC GPG 2003), specifically Chapter 4.3 Guidance for Projects.

Over the life of the project, carbon sequestration estimates will be based on direct measurements of the trees on permanent plots. Estimates of dead wood, litter, and soil carbon pools will be based on regional default estimates published by the US Forest Service. This approach uses both Tier 3 (direct measurements) and tier 2 (country or region specific default values) data to estimate carbon stocks.

⁷ David Shoch of TerraCarbon and ESI provided the following description.

This measurement approach is applied in quantifying baseline stocks against which net project performance will be tracked. For the original baseline estimates, on-the-ground observations served to confirm the absence of woody biomass. The monitoring plan was designed and implemented to quantify carbon stocks in terrestrial pools (above and belowground biomass, standing and lying dead wood, mineral soil carbon). Over the life of the project, carbon stocks can then be determined as the difference in the current carbon stock and stocks measured at the initiation of the project (i.e. the baseline carbon stock). This focus on measuring stocks (rather than fluxes) is designed for stock change accounting advocated by the IPCC.

In further conformance with IPCC guidance regarding explicit quantification of uncertainties and reducing uncertainties, the monitoring plan is designed to quantify and control for uncertainty in estimates by employing optimum sampling intensity and unbiased allocation of measurement plots to produce estimates with a known level of confidence.

Finally, per IPCC 2006GL guidance, the monitoring plan includes a Quality Assurance/Quality Control (QA/QC) plan to control for errors in sampling and data analysis. This QA/QC plan provides documentation and consistency in data archiving thus permitting efficient third-party auditing and evaluation against measurement and quantification standards over the life of monitoring. The Fund maintains a database of GIS coverages detailing parcel boundaries and plot locations, and raw field measurements and analyses permitting independent review of source data over the life of the project.

CL1.2 Net Change in Non-CO₂ gases

As we stated in the PDD, non-CO₂ gases are not expected to account for more than a 5% increase or decrease of the Mingo NWR Restoration Initiative's overall greenhouse gas ("GHG") impact and are not considered significant.

CL1.3 Other GHG Emissions from Project Activities

There were no significant GHG emissions that resulted from the project activities. Any emissions generated by the tractors during planting were minimal and are covered by a buffer pool that has been permanently set aside; this buffer should be large enough to account for any impacts that might reduce the total carbon accumulation generated by this project

CL1.4 Positive Net Climate Impact

The climate model predicts a net climate impact of 259 metric tons of CO₂ equivalent per acre (i.e., 286 short tons per acre) at year 50, and 328 metric tons of CO₂ equivalent per acre (i.e., 361 short tons per acre) at year 100. The annualized average for the first 50 years is 5.2 metric tons of CO₂ equivalent per acre per year (i.e., 5.7 short tons of CO₂ equivalent per acre per year).

CL1.5 Avoidance of Double Counting

All of the carbon benefits generated by the Mingo NWR Restoration Initiative have been withheld from regulated greenhouse gas markets and are retired upon their sale. The Fund uses an online database system to track all offset tons and their disbursement to buyers. Once tons have been allocated to a particular site, they are retired and made unavailable for sale to other buyers. This system is kept on

secure servers at Fund headquarters. In addition, all Go Zero contracts and marketing materials state that all carbon accrued by Go Zero projects is withheld from the carbon market and cannot be banked for future offset purposes, traded, or sold by Go Zero donors in the future.

CL2. OFFSITE CLIMATE IMPACTS (“Leakage”)

CL2.1 Types of Leakage

It is unlikely that leakage due to this project will be a major concern. According to a white paper published by the Offset Quality Initiative, reforestation and afforestation projects are less likely to be affected by potential leakage impacts than other carbon projects.⁸ In this case, the primary concern is that because lands were taken out of agricultural production, the tenant farmers who previously used the land may clear healthy forests to create more viable agricultural lands offsite. However, the Refuge staff has been in continuous contact with the tenant farmers and they have not cut any forests to create new agricultural lands. These actions are representative of an overall trend; cropland use in the region as a whole has been declining since 1950.⁹ Therefore, no activity shifting leakage should be expected as a result of this project.

The Fund does not believe that market leakage effects will be significant. One reason for this is that timber harvest volumes will not be affected by the project. The Fund also does not expect any other measurable leakage effects.

CL2.2 Mitigation of Negative Offsite Impacts

Because no offsite impacts attributable to project leakage are anticipated, no direct actions have been necessary to mitigate their effects.

CL2.3 Net Effect of Climate Impacts

The Fund does not expect any leakage to occur; therefore, no adjustment was made to the Net Climate Impact figures seen in CL1.4

CL2.4 Non-CO2 GHGs

The Fund does not expect there to be any non-CO2 offsite effects.

CL3. CLIMATE IMPACT MONITORING

CL3.1 Monitoring Plan

⁸ Ensuring Offset Quality: Integrating High Quality Greenhouse Gas Offsets into North American Cap-and-Trade Policy. July, 2008. The Offset Quality Initiative. Available: <http://www.offsetqualityinitiative.org/index.html>

⁹ Brown, D. G., K. M. Johnson, et al. (2005). "Rural Land-Use Trends in the Coterminous United States, 1950-2000." *Ecological Applications* 15(6): 1851-1863.

Background

The original monitoring plan that governed the Mingo Restoration Initiative was developed in 2001 by Winrock for ESI with the objective of establishing a scientific basis for measuring carbon stock changes over time on reforestation sites with similar characteristics in the Lower Mississippi Alluvial Valley (“LMAV”). The Go Zero Tracts were part of the “umbrella population” of monitored tracts, referred to as the “Monitoring Umbrella.” The monitoring umbrella provides a coordinated system for tracking carbon sequestration on similar projects distributed across the Lower Mississippi planting region. The benefit is that the Mingo site belongs to a larger monitoring population that allows for distributing the substantial costs of monitoring among component tracts while producing robust results that apply across the entire population of tracts.

Beginning in 2011, the Fund adopted a new monitoring plan to streamline the monitoring of Conservation Fund CCBA Go Zero projects. This new monitoring plan still uses the umbrella population concept to improve sampling efficiency but the population is now limited only to CCBA projects initiated by the Fund. Each Conservation Fund CCBA project serves as its own stratum and combining these stratum level estimates of carbon stocks will result in less sampling effort and higher accuracy across the full population than would be required if each project was treated separately.

Precision Levels

The number of monitoring plots, together with the spatial variability, determines the precision of the carbon measurements in biomass and soils. Based on an initial assessment of variability, the original ESI monitoring plan has been designed with a sufficient sample size to produce estimates of total carbon per unit area within +/- 10% of the mean with 90% confidence. The new 2011 monitoring plan is designed to estimate carbon accrual with accuracy within 10% of the mean at the 95% confidence level beginning in year 20.

Monitoring Protocol

ESI’s original monitoring protocol for the Go Zero Tracts consisted of three components: (I) base-year analysis (i.e., to determine soil carbon stocks and establish permanent monitoring plots); (II) tree survival analysis and; (III) measurement of carbon stocks after the tenth growing season. The new monitoring protocol also covers each of these components, as described below.

1. Baseline analysis and soil carbon

While the ESI monitoring plan involved direct soil measurements, the new monitoring plan will use default estimates of soil carbon accrual as opposed to direct sampling estimates of soil carbon. The default estimates of soil carbon conform to IPCC GPG Tier 2 requirements. The changes in soil carbon over the course of the project are expected to be relatively small and using a default approach is both cost-effective and efficient.

2. Tree survival analysis

In summer 2014, the Refuge Biologist performed a survival analysis of the Go Zero Tracts at Mingo NWR. This analysis checked the survival of trees found in pre-established plots

throughout the planted area. The analysis showed rates of survival for this project higher than 60%.

3. Monitoring of soil and tree biomass carbon during the project

The original ESI monitoring plan described on-site measurements beginning in the eleventh year following planting. That plan has been replaced with a new monitoring plan that will have a limited survival sample measured in year five (2015). The limited sample will assess tree survival to determine if replanting is necessary to assure adequate carbon sequestration. Starting in year 10, a fixed area plot design will be used and all trees within the fixed area plot will be measured on a 10 year repeat cycle. Variable radius plots using the same plot centers as the fixed area plot locations will also be measured on a 10 year cycle five years after the fixed area plots are measured to allow us to track carbon stocks between the fixed area plot sampling. Project monitoring will measure and quantify carbon stocks in aboveground and belowground live tree biomass. Dead wood, litter and soil carbon stocks will not be monitored; changes in these pools will be determined using default values adapted from Table B49; Smith et al., 2006¹⁰ and used in the USDOE 1605(b) tables.

Quality Assurance/Quality Control

The new TCF monitoring plan includes specific Quality Assurance/ Quality Control measures to control errors in sampling and data analysis and to provide documentation and consistency in data archiving. This enables efficient third-party auditing and evaluation against measurement and quantification standards.

Leakage Monitoring

The Refuge staff has been in contact with the tenant farmers that were previously farming the Go Zero Tracts. As stated in Section CL2, they have not cleared any land for agriculture as a result of their loss of access to the Go Zero Tracts.

CL3.2 Monitoring Plan Development

As outlined above, the Fund, in conjunction with the Refuge and TerraCarbon, developed a long term climate monitoring plan for the Mingo NWR Restoration Initiative in accordance with CCBA standards. The plan is being implemented as documented in this Section.

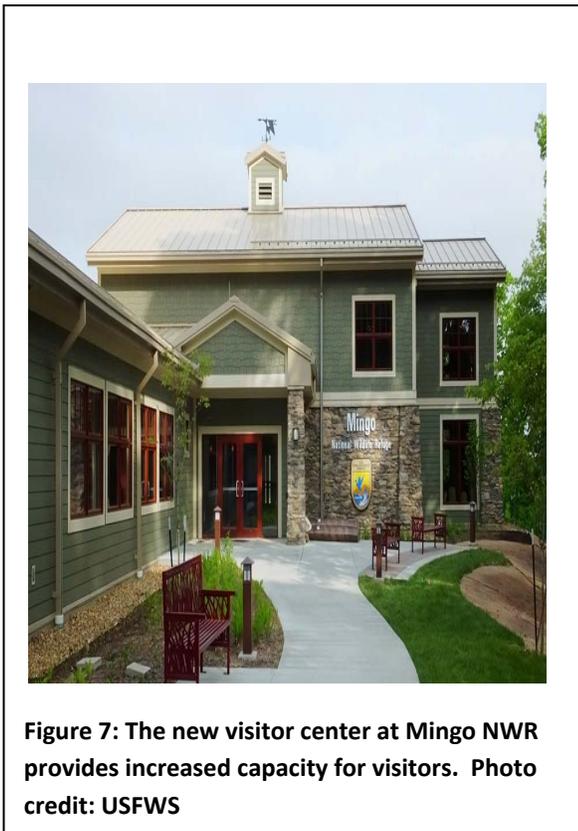
¹⁰ Smith, J.E., Heath, L.S., Skog, K.E. and R.A. Birdsey. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. USDA Forest Service, Northeastern Research Station. Newtown Square, Pennsylvania, USA. Gen. Tech. Rep. NE-343.

COMMUNITY SECTION

CM1. NET POSITIVE COMMUNITY IMPACTS

CM1.1 Community Benefits

The Refuge provides numerous recreational opportunities to the local community, including hunting, fishing, wildlife photography and observation, environmental education and interpretation. The majority of recreation on the Refuge is oriented toward birding, fishing or waterfowl and game hunting.



Paddling down the Mingo River is also popular. Since the PDD was published, Mingo NWR has increased its capacity to provide services to local citizens. In 2013, a new Visitor and Education Center opened at Mingo NWR, featuring interpretative displays, a theater, educational rooms for school programs, and a book and gift store. There is a display panel in the new visitor center that describes management actions at Mingo NWR and features the restoration project.

The Refuge has a Friends group, Mingo Swamp Friends, a non-profit organization and independent group of conservationists, outdoor enthusiasts and community members dedicated to supporting the primary purposes of the Refuge. The Friends group has always been active, but their activity has increased over the past year because of the new visitor center, which enables them to host larger and more frequent events, including events during National Wildlife Refuge week in autumn and the Eagle Days event each winter, as well as other programs aimed at visiting youth and community groups. During Eagle Days, over 2,000 individuals, including many school

groups, visit the Refuge and the neighboring Duck Creek Conservation Area for live eagle presentations, guided viewing tours of bald and golden eagles and their nests, and informational sessions. The Go Zero Tracts are used for the portion of the event that is dedicated to looking for live eagles on the Refuge. The Tracts' location along the road makes them a strategic and accessible location for eagle viewing.

The Go Zero Tracts, which were previously agricultural lands with minimal public recreation value, are now growing into forested lands that can be enjoyed by the public. All of the Go Zero Tracts on Mingo NWR are open to public recreation including some hunting but also bird watching and hiking. The quality of the visitor experience on the Refuge in the future will be improved due to the Tracts'

restoration, which will lead to improved water quality, improved forest and habitat conditions and increased wildlife species richness.

As stated in the PDD, the Go Zero project's positive community impact will be measured by monitoring the community use of the Go Zero Tracts over time. The surrounding community will be able to use the land for a variety of activities like those described above, including hunting, hiking, bird watching and special activity days. While changes will likely be very modest at first, it is anticipated that visitor use days will be positively correlated with the Tracts' stand development. As the stands develop into mature bottomland hardwood forest, activities such as hiking, bird watching, photography and hunting are expected to increase over time, and a rise in activity levels should lead to corresponding increases in overall fitness, health and wellbeing amongst community members. Along with increase in use, there should be an improvement in the quality of the experiences. As habitat improves (i.e. large comprehensive block of forest, fewer interior gaps and fragments), the quality of birding and hunting opportunities should improve.

Economic Benefits

The Mingo Restoration Initiative is also expected to have a positive economic impact on the neighboring community, including communities in the Project Zone. In October 2011, Southwick Associates published a study, commissioned by the National Fish and Wildlife Foundation, which found that \$1.7 billion in economic activity is generated through recreation use on National Wildlife Refuges, and for every dollar appropriated to management of the Refuge System, the Refuges generate \$975 in economic benefits.¹¹ Another study published by the National Fish and Wildlife Foundation, published in May 2013, found that the U.S. Fish and Wildlife Service contributed about \$4.2 billion in economic activity and supported over 32,000 jobs through their management of 553 National Wildlife Refuges and thousands of smaller natural areas in the United States.¹²

In October 2013, the Division of Economics within the Fish and Wildlife Service published a report entitled "Banking on Nature" that outlined the benefits to local communities of National Wildlife Refuge visitation.¹³ The report noted that the combined economic contribution to communities nationwide is almost five times the \$492 million appropriated to the Refuge System in FY 2011. By restoring and strengthening Mingo NWR, local residents will be able to enjoy an economic advantage that accompanies an area's elevated recreational status.

¹¹ *The Economics Associated with Outdoor Recreation, Natural Resources Conservation and Historic Preservation in the United States.* For: The National Fish and Wildlife Foundation. By: Southwick Associates, October 10, 2011.

¹² *The Conservation Economy in America: Direct Investments and Economic Contributions.* For: The National Fish and Wildlife Foundation. By: Southwick Associates, February 18, 2013.

¹³ *Banking on Nature: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation, Erin Carver and James Caudill, PhD., Division of Economics, US Fish and Wildlife Service, October 2013.*



Figure 8: Community members watching the sky during Eagles Days at Mingo NWR. Photo credit: USFWS

CM1.2 Impact on High Conservation Values

The Mingo NWR Restoration Initiative should have only positive effects on the High Conservation Values described in Section G1.8 in the Project Design Document. The bottomland hardwoods at the Refuge provide important ecosystem functions for the surrounding area including flood water storage and conveyance, filtration, and cycling of essential nutrients and minerals. Planting more bottomland hardwoods throughout the Refuge will only enhance these functions. Also, the Restoration Initiative will highlight the Refuge's role in the community as a place for local residents to appreciate their natural

surroundings and celebrate the outdoors through events like Eagle Days.

As noted in Section G4.3, the USFWS recently published a Biological Carbon Sequestration Accomplishments Report (attached as Exhibit B). This report, which features the Mingo Restoration Initiative, describes the many community benefits of forest restoration including reduced soil erosion, improved water quality, augmented floodwater storage, and increased public recreation lands.

CM2. OFFSITE STAKEHOLDER IMPACTS

CM2.1 Potential Negative Offsite Impacts

There have been no negative stakeholder impacts from restoring the Go Zero Tracts within Mingo NWR. Most of the land was previously leased to farmers for agricultural use on a year-to-year contract basis; two farmers were using the land for soybean production prior to project implementation. The Go Zero Tracts represented a small percentage of their overall acreage and the farmers were able to continue farming on other Refuge lands through 2014, as described in Section G5.4. County tax rolls were not impacted because the Go Zero Tracts were already owned by USFWS prior to the restoration activities.

CM2.2 Mitigation of Negative Impacts

As predicted in the PDD, there have been no negative impacts caused by the restoration of the Go Zero Tracts.

CM2.3 Net Stakeholder Impacts

As stated above in CM2.1, there have been no negative stakeholder impacts caused by the restoration of the Go Zero Tracts. To the contrary, restoring the Tracts to native forest has conferred many benefits on the surrounding community. Thus, the net effect on the community is positive.

CM3. COMMUNITY IMPACT MONITORING

CM3.1 Monitoring Plan

As described in the PDD, Mingo NWR staff will monitor the community benefits generated by the Mingo NWR Restoration Initiative, as described in CM1.1, with specific attention paid to the anticipated rise in community use of the Go Zero Tracts. As the seedlings develop into a mature bottomland hardwood forest, public activity on the Tracts, including hunting, birding, environmental education and celebratory events, is expected to increase. All of the Go Zero Tracts are open to hunting at some point during the year, and hunting conditions will be especially improved once the lands are restored. In addition, the Refuge is developing a scenic pull-out stop by one of the Tracts which is already along the Refuge’s existing auto tour. The pull-out stop will feature signage explaining the forest restoration processes taking place at Mingo NWR through the Restoration Initiative.

In the PDD, we predicted that as the seedlings developed into a mature bottomland hardwood forest, recreational activity on the Tracts, including hunting, bird watching and wildlife observation, would increase as illustrated in Figure 9 below. Community use of the Tracts (and the entire Refuge) for public recreation and enjoyment is a significant benefit of the Go Zero project and, therefore, an appropriate variable for community impact monitoring.

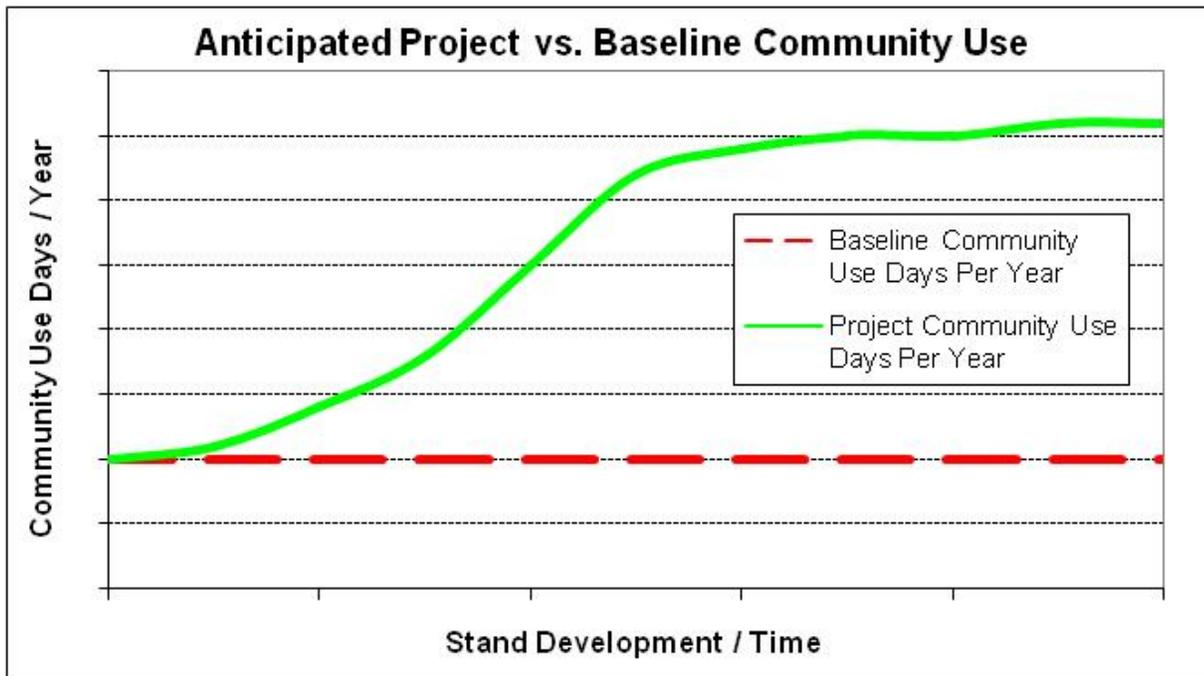


Figure 9: Anticipated Project vs. Baseline Community Use Over Time

As noted in the PDD, Mingo NWR tracks visitors to the Refuge through the use of car counters. There are about 8-10 car counters in place at different points within the Refuge, including one along the Refuge’s Ozark Highlands Tour Route, a one-way road which travels over 15 miles through the Refuge and is adjacent to many of the Go Zero Tracts. The Refuge has a car counter along this route

at a location near the Tracts and has collected data on the number of visitors using this route as described further in Section CM3.3.

CM3.2 High Conservation Value Monitoring Plan

The High Conservation Values associated with the Refuge's role as a community gathering place are being monitored by tracking visitor usage as described above. The ecological functions of the bottomland hardwoods are monitored using Refuge management plans and the processes described in Mingo's CCP.

CM3.3 Community Impact Monitoring Implementation



A detailed plan for monitoring community variables was prepared within 12 months of validation of the Project Design Document in accordance with CCBA Standards. As described above and in the monitoring plan, the Refuge uses a car counter to monitor visitors along its Ozark Highlands Tour Route, which runs from the southwest corner of the Refuge all along the west side of the Refuge and up along its northern border. This one-way route is adjacent to almost two thirds of the Go Zero Tracts. As noted in our monitoring plan, the Ozark Highlands Tour Route was completely upgraded in 2013. New asphalt was put down, two new bridges were put in place, and the entire length of the road was rehabilitated. Due to the construction, the road was closed for all of 2013 and reopened for use in June 2014.

The old Ozark Highlands Tour Route was only open for four months out of the year – April, May, October, and November – due to its poor condition. During FY 2010 (October 1, 2009 -

September 30, 2010) there were 6,726 visits recorded by the car counter over the course of those four months. During FY 2011 (October 1, 2010 – present), 6,478 visits were recorded. The reason FY11 is lower than FY10 is likely because the road was closed for most of May due to extreme flooding. There is incomplete data for 2012 and 2013 because the road was closed for construction.

The newly upgraded Ozark Highlands Tour Route will be open 9 months out of the year (closed only December-February) which will allow for many more visitors to the Go Zero Tracts. So far, there has been an average of 1,175 vehicles per month for the first four months the road has been opened (June- September). If this rate continues, over 10,000 vehicles will be expected for this fiscal year. The new road construction has allowed a significant increase in visitors to the Tracts.

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The Refuge manager has also observed individuals using the Go Zero Tracts for recreation. The Refuge manager has said the primary recreational use of the Tracts is for deer hunting and all of the Go Zero Tracts are open to deer hunting. As the weather gets colder, the Refuge Manager expects to see more people using the Tracts for bird watching now that the bird communities on the Tracts represent a more diverse cross section of species.

BIODIVERSITY SECTION

B1. NET POSITIVE BIODIVERSITY IMPACTS

1.1 Biodiversity Impacts

In our PDD, we noted that the Mingo Restoration Initiative restored key parcels within the boundary of Mingo NWR and will have significant positive effects on biodiversity and the wildlife that depend on bottomland hardwood forests. Mingo NWR was established to protect migratory birds but the agricultural tracts could not support a large variety of birdlife; many bird species require habitat that includes complex vertical and horizontal structure for nesting or foraging. Because land cover at Mingo NWR was primarily mature forest or grasslands, birds that depended on early and mid-successional forests were particularly in need of new habitat area.

As noted in our PDD, research on avian colonization has shown that bird species richness rises as bottomland hardwood forests age due to an increase in this structural complexity.¹⁴ The newly planted forests will provide the complex habitat necessary for successful breeding, nesting, and overall survival. The new forests will also minimize the threats to many species posed by the brown-headed cowbird—a brood parasite which thrives in open habitat—by reducing forest fragmentation. Habitat fragmentation negatively impacts species migration, breeding and overall survival rates; fragmentation due to land conversion has led to the decline of many avian species.¹⁵

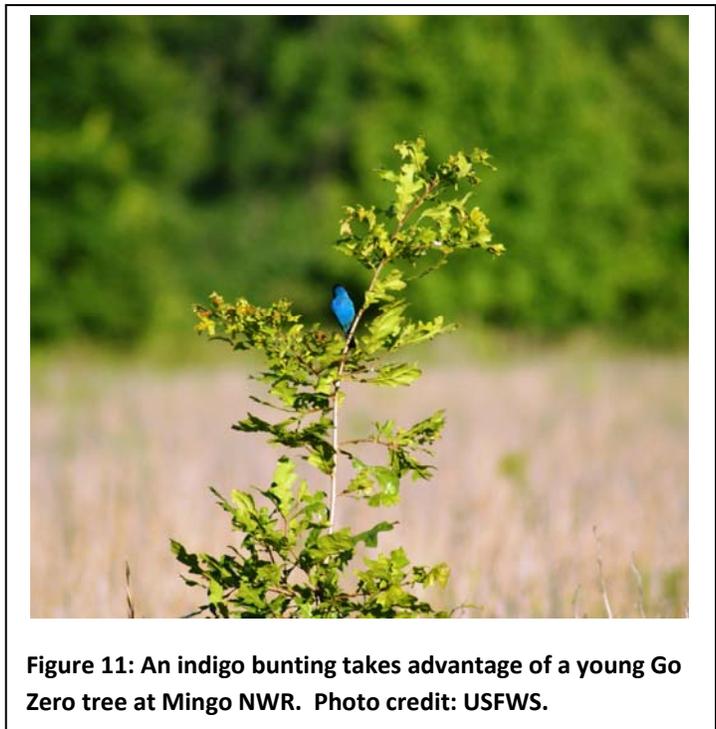


Figure 11: An indigo bunting takes advantage of a young Go Zero tree at Mingo NWR. Photo credit: USFWS.

Figure 12 below illustrates the anticipated increase in bird species richness as a result of the Go Zero project. Changes are expected to be modest at first, but eventually a shift in the overall bird

¹⁴ Wilson, R.R. and D.J. Twedt. 2005. Bottomland Hardwood Establishment and Avian Colonization of Reforested Sites in the Mississippi Alluvial Valley. Pages 341-352 in L.H. Frederickson, S.L. King and R.M. Kaminski, editors, *Ecology and Management of Bottomland Hardwood Systems: The State of Our Understanding*. University of Missouri-Columbia. Gaylord Memorial Laboratory Special Publication No. 10, Puxico.

¹⁵ Twedt, D.J., R. R. Wilson, *Management of Bottomland Hardwood Forests for Birds*. Proceedings of 2007 Louisiana Natural Resources Symposium, *available at*: <http://www.lmvjv.org/research.htm>

community from early successional species to forest interior species is anticipated. During this first phase, species such as prairie warblers, indigo buntings, American redstart, common yellowthroat and Eastern kingbird will all benefit - or are currently benefitting - from the new early successional forestland habitat.

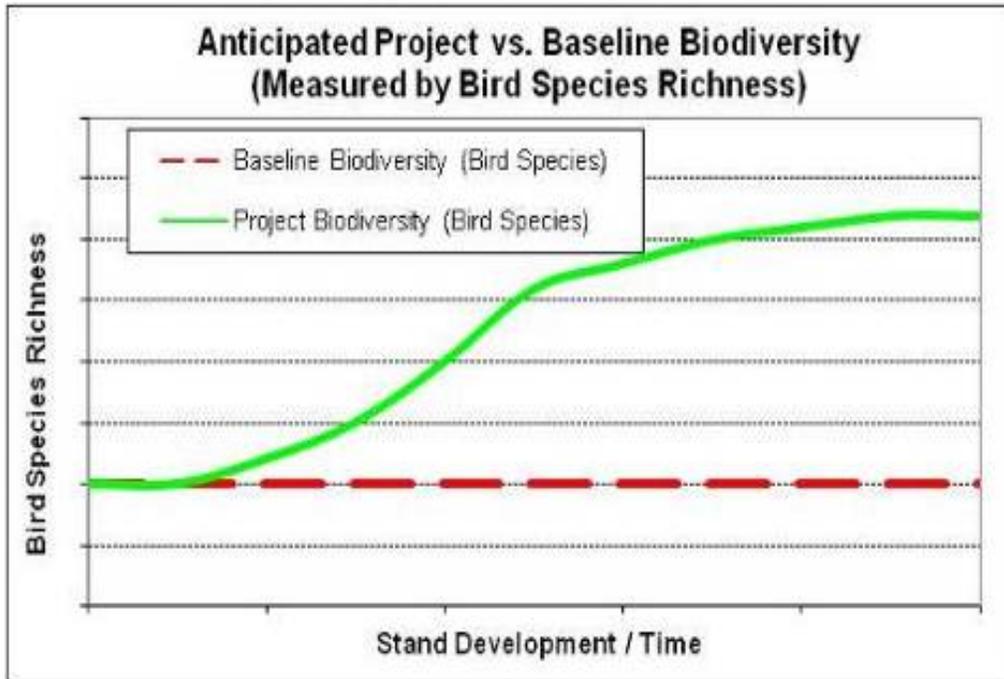


Figure 12: Anticipated Project vs. Baseline Biodiversity Over Time

B1.2 Impact on High Conservation Values

High Conservation Values have not been negatively affected by the Mingo NWR Restoration Initiative. To the contrary, the project has had only positive effects on the High Conservation Values identified in Section G1.8 of the Project Design Document. For example, the new forests are providing important new habitat for the endangered Indiana bat and for the many migratory birds that depend on habitat in the Mingo Basin.

B1.3 Species Used by the Project

Please refer to this section in the Project Design Document.

B1.4 Exotic Species in the Project Area

In accordance with Go Zero's planting principles, only native species were used for the Mingo NWR Restoration Initiative.

B1.5 Genetically Modified Organisms

Please refer to this section in the Project Design Document.

B2. OFFSITE BIODIVERSITY IMPACTS

B2.1 Potential Negative Offsite Biodiversity Impacts

Biodiversity offsite has only benefitted from the restoration because the negative effects associated with fragmented forestlands have decreased. All positive biodiversity impacts associated with the Go Zero Tracts are extended offsite to adjacent lands and the entire Mingo NWR.

B2.2 Mitigation Plans

N/A

B2.3 Evaluation of Potential Negative Offsite Biodiversity Impacts

The net effect of the restoration of the Go Zero Tracts on biodiversity has been – and will continue to be - positive on both the Go Zero Tracts and Mingo NWR as a whole.

B3. BIODIVERSITY IMPACT MONITORING

B3.1 Biodiversity Monitoring

As noted in section B1.1, the Mingo NWR Restoration Initiative is expected to have a significant positive impact on the richness and variety of bird species found on the Tracts due to the increased habitat area, greater habitat complexity, and greater habitat connectivity provided by the newly planted bottomland hardwood forests. As stated in B1.1, a positive correlation between stand development and species richness is anticipated as illustrated in Figure 12.

In order to monitor the changes in bird species richness over time, the Refuge established monitoring plots across the Tracts for bird point counts to determine bird species richness. The Refuge installed three plots per every 100 acres of newly planted area. Point counts on the Go Zero Tracts began in 2010 after planting occurred and have occurred each year since then.

As described in the PDD, standard point count methodology has been used to monitor the changes in the avian population. Sampling design and protocols followed the standard operating procedures and guidelines outlined in *Landbird Monitoring Protocol for the U.S. Fish and Wildlife Service, Midwest and Northeast Regions*.¹⁶ Point count locations were randomly selected by the Service within afforestation units; only points greater than 50 meters from an edge were selected. All birds seen or heard during 10-minute point count duration were recorded. Bird detections were separated out into 1 minute

¹⁶ Knutson, M. G., N. P. Danz, T. W. Sutherland, and B. R. Gray. 2008. Landbird Monitoring Protocol for the U.S. Fish and Wildlife Service, Midwest and Northeast Regions, Version 1. Biological Monitoring Team Technical Report BMT-2008-01. U.S. Fish and Wildlife Service, La Crosse, WI. 25 pages + 11 Standard Operating Procedures pp. (<http://www.fws.gov/bmt/protocols.htm>)

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intervals, which is more rigorous than previously stated in the PDD. In addition, bird detection distances were estimated and recorded for each individual less than 50 meters from the point center. Flyovers were not recorded since their specific habitat association to the restored sites cannot be determined. Each point count was visited three times starting in June through early July. To facilitate comparison of the overall biodiversity effects between afforestation sites and existing agricultural fields, random control plots were established in agriculture units and followed the same sampling protocol.

The data from the bird counts conducted between 2010 – 2014 supports many of the predictions in the PDD. In 2010, there were 13 detections made on the agricultural control fields. Only 3 species were detected including the indigo bunting, the mourning dove, and the brown-headed cowbird. By contrast, 10 species were detected on the Go Zero sites (across 38 total detections), including eastern meadowlark, indigo bunting, ruby throated hummingbird, American Goldfinch, brown-headed cowbird, common yellowthroat, eastern kingbird, red-winged blackbird, eastern bluebird and blue grosbeak.

In 2014, there were 119 detections made on the agricultural sites but only two species detected – every detection except for one was a red-winged blackbird. (Overall detections were unusually high in 2014 because the agricultural fields were not in row crops at that time). During the 2011-13 surveys, the overall detections on the agricultural units were much more in line with the 2010 results with an approximate average of 13 detections each year.

As predicted in the PDD, in the 2014 bird surveys, the Go Zero Tracts had much greater species diversity than the agricultural fields. Eleven species were detected (across 63 total detections) including the Baltimore oriole, the blue-grey gnatcatcher, the common yellowthroat, house wren, great crested flycatcher, mockingbird, northern cardinal, ruby-throated hummingbird, red-winged blackbird, yellow warbler and indigo bunting. Notably absent from the list of species is the brown-headed cowbird.

Refuge staff noted that, over the past year, the species diversity on the Tracts noticeably began to shift towards young tree successional species, signaled by the presence of the Baltimore oriole and the great crested flycatcher.

B3.2 High Conservation Values

As detailed in G1.8 of the Project Design Document, the Mingo Basin has been identified as a critical migration and wintering habitat for waterfowl and migratory birds. Point surveys, described in B3.1 above, have been used to monitor the impact of the project on these avian communities.

The Refuge is currently developing and implementing additional plans to monitor Indiana bat populations at Mingo NWR (see Section GL3.1).

Other High Conservation Values have been managed and maintained according to the plans specified by the Refuge's CCP.

B3.3 Monitoring Plan Implementation

A detailed plan for monitoring bird species diversity was prepared within 12 months of validation of the Project Design Document in accordance with CCBA Standards. As described above, the Refuge has rigorously implemented its plan to monitor the biodiversity impact of the Mingo NWR Restoration Initiative.

GOLD LEVEL SECTION

GL3. EXCEPTIONAL BIODIVERSITY BENEFITS

GL3.1 Vulnerability

According to the vulnerability criteria, one globally threatened species must occur within the Project Zone. As described in section G1.7 of the Project Design Document, the federally endangered Indiana bat has been found within Mingo NWR. The Indiana bat is listed as endangered by the IUCN Red List, the U.S. Fish and Wildlife Service, and by the Missouri Department of Conservation. Over the past 15 years, the bat has experienced a serious population decline.

Wooded riparian areas are needed by the bats for foraging, roosting and breeding. Indiana bats raise young and roost under the bark of trees in riparian forests and favor species of oak and hickory trees, such as those planted as part of the Mingo NWR Restoration Initiative. In the summer, females gather beneath the loose bark of living and dead trees in maternity colonies of 50 to 100 individuals. One of these maternity colonies was found on the edge of a Go Zero Tract during a bat blitz in August 2009. Indiana bats exhibit great loyalty to their roosting and hibernating sites and will return to the same locations year after year.

Changes in habitat resulting from agricultural development and conversion of forested land have affected the amount and quality of bat habitat. Some of the primary reasons cited for continuing population declines of the Indiana bat include loss and degradation of summer habitat and roost sites due to impoundment, stream channelization, housing development, clearcutting for agricultural use or incompatible forest management practices that result in a shortage of the microhabitats used for maternity roosts.¹⁷ Harvesting trees and removing dead trees reduces the amount of available habitat and forces the bats to utilize areas where the potential for disturbance or predation may be higher.



Figure 13: Efforts to monitor the Indiana bat populations are increasing at Mingo NWR and throughout the Region. Photo credit: USFWS.

¹⁷ IUCN Red List, available at: <http://www.iucnredlist.org/apps/redlist/details/14136/0>

One management strategy suggested by the Missouri Department of Conservation to help the recovery of the Indiana bat is to maintain continuous forest vegetation in riparian zones in order to increase favorable bat habitat.¹⁸ The Go Zero project has implemented this suggestion by increasing forest connectivity at Mingo NWR and improving and expanding Indiana bat habitat.

Since the project was implemented, monitoring efforts on the Refuge have increased due, in part, to the confirmation of white-nose syndrome in southeastern Missouri in 2013. White-nose syndrome is an infectious disease associated with a recently identified fungus (*Pseudogymnoascus destructans*) responsible for unprecedented levels of mortality among hibernating bats in North America, including the already endangered Indiana bat. The identification of white-nose syndrome in the area has been a primary driver for the increased monitoring of bats and bat habitat.

One new monitoring program has been the implementation of acoustic surveys. For the past three summers, the Refuge has performed mobile acoustic surveys throughout Refuge lands. During these surveys, an anabat (a tool used for detecting bat calls) is mounted on top of a Refuge vehicle and Refuge staff drives a fixed route through the Refuge at night. All bat calls are recorded and analyzed by species and each call is mapped using GPS technology. The transect goes through the majority of the Go Zero fields. These acoustic surveys are being done at Refuges across the eastern United States and the data is being catalogued by Region 4.

In addition to the acoustic surveys, Mingo NWR will be implementing a new cooperative monitoring program this year. The Refuge received a grant to start a monitoring program in partnership with Cypress Creek NWR in Illinois, the Missouri Department of Conservation, the Army Corps of Engineers, and the US Forest Service. The project will identify summer roost habitat for the Indiana bat, as well as three other bat species. The researchers are putting telemetry transmitters on the bats and looking at forest conditions that they are utilizing. Mist nets will be set up to capture bats in forested habitats at night. After the bats are captured, the telemetry equipment will be attached to them in order to better monitor what habitat types they are using and find the roost trees. Monitoring will occur on the Go Zero Tracts and one or two of the Go Zero Tracts will be a target location for the mist netting.

¹⁸ Missouri Department of Conservation Endangered Species Guide Sheet, available at: <http://mdc.mo.gov/nathis/endangered/endanger/bat/>

CONCLUSION

The Mingo NWR Restoration Initiative was implemented to restore southeastern Missouri's native bottomland hardwood forests and help mitigate climate change while conferring community and biodiversity benefits to Missouri's bootheel region. In addition to sequestering carbon dioxide from the atmosphere, the restored Go Zero Tracts are now providing benefits to birds and wildlife, enhancing water quality in the Mingo Basin and surrounding waterways, and providing improved public recreation areas for all to enjoy.