Restoring a Forest Legacy at Marais des Cygnes National Wildlife Refuge

A Forestland Restoration Partnership Between the US Fish and Wildlife Service and The Conservation Fund

Project Implementation Report
Prepared by:
The Conservation Fund
With contributions from the United States Fish and Wildlife Service

March 2019
PROJECT FACT SHEET

Project Name: Restoring a Forest Legacy at Marais des Cygnes National Wildlife Refuge

Location: Linn County, Kansas, United States, USA

Project Developer: The Conservation Fund

Project Auditor:

Environmental Services, Inc.
Shawn McMahon, Lead Verifier
3800 Clermont St. NW
North Lawrence, Ohio 44666 USA
904.626.6011
smcmahon@esinc.cc

Project Start Date: January 1, 2008 (completion of reforestation)

Monitoring Period: May 10, 2014 to March 22, 2019

GHG Accounting Period: 100 years

Project Validation Date – July 9, 2009 - Gold Level; gap validation of additional lands on February 22, 2018, First Edition CCB Standards

Project Summary: The project was initiated in 2008 with a 776-acre (314 ha) planting effort designed to restore bottomland hardwood forest in proximity to the Marais des Cygnes River in Linn County, Kansas, USA. The project also includes an additional 669 acres (271 ha) of recently planted bottomland hardwood forest restoration, bringing the total project area for the project to 1,445 acres (585 ha). Restoration is achieved by planting native hardwood trees on marginal agricultural lands that had historically been bottomland hardwood forest adjacent to the Marais des Cygnes River. The three primary goals of the project are to: 1) decrease the effects of climate change via carbon sequestration; 2) restore Kansas’s bottomland hardwood forest ecosystem, and 3) create long-term community benefits in the form of recreational lands under the management of the USFWS for hunting, fishing, wildlife photography, wildlife observation, environmental education, and environmental interpretation. The restoration effort is having significant positive effects on biodiversity values associated with the Marais des Cygnes National Wildlife Refuge, particularly for migratory and resident birds. Planted trees on the original parcels are now generally 10 years old and 1 to 2 years old on the recently-planted tracts. Survival of planted stock has been monitored beginning the first field season after planting. In 2017 a small wildfire burned approximately 16 acres of the area planted in 2008. In conjunction with planting additional areas in 2018, a supplemental planting in the burned area took place. In October of 2018, USFWS staff and Conservation Fund staff also established 12 permanent monitoring plots across the planted areas. The restored areas are currently estimated to sequester 76.05 metric tons (MT) CO2e/acre within the standing live trees, dead trees, litter, and soil carbon pools. Over the 776 acres of the first phase of the project, that totals 59,011 MT CO2e. As the trees grow, the project will continue to sequester more carbon.

Gold Level Validation: The project received Gold Level validation for complying with requirements for adaptive management, knowledge dissemination, adapting to climate change, carbon benefits withheld from regulatory markets, capacity building, best practices in community involvement, native species use, and biodiversity impact monitoring.

Project Implementation Report: March 27, 2019
EXECUTIVE SUMMARY

This Project Implementation Report is prepared for the Marais des Cygnes National Wildlife Refuge Restoration Initiative to meet the verification standards of the Climate, Community, and Biodiversity 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 Marais des Cygnes NWR Restoration Initiative was validated at the Gold Level on July 9, 2009 under the First Edition of the CCB Standards. Additional lands were added via gap validation on February 22, 2018. This project was designed to decrease the effects of climate change via carbon sequestration, restore Kansas’ 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 and is benefitting fish and wildlife, enhancing water quality along the Marais des Cygnes River, creating new areas for public recreation and trapping carbon dioxide.

On behalf of the US Fish and Wildlife Service, The Conservation Fund used donations from its program to restore 1,445 acres of marginal agricultural land within the boundary of the Marais des Cygnes National Wildlife Refuge located in Linn County in eastern Kansas. The newly restored native bottomland hardwood forest is now managed by the Service to ensure its long-term protection and stewardship. The carbon offsets that were generated and sold from this project cannot be sold, traded or banked for future offset purposes.

Since 2005, the Fund has helped 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 are at historic lows, voluntary contributions are providing new private capital that is used to further the Fund’s mission to conserve and restore our nation’s land and water legacy for current and future generations. From these projects, the nation derives—and will continue to receive for many years into the future—significant public benefits, including cleaner air, filtered water, restored wildlife habitat and enhanced areas for public recreation.

All of the Fund’s reforestation-based carbon sequestration activities are conducted 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 programs, 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.

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. Our Project Design Documents expanded upon many of the stewardship and management activities prescribed in the Marais des Cygnes National Wildlife Refuge Comprehensive Conservation Plan and our monitoring plans described in the Project Implementation Report follow the monitoring protocols prescribed by the US Fish and Wildlife Service.

The Marais des Cygnes National Wildlife Refuge was established to protect a unique and diverse landscape, including an intersection of ecosystems joining the northernmost bottomland hardwood habitats of the Southeast and the prairies of the Great Plains. Today this bottomland hardwood ecosystem represents the last hardwood stand remaining in Kansas or anywhere in the Mountain-Prairie Region of the Fish and Wildlife Service. Restoring these lands is one of The Conservation Fund’s highest priorities, resulting in cleaner air, cleaner water, and enhanced biodiversity for wildlife and people alike.

**MONITORING SUMMARY**

**Carbon Sequestration**

Planted trees on the original parcels are now generally 10 years old and 1 to 2 years old on the recently-planted tracts. Survival of planted stock has been monitored beginning the first field season after planting. In 2017 a small wildfire burned approximately 16 acres of the area planted in 2008. In conjunction with planting additional areas in 2018, a supplemental planting in the burned area took place. In October of 2018, USFWS staff and Conservation Fund staff also established 12 permanent monitoring plots across the planted areas. The restored areas are currently estimated to sequester 76.05 metric tons (MT) CO2e/acre within the standing live trees, dead trees, litter, and soil carbon pools. Over the 776 acres of the first phase of the project, that totals 59,011 MT CO2e. As the trees grow, the project will continue to sequester more carbon.

**Biodiversity**

USFWS staff monitor the biodiversity benefits of the project using bird surveys conducted along the Marais des Cygnes River, including a sample of the adjacent planted tracts. As the trees on the planted tracts mature, the bird community is expected to transition to a species complex dominated by birds that are attracted to mature forest and forest edge habitats. During the current monitoring period, bird surveys were conducted in 2014 and
2016 with dominant species including yellow-billed cuckoo, Acadian flycatcher, northern parula, and prothonotary warbler.

Community Benefits

Refuge staff monitor public use of the Marais des Cygnes NWR and pass by the reforestation tracts on regular, random schedules. Hunters have been observed using the tree planting sites, primarily for quail hunting. During the winter of 2018-2019, approximately a dozen short eared owls were also observed using some of the planted tracts, which attracted several groups of birders from the Kansas City metropolitan area. Looking forward, a homeschooling group will visit the Refuge in late April of 2019 and part of the teaching content will include visits to the planted tracts, with an explanation of carbon sequestration and habitat restoration. The Refuge Manager is also currently designing new interpretive signs for the Refuge, one of which will explain the tree planting projects, the value of carbon sequestration, and their importance as wildlife habitat. As the planted stock grow into larger trees, and forest conditions develop, public use of the reforestation tracts is expected to increase.
MARAI DES CYGNES NATIONAL WILDLIFE REFUGE RESTORATION INITIATIVE: TABLE OF CONTENTS

G1. ORIGINAL CONDITIONS AT PROJECT SITE .......................................................... 8
   G1.1 Location and Basic Physical Parameters ....................................................... 8
   G1.2 Vegetation ................................................................................................. 11
   G1.3 Current Carbon Stocks at the Project Site .................................................... 11
   G1.4 Communities Located in and Around the Project Area ................................ 12
   G1.5 Current Land Use and Land Tenure at the Project Site ................................ 12
   G1.6 Current Biodiversity in the Project Area ..................................................... 12
   G1.7 IUCN Red List Threatened Species ............................................................ 12

G2. BASELINE PROJECTIONS .................................................................................. 12

G3. PROJECT DESIGN AND GOALS .................................................................... 12
   G3.1 Project Scope and Summary of Goals ......................................................... 12
   G3.2 Description of Project Activities .................................................................. 13
   G3.3 Project Location ......................................................................................... 13
   G3.4 Project Timeframe ..................................................................................... 13
   G3.5 Risks to Climate, Community and Biodiversity Benefits ............................ 13
   G3.6 Stakeholder Identification .......................................................................... 13
   G3.7 Transparency and Project Information Availability ...................................... 16

G4. MANAGEMENT CAPACITY ............................................................................. 16
   G4.1 Management Team Experience ................................................................... 16
   G4.2 Management Capacity and Project Scale .................................................... 17
   G4.3 Technical Skills of Project Team ................................................................. 17
   G4.4 Financial Health of Implementing Organizations .......................................... 17

G5. LAND TENURE .................................................................................................. 18
   G5.1 Private Property and Land Rights ............................................................... 18
   G5.2 Voluntary Nature of the Project .................................................................. 18
   G5.3 Potential In-Migration ................................................................................ 18

G6. LEGAL STATUS ............................................................................................... 18
   G6.1 Compliance with Laws ............................................................................... 18
   G6.2 Approval from Appropriate Authorities ..................................................... 18

G7. ADAPTIVE MANAGEMENT FOR SUSTAINABILITY ...................................... 18
   G7.1 Generation of Reliable Feedback .................................................................. 18
   G7.2 Documentation of Decisions ...................................................................... 19
   G7.3 Project Flexibility ...................................................................................... 19
   G7.4 Commitment to Long-term Sustainability ................................................... 19

G8. KNOWLEDGE DISSEMINATION ..................................................................... 19
   G8.1 Documentation of Project Lessons Learned ................................................. 19
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1.3</td>
<td>Threatened Species</td>
<td>35</td>
</tr>
<tr>
<td>B1.4</td>
<td>Species Used by the Project</td>
<td>35</td>
</tr>
<tr>
<td>B1.5</td>
<td>Genetically Modified Organisms</td>
<td>35</td>
</tr>
<tr>
<td>B2.</td>
<td>OFFSITE BIODIVERSITY IMPACTS</td>
<td>36</td>
</tr>
<tr>
<td>B2.1</td>
<td>Potential Negative Offsite Biodiversity Impacts</td>
<td>36</td>
</tr>
<tr>
<td>B2.2</td>
<td>Mitigation Plans</td>
<td>36</td>
</tr>
<tr>
<td>B2.3</td>
<td>Net Effect of Project on Biodiversity</td>
<td>36</td>
</tr>
<tr>
<td>B3.</td>
<td>BIODIVERSITY IMPACT MONITORING</td>
<td>36</td>
</tr>
<tr>
<td>B4.</td>
<td>NATIVE SPECIES USE</td>
<td>37</td>
</tr>
<tr>
<td>B5.</td>
<td>WATER AND SOIL RESOURCE ENHANCEMENT</td>
<td>37</td>
</tr>
<tr>
<td>CONCLUSION</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>
G1. ORIGINAL CONDITIONS AT PROJECT SITE

G1.1 Location and Basic Physical Parameters

The Restoring a Forest Legacy at Marais des Cygnes National Wildlife Refuge project (“Marais des Cygnes Restoration Initiative”) was implemented at the Marais des Cygnes National Wildlife Refuge (“Refuge” or “Marais des Cygnes NWR”) in Linn County, Kansas. The Marais des Cygnes NWR spans a 9,300-acre acquisition boundary between U.S. Highway 69 and the Missouri state line on either side of the Marais des Cygnes River in eastern Kansas. Immediately west of the Refuge is the 7,600 acre Marais des Cygnes Wildlife Area (“State Wildlife Area”), administered by the Kansas Department of Wildlife and Parks. The location of the Refuge is illustrated in the Map in Figure 1.

Marais des Cygnes NWR is unique because of its location at the interface between tallgrass prairie and central bottomland hardwood forest. The Refuge was specifically established in 1992 for the protection and restoration of bottomland hardwood forests and restoration of bottomland hardwoods is a Refuge priority. Marais des Cygnes NWR also serves an important role as an anchor for the unique biodiversity in the region. The Refuge is home to 31 species of freshwater mussels and the federally threatened Mead’s milkweed.

The Restoration Tracts

The fragmented forest landscape at Marais des Cygnes NWR represented an important opportunity to restore habitat and ecosystem connectivity. Over 1,000 acres across the Refuge that was historically forested was covered by annual and perennial weeds or used for agricultural purposes. Restoring the acreage to its natural, forested condition was a high priority for the United States Fish and Wildlife Service (“USFWS or Service”), but there was limited or no funding available to support those efforts. After years of searching for public and private financing, an innovative partnership emerged that restored the biological integrity of the land, and at the same time, helped sequester carbon dioxide.

In early 2008, The Conservation Fund (“the Fund”) partnered with the Service to plant native seedlings across 35 non-contiguous parcels, consisting of 776 acres, within Marais des Cygnes NWR (“the Tracts”) using donations from the Fund’s program. An additional 669 acres were planted in 2018. The Tracts are managed by the Refuge as forested habitat for wildlife, including but not limited to waterfowl and neotropical songbirds. Over their lifetime, these newly restored forests are expected to sequester thousands of tons of carbon dioxide equivalent from the atmosphere. In addition to the benefits to biodiversity and climate, these restored lands also provide improved recreational areas for public enjoyment. Figure 2 illustrates the locations of the original Tracts within the Refuge. The recently planted tracts are shown in the 2017 update to the Project Design Document,

1 Marais des Cygnes Comprehensive Conservation Plan [hereinafter Marais des Cygnes CCP], pp. 30
which is publicly available (https://www.vcsprojectdatabase.org/#/ccb-all-project-details/CCB1595).

Figure 1: Map of Marais des Cygnes National Wildlife Refuge
Figure 2: Map of Original Tracts at Marais des Cygnes NWR
Climate and Precipitation

The overall climate, vegetation, and wildlife of the Refuge are quite typical of those found throughout the southeastern United States. While these characteristics are common in the Southeast, they are extremely atypical for Kansas and the Mountain-Prairie Region of the Service which administers the Refuge. Marais des Cygnes NWR offers a unique glimpse of another world to many visitors from the Midwest and western parts of the country.

In the original Project Design Document (“PDD”) for the Marais des Cygnes Restoration Initiative, it was noted that the Refuge generally received plentiful rainfall due to the path of moisture-laden air from the Gulf of Mexico. Precipitation typically averages 38.53 inches per year, with the highest monthly amounts occurring in spring and fall. This pattern held true from 2008 to 2010, with the Refuge receiving plentiful rainfall amounts. In 2011, the South Central United States, including Kansas, Oklahoma and Texas, was affected by devastating droughts. Climate scientists stated that this was the worst one-year drought experienced by this area since rainfall data started being collected in 1895.\(^2\) The Refuge and the area surrounding Marais des Cygnes NWR received very little rainfall and suffered drought conditions through 2011 and 2012. Fortunately, the trees were established by this time and the project has yielded good survival rates despite the drought. We expect this good survival was due, in part, to the ample rainfall the trees received during their first three growing seasons.

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 Current Carbon Stocks at the Project Site

The global climate change benefits of reforestation projects are widely recognized. Land use change—especially deforestation—is a significant component of increasing atmospheric CO\(_2\) levels and a cause of global warming.\(^3\) Thus, restoring forestland represents a natural way to reduce these effects and combat climate change.

\(^2\)http://www.c2es.org/blog/huberd/2011-texas-drought-historical-context;
http://usatoday30.usatoday.com/weather/drought/story/2011-09-12/texas-drought-Dust-Bowl-ranchers/50373618/1

In order to quantify the carbon sequestration rates for the project, the Fund uses a model originally developed by Environmental Synergy Inc. The monitoring regime follows IPCC Good Practice Guidance (IPCC GPG 2003). Over the life of the project, carbon sequestration estimates for live trees will be derived from direct measurements from permanent plots. Other pools will be estimated based on default emission factors published by the USDOE 1605(b) program. This monitoring regime satisfies the IPCC Tier 2 level of accuracy criteria. The carbon impact of the Marais des Cygnes NWR Restoration Initiative is estimated at 335.7 metric tons of carbon dioxide equivalent per acre over one hundred years.

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.

G1.4 Communities Located in and Around the Project Area

*Please refer to this section in the Project Design Document.*

G1.5 Current Land Use and Land Tenure at the Project Site

*Please refer to this section in the Project Design Document.*

G1.6 Current Biodiversity in the Project Area

*Please refer to this section in the Project Design Document.*

G1.7 IUCN Red List Threatened Species

*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 Marais des Cygnes NWR Restoration Initiative included restoring approximately 776 acres of land to bottomland hardwood forest by planting it with native tree species followed by an additional planting of 669 acres. The three primary goals of the project are to decrease the effects of climate change via carbon sequestration, restore Kansas’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.

G3.2 Description of Project Activities

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

The Fund originally worked with Environmental Synergy Inc. and Winrock International (Winrock) to develop a protocol for the project. The monitoring framework at Marais des Cygnes NWR was designed to estimate carbon sequestered in aboveground tree biomass to a known level of confidence. In 2007, Environmental Synergy Inc. and Winrock installed 20 permanent sample plots at the Refuge (of which 1 was not viable, leaving a sampling total of 19). Additionally, 45 plots were measured at proxy sites within the Refuge and in near proximity to the Refuge to estimate the future accrual of carbon in the ecosystem. Data was consulted to incorporate deadwood, soil and litter carbon. The anticipated carbon accrual rates are described more fully in Section CL1.

Site preparation and planting was completed in January 2008 and on the additional tracts in 2018. The project was validated against the CCBA standards and received Gold Level validation in July 2009 and gap validated for the additional tracts on February 22, 2018. 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

*Please refer to this section in the Project Design Document and to Section G1 above.*

G3.4 Project Timeframe

As stated in the PDD, the Fund planted the original Tracts with native bottomland hardwood trees in late December 2007 and through early 2008. The project start date, therefore, is January 1, 2008.

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 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 Stakeholder Identification

For each 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 Marais des Cygnes NWR Restoration Initiative defined these partners, or stakeholders, as those parties who 1) own the Tracts (“the landowner”), 2) currently own property adjacent to The 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 Marais des Cygnes NWR (“community members”).

Refuge management complements the operation of the adjacent State-operated Marais des Cygnes Wildlife Area. While the Wildlife Area and Refuge have distinct missions and management goals, they work cooperatively and communicate often with each other, recognizing that together they present a 15,000-acre 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 Marais des Cygnes Valley.

The Refuge has no official volunteer association or “Friends” group, but community members utilize the Refuge and the Tracts for public recreation and frequently attend Refuge events. The Refuge also serves as a source of job opportunities for students interested in conservation and hosts Student Conservation Association interns each year. These interns have played important roles in project implementation and tree survival analysis.

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 Environmental Synergy Inc. 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 one has retired, and one has moved (see Section CL2).
Table 1: Marais des Cygnes Restoration Initiative Stakeholders

<table>
<thead>
<tr>
<th>NAME OF STAKEHOLDER</th>
<th>CONTACT INFORMATION</th>
<th>ROLE</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Conservation Fund donors</td>
<td>Confidential</td>
<td>Donors</td>
<td>Financial support of the project</td>
</tr>
<tr>
<td>US Fish and Wildlife Service</td>
<td>Refuge Biologist, (620) 392-5553 ext. 111</td>
<td>Project Implementer/ Landowner</td>
<td>Landowner and long-term steward of the forestland. Monitors community and biodiversity variables as part of Refuge management.</td>
</tr>
<tr>
<td>TerraCarbon</td>
<td>TerraCarbon President, 1-309-693-9303</td>
<td>Monitoring</td>
<td>Involved with carbon monitoring and analysis</td>
</tr>
<tr>
<td>Marais des Cygnes Wildlife Area</td>
<td>Marais des Cygnes Wildlife Area Manager, 913-352-8941</td>
<td>Neighboring Landowner</td>
<td>Coordinates with Refuge on management decisions.</td>
</tr>
<tr>
<td>Student Conservation Association</td>
<td>SCA Headquarters, 603-543-1700</td>
<td>Project Implementer</td>
<td>Involved with tree survival analysis</td>
</tr>
</tbody>
</table>
G3.7  Transparency and Project Information Availability

Please refer to this section in the Project Design Document.

G4.  MANAGEMENT CAPACITY

G4.1  Management Team Experience

The Fund and USFWS jointly manage aspects of the Marais des Cygnes 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 553 refuges and 38 wetland districts. Refuge management is the core business of the Service, it will manage the 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 have helped to restore more than 10 million trees across 25,000 acres that will trap an estimated 10 million tons of CO$_2$e over 100 years. For the Marais des Cygnes 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. to provide planting and monitoring services across the tracts. In Fall 2010, Environmental Synergy Inc. dissolved, and the Fund contracted with TerraCarbon LLC to provide consulting services for the Marais des Cygnes 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.
G4.2 Management Capacity and Project Scale

The scale of the Marais des Cygnes 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. Following the validation of the Marais des Cygnes Restoration Initiative, the Fund - in partnership with the USFWS - had four more projects validated under the CCBA standards at the Gold Level.

G4.3 Technical Skills of Project Team

The Fund coordinated and implemented this project in partnership with the USFWS. The Fund completed multiple carbon projects of this kind in the past, and has the skill set needed to continue coordination and facilitation over the course of the project's lifetime.

The employees of TerraCarbon possess the skills and knowledge needed to provide as-needed consulting services for carbon monitoring and tree survival analysis. TerraCarbon is staffed by experts in forestry, biometry, remote sensing, and finance to provide a range of services to project developers and supporting organizations. They have more than 30 years of combined experience in the forest carbon field, working on projects across multiple carbon standards, project types, and geographies and have worked with clients on projects around the world that are protecting and restoring more than 3.7 million acres and that have already reduced greenhouse gas emissions by nearly 10 million tons.

The USFWS team possesses the appropriate skill set needed for biodiversity monitoring, long term habitat monitoring and community monitoring. These activities are essential functions of Refuge management.

G4.4 Financial Health of Implementing Organizations

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 Marais des Cygnes 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.
G5. LAND TENURE

G5.1 Private Property and Land Rights

Please refer to this section in the Project Design Document.

G5.2 Voluntary Nature of the Project

All of the lands acquired to establish the Refuge, including all of the planted tracts, were purchased from willing sellers.

G5.3 Potential In-Migration

Not relevant to project.

G6. LEGAL STATUS

G6.1 Compliance with Laws

Please refer to this section in the Project Design Document.

G6.2 Approval from Appropriate Authorities

The Fund has a signed Memorandum of Understanding with USFWS recognizing the Fund’s ability to plant and restore land on National Wildlife Refuges.

G7. ADAPTIVE MANAGEMENT FOR SUSTAINABILITY

G7.1 Generation of Reliable Feedback

The Fund’s carbon monitoring protocol was specifically designed to generate reliable feedback to improve project outcomes. The Tracts at Marais des Cygnes NWR are part of an “umbrella population” of monitored tracts consisting of all CCBA reforestation projects in the Lower Mississippi River Valley region (referred to as the “Monitoring Umbrella”). The advantage of this design is that it allows for distributing the substantial costs of monitoring among component tracts while producing robust results that will improve project outcomes and generate the most reliable carbon-related feedback for the project.

In addition, the Comprehensive Conservation Plan (“CCP”) revision process was designed to generate reliable feedback to help guide management decisions on the Tracts. The CCP process complies with standards outlined in the National Environmental Policy Act (“NEPA”), which requires CCPs both to examine a full range of alternative approaches to refuge management and mandates involving the public in selecting the alternative best suited to each refuge’s purposes. 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. In this way, feedback
on management decisions is consistently generated and used to guide management decisions for the Tracts.

**G7.2 Documentation of Decisions**

The Fund has carefully maintained, and will continue to maintain, all files relating to the Marais des Cygnes Restoration Initiative in a central permanent database to ensure that information on the project will remain with the Fund.

The Project Design Document for the project is on the Fund’s website and the Verra website (see previous citation).

In addition, the Marais des Cygnes NWR staff produces an annual narrative documenting management actions on a wide variety of issues including habitat restoration and management, fish and wildlife management, resource protection, public education and recreation on the Refuge.

**G7.3 Project Flexibility**

*Please refer to this section in the original Project Design Document.*

**G7.4 Commitment to Long-term Sustainability**

For each 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 MOU between USFWS and the Fund, the Service has agreed to provide long-term protection and management of projects under natural conditions and according to best wildlife and habitat management practices.

As described in previous sections, the 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.

**G8. KNOWLEDGE DISSEMINATION**

**G8.1 Documentation of Project Lessons Learned**

*Please refer to this section in the original Project Design Document.*

**G8.2 Dissemination of Information**

The Service has been actively investing in biological carbon sequestration research and management activities for almost two decades. The Service recognizes that carbon sequestration projects provide a tool for habitat creation or restoration, while at the same time serving the role of helping mitigate the concentration of greenhouse gases in the
atmosphere. As the carbon market continues to develop and expand, there is a growing desire for information on implementing carbon projects on Service-owned lands.
CLIMATE SECTION

CL1. NET POSITIVE CLIMATE IMPACTS

CL1.1 Estimation of Net Changes in Carbon Stocks

The original estimation of net changes in carbon stocks for the Marais de Cygnes NWR Restoration Initiative was drawn from Environmental Synergy Incorporated’s experience in measuring carbon accumulation across the United States. The Fund contracted with Environmental Synergy Inc. to plant the project area, measure the baseline conditions, and to monitor the project’s ongoing carbon gains. In 2007, Environmental Synergy Inc. and Winrock installed 20 permanent sample plots at the Refuge (of which 1 was not viable, leaving a sampling total of 19). Additionally, 45 plots were measured at proxy sites within the Refuge and in near proximity to the Refuge to estimate the future accrual of carbon in the ecosystem. Data was consulted to incorporate down dead, soil, and litter carbon. The table below shows the anticipated carbon accrual over time based on the Environmental Synergy Inc./Winrock study. All values are metric tons CO$_2$e/acre.

This model utilizes the methodologies of the Intergovernmental Panel on Climate Change’s Good Practice Guidance (IPCC GPG). 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 As noted above, the climate model predicts 248 metric tons of CO$_2$e/acre (i.e., 273 short tons per acre) at year 50, and 335.7 metric tons of CO$_2$e/acre (i.e., 370 short tons per acre) at year 100. The annualized average for the first 50 years is 5.5 metric tons of CO$_2$e/acre per year (i.e., 6 short tons of CO$_2$ equivalent per acre per year).

---


Table 2: Anticipated CO2e/acre accrual over time across the planted tracts at Marais des Cygnes NWR.

<table>
<thead>
<tr>
<th>Stand Age</th>
<th>Total CO2e/acre</th>
<th>Live Tree</th>
<th>Standing Dead</th>
<th>Understory</th>
<th>Down Dead</th>
<th>Forest Floor</th>
<th>Organic Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5.2</td>
<td>1.0</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
<td>3.6</td>
</tr>
<tr>
<td>10</td>
<td>23</td>
<td>8.4</td>
<td>0.5</td>
<td>0.3</td>
<td>0.2</td>
<td>4.9</td>
<td>8.6</td>
</tr>
<tr>
<td>15</td>
<td>50.1</td>
<td>27.6</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
<td>16.0</td>
<td>3.0</td>
</tr>
<tr>
<td>20</td>
<td>82</td>
<td>51.3</td>
<td>2.1</td>
<td>1.2</td>
<td>0.8</td>
<td>21.3</td>
<td>4.9</td>
</tr>
<tr>
<td>25</td>
<td>115.2</td>
<td>80.6</td>
<td>2.3</td>
<td>1.2</td>
<td>1.2</td>
<td>23.0</td>
<td>6.9</td>
</tr>
<tr>
<td>30</td>
<td>147.5</td>
<td>104.7</td>
<td>3.0</td>
<td>0.7</td>
<td>2.2</td>
<td>27.3</td>
<td>9.6</td>
</tr>
<tr>
<td>35</td>
<td>177.3</td>
<td>127.7</td>
<td>3.5</td>
<td>0.0</td>
<td>3.5</td>
<td>30.1</td>
<td>12.4</td>
</tr>
<tr>
<td>40</td>
<td>204.1</td>
<td>148.0</td>
<td>5.1</td>
<td>0.0</td>
<td>4.1</td>
<td>32.7</td>
<td>15.3</td>
</tr>
<tr>
<td>45</td>
<td>227.7</td>
<td>166.2</td>
<td>6.8</td>
<td>0.0</td>
<td>4.6</td>
<td>34.2</td>
<td>18.2</td>
</tr>
<tr>
<td>50</td>
<td>248</td>
<td>179.8</td>
<td>7.4</td>
<td>0.0</td>
<td>5.0</td>
<td>36.0</td>
<td>19.8</td>
</tr>
<tr>
<td>55</td>
<td>265.3</td>
<td>191.0</td>
<td>8.0</td>
<td>0.0</td>
<td>5.3</td>
<td>37.1</td>
<td>21.2</td>
</tr>
<tr>
<td>60</td>
<td>280</td>
<td>201.6</td>
<td>8.4</td>
<td>0.0</td>
<td>7.0</td>
<td>39.2</td>
<td>23.8</td>
</tr>
<tr>
<td>65</td>
<td>292.2</td>
<td>210.4</td>
<td>8.8</td>
<td>0.0</td>
<td>8.8</td>
<td>40.9</td>
<td>26.3</td>
</tr>
<tr>
<td>70</td>
<td>302.5</td>
<td>216.3</td>
<td>9.1</td>
<td>0.0</td>
<td>9.1</td>
<td>42.4</td>
<td>27.2</td>
</tr>
<tr>
<td>75</td>
<td>311</td>
<td>220.8</td>
<td>9.3</td>
<td>0.0</td>
<td>9.3</td>
<td>43.5</td>
<td>28.0</td>
</tr>
<tr>
<td>80</td>
<td>318</td>
<td>224.2</td>
<td>9.5</td>
<td>0.0</td>
<td>11.1</td>
<td>44.5</td>
<td>28.6</td>
</tr>
<tr>
<td>85</td>
<td>323.8</td>
<td>226.7</td>
<td>9.7</td>
<td>0.0</td>
<td>13.0</td>
<td>45.3</td>
<td>29.1</td>
</tr>
<tr>
<td>90</td>
<td>328.6</td>
<td>228.4</td>
<td>9.9</td>
<td>0.0</td>
<td>13.1</td>
<td>46.0</td>
<td>29.6</td>
</tr>
<tr>
<td>95</td>
<td>332.5</td>
<td>229.4</td>
<td>10.0</td>
<td>0.0</td>
<td>13.3</td>
<td>46.6</td>
<td>29.9</td>
</tr>
<tr>
<td>100</td>
<td>335.7</td>
<td>231.6</td>
<td>10.1</td>
<td>0.0</td>
<td>13.4</td>
<td>47.0</td>
<td>30.2</td>
</tr>
</tbody>
</table>
Pre-project carbon stocks

As noted in Section G1.3, 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. The project monitoring program includes baseline soil measurements from which future gains can be observed.\(^6\) Future soil monitoring will not be based on soil measurements but instead will be based on default estimates taken from USDOE 1605(b) tables.

CL1.2 Non-CO2 greenhouse gases

*Please refer to this section in the Project Design Document.*

CL1.3 Net Climate Impact

As noted above, the climate model predicts 248 metric tons of CO\(_2\)e/acre (i.e., 273 short tons per acre) at year 50, and 335.7 metric tons of CO\(_2\)e/acre (i.e., 370 short tons per acre) at year 100. The annualized average for the first 50 years is 5.5 metric tons of CO\(_2\)e/acre per year (i.e., 6 short tons of CO\(_2\) equivalent per acre per year).

CL2. OFFSITE CLIMATE IMPACTS

CL2.1 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.\(^7\) In this case, the primary concern is that because lands were taken out of agricultural production and restored to trees, the tenant farmers who previously used the land may clear healthy forests to create more viable agricultural lands offsite.

In the PDD, we noted that the individuals who farmed on the Tracts had no intention of clearing any forested lands. Both farmers stopped farming on the Refuge prior to project implementation; there was no displacement due to the project. One farmer, who used about two-thirds of the agricultural area, ceased his farming operations before restoration on the Tracts began for personal reasons unassociated with the restoration. The other individual moved his farming operations to other farmlands already in his possession.


These actions are representative of an overall trend; cropland use in the region as a whole has been declining since 1950.\(^8\) Therefore, no activity leakage should be expected as a result of this project.

According to Refuge staff, one tenant farmer who used to farm on the Tracts has now retired completely and the other now lives outside the Refuge area. Refuge staff have been in contact with these farmers and they have not cleared any forests to create new agricultural land.

**CL2.2 Mitigation of Negative Offsite Impacts**

Because no offsite impacts attributable to project leakage have resulted, no direct actions have been necessary to mitigate their effect.

**CL2.3 Net Effect of Climate Impacts**

The total net effect of climate impacts of this project is positive. As noted above, there are no anticipated negative climate impacts.

**CL3. CLIMATE IMPACT MONITORING**

**CL3.1 Monitoring Plan**

*Background*

The original monitoring plan that governed the Marais des Cygnes Restoration Initiative was developed in 2001 by Winrock for Environmental Synergy Inc. with the objective of establishing a scientific basis for measuring carbon stock changes over time on reforestation sites with similar characteristics. The 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 a planting region. The benefit is that the Marais des Cygnes 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 created by TerraCarbon in order to streamline the monitoring of Conservation Fund CCBA projects. This plan is periodically updated as new information becomes available. 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 Environmental Synergy Inc. 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 monitoring plan is designed to estimate carbon accrual with an accuracy within 10% of the mean at the 95% confidence level beginning in year 20.

**Monitoring Protocol**

Environmental Synergy Inc.’s original monitoring protocol for the 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 Environmental Synergy Inc. 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 effective and efficient.

2. **Tree survival analysis**

   In Fall 2013, the Refuge Biologist performed a survival analysis of the Tracts at Marais des Cygnes NWR. This analysis checked the survival of trees found in 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 Environmental Synergy Inc. 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 (2013). 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 was used and all trees within the fixed area plot will be measured on a 10 year repeat cycle. 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., 2006.9

Planted trees on the original parcels are now generally 10 years old and 1 to 2 years old on the recently-planted tracts. Survival of planted stock has been monitored beginning the first field season after planting. In 2017 a small wildfire burned approximately 16 acres of the area planted in 2008. In conjunction with planting additional areas in 2018, a supplemental planting in the burned area took place. In October of 2018, USFWS staff and Conservation Fund staff also established 12 permanent monitoring plots across the planted areas. The restored areas are currently estimated to sequester 76.05 metric tons (MT) CO2e/acre within the standing live trees, dead trees, litter, and soil carbon pools. Over the 776 acres of the first phase of the project, that totals 59,011 MT CO2e. As the trees grow, the project will continue to sequester more carbon.

CL4. ADAPTING TO CLIMATE CHANGE AND CLIMATE VARIABILITY

CL4.1 Regional Climate Change Impacts

Please refer to this section in the Project Design Document.

CL4.2 Measures Taken to Anticipate Climate Change Impacts

Please refer to this section in the Project Design Document.

CL5. CARBON BENEFITS WITHHELD FROM REGULATORY MARKETS

All of the carbon benefits generated by the Marais des Cygnes NWR Restoration Initiative have been withheld from regulated greenhouse gas markets.

COMMUNITY SECTION

CM1. NET POSITIVE COMMUNITY IMPACTS

CM1.1 Community Benefits

The Refuge provides numerous recreational opportunities to the local community, including residents in the surrounding Kansas City Metropolitan Area, such as hunting, fishing, river paddling, wildlife photography and observation, environmental education and interpretation. The majority of recreation on the Refuge is oriented toward river recreation or waterfowl and game hunting. Collecting wild foods, including nuts, berries and mushrooms, is also popular at Marais des Cygnes NWR. A variety of clubs use the Refuge each year for birding, hiking in the natural areas, and viewing wildflowers and other plant species. These clubs travel from throughout the State of Kansas and the Midwest region to enjoy the naturalness and diversity of the area.

While Marais des Cygnes NWR has no official Friends group, there are many active volunteers on the Refuge. A new Assistant Manager position was created at the Refuge last year, and the Assistant Manager helps coordinate volunteer activities on the Refuge and facilitates public outreach. In addition, a new office building/visitor center was opened on the Refuge in 2012, which is used to greet and orient visitors to Marais des Cygnes NWR. An Open House for the new office was featured during National Wildlife Refuge Week in October 2012. The Refuge hosts numerous events, including a Kansas Days event for elementary school students, Refuge week events, and other programs aimed at visiting youth and community groups, such as the raptor program pictured in Figure 4.

The Tracts, which were previously weed-covered or agricultural lands with minimal public recreation value, are now growing into forested lands that can be enjoyed by the public. The quality of the visitor experience on the Refuge will be improved due to the Tracts’ restoration, which will lead to improved water quality along the River, improved forest and

Figure 4: Raptor show during National Wildlife Refuge Week. Photo credit: USFWS.
habitat conditions and increased wildlife species richness. While the parcels on the northwestern corner of the Refuge (see Figure 2) are closed to public access because they are part of a migratory bird sanctuary, the eastern Tracts are all open to public recreation including some hunting but also bird watching and hiking.

The project also presents additional educational opportunities to teach Refuge visitors about the science of restoration and biological carbon sequestration. Refuge staff has spoken to numerous groups, including the Kansas Department of Wildlife and Parks, the Kansas Biological Survey, and the University of Kansas about the restoration project and students from the University of Kansas specifically came to see the restoration project as part of an ecology class. The project is incorporated into tours of the Refuge and described to individuals coming into the new Refuge visitor center. As funding becomes available, Refuge staff is planning to install some interpretative displays in the new facility, including one featuring the project and the science of biological carbon sequestration.

![Figure 5: Local residents enjoy a hike in Marais des Cygnes NWR. Photo credit: USFWS.](image)

The project’s positive community impact will be measured by monitoring the community use of the 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. Although increase in use 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, and a rise in activity levels should lead to corresponding increases in overall fitness, health and wellbeing amongst community members. This metric is particularly important in Kansas, which ranks last among all states for percentage of land owned by the state or federal government (less than 1
percent of land in Kansas is state or federally owned). Therefore, Kansas has relatively little public conservation lands. This makes supporting Refuge goals and engaging community members with the Refuge particularly important at Marais des Cygnes NWR; there are comparatively limited opportunities for Kansans to get outside and experience and enjoy natural settings.

**Economic Benefits**

The Marais des Cygnes Restoration Initiative is also expected to have a positive economic impact on the neighboring community. 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. 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.

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. 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. The report chose to highlight several Refuges in each Region, including Marais des Cygnes NWR for Region 6. By restoring and strengthening Marais des Cygnes NWR, local residents will be able to enjoy an economic advantage that accompanies an area’s elevated recreational status.

The Refuge also provides educational and employment opportunities to individuals in the surrounding community. The Student Conservation Association (“SCA”) sponsors internship opportunities on the Marais des Cygnes Refuge each year. These SCA interns have assisted Refuge staff with the project, including tree counts and survival monitoring every summer since project inception. In exchange for their work, the interns receive free

---

10 See: http://www.nrcm.org/documents/publiclandownership.pdf


housing provided by the Service, a food stipend, and payments towards their student loans. Participating in the project activities has allowed these SCA interns to acquire skills in an innovative new field, making them more valuable as employees on Marais des Cygnes NWR and other Refuges, especially as carbon projects continue to grow in popularity.

**CM1.2 Stakeholder Participation in Project Planning**

Since the project was implemented, stakeholders continue to play active roles in the project. USFWS owns and manages all of the Tracts. The USFWS, in conjunction with the Fund and its partners performs monitoring on the Tracts. Community members use the Tracts for outdoor recreation and educational opportunities. Over half of the acreage of the Tracts is open to public recreation and the areas are popular for bird watching and wildlife observation.

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

**CM1.3 Conflict Resolution and Grievance Procedures**

Per communication with the Refuge staff, there have been no grievances to date about the Marais des Cygnes Restoration Initiative.

**CM2. OFFSITE COMMUNITY IMPACTS**

**CM2.1 Potential Negative Offsite Community Impacts**

There are no potential negative community impacts from restoring the Tracts within Marais des Cygnes NWR. Prior to its restoration, most of the land just sat covered in grasses and forbs. A small percentage of the land was used for farming, but the farmer who used two-thirds of this area ended his contract with the Refuge before the project started. The remaining one-third was farmed by another individual, but this land only represented a small percentage of his total acreage, and he has since moved farther from the Refuge and works on other lands in his possession. Therefore, no jobs have been lost in the community due to the cessation of farming on the Tracts.

**CM2.2 Mitigation of Negative Impacts**

There have been no negative impacts caused by the restoration of the Tracts.

**CM2.3 Net Social and Economic Impacts**

As stated above, there have been no negative impacts caused by the restoration of the Tracts. Restoring the Tracts to native forest has conferred many benefits on the surrounding community, as described in CM1.1. Thus, the net effect on the community is positive.
CM3. COMMUNITY IMPACT MONITORING

CM3.1 Monitoring Plan

As described in the PDD, Marais des Cygnes NWR staff monitors the community benefits generated by the Marais des Cygnes NWR Restoration Initiative, as described in CM1.1, with specific attention paid to the anticipated rise in community use of the Tracts. As noted above, the parcels in the northwestern corner of the Refuge (see Figure 2) are closed to public access because they are part of a migratory bird sanctuary, but the eastern Tracts are all open to public recreation including some hunting but also bird watching and hiking. 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 6 below. Community use of the Tracts, and the entire Refuge, for public recreation and enjoyment is a significant benefit of the projects and, therefore, an appropriate variable for community impact monitoring.

![Anticipated Project vs. Baseline Community Use](image)

**Figure 6: Anticipated Project vs. Baseline Community Use Over Time**

The number of visitors using the Tracts is monitored by the Refuge’s law enforcement officer who patrols the Refuge on a regular basis throughout the year and keeps track of visitor use. Visitation for the entire Refuge is monitored in this same way and recorded annually via the RAPP (Refuge Annual Performance Plan) reports. The monitoring plan for the Tracts has been incorporated as a subset of the overall Refuge monitoring plan.

Refuge staff monitor public use of the Marais des Cygnes NWR and pass by the reforestation tracts on regular, random schedules. Hunters have been observed using the
tree planting sites, primarily for quail hunting. During the winter of 2018-2019, approximately a dozen short eared owls were also observed using some of the planted tracts, which attracted several groups of birders from the Kansas City metropolitan area. Looking forward, a homeschooling group will visit the Refuge in late April of 2019 and part of the teaching content will include visits to the planted tracts, with an explanation of carbon sequestration and habitat restoration. The Refuge Manager is also currently designing new interpretive signs for the Refuge, one of which will explain the tree planting projects, the value of carbon sequestration, and their importance as wildlife habitat. As the planted stock grow into larger trees, and forest conditions develop, public use of the reforestation tracts is expected to increase.

CM4. CAPACITY BUILDING

CM4.1 Accommodates Communities

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, especially in the southeastern United States, have started exchanging lessons learned and best management practices for carbon sequestration projects, allowing for the successful replication of projects in other communities. Members of the project team have been instrumental in this information exchange and have attended workshops to share lessons learned about conducting carbon projects on Refuge lands. 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. As noted above, the Service has published a Biological Sequestration Activities and Accomplishments Report, which highlights the community benefits of these projects including improved water quality, floodwater storage, and public recreation opportunities, in addition to climate change mitigation. The Marais des Cygnes Restoration Initiative is featured by the Service in this report as an example of a successful biological sequestration project.

CM4.2 Inclusion of All Groups

Please refer to this section in the Project Design Document.

CM4.3 Inclusion of Women

Please refer to this section in the Project Design Document.

CM4.4 Community Participation

After planting was completed, the Fund conducted a ceremonial dedication event in May 2008 to highlight the restoration of the land and the importance of the nation’s Refuge system. Local community members and stakeholders were invited to this event, where
they had the opportunity to learn more about the Marais des Cygnes NWR Restoration Initiative.

**CM5. BEST PRACTICES IN COMMUNITY INVOLVEMENT**

**CM5.1 Knowledge of Local Customs**

*Please refer to this section in the Project Design Document.*

**CM5.2 Stakeholder Employment**

*Please refer to this section in the Project Design Document.*

**CM5.3 Workers’ Rights**

*Please refer to this section in the Project Design Document.*

**CM5.4 Worker Safety**

*Please refer to this section in the Project Design Document.*
B1. NET POSITIVE BIODIVERSITY IMPACTS

B1.1 Net Positive Biodiversity Under the Project Scenario

In our PDD, we noted that the Marais des Cygnes Restoration Initiative restored key parcels within the boundary of Marais des Cygnes NWR and is having significant positive effects on biodiversity and the wildlife that depend on bottomland hardwood forests. Marais des Cygnes NWR is an especially important area for many bird species, especially migratory birds. However, the agricultural lands that existed on the Tracts before the land was restored did not--and could not--support a large variety of birdlife because many bird species require habitat that includes complex vertical and horizontal structure for nesting or foraging. 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. 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. Figure 8 below illustrates the anticipated increase in bird species richness as a result of the project. Changes are expected to be

Figure 7: An aerial view, taken in 2013, of one of the fields surrounded by mature forests. The reforestation project will reduce fragmentation on the Refuge. Photo credit: USFWS.

very modest at first, but eventually a shift in the overall bird community from early successional species to forest interior species is anticipated.

![Anticipated Project vs. Baseline Biodiversity Over Time](image)

**Figure 8: Anticipated Project vs. Baseline Biodiversity Over Time**

Without the project, the land would remain in agricultural production, and/or, remain overrun with annual and perennial weeds, either of which would have an adverse impact on biodiversity. 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.\(^{15}\)

**B1.2 Possible Adverse Effects of Non-Native Species**

Only native species were used for the Marais des Cygnes NWR Restoration Initiative.

**B1.3 Threatened Species**

*Please refer to this section in the Project Design Document.*

**B1.4 Species Used by the Project**

*Please refer to this section in the Project Design Document.*

**B1.5 Genetically Modified Organisms**

All projects are planted with natural, native trees. No genetically modified organisms were used to generate carbon credits from this project.

**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 Tracts are extended offsite to adjacent lands and the entire Marais des Cygnes NWR.

**B2.2 Mitigation Plans**

N/A

**B2.3 Net Effect of Project on Biodiversity**

The net effect of the restoration of the Tracts on biodiversity has been highly positive on both the Tracts and Marais des Cygnes NWR as a whole.

**B3. BIODIVERSITY IMPACT MONITORING**

The biodiversity within Marais des Cygnes NWR is actively studied and monitored by USFWS staff. As described in the PDD, changes in species richness have been monitored via an annual bird survey along the Marais des Cygnes River. Each June, biological staff from the University of Kansas and the Service float the 8-mile section of the River which flows through the Refuge. The breeding bird survey documents the occurrence of riparian species adjacent to the largest planting fields in the restoration project. The Service has the benefit of 11 years of data collection before the planting occurred; a gap in the dataset occurs in 2008 because water levels remained too high for safe canoeing. Therefore, post-planting monitoring began in June 2009. During the current monitoring period, bird surveys were conducted in 2014 and 2016 with dominant species including yellow-billed cuckoo, Acadian flycatcher, northern parula, and prothonotary warbler.

The monitoring has been designed to detect changes to the bird community as a result of the project. The river transect covers several of the largest fields within the planting project. The monitoring team starts the survey before 6:00 a.m. and finishes by 10:30 a.m. Three people are required, with two paddling and the third listening, watching, and documenting occurrence. Many more birds are heard than seen, requiring good knowledge of bird calls.

The bird survey results show the presence of several bird species that prefer openings characteristic of young forests including indigo buntings, yellow-breasted chat, and white-eyed vireo. The yellow-billed cuckoo, eastern wood pee-wee, northern parula, Acadian flycatcher, and yellow-throated vireo were the most common species sited during the survey. Greater differences in species and a wider variety of species richness are expected as the trees mature over time.
The riparian bird survey is included in Refuge protocols and the resulting data sets are kept in Service files. As noted in section G7.1, the CCP for Marais des Cygnes NWR is reviewed and revised according to changes in ecological conditions and augmented by additional management plans that address specific strategies in support of Refuge goals. The results of the species richness surveys will be considered when devising and implementing management plans for the Refuge. Over time, it is expected that the trees will mature and support a bird community typical of the forest interior and the forest will be managed accordingly.

B4. NATIVE SPECIES USE

As previously stated in B1.2, and in accordance with the Fund’s planting principles, all carbon sequestration projects are planted with native trees.

B5. WATER AND SOIL RESOURCE ENHANCEMENT

The restoration of the Tracts and subsequent management of the Tracts by USFWS has already conferred many benefits to soil and water quality. The Marais des Cygnes River has high turbidity and a high sediment load. The restoration of the Tracts, all which are within the River’s watershed, reduces sediment load in several ways. Erosion is reduced due to new forest establishment, and bottomland hardwoods—as opposed to goldenrod-broomsedge habitat—are more effective at retaining soil on site. The tree canopy that is growing on the Tracts now protects the soil through interception of wind and rain because the canopy is very effective at reducing the energy of raindrops which dislodge soil particles. These effects will only increase as the trees and leaves increase in size and density. The replanted areas are also improving water quality in the river by filtering and flushing nutrients and reducing sediment before it reaches open water. Overall water quality should improve because soil, nutrient, and chemical inputs associated with agriculture are now reduced due to the cessation of farming on the Tracts.

Figure 9: Bottomland hardwoods at Marais des Cygnes NWR. These trees perform critical functions that improve both water and soil quality.
Finally, the Tracts’ soil quality is healthier due to increased diversity of plant life and biomass accumulation associated with forest regeneration.

**CONCLUSION**

The Marais des Cygnes National Wildlife Refuge Restoration Initiative was implemented to help restore the last remaining stand of native bottomland hardwood forest in Kansas and help mitigate climate change while conferring community and biodiversity benefits to eastern Kansas. In addition to sequestering carbon dioxide from the atmosphere, the restored Tracts are now providing benefits to birds and wildlife, enhancing water quality along the Marais des Cygnes River and surrounding waterways, and creating new public recreation areas for all to enjoy.