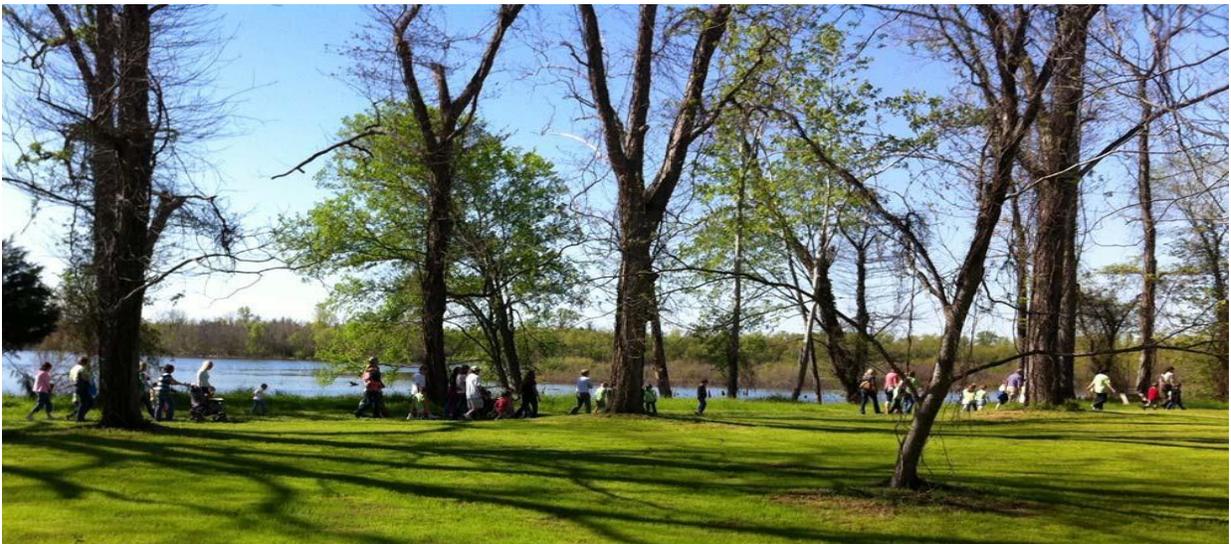


# Restoring a Legacy at Red River National Wildlife Refuge

*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 Legacy at Red River National Wildlife Refuge

**Location:** Natchitoches Parish, Louisiana, USA

**Project Proponent:** The Conservation Fund

**Project Auditors:**

Environmental Services, Inc.  
Shawn McMahon, Lead Verifier  
3800 Clermont St. NW  
North Lawrence, Ohio 44666 USA  
904.626.6011  
[smcmahon@esinc.cc](mailto:smcmahon@esinc.cc)

**Project Start Date:** February 2010 (completion of reforestation)

**Monitoring Period:** April 2014 – March 2019 (since last verification statement)

**GHG Accounting Period:** 100 years

**Project Validation Date** – May 13, 2009 - Gold Level

**Project Standard** – First Edition CCB Standards

**Project Summary:** The three primary goals of the project are to decrease the effects of climate change via carbon sequestration, restore Louisiana'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, and environmental education and interpretation.

**Gold Level Validation:** The project achieved Gold Level validation by satisfying all eight of the optional Gold Level points per the requirements of the First Edition. These include sections G7 (Adaptive Management for Sustainability), G8 (Knowledge Dissemination), CL4 (Adapting to Climate Change and Climate Variability), CL5 (Carbon Benefits Withheld from Regulatory Markets), CM4 (Capacity Building), CM5 (Best Practices in Community Involvement), B4 (Native Species Use) and B5 (Water and Soil Resource Enhancement).

The project satisfied criteria G7 and G8 by incorporating mechanisms for adaptive management and knowledge dissemination into the project design. The project is also well-suited to adapt to climate change (CL4) and all of the carbon benefits are being withheld from regulatory markets (CL5). The project design demonstrated exceptional measures for capacity building which was inclusive of all groups within the community (CM4). The project design also respected local and community customs (CM5) and held project implementation to the highest standards (for worker rights and worker safety). Finally, the project was designed to create exceptional biodiversity benefits by only planting native tree species (B4) which in turn led to great benefits for the water and soil resources on the planted tracts and throughout the Refuge (B5).

**Project Implementation Report:** V1 completed November 20, 2013; V2 completed April 18, 2014; V3 completed March 12, 2019.

## EXECUTIVE SUMMARY

This Project Implementation Report is prepared for the *Restoring a Legacy at Red River National Wildlife Refuge* project to meet the verification standards of the Climate, Community, and Biodiversity Alliance and document monitoring activities that have taken place over the previous five years. 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 every five years to determine that the project has been successfully implemented, generating net positive climate, social, and biodiversity benefits in accordance with its design. The Project was last verified on April 15, 2014, by SCS Global Services (Certificate #SCS-GHG-0032).

The Project was validated at the Gold Level on May 13, 2009, under the First Edition of the CCB Standards. This project was designed to decrease the effects of climate change via carbon sequestration, restore Louisiana's bottomland hardwood forest and wetland ecosystem and create long-term community benefits in the form of recreational lands under the management of the US Fish and Wildlife Service – hunting, fishing, wildlife photography, wildlife observation, environmental education and environmental interpretation. The project presented a unique opportunity to restore native bottomland hardwood forests that benefit fish and wildlife, enhance water quality along the Red River and surrounding waterways, create new areas for public recreation, and trap carbon dioxide.

On behalf of the US Fish and Wildlife Service, The Conservation Fund purchased a total of 1,173 acres of private, marginal agricultural land within the boundary of the Red River National Wildlife Refuge located in Natchitoches Parish in northern Louisiana. Using donations, the Fund restored the entire acreage to its native bottomland hardwood forest habitat. Once restored, the land was conveyed to the US Fish and Wildlife Service as an addition to the Red River National Wildlife Refuge for long-term protection and stewardship. The carbon offsets that are generated and purchased from this project cannot be sold 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 restoration 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.

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 Document expanded upon many of the stewardship and management activities prescribed in the Red River National Wildlife Refuge Comprehensive Conservation Plan and our monitoring plans described in our Project Implementation Reports follow the monitoring protocols prescribed by the US Fish and Wildlife Service.

Over the course of the last century, we have lost more than 24 million acres of bottomland hardwood forest along the Red River and lower Mississippi River valleys, primarily because the land was converted to agriculture. Habitat destruction is more pronounced here than in any other area of the United States. Due to the geological challenges of farming in a floodplain, combined with changing market forces, agricultural landowners are increasingly interested in alternatives, providing significant opportunity for acquisition and restoration of vast acreage back to its original bottomland habitat. Restoring these lands—especially at Red River—is now one of The Conservation Fund’s highest priorities, leaving our communities with cleaner air, cleaner water, and restoring biodiversity for wildlife and people alike.

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## **G1. ORIGINAL CONDITIONS AT PROJECT SITE**

### **G1.1 Location and Basic Physical Parameters**

The *Restoring a Legacy at Red River National Wildlife Refuge* project (“Project”) was implemented at the Red River National Wildlife Refuge (“Refuge” or “Red River NWR”), in northern Louisiana. The Refuge is comprised of five units, illustrated in the map in Figure 1. The restored acres are located within the Lower Cane Unit in Natchitoches Parish, which is the largest Unit within the Refuge. The restored lands are highlighted below in the Lower Cane Unit map in Figure 2.

Per the time table outlined in the Project Design Document (“PDD”), the Project was successfully completed in two phases. The first parcel, which consisted of 922 acres, was purchased by the Fund in October 2008 and restored with native seedlings in January 2009. The acquisition of Phase 2, totaling 251 acres, was completed in Fall 2009 and was planted with native bottomland hardwood seedlings in February 2010. Both parcels (the “Planted Tracts” or the “Tracts”) were conveyed to the United States Fish and Wildlife Service (“USFWS” or “Service”) for inclusion into the Refuge in 2010.

The entire acreage of the Red River NWR is currently 13,070 acres. The Conservation Fund acquired, restored and conveyed 1,173 of these acres to the Service, or approximately 9% of the total Refuge area.

*For additional information, please also refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

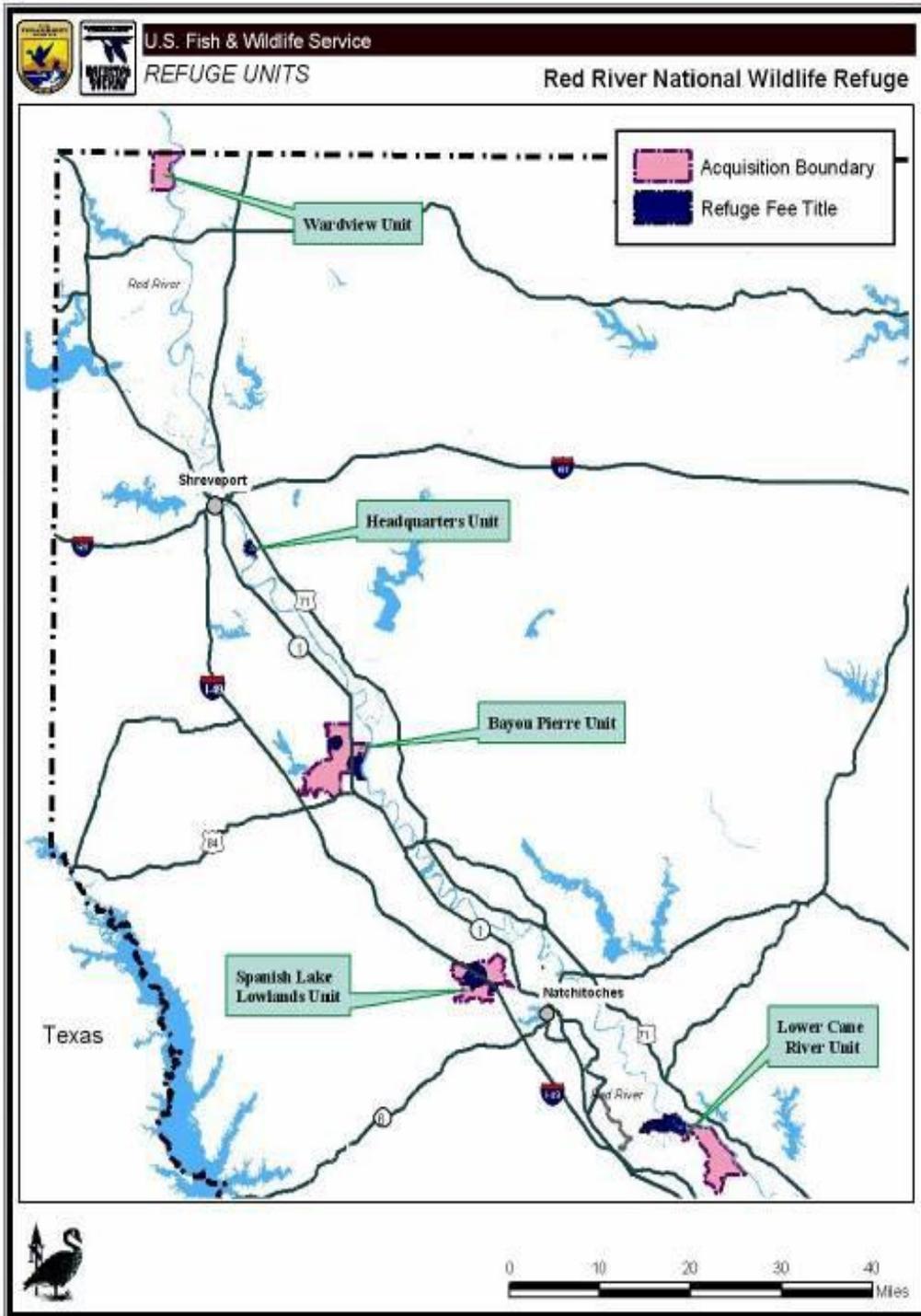
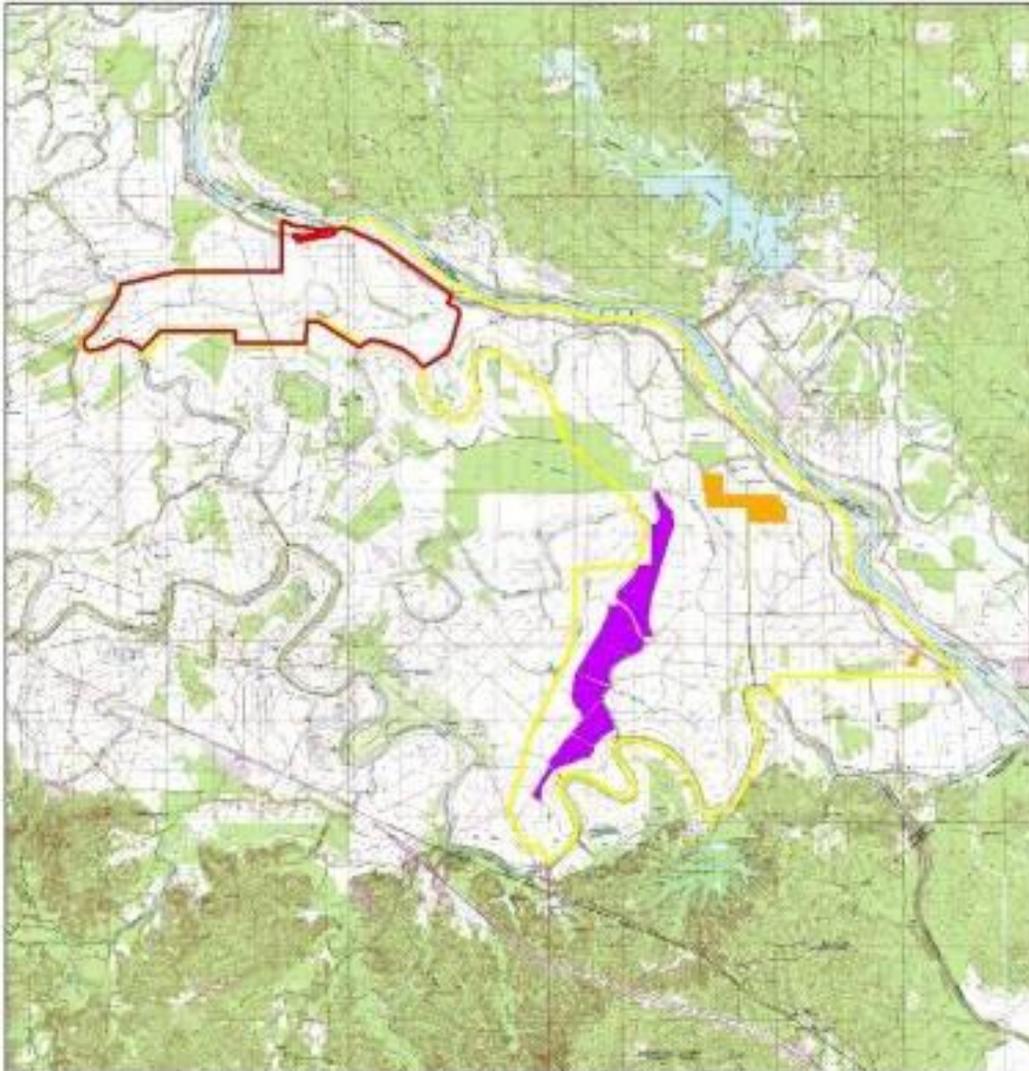


Figure 1: Map of Red River National Wildlife Refuge

# Red River National Wildlife Refuge Lower Cane River Unit Planned Reforestation



Legend	
	Phase II Planned Reforestation
	Phase I Planned Reforestation
	Refuge Fee Title Boundary
	Refuge Acquisition Boundary



U.S. Fish & Wildlife Service  
Battleground Wildlife Refuge  
Battleground, Louisiana  
Created by G. B. Smith  
1961 (Revised)  
REVISIONS: 2/1/11

Figure 2: Map of Red River National Wildlife Refuge's Lower Cane River Unit

## **G1.2 Vegetation**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

## **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<sub>2</sub> levels and a cause of global warming.<sup>1</sup> 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.

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 using both fixed radius and variable radius plot designs. Planted trees are now generally 9 to 10 years old. In February of 2009, USFWS staff and Conservation Fund staff established 15 permanent monitoring plots across the planted area. The restored area is estimated to sequester 67.74 metric tons (MT) CO<sub>2</sub>e/acre within the standing live trees, dead trees, litter, and soil. Over the 1,173-acre project, that totals 79,461 MT CO<sub>2</sub>e. As the trees grow, the project will continue to sequester more carbon. The carbon impact of the Project is estimated at 361 short tons/327.5 metric tons of carbon dioxide equivalent per acre over one hundred years.<sup>2</sup>

## **G1.4 Communities Located in and Around the Project Area**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

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

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

## **G1.6 Current Biodiversity in the Project Area**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

<sup>1</sup> 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., A. 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.

<sup>2</sup> 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.

## **1.7 IUCN Red List Threatened Species**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

## **G2. BASELINE PROJECTIONS**

*Please refer to these sections in the Project Design Document and the 2014 Project Implementation Report.*

## **G3. PROJECT DESIGN AND GOALS**

### **G3.1 Project Scope and Summary of Goals**

The scope of the Project included purchasing 1,173 acres of private agricultural land and restoring it to bottomland hardwood forest by planting it with native tree species. After the trees were planted, the land was conveyed to the USFWS for incorporation into Red River NWR where it is now utilized by wildlife, local residents, and non-resident visitors to the Refuge.

The three primary goals of the Project are to decrease the effects of climate change via carbon sequestration, restore Louisiana's bottomland hardwood forest and wetland ecosystems, 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. All project activities are being accomplished on timelines consistent with the Project Design Document.

Research on carbon sequestration rates was conducted prior to project implementation. In 2007, a consortium of leaders in forest science and carbon project development, including representatives from TerraCarbon, amassed the most comprehensive dataset of bottomland hardwood stands yet assembled for the Lower Mississippi River Valley (LMV), drawing on 540 biomass plot measurements, and produced the most reliable predictive model to date. As more fully described in Section CL1, baseline carbon stocks were assessed before planting.

Site preparation and planting was completed in two phases, with the first 922 acres planted in January 2009, and the remaining 251 acres planted in February 2010. The project was validated against the CCBA standards and received Gold Level validation in May 2009. The fully restored 1,173 acres were conveyed to the Service in 2010 for addition to the Refuge and for long term stewardship and management. 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 life time. 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**

The project has been implemented according to the timeline outlined in the PDD. The Fund purchased the first Planted parcel in October 2008 and restored it with native trees in early 2009. The Fund purchased the second Planted parcel in Fall 2009 and restored it with native trees in early 2010. Once restored, both parcels were then conveyed to the Refuge in 2010 and USFWS is providing long term management of the land.

The project start date is February 2010, which is when restoration of both phases was completed. The GHG accounting period is 100 years.

### **G3.5 Risks to Climate, Community and Biodiversity Benefits**

As noted in the original PDD, careful risk assessments were made before choosing to restore the planted tracts in Natchitoches Parish; this land was selected for restoration for several reasons. The Tracts are located in a very wet area, which reduces risk of drought and also minimizes risk of fire. The risk of damage from hurricanes is also fairly low because the Tracts are located in the northern part of the state. Wind and rain damage from past hurricanes in Louisiana, including Hurricane Katrina, was mainly confined to coastal areas.

While parts of Louisiana and neighboring states like Texas have been afflicted by terrible droughts in the past, the planted trees at Red River NWR have received sufficient rainfall and yielded adequate survival rates.

#### *Mineral Extraction*

While oil and gas extraction on Refuge lands presents a small risk to the Planted project, the overall risk to the planted trees is very low and there are multiple safeguards in place to minimize the risk.

By law, persons holding mineral rights on these parcels of Refuge lands are required to get a Special Use Permit from the FWS to extract those minerals and the FWS has to give approval on any of the mineral holder's actions. The mineral rights holder must conduct operations in manner as to prevent damage, erosion, pollution, or contamination to the lands, waters, facilities and vegetation in the Refuge area. Operations must also be conducted without interference with the operation of the Refuge or disturbance of wildlife, and once operations are completed, the area shall be restored as nearly as possible to its original condition.

Given the extensive permit requirements for extracting minerals on Refuge lands (compounded by the complex ownership arrangements on the Refuge), it's very unlikely that the individual holding these mineral rights would choose to exercise them on Red River Refuge lands. It would be much easier for the mineral rights holders to perform drilling operations on adjacent private lands.

If mineral extraction were to occur, the affected project area would be very minimal. The ground disruption at a pad site is approximately 4 acres (or about 1,200 trees) – this would become an extraction site with gravel on top. The total affected area would be less than 1% of the total Project Area. In order to mitigate this disruption, the Refuge would plant 4 acres elsewhere on the Refuge and replace the 1,200 trees that could be lost due to extraction activities. As noted

in section CL1.3 of the Project Design Document, a buffer pool of offsets has not been marketed as part of the project and this buffer should be large enough to account for any impacts from mineral extraction that might reduce the total carbon accumulation generated by this project.

### G3.6 Stakeholder Identification

For each restoration project, the Fund works with an array of public and private partners to engage project donors, select and evaluate a project location, negotiate for and acquire the land, 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).

In the original PDD, the Project defined these partners, or stakeholders, as those parties who 1) recently or currently owned the Planted Tracts (“the landowner”), 2) currently own property adjacent to the Planted Tracts (“the neighbor”), 3) were directly involved with site selection, acquisition, planting, biological monitoring, carbon monitoring or long-term management (“project implementers”), 4) donated to support the project (the “donors”), and/or 5) are members of local groups who use Red River NWR (“community members”). The Friends of Red River National Wildlife Refuge, an all-volunteer group dedicated to assisting Red River NWR with its mission, is a community stakeholder. The Friends group hosts community and educational events on Refuge lands.

The below table illustrates the list of stakeholders and their roles. 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). The roles have been updated to reflect the current phase of the project.

**TABLE 1: PROJECT STAKEHOLDERS**

Name	Company / Entity	Contact Information	Responsibility
Gypsy Hanks	US Fish and Wildlife Service	<a href="mailto:Gypsy_hanks@fws.gov">Gypsy_hanks@fws.gov</a> (318) 726-4222	Project Monitoring
Chris Foster	US Fish and Wildlife Service	<a href="mailto:christopher_foster@fws.gov">christopher_foster@fws.gov</a> (318) 726-4222	Project Monitoring
Mike Thompson	CES, Inc	<a href="mailto:mthompson@cesincusa.com">mthompson@cesincusa.com</a> 207-989-4824	Technical Assistance
N/A	Environmental Synergy, Inc.	N/A: Company Closed 2011	Planting Supervision and Project Monitoring.
Kevin Harnish	The Conservation Fund	<a href="mailto:kharnish@conservationfund.org">kharnish@conservationfund.org</a> 919-948-6152	Project Monitoring/Management
Jena Thompson Meredith	The Conservation Fund	<a href="mailto:jthompson@conservationfund.org">jthompson@conservationfund.org</a> (512) 423-5086	Project Management
David Shoch	Terra Carbon LLC	<a href="mailto:david.shoch@terracarbon.com">david.shoch@terracarbon.com</a> 1-309-693-9303	Project Development

### **G3.7 Transparency and Project Information Availability**

The Project Implementation Report has been placed at the front of the Refuge Headquarters building in a prominent location by the volunteer station and gift shop. This is where all of the informational brochures and documents pertaining to Refuge activities are displayed.

## **G4. MANAGEMENT CAPACITY**

### **G4.1 Management Team Experience**

The management responsibilities of the Project are split between the Fund and USFWS. 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, and management of the restored Planted Tracts is the Service's responsibility.

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 Planted, have helped to restore more than 10 million trees across 25,000 acres that will trap an estimated 10 million tons of CO<sub>2</sub>e over 100 years.

To date, TerraCarbon has provided services to the Fund on a contractual basis. As the project moves forward, The Conservation Fund will secure services such as carbon monitoring and analysis and replanting (if necessary) on an as-needed basis. TerraCarbon is one of several contractors that may be used for these purposes. All of these services will be performed under the direction of The Conservation Fund and the Red River National Wildlife Refuge.

### **G4.2 Management Capacity and Project Scale**

The scale of the Project 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 Project, 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 has coordinated and implemented this project in partnership with the USFWS. The Fund has 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 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.

Local groups, including Friends of Red River, are also able to assist with monitoring community impacts. The mission of the Friends group is to support the Refuge and enable the local community to enjoy the Refuge for educational and recreational purposes.

#### **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 Red River 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 consistently 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**

The first phase of the Project consisted of 922 acres, which were purchased by the Fund in October 2008 from a private landowner and willing seller. The acquisition of Phase 2, totaling 251 acres, was completed in Fall 2009 and purchased from the same individual. Both parcels have been conveyed to the Service for incorporation into the Refuge. The majority of the planted lands are now open to the public for hunting and outdoor recreation.

#### **G5.2 Voluntary Nature of the Project**

The private landowner sold both parcels willingly to the Fund.

#### **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 and the 2014 Project Implementation Report.

#### **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 with the intention of conveying it to the Service for addition to the refuge system.

### **G7. ADAPTIVE MANAGEMENT FOR SUSTAINABILITY**

#### **G7.1 Generation of Reliable Feedback**

The Fund's carbon monitoring protocol is specifically designed to generate reliable feedback to improve project outcomes. The planted tracts at Red River NWR are part of an "umbrella

population” of monitored tracts (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 CCP revision process is designed to generate reliable feedback to help guide management decisions on the Planted Tract. 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 also 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 Tract.

## **G7.2 Documentation of Decisions**

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

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

## **G7.3 Project Flexibility**

Please refer to this section in the original Project Design Document and the 2014 Project Implementation Report.

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

For each restoration 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 restoration projects under natural conditions and according to best wildlife and habitat management practices.

As described in previous sections, the restoration tracts were conveyed to 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 and the 2014 Project Implementation Report.

## **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.

Finally, the information we used for our monitoring plan has been publicly disseminated. The model for projected carbon stock changes over time was published in the journal *Wetlands*.

## **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 Project 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 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.

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 CO<sub>2</sub> equivalent per acre (i.e., 286 short tons per acre) at year 50, and 327.5 metric tons of CO<sub>2</sub> 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 CO<sub>2</sub> equivalent per acre per year (i.e., 5.7 short tons of CO<sub>2</sub> equivalent per acre per year). The results were vetted through a rigorous internal peer review process and were published in the journal *Wetlands*. 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)**

Stand age	Measured	USDOE tables		TOTAL	(metric)	(short tons)
	Above- and below ground live tree tC/ha	Soil	Dead Wood and Litter		t CO <sub>2</sub> -e/ac	t CO <sub>2</sub> -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

The results of this model show the expected accrual of carbon stocks in bottomland forests in the same region as the Red River CCBA project. Actual carbon stocks for the project will be measured over time using field measurements for live tree biomass and default values for soil, dead wood, and litter (see section CL3 for a discussion of the monitoring plan).

Pre-project Carbon Stocks

As noted in Section G1.3, the assumption for pre-project carbon stocks (i.e., on the agricultural lands prior to reforestation) was that woody biomass carbon stocks were zero. The only baseline carbon stock was the soil carbon. Future soil monitoring will use default estimates taken from USDOE 1605(b) tables.

**CL1.2 Non-CO2 greenhouse gases**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

**CL1.3 Net Climate Impact**

As noted above, the climate model predicts 259 metric tons of CO<sub>2</sub> equivalent per acre (i.e., 286 short tons per acre) at year 50, and 327.5 metric tons of CO<sub>2</sub> 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 CO<sub>2</sub> equivalent per acre per year (i.e., 5.7 short tons of CO<sub>2</sub> 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.<sup>4</sup> In this case, the primary concern is that as a result of the planted tracts being taken out of agriculture and restored to trees, farmers may clear healthy forests to create more viable agricultural lands.

First, this is unlikely given that so much of the native forestland in the area has already been cut and converted in preceding decades. In fact, only about 30% of the original bottomland forests still remain in this ecoregion.<sup>5</sup>

Furthermore, the history of the federally subsidized Conservation Reserve Program<sup>6, 7</sup> (“CRP”) makes leakage unlikely here. Administered by the United States Department of Agriculture’s Natural Resources Conservation Service, CRP provides financing to farmers who are willing to take their lands out of agricultural production and restore them to a more natural state. Since its inception, the CRP program in Natchitoches has been fully subscribed. The local Natchitoches CRP program officer, Dale Ford, previously stated that there have been no leakage effects associated with the CRP; specifically, no forested land has been cleared for farming despite increasing enrollment of lands in the CRP and a reduced agricultural land base. In this way, the Conservation Reserve Program is analogous to the Red River Restoration Initiative, and thus we should expect very little leakage from reforestation projects in this region.

The Refuge Manager is still in contact with the tenant farmer who used to farm on the planted tracts prior to their restoration. This farmer is now farming on agricultural lands adjacent to the Refuge, and did not clear any forests to create new agricultural land.

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<sup>4</sup> Ensuring Offset Quality: Integrating High Quality Greenhouse Gas Offsets into North American Cap-and-Trade Policy, p. 19. July 2008. The Offset Quality Initiative. Available at: <http://www.offsetqualityinitiative.org/index.html>

<sup>5</sup> BATTAGLIA, L. L., P. R. MINCHIN, AND D. W. PRITCHETT. 2002. Sixteen years of old-field succession and re-establishment of a bottomland hardwood forest in the Lower Mississippi alluvial valley. *Wetlands* 22: 1–17.

<sup>6</sup> United States Department of Agriculture, “Conservation Reserve Program,” available at <http://www.nrcs.usda.gov/PROGRAMS/crp/> The USDA Farm Service Agency, available at: <http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp-sp>

<sup>7</sup> United States Department of Agriculture, “Wetland Reserve Program,” Available: <http://www.nrcs.usda.gov/PROGRAMS/wrp/>

## **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 Project 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 Red River planted 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 Red River 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 Planted 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 by 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 an accuracy within 10% of the mean at the 95% confidence level beginning in year 20.

#### Monitoring Protocol

ESI’s original monitoring protocol for the Planted Tracts consisted of three components: (1) base-year analysis (i.e., to determine soil carbon stocks and establish permanent monitoring plots); (2) tree survival analysis and; (3) 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: The initial site assessment that was conducted prior to planting in 2009 concluded that there was no significant plant material present at the planting site. The default values that were used also assumed zero plant biomass at the project start.

While the ESI monitoring plan involved direct soil measurements, the new monitoring plan uses 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: The Refuge staff has been visually monitoring the planted areas to ensure adequate survival while the trees are still very young. The Conservation Fund monitoring plan included a survival analysis after 5 years. To assess the survival of the trees, a series of survival plots were installed, and Refuge staff follow the protocol described below. If the Refuge staff, in consultation with the Fund, determines that survival rates are not acceptable, the Fund will perform supplemental planting as necessary.
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 had a sample of tree survival measured in year five (2015) and then will be measured every five years after that. The survivorship sample assesses the rate of survival in plots where there are 100 planted trees. Starting in year 10, the sampling will use 1/10th acre fixed area plots to measure carbon stocks. These fixed area plot measurements will be repeated every 10 years. Starting in year 15, a variable radius plot will be used to estimate carbon stocks at the same locations as the fixed area plots. These variable radius plots will be also re-entered on a 10 year 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.<sup>8</sup>

#### **CL4. ADAPTING TO CLIMATE CHANGE AND CLIMATE VARIABILITY**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

#### **CL5. CARBON BENEFITS WITHHELD FROM REGULATORY MARKETS**

All of the carbon benefits generated by the Project have been withheld from regulated GHG markets and were essentially retired upon their sale.

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<sup>8</sup> 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 Planted Tracts, which were previously private farmland with no public recreation value, can now be used and enjoyed by the public and especially residents in the surrounding communities of northern Louisiana. The Tracts provide numerous recreational opportunities to local residents and other Refuge visitors, including hunting, fishing, wildlife photography and observation, environmental education and interpretation.

Since the original PDD was published, the Red River NWR has grown in size and in capacity to provide services to local citizens. The new parcels conveyed to the Refuge in 2010 via the Project added almost 10% more acreage to the Refuge lands. And in January 2012, a brand new Visitor and Education Center opened at Red River NWR. The 9,000 square foot visitor's center building is located just off Lake Caroline, and features both an Exhibit Hall and a Nature Store, and is utilized for many Refuge events. The Refuge sponsors many educational programs, including classes for kids of all ages and workshops for education professionals. The Refuge, in connection with its Friends group, also hosts community events, like the Annual Refuge Festival, which features booths with live hawks and eagles, nature and bird walks around Lake Caroline, hayrides, fishing games and demonstrations and nature projects and special activities for children. Right now most formal events occur at the headquarters unit (because of the Visitor Center) or at the Bayou Pierre unit (because a renovated farm house serves as a base there). However, the Friends Group expects that formal events will happen at the Lower Cane, where the Planted Tracts are located, as the Friend Group continues to grow in both volunteers and public awareness.

Although large events are typically held at the headquarters unit, local residents use the Lower Cane River Unit for recreational activities. According to local residents and Friends group members, visitors frequently use the Lower Cane River Unit for hunting and wildlife photography and observation. Because the Lower Cane Unit is the largest unit, it has the most diverse landscape of any Unit on the Refuge, and is therefore popular with photographers. The Unit is also home to significant duck populations during the winter, making it incredibly popular with hunters. Duck hunting and bow hunting for deer are both popular activities on the Planted Tracts and in the surrounding areas on the Lower Cane Unit.

The project's positive community impact is being monitored by evaluating the community use of the Planted Tracts over time. In our PDD, we originally predicted that increase in usage would be modest at first and would be positively correlated with the Tract's stand development.

However, community use of the Tracts jumped significantly once the Tracts were conveyed to the Red River NWR. They were previously closed to recreational usage because they were private agricultural lands. Once the Tracts were conveyed to the Refuge, there was a sharp increase in usage as the lands are now used for hunting and wildlife viewing and photography, as noted above. After this initial spike, we expect further increases to be modest over time.

Increase in Refuge visitation and a rise in activity levels should lead to corresponding increases in overall fitness, health and wellbeing amongst community members.

## Economic Benefits

The PDD also highlighted the fact that the Project was expected to have a positive economic impact on the neighboring community, pointing to data that showed that fishing, hunting and wildlife-watching activities were large economic generators in the Louisiana economy.<sup>9</sup> The data highlighted the advantages an outdoor destination area such as a wildlife refuge can bring to a local economy, and we predicted that the expansion of the Refuge should only cause these numbers to rise.

In October 2011, Southwick Associates published a study, commissioned by the National Fish and Wildlife Foundation, further supporting this research. The study 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.<sup>10</sup> An article in the Shreveport Times titled “Red River Refuge to give jolt to economy” specifically highlighted the contributions that the Refuge has made to the northern Louisiana economy (see Exhibit C). 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.<sup>11</sup>

The newly acquired and restored forestlands that were transferred by the Fund to the Service represent approximately nine percent of the total Service holdings at Red River NWR. By restoring and strengthening Red River NWR, local residents will be able to enjoy an economic advantage that accompanies an area’s elevated recreational status.

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

Since the project was implemented, stakeholders have continued to play active roles in the project. USFWS now owns and manages all of the Planted Tracts. The USFWS, in conjunction with the Fund, performs monitoring on the Tracts. Community members use the Tracts for outdoor recreation and educational opportunities. The Tracts are very popular with hunters and approximately two-thirds of the Tracts are open to hunting.

*For additional information on stakeholder participation in project planning, please see this section in the original Project Design Document and the 2014 Project Implementation Report.*

9 Red River CCP, available at <http://www.fws.gov/southeast/planning/CCP/RedRiverFinalPg.html>

10 *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.

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

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

Per communication with the Refuge Manager, there have been no grievances to date regarding the Red River Restoration Initiative.

## **CM2. OFFSITE COMMUNITY IMPACTS**

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

There have been no potential negative impacts from restoring the Planted Tracts and conveying the land to Red River NWR. The tenant farmers who previously worked on the Tracts are currently farming on other lands near the Refuge. Therefore, no jobs have been lost in the community due to the cessation of farming on the Tracts.

There was also relatively little impact on taxes because Revenue Sharing Payments have been made to each Parish where USFWS now owns lands.

### **CM2.2 Mitigation of Negative Impacts**

As stated above, there are no anticipated negative impacts caused by the restoration of the Tract. As noted in CM2.1, the tenant farmer who was previously working on the land is continuing to work on other agricultural property, so no jobs were lost due to the project. There was also relatively little impact on Natchitoches Parish tax rolls even though lands are being taken out of private ownership because, as stated above, Revenue Sharing Payments are made by USFWS to each Parish where USFWS owns lands.<sup>12</sup> These payments are based on the appraised value of the lands and, in many cases, are similar to or even greater than the anticipated tax revenues.

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<sup>12</sup> These payments are made according to the Revenue Sharing Act (16 U.S.C. 715s). The Service receives revenue from certain products or privileges like timber sales, grazing fees and right-of-way permits and this revenue is then deposited into the National Wildlife Refuge Fund for revenue sharing payments. If there is not enough money in the NWR Fund to cover the payments, Congress is authorized to appropriate money to make up the difference.

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

There have been no negative impacts caused by the restoration of the Planted Tracts and conveyance of these Tracts to the USFWS for addition to the Red River NWR. Restoring the land to native forest and conveying it to USFWS has conferred many benefits on the surrounding community, as described in CM1.1. Thus, the net effect on the community continues to be positive.

## **CM3. COMMUNITY IMPACT MONITORING**

### **CM3.1 Monitoring Plan**

Since the PDD was published, the Red River NWR has grown in size and in capacity to provide services to local citizens and visitor use across the entire Refuge has increased exponentially. According to the Refuge Annual Performance Plans (RAPP), visitor usage increased from approximately 1,330 visitors in 2009 to 26,500 visitors in 2013, an increase of over 25,000 visitors in 5 years.

Refuge staff has been monitoring the community benefits generated by the Project, as described in CM1.1, with specific attention paid to the anticipated rise in community use of the Planted Tracts. As noted in CM1, there was a sharp increase in visitor usage once the lands were opened to the public for recreation as part of the Refuge. As the public discovers these new Refuge lands and the seedlings develop into a mature bottomland hardwood forest, public activity on the Tracts is expected to increase even further.

At this time, Refuge staff have been monitoring the use of the Planted Tracts primarily through visual observation. The Refuge is not currently utilizing daily use cards but that could become another monitoring tool in the future. According to Refuge staff, the community is using and visiting the Tracts at rates comparable to other Refuge lands. There are two parking lots near the Tracts which help facilitate visitor use. Approximately two-thirds of the Planted acreage is open to hunting, and hunters, especially duck hunters, are the primary users of the Tracts at this time. As noted in CM1, the Tracts are also very popular with bird watchers and photographers because the Lower Cane Unit has a very diverse landscape and many different species (including birds and mammals) can be found there.

The President of the Red River Friends group has also confirmed that local residents use the parcels for both duck hunting and bow hunting for deer. She noted that, judging from the call volume and numbers of questions received regarding the Planted Tracts, many community members were interested in using these lands for recreational purposes and stated that this area was a popular recreation spot for the local community.

## **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 exchanged lessons learned and best management practices for carbon sequestration projects, allowing for the successful replication of projects in other communities. Members of the Go 33

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. Planted 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.

#### **CM4.2 Inclusion of All Groups**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

#### **CM4.3 Inclusion of Women**

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

#### **CM4.4 Community Participation**

Community members continue to be enthusiastic and involved supporters of the Refuge. In January 2012, the Refuge held a grand opening ceremony for the new Refuge Visitor Center, which was attended by hundreds of residents of the local community.

### **CM5. BEST PRACTICES IN COMMUNITY INVOLVEMENT**

#### **CM5.1 Knowledge of Local Customs**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

#### **CM5.2 Stakeholder Employment**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

#### **CM5.3 Workers' Rights**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

#### **CM5.4 Worker Safety**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

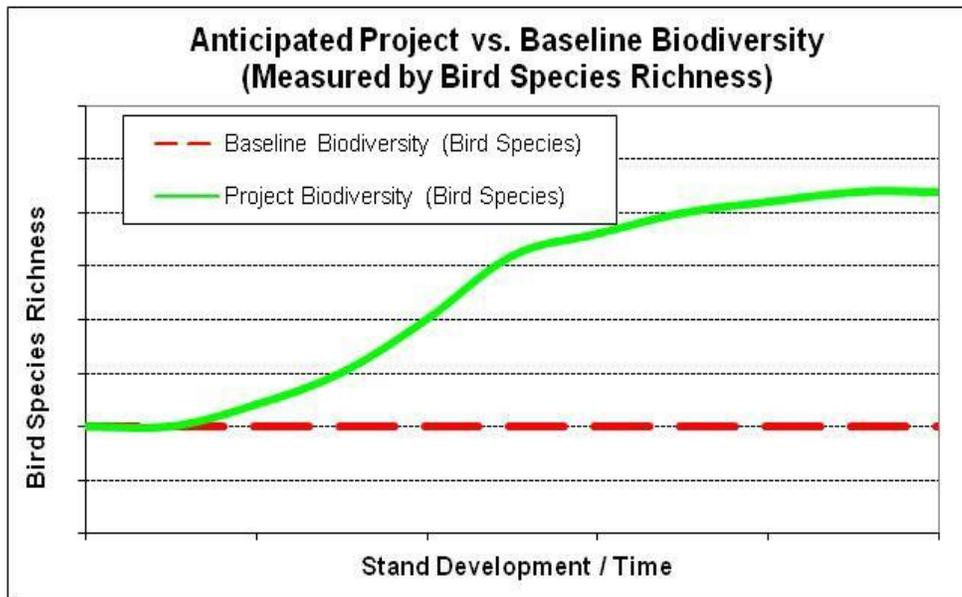
## **BIODIVERSITY SECTION**

### **B1. NET POSITIVE BIODIVERSITY IMPACTS**

#### **B1.1 Net Positive Biodiversity Under the Project Scenario**

In our PDD, we noted that the Project will restore key parcels within the boundary of Red River NWR and will have significant positive effects on biodiversity and the wildlife that depend on

bottomland hardwood forests. Red River NWR is an especially important area for many bird species, especially migratory birds. However, the agricultural lands that existed on the Planted 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 in the Lower Mississippi Valley has shown that bird species richness rises as bottomland hardwood forests age due to an increase in this structural complexity.<sup>13</sup> The newly planted forests will provide the complex habitat necessary for successful breeding, nesting, and overall survival. Figure 4 illustrates the anticipated increase in bird species richness as a result of the Planted project.



**Figure 3: Anticipated Project vs. Baseline Biodiversity Over Time**

<sup>13</sup> 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.

Without the project, the land would remain in agricultural production which would have an adverse impact on biodiversity. Habitat fragmentation negatively impacts species migration, breeding, and overall survival rates; fragmentation due to land conversion for agriculture has led to the decline of many avian species.<sup>14</sup> In small patches, forest birds are subjected to more competition with other species, increased parasitism, increased likelihood of predation, and increased isolation and inhibition of dispersal. Larger, more connected areas of natural habitat, including that made possible by the Planted Tracts' restoration, will benefit the many species that rely on bottomland hardwoods at Red River NWR. Therefore, the net biodiversity impact of the Planted project has been, and is expected to continue to be, very positive.

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

Only native species were used for the Red River Restoration Initiative.

### **B1.3 Threatened Species**

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

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

*Please refer to this section in the Project Design Document and the 2014 Project Implementation Report.*

### **B1.5 Genetically Modified Organisms**

All Planted 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 Planted Tracts are extended offsite to adjacent USFWS-owned lands and the entire Red River NWR.

### **B2.2 Mitigation Plans**

N/A

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

The net effect of the restoration of the Planted Tracts on biodiversity has been highly positive on both the Planted Tracts and Red River NWR as a whole.

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14 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>

### **B3. BIODIVERSITY IMPACT MONITORING**

In our PDD, we stated that the Refuge staff would conduct a species richness bird survey on the Planted Tracts every five years after planting is completed. In 2012, point counts were conducted by the US Fish and Wildlife Service on the Lower Cane River Unit reforestation tracts to document changes in bird species presence and abundance as plant succession occurs. A total of 73 individuals and 8 species were detected on 8 points. Averages of 2.25 species/point and 7.88 individuals/point were documented. The main two species utilizing the young reforested tracts are dickcissels and red-winged blackbirds. This is expected given that the trees were only three years old in 2012, and conditions still resemble the open fields that these two birds prefer. As the trees grow, bird species diversity will increase to include early successional species such as buntings, grosbeaks, and chats.

Point counts were again conducted in 2017 on the Lower Cane River Unit reforestation tracts to document changes in bird species presence and abundance as plant succession occurs. A total of 84 individuals and 13 species were detected on 8 points. Averages of 6.88 species/point and 10.5 individuals/point were recorded. The two most frequent and abundant species are still dickcissels and red-winged blackbirds; however, unlike in 2012, a higher species diversity is present. The third most abundant species recorded was yellow-breasted chat. Also present in good numbers were blue grosbeak, painted bunting and indigo bunting.

Refuge staff noted that as the forest grows in the next five years, species richness will increase dramatically. Birds that will soon be utilizing the fields include indigo buntings, yellow-breasted chats, painted buntings, blue grosbeaks, orchard orioles, common yellowthroats and possibly prairie warblers.

As noted in our PDD, biodiversity within Red River NWR is actively studied and monitored by USFWS staff. Refuge management issues an annual report containing updates and information on fish and wildlife on the Refuge, including the results of waterfowl surveys and bird breeding surveys. As noted in section B1.1, the Project 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 and greater habitat complexity provided by the newly planted bottomland hardwood forest.

### **B4. NATIVE SPECIES USE**

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 Planted Tracts and subsequent management of the Tracts by USFWS have conferred many benefits to soil and water quality. The soil quality on the restored Tracts is healthier due to increased diversity of plant life and biomass accumulation associated with forest regeneration. Erosion is reduced due to new forest establishment, which has replenished both soil carbon and soil nutrients. In addition, the previous landowner had maintained the roads within the Tract by grading and dragging them, which kept them in a bare dirt condition. USFWS maintains the roads in a vegetated condition, which also reduces erosion.

The Project has also improved flood control on the Tracts. In general, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities because they provide areas to store floodwater. Specific management activities taken by USFWS on the Tracts have also helped improve flood control. Since project inception,

Refuge staff have added culverts along the road to improve drainage. Additional water control structures may also be added in the next 10 years after the trees are more established. The water control structures can attract beavers so they must be carefully maintained.

Finally, overall water quality has improved because soil, nutrient, and chemical inputs associated with agriculture have been reduced due to the cessation of farming on the Tracts. As the trees grow, the replanted areas should improve water quality by filtering and flushing nutrients, processing organic wastes and reducing sediment before it reaches open water.

## **CONCLUSION**

The Restoring a Legacy at Red River National Wildlife Refuge was implemented to restore Louisiana's native bottomland hardwood forests and help mitigate climate change while conferring community and biodiversity benefits to northern Louisiana. In addition to sequestering carbon dioxide from the atmosphere, the restored Planted Tracts are now providing benefits to birds and wildlife, enhancing water quality along the Red River and surrounding waterways, and creating new public recreation areas for all to enjoy.