THE VALUE OF RESTORING FORESTED WETLANDS: THE AVAHOULA CLIMATE MITIGATION PROJECT

CATAHOULA PARISH, LOUISIANA

IMPACT SUMMARY

$2.7 billion
in new and permanently protected ecosystem services (at a 3% discount rate)

$80 million
in ecosystem services created every year

$170 million
in climate resilience benefits from 840K tons of CO_2e captured over 40 years.

12k–23k
migratory waterfowl supported annually by restoration of food sources

$180k–$400k
annually for improved recreational experiences

67k
Louisiana residents benefit from Avahoula's impacts

The Avahoula Climate Mitigation Project ("Avahoula") is a 7,200 acre afforestation/ restoration project in the Lower Mississippi Alluvial Valley (MAV) of east-central Louisiana, owned and managed by Delta Land Services, LLC. The site is part of the Saline-Larto Lake complex, a diverse ecosystem that has experienced loss of bottomland hardwood forest over the last 70 years due to agricultural conversion. The combination of frequent high-water events on the Mississippi and Red Rivers, low capability soils, and limited irrigation have rendered much of the agricultural land marginal, including Avahoula. These factors, in addition to the large-scale restoration effort that is planned, make Avahoula an ideal site for carbon mitigation. As climate changes, restoring native bottomland hardwood forest, as planned at Avahoula, increases resilience to changing environmental conditions and provides greater co-benefit values to society.

Avahoula is currently under farm management to support soybean and cotton production. To protect these crops during high water events, water pumps are operated for prolonged periods to keep the fields dry, and the crops are treated with herbicide and fertilizers. In partnership with Pachama, a forest carbon technology provider, Delta will discontinue crop production, reconnect natural surface drainage patterns, and plant approximately 3.5 million native trees on 6,500 acres. Additionally, moist soil areas will be developed to create and enhance waterfowl and wading bird habitat. As is customary in this area, seasonal flooding will take place, creating foraging habitat for waterfowl and reestablishing a more historic hydrological regime for the bottomland hardwood forest.

This restoration will ultimately be funded through the sale of carbon credits generated by in-situ sequestration and storage over a period of 40 years. However, the value of the ecosystem services created by the project is much higher than the market price of the carbon credits sold, as Avahoula provides broad benefits to society and the regional community. Furthermore, Avahoula will be placed under a perpetual conservation easement, ensuring these services are protected in perpetuity.

In 2023, Earth Economics analyzed the value of the ecosystem services created by the permanently protected Avahoula Climate Mitigation Project. Earth Economics found that every year, the current agricultural land use creates $2.03 million in harms, mainly through detriment to water quality related to fertilizer runoff. **When restored to a healthy functioning forested wetland, Avahoula will create $79.92 million in benefits annually and $1.85 billion in benefits discounted at a 3 percent rate over the project's 40-year carbon crediting period.**

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SUPPORT FOR WILDLIFE AND BIODIVERSITY

Avahoula sits in the Lower Mississippi Alluvial Valley, in the heart of the Mississippi Flyway, where more than 40 percent of North America's waterfowl and 60 percent of all U.S. bird species migrate during winter months. The Saline-Larto Lake complex is a critical area of habitat as it is just southeast of Catahoula Lake, a globally recognized Ramsar wetland. By restoring the site to natural wetland forest, Avahoula will extend habitat for waterfowl, neotropical resident, and migrating species, as well as connect habitat for the Louisiana black bear, white-tailed deer, swallow-tailed kites, and any other resident and migratory species.

The project will create a forested corridor between the 64,000-acre Dewey Wills Wildlife Management Area (WMA), the 17,500-acre Lake Ophelia National Wildlife Refuge, and the 20,000-acre Honey Brake hunting lodge, which includes 9,000 acres of protected Wetlands Reserve Project land—the largest single-owned in Louisiana. Through Dewey Wills WMA, Avahoula will also connect to Catahoula Lake, the largest natural freshwater lake in the state, and the largest moist-soil wetland in North America.

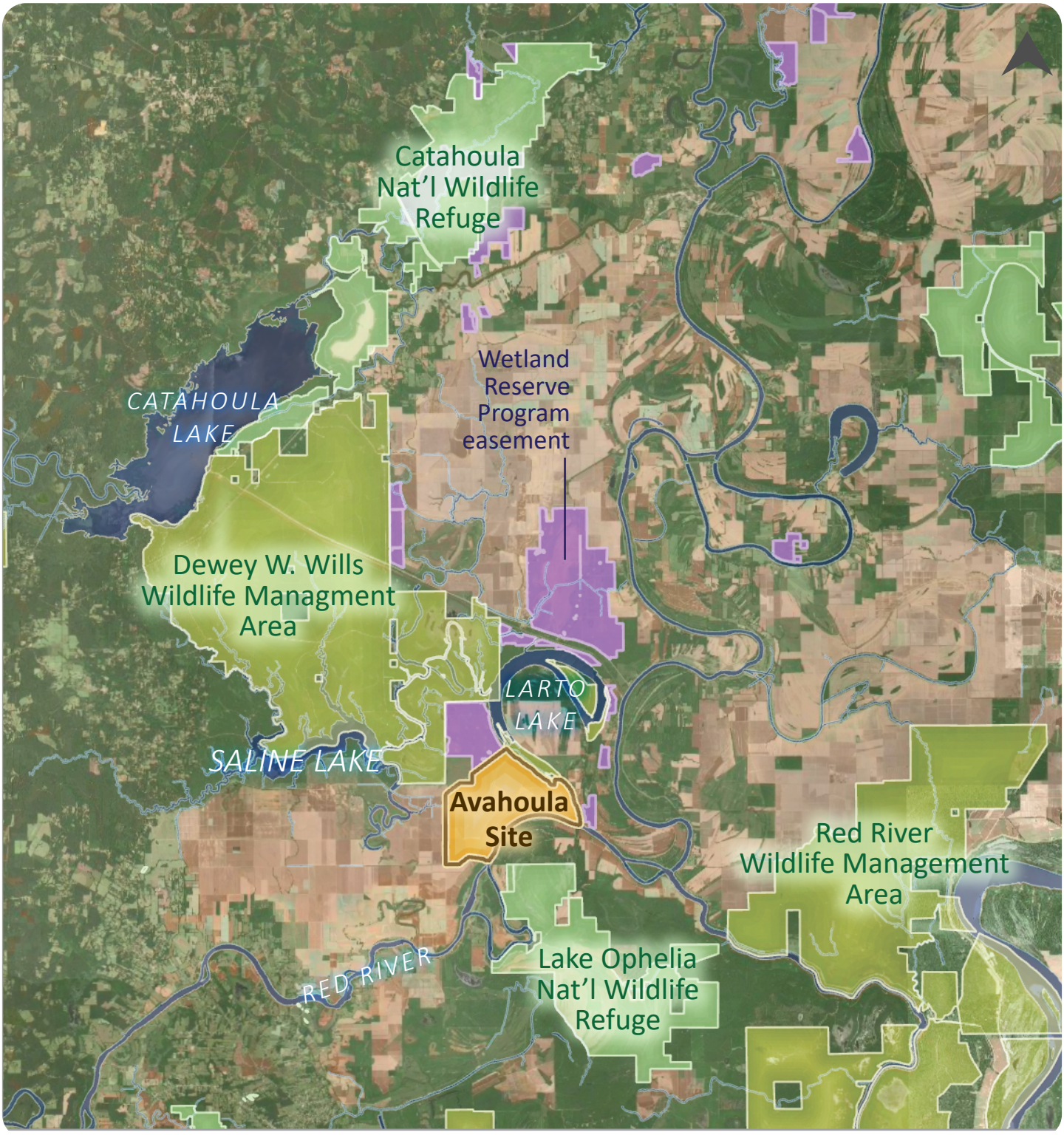
Currently, Avahoula's drained agricultural land provides no opportunity for waterfowl to feed. Delta will develop approximately 650 acres of moist-soil areas and allow rain to flood around 1,000 acres, establishing the feeding conditions needed by waterfowl. The moist-soil managed habitat will support invertebrate species that provide essential protein. A variety of oak tree species will be planted, and their annual mast production will be a key source of energy for wintering waterfowl. **In total, the additional calories created by habitat restoration could support 12,000 waterfowl, increasing to 23,000 waterfowl if the whole site is flooded during the winter months.**

The United States and Canada have lost 3 billion breeding birds since 1970—that is 1 in 4 birds. Many of those are forest-breeding landbirds, which nest in forest core habitat (over 250m from forest edge). The Lower Mississippi Valley Joint Venture (LMVJV) has set a goal of restoring 1.73 million acres of sustainable bottomland hardwood forest through optimal forest management or afforestation to support target populations of landbirds in the MAV. Avahoula will be a major contributor to this goal.

Avahoula is a high priority site for restoration. The creation of 5,775 acres of forest core will support 6,104 birds belonging to ten species the LMVJV has identified as in need of additional habitat. More broadly, the restoration of Avahoula will meet 0.33% of the habitat restoration goals for the MAV's landbird population.

The additional populations of waterfowl, landbirds, and other wetland dependent species will improve the quality of recreation across the region. Based on studies that have estimated the increased value of recreational trips from increased bird population, **the creation of habitat at Avahoula could support $183,000 to $398,000 in annual value to tourists**, depending on species of birds.

MAP 1. AVAHOULA CLIMATE MITIGATION PROJECT SITE



SOURCES: Delta Land Services, USGS, Esri

Ecosystem services are the non-market benefits that nature provides to people—clean and accessible water, clean air, food, and other vital goods and services that support human well-being and communities. Earth Economics found that **the Avahoula Climate Mitigation Project provides more ecosystem service benefits than the previous agricultural land use, improving resiliency and supporting more social and environmental benefits for local communities by $53 million to $112 million each year.**

DISASTER RISK REDUCTION |***$6.8M—$47M per year***| Forested wetlands offer protection against natural disasters. They absorb and store rainfall and reduce flood surges. Wetlands release stored water during dry seasons, delaying the onset of droughts and minimizing water shortages.

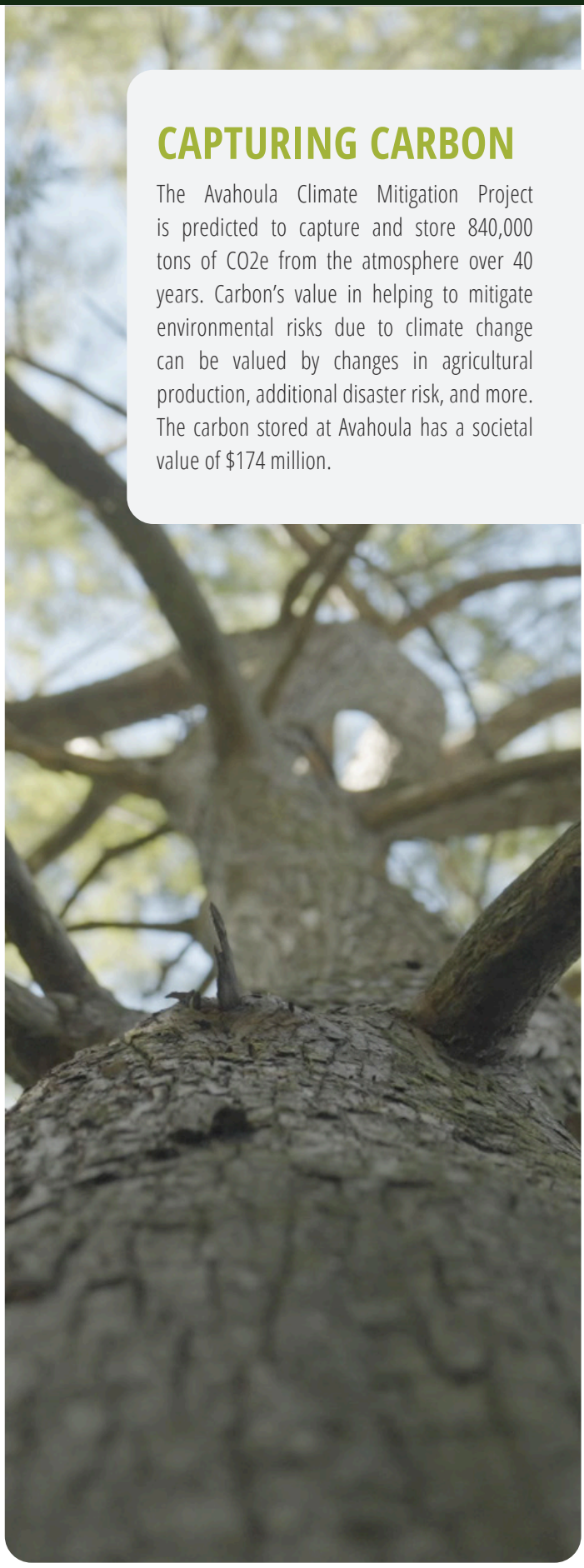
AIR QUALITY |***$18K—$44K per year***| Vegetation captures air pollutants, such as particulate matter, ozone, and more, which can reduce incidences of adverse health effects from respiratory illness.

WATER QUALITY, WATER SUPPLY, AND AQUIFER RECHARGE |***$7.7M per year***| Forested wetlands help maintain water systems by processing, removing, and sequestering suspended and dissolved nutrients, solids, and other contaminants; enhancing groundwater recharge to aquifers; and supporting agricultural, residential, and industrial water supplies.

SOCIAL VALUE |***$20M—$34M per year***| People derive satisfaction from simply from knowing habitats exist in the present, and it is well-documented that people are willing to pay for restoration projects, even if they will never see or use a site.

POLLINATION & BIOLOGICAL CONTROL |***$1.6M per year***| People depend on pollination to produce food and fiber, especially pollination by wild animals and insects, which in turn depend on suitable natural habitat to sustain their populations. Natural habitats also support native species that suppress pest populations, further enhancing regional agricultural production.

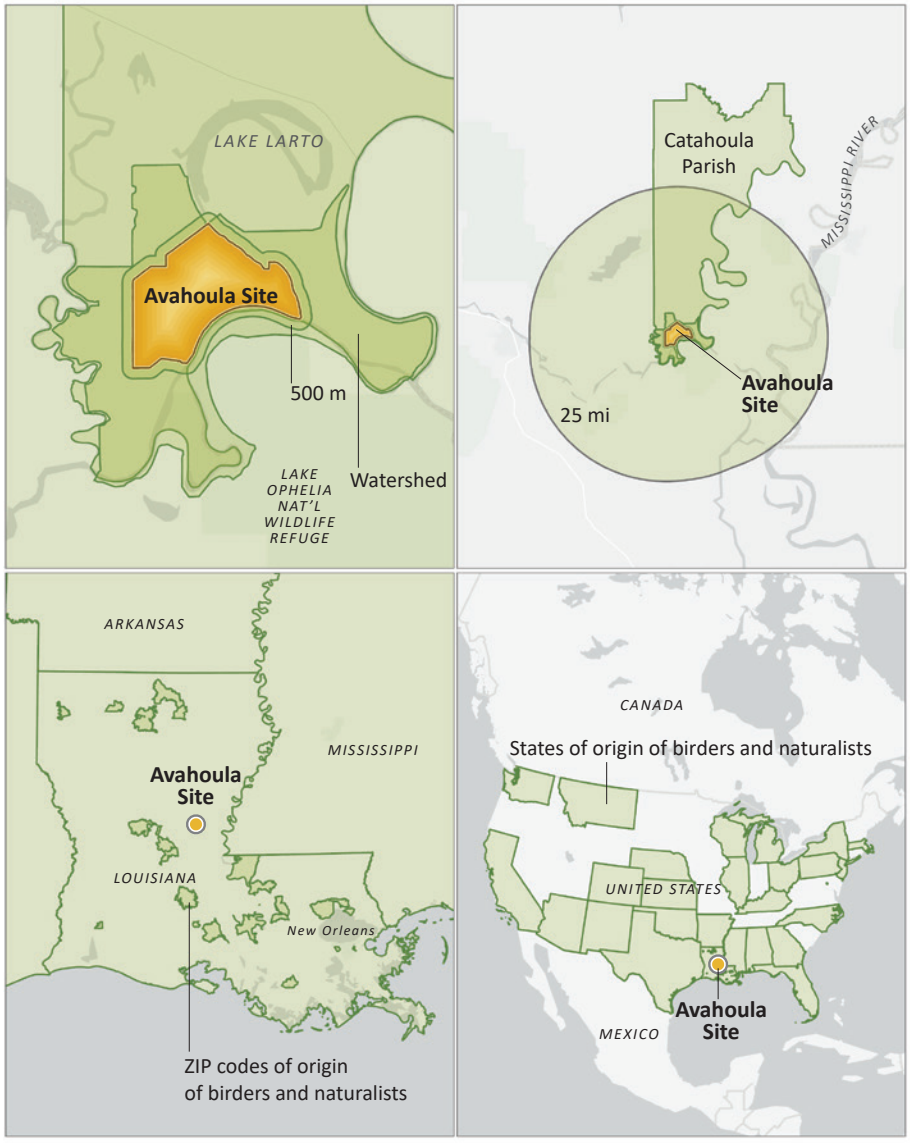
HABITAT |***$17M to $22M per year***| Natural areas provide shelter, food, and living spaces for wildlife. The restoration of the Avahoula site connects the 64,000-acre Dewey Wills WMA and the 17,500-acre Lake Ophelia National Wildlife Refuge.



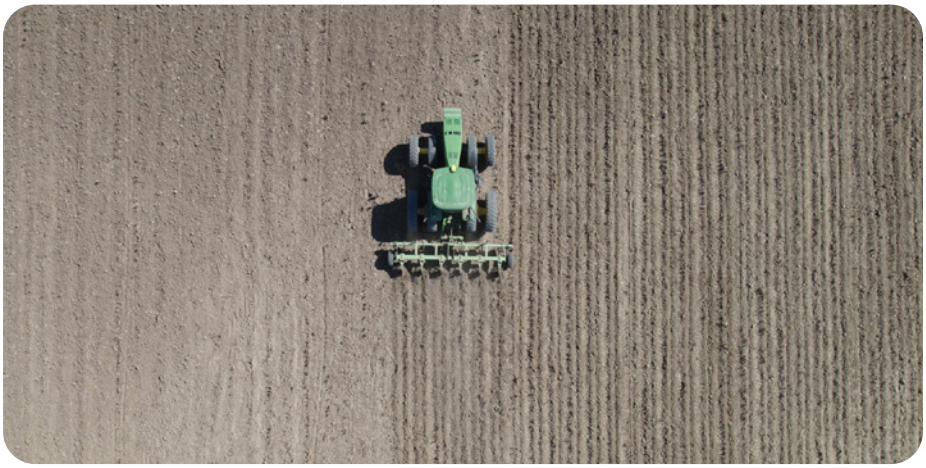
CAPTURING CARBON

The Avahoula Climate Mitigation Project is predicted to capture and store 840,000 tons of CO2e from the atmosphere over 40 years. Carbon's value in helping to mitigate environmental risks due to climate change can be valued by changes in agricultural production, additional disaster risk, and more. The carbon stored at Avahoula has a societal value of $174 million.

MAP 2. BENEFICIARIES OF AVAHOULA CLIMATE MITIGATION PROJECT



SOURCES: USGS, US Census Bureau, eBird, iNaturalist



WHO WILL BENEFIT

Avahoula will positively impact different communities of residents and visitors. Some benefits may be experienced directly and daily, such as improved air and water quality, while other benefits may be experienced occasionally. For instance, birders may only see certain species during migration season, and landowners may benefit from reduced disaster risk during high water events and storms. Lastly, some benefits may be experienced indirectly, such as benefitting from the knowledge that the greater landscape is more resilient to climate change and more supportive of greater biodiversity.

Through restoration, the following groups will receive benefits:

15 Farmers
adjacent to the project site

15 Landowners
in 3,355 acres surrounding the project site

67K Residents
local to the area

3.7K Water Users
downstream in the watershed

46K Tourist Visits
to the area

The planned Avahoula Climate Mitigation Project is an example of a strong, multi-benefit nature-based solution. By permanently protecting the site, Delta and Pachama will create $2.7 billion in benefits in perpetuity and $80 million annually, an improvement of $82 million a year when accounting for the current $2.0 million in harms created by agricultural runoff into the Red River and other impacts. The capital investment and ongoing operations and maintenance at the site will create 25 job-years in supporting industries and 17 jobs-years more broadly in the local economy.

Targeted restoration of pre-conversion habitat in the Lower Mississippi Alluvial Valley will improve the landscape's resilience—which is greatly needed in the face of climate change impacts. In 2022, the main cause of crop loss in Catahoula Parish was excess precipitation, accounting for 74 percent of total reported losses by federal crop insurance policy holders. In 2021, excess precipitation accounted for 94 percent of total claimed losses and 85 percent of losses in 2018.

The second most prevalent cause of loss to crops is flooding. Avahoula's alluvial Sharkey soils, fertile but poorly draining and very slowly permeable, exacerbates the site's vulnerability. The USDA's Natural Resource Conservation Service Web Soil Survey map rates Avahoula's soils as possessing severe and very severe limitations that reduce the choice of plants or that require conservation practices.

The cost of retaining marginal and vulnerable agricultural land is passed onto the taxpayer. In 2022, the average insurance claim per acre of farmland in Catahoula was $42, more than double the state's average. In total, around $269,000 of taxpayer money subsidized agriculture at the site that year. By returning Avahoula to bottomland hardwood forest, the burden on taxpayers will be alleviated.

Avahoula is a nature-positive investment. By converting sub-optimal and climate vulnerable agricultural land to priority habitat, Avahoula mitigates climate change impacts and addresses the biodiversity crisis. Restoring wetland ecosystems and their water and nutrient regulation functions in the Parish can help farmers and government agencies address the challenge of poor-quality soils in addition to present and future challenges associated with changes in precipitation. The site will support regional objectives for bird populations and meet reforestation goals. In addition, the creation of habitat will benefit the local economy, which is tied both economically and culturally to hunting and outdoor recreation.

More broadly, targeted restoration of forested wetlands in the Lower Mississippi Alluvial Valley creates significant non-market and market benefits to surrounding communities and industry. As the voluntary carbon market prioritizes improving ecosystem services and co-benefits, projects like Avahoula can become useful tools to accelerate investment in local restoration efforts, thereby creating an innovative evolution in rural development.

Earth Economics works to quantify and value the benefits nature provides - our work drives effective decisions and systemic change through a combination of education, natural capital analysis, and policy recommendations.

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