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*Rainey Conservation Alliance*

# COMPREHENSIVE MANAGEMENT PLAN

SEPTEMBER 2022



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Cover: An aerial view of the main buildings at Paul J. Rainey Wildlife Sanctuary in Vermilion Parish, Louisiana. Photo: Karen Westphal/Audubon Delta. Back cover: Sunrise at Paul J. Rainey Wildlife Sanctuary. Photo: Karen Westphal/Audubon Delta

A distant thunderstorm rolls through in the early morning at Paul J. Rainey Wildlife Sanctuary. Photo: Karen Westphal/Audubon Delta





# The Rainey Conservation Alliance

The Rainey Conservation Alliance (RCA) is a collection of private landowners in south-central Louisiana that share a vision of having sustainable coastal habitats that protects the economic, cultural, fisheries, and wildlife resources of the landscape. Collectively, the E. A. McIlhenny Enterprises LLC, Avery Island Inc., McIlhenny Resources, Vermilion Corporation, Sagrera Family Estate, and National Audubon Society work together, disregarding property boundaries, to restore the ecological functions across 187,000 acres of coastal habitats (about 4% of all of coastal Louisiana, Figure 1). Established in 2010, the RCA has leveraged each organization's expertise to advance coastal restoration in the region.



Fisherman at sunrise at Paul J. Rainey Wildlife Sanctuary. Photo: Karen Westphal/Audubon Delta

**FIGURE 1 |** RAINEY CONSERVATION ALLIANCE LANDOWNERS IN VERMILION PARISH



# Historical Context



Left: Fisheries biologist Randy Moertle, 6' 3", is dwarfed by a 10' 4" alligator from Little Pecan marshes. Right: Ducks, such as these Blue-winged Teal, are dipped in hot wax to remove the feathers and down. Photos: McIlhenny Archives

**T**he area known as the Chenier Plain of coastal Louisiana boasts a complex and intriguing history that can be traced back thousands of years. The rich natural resources of the area supported early indigenous peoples, American Indians, Spanish explorers (who first documented the cheniers), and the French who ultimately sold the property land to the United States.

Following the Louisiana Purchase of 1803, Louisiana became a state in 1812, and the chenier ridges were subsequently listed with the government as Navy Reserves because of the abundance of trees. Between the 1820s to 1840s, the chenier ridges were settled from Texas as grazing land was sought for cattle, and from the east as people explored along the Gulf, including smugglers and pirates.

French, Spanish, Africans, and French-Canadians (from Acadia expelled after the Seven Years War won by Great Britain), had all entered the area by the end of the 18th century. As the population became mostly Cajun, the primary language for years was French. In the

mid- to late 19th century, they were joined by European Americans; immigrants from Italy were recruited to work on the plantations, as well as Jewish immigrants from Germany and eastern Europe, who tended to settle in towns and become merchants. The history of the primary partners are further explored below.

## **AVERY ISLAND AND MCILHENNY COMPANY**

Avery Island is actually a massive salt dome with a history dating back thousands of years. Native Americans lived on Avery Island by 2500 BC and other “pre-tribal” Native Americans subsequently came to the island to extract salt from its springs. Thousands of pottery shards collected around the island reflect the scope of this industry.

Europeans encountered Avery Island as early as 1779, when the island itself soon became known as Île Petite Anse, or Petite Anse Island, as named by French explorers employed by Louisiana’s Spanish administrators. By the early 1800s, several pioneer settlers owned parts of the island and in 1818, New Jersey native John Craig





A vine covered plant where Tabasco sauce was made on Avery Island, 1968. Photo: State Library of Louisiana

Marsh purchased a share of the island and began to farm sugarcane. In the early 1850s, Marsh sold his plantation to his son, George Marsh and his two sons-in-law Ashbel Burnham Henshaw and Daniel Dudley Avery.

During the Civil War (1861–1865), Confederate troops under General Richard Taylor defended the island's mines, which provided salt to several states in the lower South. Federal troops finally captured the island by land in April 1863, after previously failed attacks by water in November of 1862. Mining equipment and out-buildings were destroyed.

After the war, the Averys returned to the island, including Edmund McIlhenny, a former banker from New Orleans who had married Avery's daughter, Mary Eliza Avery, and in 1869, D. D. Avery bought out the last of the early landholders — making Avery the island's sole owner. In 1868, Edmund McIlhenny founded the McIlhenny Company, and began manufacturing Tabasco brand pepper sauce. In 1870, he received letters patent for his sauce processing formula, the same basic process still used today.

On his death in 1879, ownership passed to Avery's five children. In 1903, the surviving Avery siblings organized their plantation into a modern corporation, dubbed the Avery Planting and Improvement Company. In 1924, this entity became the Petit Anse [sic] Company, which in turn became Avery Island, Inc. in 1948.

Avid conservationists, the McIlhenny branch of the Avery family adopted the motto “Man and Environment in Balance” in 1971. Their environmental efforts, however, actually extend back to around 1895, when E.A. McIlhenny founded a private wildfowl refuge on the island in an effort to save egrets from extinction from the plume trade. This “heronry” and refuge still attracts tens of thousands of birds (primarily egrets) annually.

E. A. McIlhenny spent the first part of the 1900s seeking shareholders and partners in a grand scheme to secure as much of the southwestern Louisiana marshes for outdoor recreation, such as hunting, fishing, and fur trapping. He was instrumental in the establishment of State Refuge (1911), Marsh Island (1912), Rockefeller Refuge (1913), and the creation of Louisiana Furs, Inc. (which became Vermilion Corporation) and indirectly for the creation of the Paul J. Rainey Wildlife Sanctuary (1924).

#### **PAUL J. RAINEY WILDLIFE SANCTUARY (NATIONAL AUDUBON SOCIETY)**

Paul J. Rainey was a member of a wealthy family that made its money from coke (steel industry) in the Midwest. He became fond of hunting at Louisiana Fur, and commissioned E. A. McIlhenny to locate some marsh lands for him adjacent to their property for the purposes of hunting Snow Geese. Rainey purchased the indicated 40,000 acres, dug canals, and set up two camps to hunt, one at the location of the current Sanctuary headquarters office, and one at Chenier au Tigre where the McIlhenny family camp is located today.

Rainey wanted to hire E. A. to manage the property and keep the camps up for his winter hunt, but E.A. proposed that he would do it for free if upon Rainey's death, E. A. would get one-third of property of his choice. When Rainey passed away in the 1920s, E. A. claimed his third, leaving two-thirds belonging to Rainey's sister Grace Rainey Rogers, who lived in the northeast U.S.

Grace asked E. A. to donate to some entity that would protect it. E. A. approached the fledgling National Audubon Society (which was then called the National Association of Audubon Societies; hereafter Audubon) with the idea. They wanted it but could not afford to run it. The Rainey property was set aside as a wildlife refuge in 1924, and in 1927, Rainey's sister Grace donated the funds to start the Rainey endowment, with the understanding that all proceeds would be used to enhance and maintain the Refuge or it would revert back to the descendants.

### SAGRERA ESTATES

Cheniere au Tigre, or “Tiger Island” (literally “oak grove of the tiger”) is a coastal island ridge in South Vermilion Parish between Southwest Pass and Freshwater Bayou owned by the Sagrera family of Abbeville. The island was named for its great oak trees and also the tigers (possibly jaguars) that legend suggests once roamed the region.

The Sagreras began their history in Abbeville when Raphael E. Sagrera (born April 1847) moved from New Orleans into the area due to declining health—many people sought out the salt water and the silt due to the belief in its healing powers. He died shortly thereafter, but his family remained, including his son Dr. Raphael E. Sagrera who would eventually practice medicine in Abbeville, Grand Chenier, and later at Chenier au Tigre. Sagrera married and had 11 children, was buried in Cheniere au Tigre cemetery, and has been followed by subsequent generations of Sagreras in the area he called home.

The eldest son of Dr. Sagrera was Ralph Semmes Sagrera (born June 1891) who, by all accounts, was a smart, educated outdoorsman adept at trapping, farming, ranching, and gardening. His father died when he was 19 years of age and he was left to care for his mother and eight siblings as the man of the house.

Ralph Semmes Sagrera married in 1912 and his family made their home on the initial site of the R. Semmes Sagrera Health Resort Hotel, formerly the grand and spacious Cessac house (named for his wife’s family)



An American alligator seen in southern Louisiana.  
Photo: Luke Franke/Audubon

on Cheniere au Tigre. The property was destroyed on August 6, 1918 by a devastating hurricane that struck Cameron Parish and affected a vast swath of area that continued into parts of Texas.

Historic development of the communities in and around Cheniere au Tigre is directly attributable to many members of the Sagrera family. Avid hunters, trappers, farmers, and natural conservationists, they remain a staple of the regions coastal restoration and protection advocates and still own and manage the lands that have been in their family for well over a hundred years.

### VERMILION CORPORATION

Organized and incorporated in March of 1958, Vermilion Corporation (hereafter “Vermilion”) is the descendant of Louisiana Land and Mining Company (1912), Louisiana Gulf Coast Club (1923), Louisiana Coast Land Company (1924), Louisiana Furs, Inc. (1927), and Louisiana Furs Corporation (1952). During the oil and gas boom in the mid-1950s, Humble Oil and Refining Co. (later consolidated with Standard Oil of New Jersey to become Exxon Company, USA) sought to purchase the property of the Louisiana Furs Corporation to further their oil and gas exploration and production endeavors. A proposition for purchase of the property with the requirement of a 99-year lease of the surface lands was offered to and accepted by Louisiana Furs Corporation. Vermilion Corporation continues this lease arrangement with Exxon Corporation today.

Aside from some family and business connections that remained throughout these many years and variations of the companies that called the area home, another element of continuity in Vermilion’s legacy is the landholding of about 125,000 acres assembled under a single ownership by 1923.

Bounded on the east and the west by two wildlife refuges, the property has characteristics similar to its adjacent neighbors. Approximately 70% of these acres are comprised of marsh, wetlands, bayous, canals, ponds, and natural drainage ditches. The land is rich with wildlife and fisheries—and minerals production that has been the principal asset of the company and its predecessors. The land supports huge flocks of ducks and geese during the fall and winter seasons, and provides year-round habitat for native birds, fur-bearers, alligators, shrimp, fish, and crawfish.



# Frequently Asked Questions

**A**s the RCA has been increasingly recognized within both the landowner and coastal restoration communities, it has become increasingly necessary to clearly define its identity. The best method to accomplish this task is to couch its identity in a manner by which its members are most often queried, which is the Frequently Asked Question (FAQ) format.

**What is the Rainey Conservation Alliance?** The RCA is a coalition of six land management companies that control the surface acreage of about 187,000 acres of property within the Coastal Zone of Louisiana, along the southern range of Vermilion and Iberia Parishes (See page 14). The area hosts fresh, brackish and saline marshes, gulf shoreline, chenier ridges, and some bottomland hardwood forests and prairie habitats. The alliance acts as a collective surface lands management organization.

**Who are the members?** The current (and original) members of the RCA are the National Audubon Society, Vermilion Corporation, E. A. McIlhenny Enterprises LLC, Avery Island Inc., McIlhenny Resources, and Sagrera Estates.

**When was the alliance formed?** The alliance was memorialized through a signed Memorandum of Understanding between its partners on March 4, 2010.

**Why was the RCA formed?** Since



Green Heron. Photo: Peggy Coleman/Audubon Photography Awards

the initiation of statewide coastal restoration planning and implementation programs—in 1989 through the passage of Act 6 in Louisiana (creation of the State Wetlands Authority) and CWPPRA in 1990 through Federal law (PL101-646)—landowners and managers have competed for available funding to implement restoration projects. This competition initially lent itself to the crafting of small projects that were associated with one particular property and often did not address the systemic problems of the region. The RCA was formed to broaden restoration

focus in the area of its property holdings to a regional scale, and to consolidate its collective member's resources and funding to create efficiencies in project planning and implementation, to avoid duplication of effort, and leverage those resources for the greater good.

**What are the goals of the alliance?** The goals of the alliance include 1) development of a business model of cooperation between land managers that can be expanded to other regions of the state and/or the nation, and 2) on-the-ground protection, stabilization, and

restoration of the natural habitats covering a 510,000-acre coastal wetland area in southwestern Louisiana (See page X).

**What are the project activities of the alliance?** RCA project activities include participation in coastal restoration planning initiatives and programs, permitting, on-the-ground construction for marsh creation, bank line protection, and hydrologic management, land management programs, governmental affairs, grant solicitations, and database management.

**Who actively participates in project activities?** RCA members participate with numerous partners, which include, but are not limited to, Ducks Unlimited (DU), Coalition to Restore Coastal Louisiana (CRCL), Louisiana State University Extension Service, National Oceanic Atmospheric

Administration (NOAA) Fisheries, Fenstermaker and Associates, Louisiana Department of Wildlife and Fisheries (LDWF), Louisiana Coastal Protection and Restoration Authority (CPRA), Vermilion Parish Government, and Vermilion Parish Soil and Water Conservation District.

**How does the alliance function?** A Program Administrator directs RCA activities with guidance from a Board of Directors consisting of leaders of each of the alliance members. Quarterly RCA meetings are held on Avery Island, Louisiana. Special meetings of the board are held as necessary to discuss shared finances and similar discreet management items.

**What has the alliance accomplished?** Between 2010 and 2021, the alliance has successfully participated in the solicitation and

procurement of over \$80 million in coastal restoration funding. Through a concerted unified effort, the alliance has combined its resources to affect real progress in getting on-the-ground projects planned, permitted, funded, and constructed. Project size has ranged from tree plantings on Chenier Au Tigre to large marsh creation and hydrologic restoration in open water areas west and east of Freshwater Bayou Channel. To ensure that project planning and implementation is coordinated, the alliance has developed an organizational structure that allows for equal involvement from its various stakeholders. Through shared goals, the alliance has managed to unite stakeholders that range from the on-site trapper to the Ph.D. Together, they provide realistic and practical solutions to complex ecosystem problems and challenges.



Former Senior Sanctuary Manager (1995–2020), Timmy Vincent, replacing a boundary sign to mark Paul J. Rainey Wildlife Sanctuary property after a prescribed marsh burn. Photo: Karen Westphal/Audubon Delta



# Background and Challenges

**T**he land area of the Gulf’s five states encompasses more than 290 million acres, and in stark contrast to other regions of the United States, 86 percent of that is privately owned (NRCS 2014). Private ownership also dominates in Louisiana’s 10-million-acre coastal zone with over 85 percent of the surface and/or subsurface rights privately controlled. Parcel sizes range from the proverbial “back 40” to upwards of 640,000 acres by a single landowner.

Louisiana’s coastal zone includes 40 percent of the contiguous United States’ coastal wetlands, but landscape types vary and include marshlands, cypress swamps, bottom-land hardwood forests, coastal maritime forests, coastal prairie, agricultural properties, and residential and industrial complexes. The result is a complex mosaic of landowners and stakeholders throughout the coastal area with the responsibility for managing some of the most unique and threatened habitats for birds, fish, wildlife—and people—in the nation.

Even after the loss of 2,000 square miles of land since the 1930s, Louisiana is still home to the largest expanse of coastal wetlands in the contiguous United States, but and these lands continue to erode at a dramatic pace. The reasons for the land loss rates are a combination of natural forces and anthropogenic practices. Without calculated management efforts,

erosive forces will continue to threaten this landscape until it is unable to support the citizens and wildlife populations that currently call it home.

To date, there have been a myriad of coastal restoration programs and initiatives to address land loss at local, regional, and statewide scales. Federal programs include the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA), the Water Resources Development Act/Louisiana Coastal Area program, and NRCS Wetlands Reserve Program, among others. The state of Louisiana has developed its 2007 and revised in 2012 and 2017 the State Coastal Master Plan, a \$50-billion plan for holding back the Gulf of Mexico and restoring vast acres of deteriorating wetlands. Additionally, parish governments and police juries have plans and ideas of their own for the lands with which they are intimately familiar.

It is difficult for any one landowner to expend the time and resources required to keep up with the plethora of programs, agencies and organizations, rules and policies—and ultimately available funding sources—that all move forward in tandem and all have an effect on coastal restoration and protection opportunities. Strategic partnerships must be built to cover all bases in this complex political and fiscally constrained arena.

Furthermore, although a single landowner may understand his own plot of land and the interactions that improve—or worsen—its resiliency, it is difficult for that same individual to wholly understand the property of his neighbors to the north, south, east or west as intimately as he does his own. If long-term conservation and restoration objectives are to be met, the broader landscape functionality must be assessed and well-understood at a reasonably large scale so that the interactions between and among its subparts may all be addressed through coordinated restoration planning and implementation. Nature doesn’t recognize property boundaries and neither should we when we tackle large-scale restoration challenges.



The 4,000-acre Deep Lake Water Management Unit hosts a variety of conservation projects focused on marsh system health including a water flow and tidal range control system. Photo: Karen Westphal/Audubon Delta

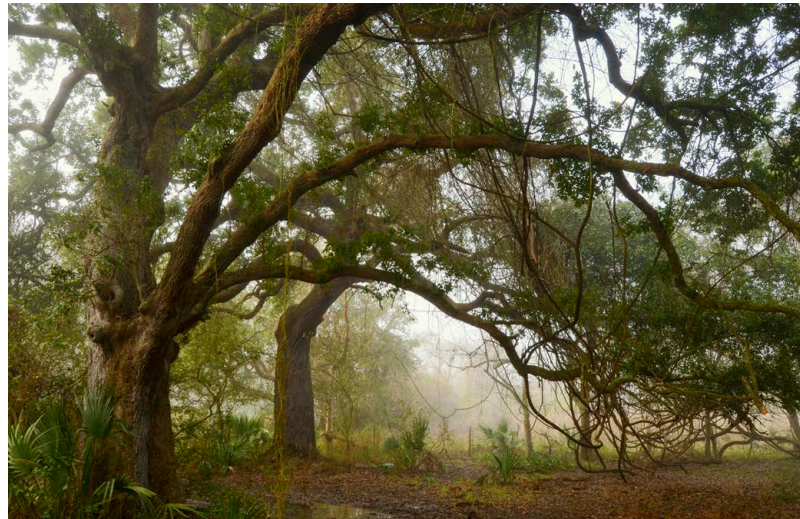


# Geological Content

The RCA project area is located between the mouth of the Atchafalaya River and the Mermentau River (predominantly west of Vermilion Bay), and occupies a geomorphic transition between the broad deltaic plain of the Mississippi River Delta plain to the east and the Chenier Plain to the west. It is characterized by expansive stretches of intermediate and brackish marsh, linear chenier (oak) ridges, winding bayous, multiple interconnected ponds and lakes, nearshore oyster reefs, and Gulf and Bay beaches and marsh shorelines.

The Chenier Plain developed from a variety of riverine sources, but was influenced most by sediment from the Mississippi River as it switched course over the past 7,500 years. The marsh built seaward when the Mississippi River built to the south, and when the delta-building River switched to the east, shorelines retreated building barrier shorelines and ridges (cheniers). The Atchafalaya River currently receives 1/3 of the combined water and sediments of the Red River and the Mississippi River, making the Atchafalaya River the largest tributary of the Mississippi River. As a result, the Atchafalaya and Wax Lake Deltas are the only growing delta complexes in Louisiana. With essentially 1/3 of the Mississippi River once again building to the south, isolated portions of the Chenier Plain shoreline have begun to build Gulfward again.

Although the Chenier Plain does not experience the high rates of subsidence found elsewhere in Louisiana, it is losing significant acreage of interior marsh because of altered hydrology, increasingly severe storms, and sea level rise (Figure 1). The ridge and swale topography historically experienced a slow movement of fresh water across the landscape from west to east as rainwater filtered through the thick fresh and intermediate marshes. Tidal and storm forces were buffered by a sea of grass and diffuse drainage resulting in water levels that rarely changed more than a foot over several days. With the construction of the Gulf Intracoastal Waterway in the 1910s, the Freshwater Navigation Channel in the 1960s, and multiple oil and gas channels over the last century, the region's hydrology was changed to a

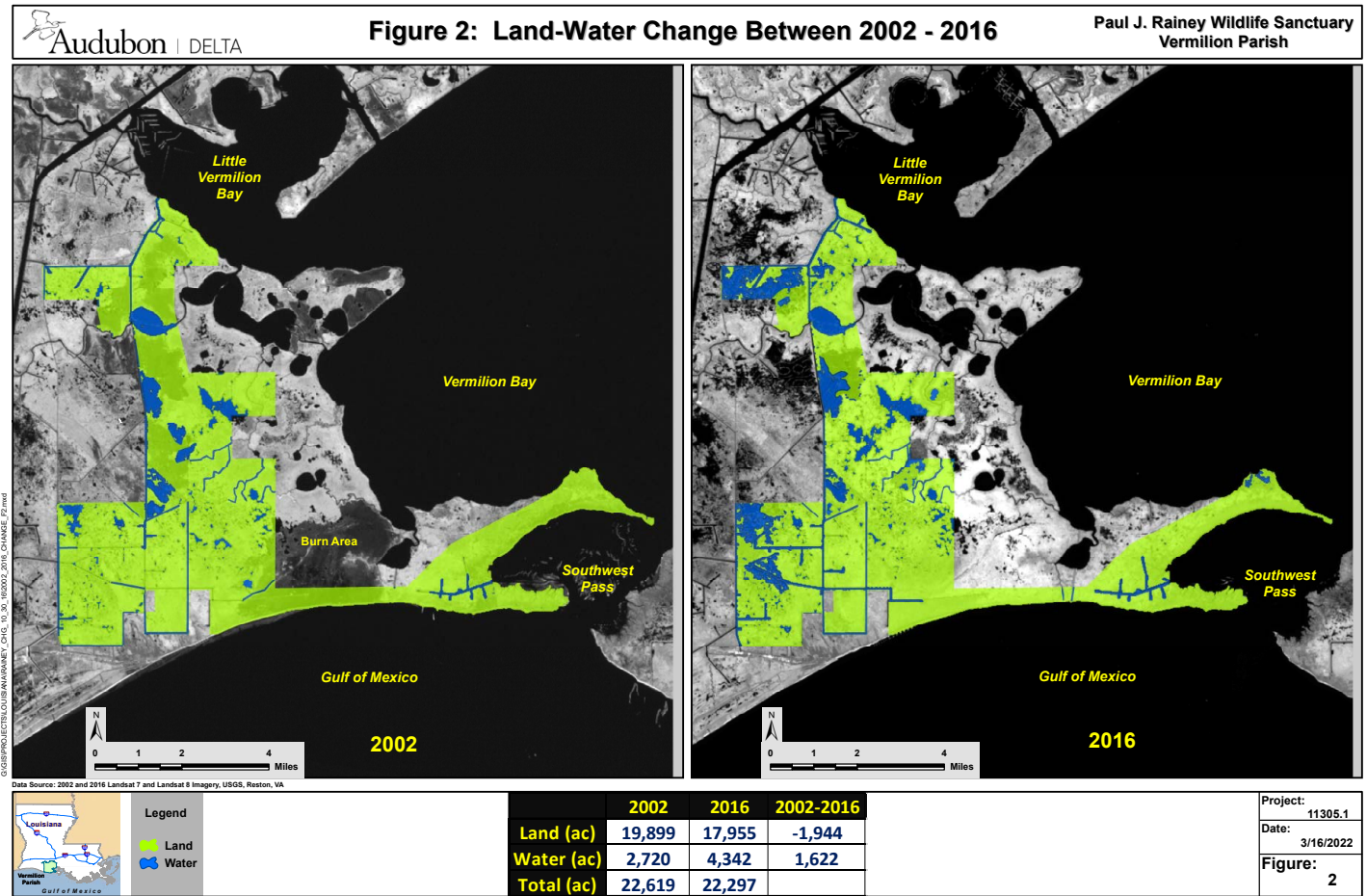


Above: A full moon over Lonnie's Island which is often used by egrets and other wading birds as a winter roost. Photo: Karen Westphal/Audubon Delta. Below: Cheniere au Tigre, Vermilion Parish, Louisiana. Photo: Erik Johnson/Audubon Delta

rapid filling and flushing of the system, often forcing water-level changes of several feet over the course of hours. This has allowed increasing salinity and extreme drying and flooding conditions to stress the marsh plants, and increased water currents to lift the fine organic and mineral particles that make up the substrate. Constant water movement removes more sediment than it deposits, and the interior marshes are dissolving from the inside out.

The people on the landscape have recognized these changes to the hydrology and have begun instituting techniques and innovations to slow water movement and attempt to control the ingress of salt water. They have augmented natural levees, placed weirs, invented





**FIGURE 2 | LAND-WATER CHANGES AT THE RAINEY SANCTUARY BETWEEN 2002 AND 2016 ESTIMATED USING SATELLITE IMAGERY.**

flap-gates, and even used pumps all in an attempt to mimic and maintain historical water levels, salinity, and flows. They also instituted other management techniques to meet economic needs, such as replacing natural fires with strategically-timed prescribed burns, and controlled herbivory by fur trapping. These techniques were successful at maintaining productive and healthy marshes until more recent times, when banks of nearby navigation channels eroded and allowed increased water exchange into the interior marsh, and the state and federal government instituted

a permitting system that made marsh maintenance by landowners more cumbersome and less timely. Increasing salt stress on traditionally fresh and intermediate marshes set them up for destruction during the hurricane seasons of 2005 and 2008, when thousands of acres of marsh were destroyed. The busy hurricane season of 2020 continued to impact the region and increasing storm severity is anticipated into the future. As such, restoration actions must account for the changes associated with climate change and sea level rise to ensure a sustainable future.



# The Strategic Approach for RCA Management Planning

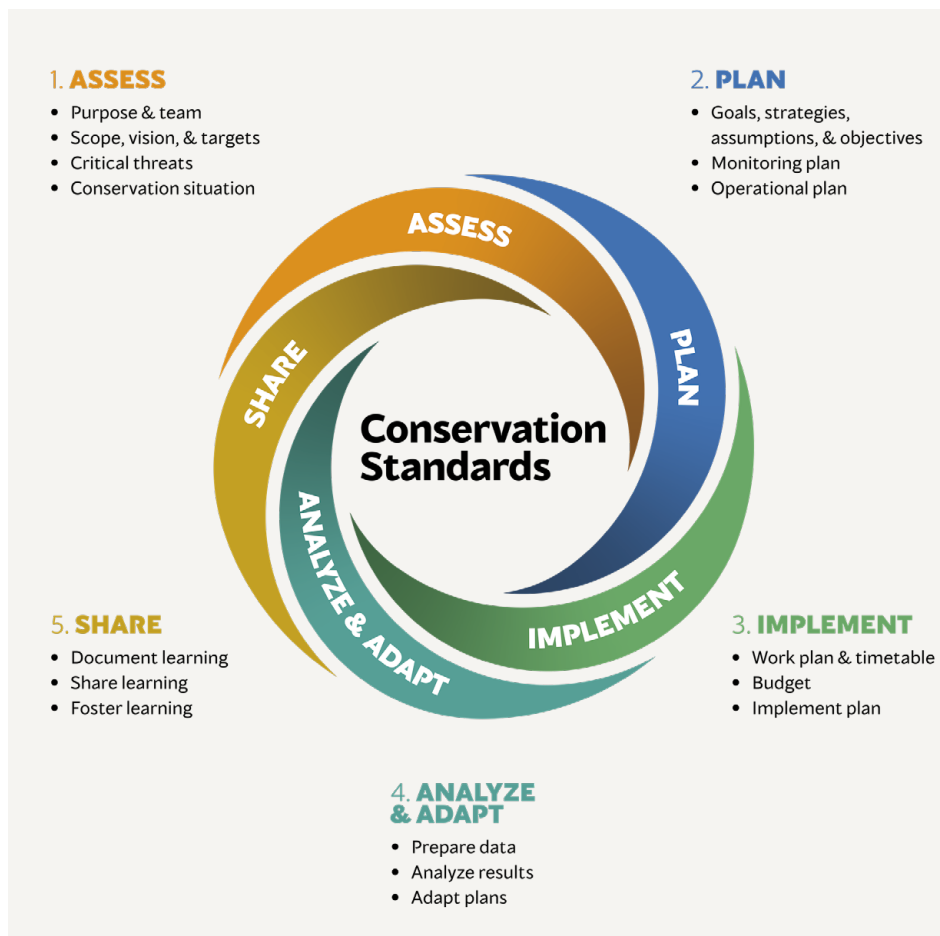
This strategic plan was developed following the methodology of The Conservation Measures Partnership (CMP), Open Standards for Practice of Conservation<sup>1</sup> (Figure 3). “The Open Standards brings together common concepts, approaches, and terminology in conservation project design, management, and monitoring in order to help practitioners improve the practice of conservation.” Open Standards provides a framework for making and documenting strategic choices and provides a systematic approach about how to allocate time, materials, and funding resources. Open Standards also allows for the use of a common language among an increasing number of conservation implementation organizations, agencies, and funders. This common language can then be used to facilitate sharing and collaboration of conservation work across organizations and even cultures.

The Open Standards has within its planning framework the Miradi Adaptive Management Software Program<sup>2</sup>. This software provides a tool for visualizing and documenting conservation scope, targets, threats, and strategies and was used extensively in the formulation of the initial strategic plan in 2014. Miradi was used to capture conservation goals in a common format that was shared electronically between project teams

1 <https://conservationstandards.org/wp-content/uploads/sites/3/2020/10/CMP-Open-Standards-for-the-Practice-of-Conservation-v4.0.pdf>

2 <https://miradi.org/>

**FIGURE 3 | PROJECT MANAGEMENT CYCLE** | The Open Standards for the Practice of Conservation provide a set of best practices for successful conservation projects, organized into a five-step management cycle.



and with stakeholders. Through a collective process in 2021, RCA partners have updated this management plan.

In conjunction with utilization of the Miradi software, RCA used Google Earth Pro (spatial mapping software) for meeting facilitation, documentation, and data sharing. Since this strategic plan included operational coordination between private landowners, non-governmental organizations,

local, state, and federal agencies, and private foundations, the workgroup decided to assimilate Google Earth Pro into the more widely utilized ESRI ArcGIS (Geographic Information System). Extensive amounts of data were collected and incorporated into the GIS database by National Audubon Society’s (Audubon) Coastal Geomorphology/ArcGIS specialist. The RCA utilized and continues to

use the ArcGIS platform to produce products and as its central storage and analysis center of operations. Data layers included such things as delineation of property boundaries and hydrologic units; coastal restoration project boundaries and fact sheets; water control structure locations and conditions; spoil bank conditions; breaches and water access locations; alligator nest locations and numbers by hydrologic unit; bank and shoreline protection project locations, condition, and costs; coastal use permit (CUP) locations, authorization, and status; hydrologic unit health assessments; coastal resource monitoring station (CRMS) locations and/or data; Coastal Protection and Restoration (CPRA) Master Plan locations and fact sheets; Coastal Impact Assistance Program (CIAP) locations and fact sheets; vegetative planting sites; hydrologic unit land to water assessments, and RCA proposed and constructed project locations with proposed and/or final costs and construction plans. The RCA GIS database continues to expand as more and more data are being assembled, grouped, and assessed. Database layers are being assembled at both the regional level and at the hydrologic unit management level as defined in the Mermentau Cooperative River Basin Study<sup>3</sup> and the Teche/Vermilion Cooperative River Basin Study<sup>4</sup>.

Audubon is also in partnership with ESRI to coordinate their national and international programs through a real-time, web-based ArcGIS system that can be accessed and updated by all its partners, including the RCA. To date,

3 [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs141p2\\_015618.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_015618.pdf)

4 [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs141p2\\_015621.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_015621.pdf)

the RCA Management Plan identified conservation targets, threats, and strategies and analyzed effectiveness of strategies for implementation with identified project needs. This has allowed for the systematic grouping of the highest priority projects to be considered for implementing the coastal use permit process necessary to have in order to solicit funding and construct the project.

## Planning Team and Process Overview

**A** key tenant of adaptive management is that program design and monitoring involve the managers who will be implementing the program. To this end, the first task in Step 1 of the Open Standards process involves specifying who is on the core program management team. These individuals have the responsibility of developing the approach, identifying the conservation targets and threats, and ultimately, developing the strategies for achieving conservation goals that will allow the property to flourish. In this case, the team included program leaders responsible for project administration and management of the RCA, the funding administrator, staff members who help facilitate the Open Standards planning process and development, the Open Standards and Geographic Information System (GIS) integration planning and development team, several key land managers with on-the-ground expertise and knowledge of the property, and other key representatives of the RCA who provided input and feedback into the process.

Key milestones in this planning process included:

- August 29, 2013: Initial meeting of Core Team to outline basic plan
- October 23, 2013: Basic strategic plan components identified
- November–January 2014: Open Standards/GIS data input and modifications
- January–July 2014: Revisions and drafting of final management plan
- September 2014: Initial implementation of strategy
- July–November 2021: Revisions to update the plan

This strategic plan provides a guide for RCA investments within the program area. It is meant to provide a framework to help the project team:

- **Come to Consensus on Problems and Potential Strategies—**  
The planning process captured in this document enabled the project team to systematically frame and discuss key issues within the program area as well as evaluate and come to agreement on strategies that the RCA could potentially undertake to address these issues.
- **Share Plans and Assumptions with Key Stakeholders—**  
The planning process also enabled the planning team to share their thinking and assumptions with key stakeholders (e.g. RCA partners, potential future members and grantees) and to get their feedback and input into the details of the plan.
- **Manage Risk and Uncertainty—**  
The plan not only shows what the project team believes, but highlights areas of uncertainty that will require additional research and information.
- **Adapt Work as Needed—**This plan lays out strategies for implementation, but is easily adapted to changing landscape situations and funding opportunities.

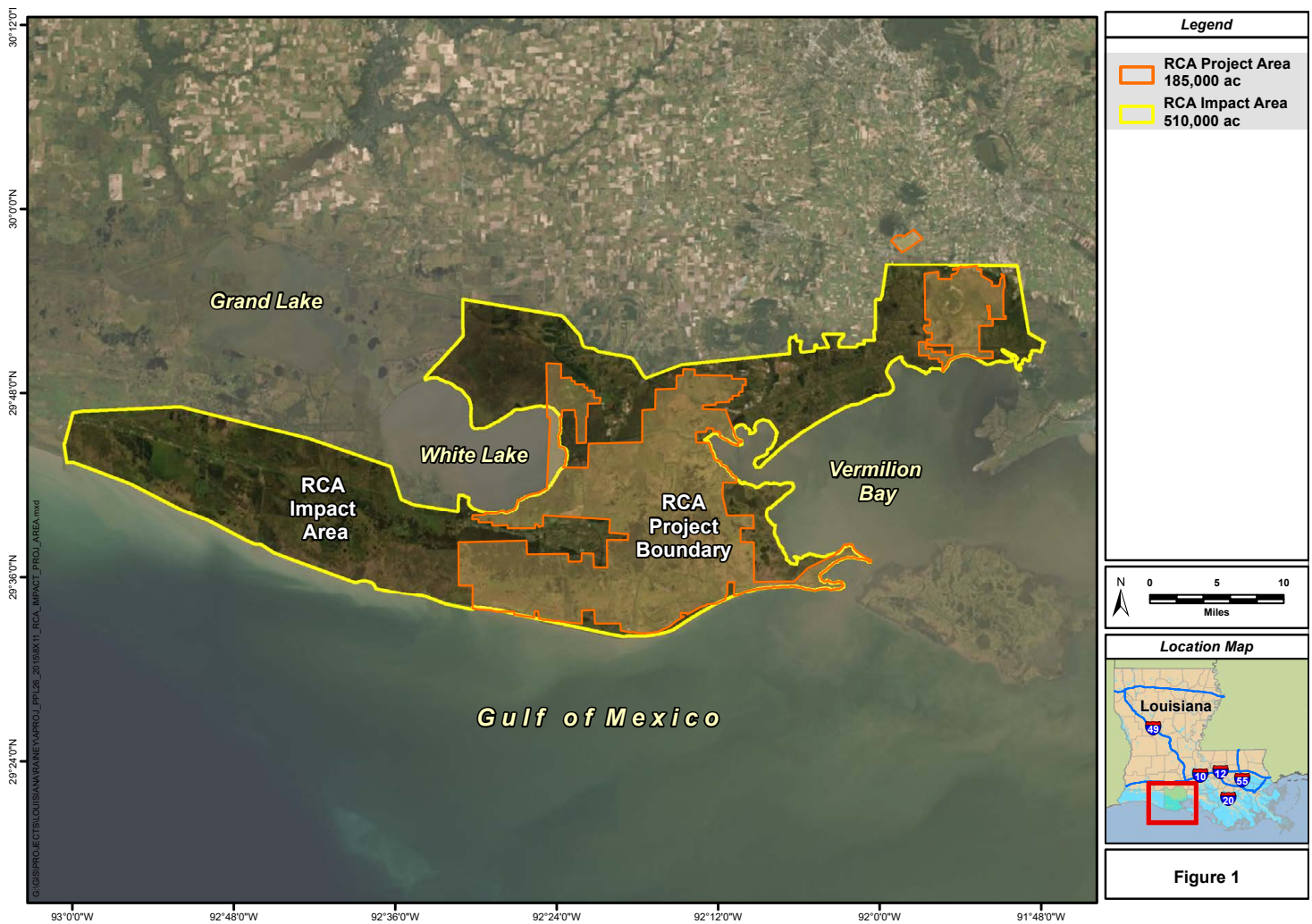


# Program Scope

**S**tep 1 of the Open Standards is defining the initial scope, meaning the land footprint, of the program. Because the very purpose for the creation of the RCA was to inspire collaboration and cooperation between major landowners to achieve conservation goals and objectives, the project team felt it necessary to first clearly delineate RCA controlled properties and also the area of influence surrounding and including those properties.

The RCA was established on March 4, 2010 with the signing of a Memorandum of Understanding (MOU). This MOU was to act as a guidance document for the RCA members that control approximately 187,000 acres in two coastal Louisiana Parishes. Each landowner has a long history of conservation dating back to the 1940s, or before in some cases. Historically, these landowners worked independently to achieve conservation goals on their lands. But, the realization and more holistic understanding that what one landowner does could greatly affect other landowners and/or even an entire region prompted these landowners to

**FIGURE 4 |** RAINEY CONSERVATION ALLIANCE IMPACT AREA AND PROJECT BOUNDARY



form an alliance whose goal was to view conservation goals more universally than independently.

As a result, the program team initially considered three scope options as follows:

- 1. Lands controlled by RCA partners**
- 2. Lands controlled by RCA partners including lands directly adjacent to RCA controlled properties**
- 3. Lands within a larger region that could be affected by RCA actions**

The third option was chosen since properties controlled by the RCA partners cover such a vast area that actions or initiatives implemented on those properties could inadvertently affect a larger area, connected through shared hydrology and wetlands (Figure 4). The team identified and selected a larger region that includes additional land-owner properties adjacent to the RCA properties. The planning team decided that the total geographic scope of the program should cover the 510,467 acres depicted in Figure 4.

**CONSERVATION TARGETS**

An important part and often first step of the Open Standards process is to identify focal conservation targets that are representative of or important to the integrity of the ecosystem, species or species groups, and/or human welfare goals. As such, the RCA chose five habitats, five wildlife groups, and three important human welfare targets. These were identified as being representative of the region, and furthermore, the RCA project area plays an important role for these targets. Measurable key ecological attributes were identified for each conservation target, and biological experts and habitat managers sought and acquired data to quantify the current status of each target relative to



King Rail. Photo: Robert Gundy/Audubon Photography Awards

goals established by the conservation planning team. Much of the habitat data were quantified using ArcGIS, bio data collected by staff biologists and land managers, and cultural data provided by Louisiana Sea Grant or assessed by RCA land managers. The status of each habitat, biological, and cultural target was ranked on a four-tiered scale (poor, fair, good, very good). Data identification and collection efforts are ongoing, particularly where critical conservation targets are lacking data, but also to update the status of targets every one to three years.

**HABITAT TARGETS**

Five habitat types were identified that are important to the ecological functions in this landscape. Three of these habitat types are indicative of healthy and productive coastal marshes, indicating the desire for an appropriate balance of open water (lakes and bayous), vegetation, salinities, and hydrological regimes. A number of datasets using 2013 imagery are available through remote sensing techniques. Two other habitat types

(maritime forests and Gulf and bay shorelines) are also critical in that they help maintain the integrity of coastal marshes, and are also important to the success of key wildlife targets. Using the most recent data available, the current condition of each potential key attribute of each habitat target was assessed (Table 1).

**WILDLIFE TARGETS**

In many cases, habitat management is the key to species management, but the RCA team also recognizes the need to monitor and track certain wildlife targets independent of habitat targets, as management decisions beyond maintaining or restoring otherwise healthy and productive habitats may be needed to appropriately benefit these desirable species.

Some of these species were chosen based on their importance to the cultural heritage of the region, and because they provide a sustainable income through harvest leases, such as waterfowl and alligators. Other species targets were chosen because of their conservation status, or those that are



**TABLE 1 | LIST OF HABITAT TARGETS AND THE CURRENT STATUS OF POTENTIAL KEY ATTRIBUTES**

HABITAT TYPE	KEY ATTRIBUTE	CURRENT STATUS
<b>Marsh</b>	Area	Good
	Salinity	Good
	Fire Regime	Fair
	Tidal Range	Unknown
	Hydrological Flow Rate	Unknown
<b>Water Characteristics</b>	Area of Lakes	Fair
	Contour of Lake Bottoms	Unknown
	Submerged Aquatic Vegetation	Unknown
<b>Bayous and Canals</b>	Dendritic Coverage Pattern	Fair
	Width & Depth	Unknown
	Hydrological Flow	Unknown
<b>Maritime Forest &amp; Cheniers</b>	Area	Fair
<b>Gulf and Bay Shorelines</b>	Full “Normal” Profile Structure	Good
	Shoreline Change (Retreat or Gain)	Fair

listed as Endangered Species, such as the globally important population of Piping Plover found on RCA beaches (Table 2).

**CULTURAL TARGETS**

The combination of the peoples and the vast richness and remoteness of the southwest Louisiana landscape created a culture that is not found anywhere else in the United States. For generations, the people here have used the coastal wetlands for a variety of activities such as hunting alligator and waterfowl, recreational and commercial fishing, trapping, oystering and crabbing, which has resulted in the formation of a truly unique culture that is dependent on a healthy ecosystem. If any one of the conservation targets (the five habitat types: marsh habitat, water characteristics, bayous and canals, maritime forests and cheniers, Gulf and bay shorelines) is not sustained, this way of life will be diminished or lost. It is one of the goals of the RCA to ensure that the health of our ecosystem is maintained for the people that live and play here.

**CONSERVATION THREATS**

The RCA has identified 17 threats that have and will continue to impact conservation targets if no action is taken to implement restoration strategies. The team then also reviewed the IUCN-CMP Classification of direct threats to ensure that all potential threats were identified. The threats can be summarized as resulting from (in no particular order) energy exploration and production, shipping and transportation, modifications to natural ecosystem processes, invasive species proliferation, and climate change. Next, the scope, severity, and irreversibility of each of these 17 threats on each of the 10 priority targets was assessed using a four-tiered scale as classified by the Open Standards (Table 4).

This process resulted in a cumulative rating for each threat using Miradi software; threats were ranked in order of overall threat rating and then given an overall cumulative threat rating based on the multiple threats each target experiences.

Although only one threat was considered “very high” (hurricanes) and two were considered “high” (sea level rise and saltwater intrusion), the combination of these multiple threats (Table 5) ultimately will continue to deteriorate the RCA area. Because some threats, like hurricanes and sea level rise, are out of our ability to control or reverse, they rank particularly high using this system. Many other threats that rank relatively high, like saltwater intrusion, altered hydrology, and invasive species, rank lower because their impacts can be lessened or eliminated through on-the-ground projects and funding. Low-ranking threats, such as the lack of prescribed fire management, are more easily reversed with less effort or funding.



Vermilion Flycatcher. Photo: Mick Thompson/Audubon Photography Awards

**TABLE 2 | LIST OF WILDLIFE TARGETS AND THE CURRENT STATUS OF POTENTIAL KEY ATTRIBUTES**

WILDLIFE TYPE	KEY ATTRIBUTE	CURRENT STATUS
<b>Waterfowl</b>	Mottled Duck Population	Good
	Winter Duck Population	Good
<b>Alligators</b>	Number of Nests	Good
<b>Migratory Birds</b>	Population Size	Fair
<b>Colonial Beach-nesting Birds</b>	Least Tern Population Status	Fair
<b>Coastal Shorebirds</b>	Global IBA Threshold Species Status	Fair

**TABLE 3 | LIST OF CULTURAL TARGETS AND THE CURRENT STATUS OF POTENTIAL KEY ATTRIBUTES**

CULTURAL TYPE	KEY ATTRIBUTE	CURRENT STATUS
<b>Hunting Opportunities</b>	Hunter Satisfaction	Fair
<b>Vermilion Bay Fishery</b>	Fleet Size	Good
<b>Cultural Heritage from Ecosystem</b>	Community Satisfaction	Good





Aerial view of the Rainey headquarters, view to the north along McIlhenny Canal, with prescribed burns on McIlhenny property, left, and Rainey Bay Coast, right. Photo: Karen Westphal/Audubon Delta

**TABLE 4 | ASSESSMENT LEVELS OF SCOPE, SEVERITY, AND IRREVERSIBILITY (AS DEFINED BY THE OPEN STANDARDS) OF EACH OF THE 17 THREATS IDENTIFIED BY THE RCA STRATEGIC PLANNING TEAM.**

SCORE	COLOR	SCOPE	SEVERITY	IRREVERSIBILITY
<b>Very high</b>	Dark Orange	all or nearly all of the project area	would destroy target in 10 years or 3 generations	cannot be reversed or would take > 100 years
<b>High</b>	Orange	31-70% of the target area	would reduce target 31-70% in 10 years or 3 generations	can be reversed technically, but not feasibly in 21-100 years
<b>Medium</b>	Green	10-30% of the target area	would reduce target 10-30% in 10 years or 3 generations	can be reversed with reasonable resources in 6-20 years
<b>Low</b>	Dark Green	<10% of the target area	would reduce target in <10% of 10 years or 3 generations	can be easily reversed with little intervention

**TABLE 5 |** SPECIFIC DIRECT THREATS AND IUCN-CMP CLASSIFICATION (INCLUDING CLASSIFICATION NUMBERS AND CATEGORIES IN PARENTHESES).

Threat	IUCN-CMP Classification <sup>1</sup>	Threat Description	Threat Rating
Nomadic Grazing	2 Agriculture & Aquaculture 2.3 Livestock Farming & Ranging	A small group of unclaimed cattle graze unrestricted across some of our southern marshes, which has the potential to increase the risk of erosion.	<b>Low</b>
Human-caused Erosion	3 Energy Production and Mining 3.1 Oil and Gas Drilling	Direct or mechanical removal of soil can exacerbate erosion.	<b>Low</b>
Boat-induced Erosion	4 Transportation and Service Corridors 4.3 Shipping Lanes	Primarily from the Freshwater Bayou and Intra-coastal Waterway shipping channels used by industry, but also along interior canals for local and recreational use, boat-induced wakes and waves erode canal banks and create inappropriate water flows to interior marshes.	<b>Medium</b>
Recreational activities	6 Human Intrusions & Disturbance 6.1 Recreational Activities	Surface drives and wakes impact spoil banks and increase the risk of breaching, increasing poaching pressures, and increases safety concerns. This is being potentially exacerbated through public policies that expand recreational access to private water bottoms.	<b>Medium</b>
Lack of Fire	7 Natural System Modifications 7.1 Fire and Fire Suppression	Inappropriate fire management can lead to reduction in wetland plant density, diversity, and sustainability.	<b>Low</b>
Altered Hydrology	7 Natural system modifications 7.2 Dams and Water Management/Use	Appropriate water flows, both daily and seasonal, are needed to sustain healthy roots of wetland vegetation to stabilize soils and to carry necessary nutrients to marshes. Given hydrologic modifications through canalization (e.g., Intra-coastal Waterway, dredging of Freshwater Bayou, etc.), the right balance of levees and water control structures are needed to restore appropriate water flows.	<b>Medium</b>
Inappropriate Water Levels	7 Natural System Modifications 7.2 Dams and Water Management/Use	A consequence of altered hydrological regimes, inappropriate water levels can drown marsh vegetation or result in drought-like conditions, causing changes to the plant and subsequently animal communities in marsh ecosystems. Inundation by high precipitation and low drainage—changes in rainfall intensity.	<b>Medium</b>
Saltwater Intrusion	7 Natural System Modifications 7.3 Other Ecosystem Modifications	Natural phenomena, like subsidence and hurricanes, as well as human-based modifications to the ecosystem, such as inappropriate water control operations, canalization, and altered hydrology, collectively contribute to an increased threat of salt entering otherwise fresh, intermediate, or brackish marshes.	<b>High</b>

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TABLE 5 | CONTINUED

Lack of Coastal Sedimentation	7 Natural System Modifications 7.3 Other Ecosystem Modifications	Changes to upstream hydrology, particularly to the Atchafalaya, but also the Mississippi River, has altered the amount and timing of sediment transport to coastal waters. Long-shore currents deliver these sediments to the Chenier Plain, but with fewer sediments the balance of wave-induced erosion and land building has shifted towards a deficit.	Medium
Wave-induced Erosion	7 Natural System Modifications 7.3 Other Ecosystem Modifications	A combination of increased storm occurrence, subsidence, and changes to long-shore sediment transport increases the threat of erosion to Gulf and bay shorelines.	Medium
Invasive Aquatics	8 Invasive and Other Problematic Species and Genes 8.1 Invasive Non-native/Alien Species	Invasive aquatic species, like common and giant salvinia as well as water hyacinth, can disrupt hydrological regimes, choke out native aquatic species, and alter fisheries.	Medium
Invasive Plants	8 Invasive and Other Problematic Species and Genes 8.1 Invasive Non-native/Alien Species	Invasive plants like Chinese tallow and Chinese privet colonize higher areas with minimal flooding, such as spoil banks and chenier forests, particularly in disturbed areas. As pioneers, they crowd out natives, and can disrupt the natural process of forest succession and regeneration, and disrupt the balance of wildlife species.	Low
Invasive Animals	8 Invasive and Other Problematic Species and Genes 8.1 Invasive Non-native/Alien Species	Feral hogs in particular are becoming increasingly problematic in the Chenier Plain of SW LA. They damage native plant species in cheniers, marshes, and other sensitive habitats, which can increase rates of erosion and promote invasive plant species proliferation. They also impact breeding success of birds, alligators, and other wildlife targets.	Medium
Unbalanced meso-predators	8 Invasive and Other Problematic Species and Genes 8.2 Problematic Native Species/Diseases	Unbalanced native mesopredators (e.g., coyotes, raccoons, bobcats, Great Horned Owls, etc.) can impact population of conservation targets.	Medium
Oil & Gas Spills/ Pollution	9 Pollution 9.2 Industrial and Military Effluents	There has been increased attention concerning spills and pollution from oil and gas (O&G) operations in the aftermath of the much publicized BP Deepwater Horizon oil spill in the Gulf of Mexico off the coast of Louisiana. Although there is O&G activity on the RCA properties by ExxonMobil (owner of Vermilion Corporation lands), Energy XXI, and others, there is nothing that could pose a direct threat to the properties of the magnitude of the BP oil spill. There have been isolated spills and pollution on the property.	Low

CONTINUED →

TABLE 5 | CONTINUED

Inappropriate Nutrient Balance	9 Pollution 9.3 Agricultural and Forestry Effluents	Upstream run-off, modifications to hydrology, and changes to fire regimes have altered nutrient balances in aquatic and marsh ecosystems, which can have cascading effects that change biotic communities, which may be expected to worsen because of high rain and runoff.	Medium
Sea Level Rise	11 Climate Change and Severe Weather 11.1 Habitat Shifting and Alteration	Increases in sea level could threaten long-term sustainability of natural ecosystems. Sea level rise also puts bird and alligator nests at risk to flooding.	High
Hurricane Frequency & Intensity	11 Climate Change and Severe Weather 11.4 Storms and Flooding	Probably the greatest threat for a sudden and dramatic change to the ecosystem that could wipe out vulnerable species and/or habitat.	Very high
Tide-induced Erosion	11 Climate Change and Severe Weather 11.4 Storms and Flooding	Increased tidal amplitude can scour marshes, which is exacerbated by subsidence, canalization, and other human modifications to the ecosystem.	Medium

All ten of the habitat and wildlife conservation targets are experiencing medium to high levels of threat when the combination of all threats combined are considered (Table 6). Furthermore, it is worth emphasizing that all conservation targets are

experiencing multiple threats, highlighting the need to address these various threats simultaneously. The RCA must work at multiple scales in order to address these multiple threats, many of which are reasonably feasible to address, and reduce their

impacts on targets. Action to reverse these threats should occur through a cohesive and comprehensive approach, which will be guided by the availability of funding and other resources.

TABLE 6 | A LIST OF TARGETS, AND THE SEVERITY OF THREAT TO EACH TARGET. HURRICANES AND SEA LEVEL RISE ARE IDENTIFIED HAS HIGH OR VERY HIGH THREATS TO ALL TARGETS; WE DID NOT INCLUDE THEM IN THIS TABLE.

Target	Overall Threat Level	Primary Threat(s)
Marsh habitat	High	Saltwater intrusion, altered hydrology, tide-induced erosion, wave-induced erosion, inappropriate nutrient balance, nomadic grazing
Water characteristics	High	Saltwater intrusion, invasive animals, inappropriate nutrient balance
Colonial beach-nesting birds	High	Lack of nesting habitat, invasive animals, erosion
Alligators	High	saltwater intrusion, inappropriate water level, invasive species
Maritime forest/chenier	High	Saltwater intrusion, invasive plants, invasive animals
Bayous and canals	High	Saltwater intrusion, recreational activities, wave-induced erosion, invasive aquatics
Migratory birds	Medium	Invasive animals, unbalanced mesopredators, oil and gas spills, lack of fire
Gulf/Bay shoreline	Medium	Lack of sedimentation, erosion
Coastal shorebirds	Medium	Lack of sedimentation, oil and gas spills
Waterfowl	Medium	Saltwater intrusion, inappropriate water levels, altered hydrology



**CONTRIBUTING FACTORS**

Contributing factors are the economic, cultural, political, legal, social, and/or institutional factors that drive direct threats—these are often the important intervening points or opportunities for addressing the impacts of threats on conservation targets. For example, Freshwater Bayou channel drives many of the hydrological and erosional issues on RCA properties; boat-induced erosion caused by marine traffic along Freshwater Bayou degrades bank lines, increases saltwater intrusion into marshes, and increases the rate of water movement throughout the interior marsh which affects submerged aquatics and the interior loss of sediment.

Likewise, to address and develop strategies against specific threats, it is critical to understand and mitigate against one or more contributing factors. For example, the threat of altered hydrology is exacerbated by degrading bank lines and levees, degrading water control structures, inappropriate water control and channelization. Multiple approaches are necessary to address these contributing factors, and really all are necessary to restore more natural or appropriate hydrological conditions.

General contributing factors to threats that affect RCA properties include:

- Degrading bank lines and levees
- Degrading water control structures
- Insufficient water control/management
- Certain development activities
- Lack of funding necessary to implement projects Canalization and channelization
- Lacking navigation canal maintenance (Freshwater Bayou)
- Subsidence

The RCA understands many of these contributing factors and its members constantly seek to gain information as new ones develop in the region and address them in a variety of ways.

**CONSERVATION STRATEGIES**

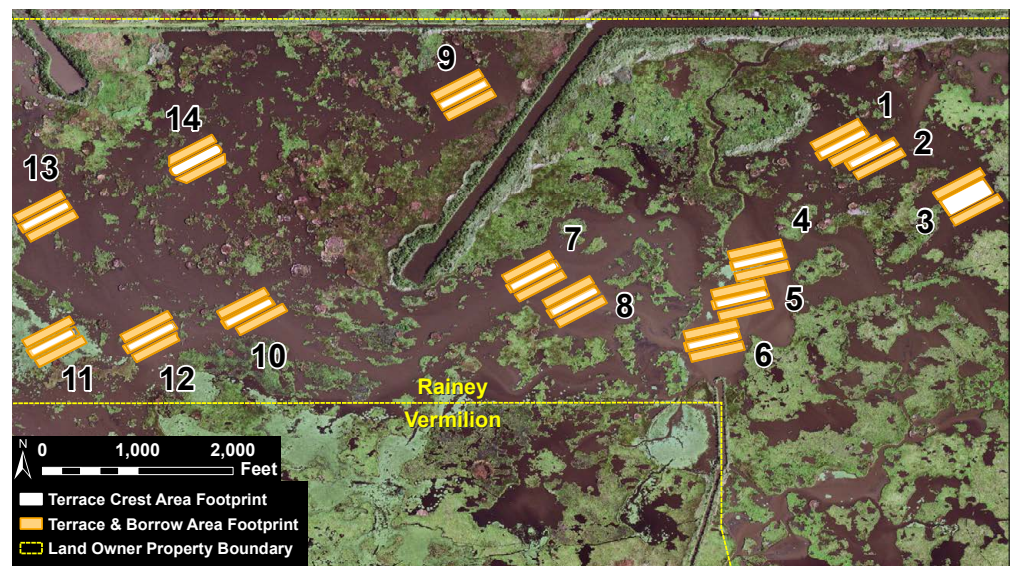
Once conservation targets, threats, and contributing factors have been identified, Step 2 of the Open Standards process involves deciding which strategies are appropriate in mitigating or reversing threats to improve the status of conservation targets. The RCA planning team identified a list of strategies and ranked them according to their potential impact (the ability of a strategy to mitigate against a threat and restore a target, from low to very high) and feasibility (the feasibility of implementing a strategy, which may be bound by ethical and financial limitations). The potential impact and feasibility were ranked on a four-tiered scale (low, medium, high, and very high) to generate an overall effectiveness rating also ranked on a four-tiered scale (ineffective,

less effective, effective, and highly effective) (Table 7). We removed strategies that the group deemed ineffective for consideration.

The first three strategies are highly effective and are currently being implemented by the RCA members. RCA members help guide policy development at the state and federal levels when opportunities arise that will benefit the RCA; fire management takes place on a two-to three-year rotation on the Rainey Wildlife Sanctuary, and more sporadically on other RCA properties; and Audubon is collaborating with Louisiana State University researchers to develop small dredge technology for use by individual landowners to build targeted cost-effective marsh restoration projects on their properties.

The other nine strategies require additional funding to implement. RCA members work with state and federal agencies, granting agents and private partners to propose project ideas, guide restoration dollars to fund these projects, and implement the projects on RCA lands to maximize the benefit of these projects to the RCA scope area.

**FIGURE 5 | TALL TERRACES FOR MARSH RESTORATION AND BIRD NESTING OPPORTUNITIES**



**TABLE 7 | CONSERVATION STRATEGIES IDENTIFIED BY THE RCA AND THEIR BASIC DESCRIPTION, POTENTIAL IMPACT, FEASIBILITY AND OVERALL EFFECTIVENESS.**

#	Strategy & Details	Potential Impact	Feasibility	Overall Effectiveness
1	Guide State of Louisiana policy on Freshwater bank stabilization—Eroded bank lines of this Federal navigation channel causes direct negative impacts to the interior marshes of RCA properties. RCA members are working to influence Federal and state policy to reverse this trend and hold managers of the channel responsible for its repair.	High	Very High	Effective
2	Prescribed Fire Management—Fire is a traditional management tool in coastal marshes and promotes plant production, prevents invasive species proliferation.	High	Very High	Effective
3	Expand Use of Small Dredges—This is a proven technique for creating emergent wetlands and/or for elevating pond bottoms, which can be utilized on a small scale.	High	Very High	Effective
4	Improve Water Control Management—Conditions of water control structures need to be prioritized so that those structures that could affect the greatest area at the lowest cost could be repaired or replaced.	High	High	Effective
5	Marsh Restoration—Marsh creation through a variety of techniques, which can include dredge and fill, planting vegetation, and constructing terraces, including tall terraces (Figure 5).	High	High	Effective
6	Create Bird Nesting Opportunities—Use dredged material, direct terrace design, etc. Proven technique that can be funded through NAWCA or NRDA.	Very High	Medium	Somewhat Effective
7	Manage Invasive Species—Invasive animals (e.g., feral hogs), aquatic vegetation (e.g., salvinia) and plants (e.g., Chinese tallow) need to be controlled or eradicated, guided by established removal techniques.	High	Medium	Somewhat Effective
8	Re-enforce Canal Banks—Levees and bank lines are the framework for containing and managing coastal wetlands within the ecoregion in the face of greatly altered hydrology and storm damaged landscape and must be maintained and/or re-enforced to the greatest extent possible.	High	Medium	Somewhat Effective
9	Shoreline Protection—Rip rap, breakwaters, and artificial oyster reefs are techniques that have been successfully utilized along Bay and Gulf shorelines, protecting shorelines from wave and other erosional forces.	High	Medium	Somewhat Effective
10	Bankline Protection—Bankline stabilization with rip-rap (e.g., rock) is necessary to prevent saltwater intrusion into marshes and the further widening of Freshwater Bayou, as well as banklines along interior canals.	High	Medium	Somewhat Effective
11	Restore Maritime Forest—Maritime forests have declined from tropical storms, saltwater intrusion, and subsidence. Replantings and ridge restoration (increasing elevation) are needed to sustain these ridges that protect interior marshes from storm surges and fetch.	Medium	Medium	Somewhat Effective
12	Influence Policy Regarding Atchafalaya—The Atchafalaya River is a source of freshwater into the region through the GIWW and Freshwater Bayou Channel. At this time, much of the flow is diverted through outlets into Vermilion Bay. It would benefit the entire region if these outlets were restricted to allow more freshwater to move westward into Vermilion Parish.	Medium	Medium	Somewhat Effective



**PROJECT OPPORTUNITIES**

One of the most critical tasks of the RCA members is to work with partners (federal, state, NGO, private, etc.) to secure funding for and implement restoration projects. The RCA planning team has identified 37 priority projects (Table 8) that would benefit the RCA project scope by reducing threats and providing benefits to conservation targets.

Certain types of restoration, such as hydrologic restoration, are highly

important for restoring natural processes. Marsh creation projects are important to increase critical habitat area and reduce threats of erosion, but are more effective once hydrologic restoration has been addressed. This type of sequencing consideration is understood by RCA planners and is reflected in the project roster above, as are other project development factors such as maximization of other project work going on in the vicinity, or phasing projects so that the cost is

more manageable. As demonstrated by the project list, the RCA has and will continue to utilize strategies addressed in this Strategic Plan that have resulted in real work and on-the-ground results. As the RCA continues its coastal restoration mission, it will remain focused on those strategies that will affect the greatest good given opportunities that present themselves at whatever level of restoration is available (from simple vegetative planting to large-scale marsh creation).

**TABLE 8 | RESTORATION PROJECTS COMPLETED SINCE 2015 AND PRIORITIZED UPCOMING PROJECTS**

SP—Shore Protection    HR—Hydrologic Restoration    MC—Marsh Creation    OR—Oyster Reef    TE—Terraces    OT—Other

Project Name	Project Type	Current Phase <sup>1</sup>	Cost <sup>2</sup>	Funding Program <sup>3</sup>
Deep Lake Marsh Management	HR	Completed - 2021	\$1,150,000	NAWCA <sup>4</sup>
Chenier au Tigre Oyster Reef (Phase 1)	SP	Completed - 2021	\$1,433,000	CIAP
Cole’s Bayou Marsh Restoration (TV-0063)	MC	Completed - 2019	\$27,881,223	CWPPRA
Deep Lake Terraces	TE	Completed - 2019	\$451,514	WCS
Tom’s Bayou Weirs	HR	Completed - 2017	\$911,812	NAWCA <sup>4</sup>
Joe’s Bayou Water Control Structure Replacement	HR	Completed - 2016	\$2,000,000	FEMA
Freshwater Bayou Bank Stabilization (TV-0076)	SP	Completed - 2016	\$1,300,000	STATE
Performance Evaluation - Freshwater Bayou (LA-0012-03)	OT	Completed - 2016	\$286,029	CIAP
Freshwater Bayou Bank Stabilization (TV-0011-B-EB)	SP	Completed - 2015	\$13,568,804	CIAP
Marsh Creation Near Freshwater Bayou (ME-0025-SF)	MC	Completed - 2015	\$5,700,000	State
Deep Lake Small Dredge Demonstration	MC	Completed - 2015	\$500,000	NFWF
AgMac Beneficial Use Part 2 (Intracoastal City to Gulf via Freshwater Bayou)	MC	In Construction	\$30,000,000	State
AgMac Beneficial Use Part 1 (Industrial and Commercial Canals)	MC	In Construction	\$15,000,000	State
North Vermilion Bay Shoreline Protection (TV-0077)	SP	In Construction	\$7,900,000	State Surplus
Freshwater Bayou Shoreline Protection (TV-0082)	SP	In Construction	\$3,671,432	State Surplus

1 as of publication date

2 cost estimate to incomplete projects

CONTINUED →

TABLE 8 | CONTINUED

Shoreline Protection at Southwest Pass (TV-0041)	SP	Contract Awarded	\$3,000,000	GOMESA
Chenier au Tigre Oyster Reef Extension (Phase 2)	SP	Contract Awarded	\$1,382,000	GOMESA
Rainey Bird Nesting Platforms	Bird	Contract Awarded	\$10,000	Coypu Foundation
Tall Terrace Bird Management	Bird	Contract Awarded	\$20,000	Coypu Foundation
Freshwater Bayou Marsh Creation (ME-0031)	MC	E&D complete	\$26,756,513	CWPPRA
Bay Coast Hydrologic Restoration	HR, SP	E&D	\$9,000,000	NAWCA/ NFWF
Chenier au Tigre Ridge Restoration	RC	E&D	\$8,500,000	State Surplus
Freshwater Bayou Canal Shoreline Protection (TV-0079)	SP	E&D	\$4,590,000	RESTORE
Humble Canal West Weir	HR	E&D	\$3,000,000	TBD
Central Marsh / Bayou Chene	TE, HR	E&D	\$2,500,000	NAWCA <sup>4</sup>
Chenier au Tigre Oyster Reef Extension (Phase 3)	SP	E&D	\$1,000,000	TBD
South Pecan Island Marsh Creation and Terraces	MC, TE	Conceptual	\$42,135,698	CWPPRA
South Humble Marsh Creation & Nourishment	MC, HR	Conceptual	\$40,000,000	CWPPRA
South Avery Island Shoreline Protection and Marsh Creation	MC, SP	Conceptual	\$30,000,000	CWPPRA
Freshwater Bayou East Marsh Creation	MC	Conceptual	\$25,000,000	CWPPRA
Freshwater Bayou Marsh Creation - Increment 2	MC	Conceptual	\$25,000,000	CWPPRA
SW LA Gulf Shoreline Nourishment and Protection (ME-0024)	SP	Conceptual	\$17,144,234	TBD
Greater Bob Gil Restoration	HR, MC	Conceptual	\$6,000,000	TBD
SW Pass Bird Rookery Enhancement	Bird	Conceptual	\$5,000,000	TBD
Rainey Shoreline Protection	SP	Conceptual	\$2,000,000	TBD
Chenier au Tigre Hydrological Restoration	HR	Conceptual	\$1,500,000	TBD
Cole's Bayou breaches	HR	Conceptual	\$500,000	CPRA/ CWPPRA
Belle Isle Lake Landbridge and Terrace Restoration	TE, SP	Conceptual	\$200,000	Audubon + TBD
Christian Marsh Hydrological Restoration	HR	Conceptual	TBD	TBD
USACE Beneficial Use Disposal Relocation	MC	Conceptual	TBD	USACE

3 TBD = To Be Determined

4 in cooperation with Ducks Unlimited





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