
CLIMATE RESILIENCE, CONSERVATION, AND OUTDOOR
RECREATION STRATEGIES FOR THE ISLAND OF CULEBRA

CONSERVA CULEBRA





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INTRODUCTION

Culebra, a small island municipality of Puerto Rico, is a hidden gem in the Caribbean Sea known for its pristine beaches, vibrant marine life, and serene landscapes. Culebra was initially inhabited by the Taíno people before Spain's colonization in the 1880s. The island later served as a military site for the United States Navy during the 20th century where they had a bombing range and site for military-training exercises.

Culebra has faced significant challenges due to hurricanes, particularly hurricanes Irma and Maria in 2017, which devastated much of Puerto Rico. The island's infrastructure and natural habitats suffered extensive damage, highlighting the urgent need for conservation efforts. However, the resilience of Culebra's community has been remarkable, with local efforts focusing on rebuilding and protecting its unique environment.

In recent years, Culebra has seen an influx of tourists, which poses a threat to the island's delicate ecosystems. The conservation of Culebra is paramount, not only to preserve its natural beauty and biodiversity but also to maintain the balance between tourism and the resident's way of living. The surge in tourism has brought negative effects, including increased trash and pollution, as well as a rise in rentals which has reduced the available housing for locals. Protecting this island ensures that residents can continue to enjoy its charm and learn from its rich historical and cultural heritage.

As the community plans to restore and strengthen their built infrastructure, they want to ensure the protection of Culebra's natural resources by implementing environmentally sustainable projects that promote biodiversity and minimize pollution from increased tourism. They also want to increase access to outdoor recreation so that everyone, from the island's youth to senior citizens, can enjoy.

In September 2022, a team from the **National Park Service – Rivers, Trails, and Conservation Assistance program (NPS-RTCA)** worked with Culebra's Municipality Planning Director to identify conservation and outdoor recreation projects across the island. Following that initial meeting, NPS-RTCA collaborated with organizations and local leaders of Culebra to finalize the project list that would lead to the development of a comprehensive master plan aimed at conservation and enhancing outdoor recreation. This collaborative effort involved community meetings, interviews, and feedback sessions, ensuring that the voices and needs of residents were integral to the planning process. The resulting master plan focuses on preserving Culebra's unique natural habitats, protecting its diverse marine and terrestrial ecosystems, and promoting sustainable tourism practices. By incorporating community input, NPS-RTCA has created a strategy that balances conservation with outdoor recreation, ensuring that both locals and visitors can enjoy and protect the island's pristine beauty for generations to come.



Executive Summary

This project began as an analysis of conditions and resilience planning opportunities on the Island of Culebra, following hurricanes Irma and Maria. Over the course of two years, an NPS-RTCA team conducted four site visits to Culebra for analysis, relationship-building, planning, and community engagement. Collaborating closely with local community members, the municipality, and nonprofit partners, the team identified the community's priorities and key projects through interviews, public meetings, oral history collection, and facilitated meetings. Funding for key on-the-ground improvements was secured through a partnership with the Texas Conservation Corps. Additionally, a mangrove and tree canopy analysis was conducted in collaboration with the Green Infrastructure Center.

The outcome of this project is a comprehensive report that outlines climate resilience, conservation, and outdoor recreation recommendations and strategies for the Island of Culebra. This report provides a roadmap for future improvements and highlights the importance of community engagement in conservation efforts. The community's support for this project is a testament to the power of collaboration and the significant impacts that can be achieved when planners and stakeholders work together towards a common goal.



PROJECT PARTNERS

As part of the recovery efforts from hurricanes Irma and Maria which made landfall only two weeks apart in 2017, the Municipality of Culebra requested assistance from the **Federal Emergency Management Agency (FEMA)** and the **National Park Service – Rivers, Trails, and Conservation Assistance program (NPS-RTCA)** to help identify resilient recovery strategies for the island.

In addition to developing strategies to enhance the island's resilience to future natural disasters, the Municipality of Culebra sought support from NPS-RTCA to identify and convene partners, engage community members in the planning process, scope and prioritize conservation and outdoor recreation projects in Culebra, and implement an on-the-ground demonstration project. NPS-RTCA could not have completed this report without the help and support from the incredible project partners.

Additional thanks to the organizations, programs, and residents who shared their time, expertise, and feedback with us: Departamento de Recursos Naturales y Ambientales, Sociedad Ambiente Marino, Líderes Ambientales Culebrenses, Museo Histórico de Culebra, Abbie's Ecological School, Escuela Ecológica de Culebra, and el Centro de Envejecientes Marcelina Díaz Pellot.



The **Municipality of Culebra** provided project assistance and input primarily through the Municipality Planning Director.



The **U.S. Fish and Wildlife Service's Culebra National Wildlife Refuge** strives for ecosystem sustainability through preservation, conservation, enhancement, and restoration of habitats essential for the long-term viability of the fish, wildlife, and plants in the Caribbean.



Mujeres de Islas is a community organization that promotes the emotional health, cultural, environmental, and socioeconomic development of Culebra through programming that is driven by community interests and needs.



Fundación de Culebra is a nonprofit organization, incorporated in 1994, whose mission is to preserve, promote, and protect Culebra's history, culture, environment, and community.



Asociación Pesquera de Culebra is a nonprofit organization focused on reintroducing fishing on the island to nurture the community's well-being and create a sustainable economic livelihood.



The **Federal Emergency Management Agency Community Assistance Recovery Support Function (CARSF)** enables local governments to effectively and efficiently carry out community-based recovery planning and management in a post-disaster environment. CARSF also supports state or territorial governments in developing programs of support for local recovery planning.



The **National Park Service – Rivers, Trails, and Conservation Assistance program (NPS-RTCA)** supports locally-led conservation and outdoor recreation projects and assists communities with natural disaster recovery across the United States. NPS-RTCA assists communities and public land managers in developing or restoring parks, conservation areas, rivers, and wildlife habitats, as well as creating outdoor recreation opportunities and programs that engage future generations in the outdoors.

SITE VISITS

The NPS-RTCA team assessed Culebra's current conservation and outdoor recreation resources, challenges, and opportunities through on-the-ground site visits and meetings, virtual conversations with partners, and review of the island's history and existing conditions. These efforts culminated in the development of this report, which provides recommendations and relevant resources to help Culebra realize its potential for outdoor recreation and nature-based tourism. Over the course of four visits, NPS-RTCA developed partnerships and engaged with the community to gather input and identify priorities for the island.

In **September 2022**, NPS-RTCA staff visited Culebra for the first time and met with the Municipality's Planning Director who shared some of the challenges the island faces as well as opportunities for conservation and outdoor recreation projects. NPS-RTCA spent the day visiting several sites and began identifying potential projects and partners.

In **March 2023**, NPS-RTCA staff returned to Culebra and began meeting with several community organizations and institutional contacts within Mujeres de Islas, Asociación Pesquera de Culebra, Culebra National Wildlife Refuge, and the Municipality of Culebra to compile a list of projects and priorities on the island. NPS-RTCA conducted additional site visits of the project areas, including nearby keys, and co-created community engagement strategies with local representatives.

In **May 2023**, NPS-RTCA staff spent 10 days in Culebra to gather feedback on outdoor recreation and conservation priorities from the community. The visit included community meetings and interviews with residents on the island. In collaboration with Fundación de Culebra, NPS-RTCA concluded the visit with a public celebration and presentation of findings and feedback at the local historic museum. The feedback process and results can be found in the following sections.

The last visit, in **March 2024**, focused on gathering final feedback and working on prioritized improvements to public areas with the support from the Texas Conservation Corps. Enhancements to the camping areas at Punta Soldado and the development of a trail at Culebra National Wildlife Refuge, along with tree canopy and mangrove maps from the Green Infrastructure Center, inspired the community to continue advancing other identified projects in collaboration with internal and external partners.



Public Outreach and Engagement Strategies

The list of potential conservation and outdoor recreation projects in Culebra led to the development of intentional public outreach and engagement strategies. During initial visits, NPS-RTCA gathered valuable insights from the municipality and community organizations who identified challenges, opportunities, and shared personal stories about their connection to their land, culture, and resources. These first visits highlighted access and capacity limitations since many community members lack access to transportation and are managing numerous projects of their own. Understanding these challenges, NPS-RTCA focused on fostering individual connections while also hosting a few community workshops.

Key engagement strategies included building trust and meaningful connections with project partners through consistent in-person and virtual meetings, engaging with community members at their preferred locations (including their job sites or homes), and creating a formal agreement with Mujeres de Islas to assist with the development and implementation of public engagement events.

Inspired by these interactions, NPS-RTCA began an oral history project that captured interviews focused on conservation and outdoor recreation with residents of all ages. Titled Voces Culebrenses (Voices from Culebra), NPS-RTCA held interviews at schools, the elderly center, businesses, homes, and the museum, all of which helped guide the climate resilience, conservation, and outdoor recreation strategies outlined in this plan.

Additionally, NPS-RTCA was able to work through an agreement with the Texas Conservation Corps who brought a team to Culebra to implement a pilot project focused on conservation and outdoor recreation. Project partners were involved in the planning process, ensuring the project aligned with local priorities, and community members were invited to participate in a hands-on trail workshop. The improvements to the camping areas at Punta Soldado and development of a trail at Culebra National Wildlife Refuge were the result of the community's commitment to enhancing public spaces.



BUILDING AN ACCESSIBLE RAMP AT PUNTA SOLDADO



EXISTING CONDITIONS AND PUBLIC PERCEPTION

During the public engagement process, the following comments and sentiments highlighted the numerous challenges the island faces due to overtourism and other local issues.

EXISTING CONDITIONS

OTHER ATTRACTIONS

Camp sites at Punta Soldado, Playa Larga, and Flamenco

Horses and deer (double-edged sword)

Coral reefs

New Year's Eve events

Encouraging visitors to go to the Museo Histórico de Culebra (Historic Museum of Culebra)

Culebrita and Luis Pena – nearby keys managed by the U.S. Fish and Wildlife Service's Culebra National Wildlife Refuge

Nightlife

Outdoor market

Farmers market

Tamarindo Grande beach

Bird watching

Dakiti Bay

Fishing (as a hobby)

Zoni Beach and nearby forest

Cayo Pirata, a municipality managed key that was once a fun family picnic area with gazebos and fire pits, but after Hurricane Hugo destroyed the pier in 1989 it has been very hard to access the site

It is said that there are 28 beaches in Culebra

Mosquito Bay

OTHER PROBLEMS

A lack of capacity to manage the conservation and outdoor recreation sites in Culebra and nearby keys such as Luis Pena

Excessive use of the Culebrita Key

Low lighting

Coastal development near the Culebra National Wildlife Refuge

Excessive rental jeep and golf carts around the island

Trash on the beaches of Culebrita

Safety concerns: reckless drivers, low lighting, narrow sidewalks, and areas without sidewalks

Lack of garbage cans at beaches

Deforestation

Illegal docks

Access to beaches is limited, making it difficult to get to some of them

Truck that fell into a critical conservation/habitat area

A lack of centralized public education for visitors about how to help protect the island

Ferry: it is difficult for workers and residents to use the ferry because of the hours it operates.

Idea is to suggest preferred hours to encourage the ferry to change their schedule

Need more public transportation options for locals

Construction and implementation codes

Regulations: there are no agencies to control the illegal construction

Lack of housing options for residents because of increased rent prices and surge of short-term rentals

No hospital

No bike lanes

Wagons and shopping carts to carry groceries are difficult to move around because of the narrow and bumpy sidewalks

The area surrounding Playa Brava needs cleaning

Use of styrofoam containers at restaurants that end up in the landfill

Lack of diverse activities for youth to enjoy

Overpopulation of wild chickens, cats, horses, deer, and goats that get into trash and sometimes homes

Increased cost of living

Lack of information about the recycling process on the island

Pharmacy hours (closes at 3 p.m.)

Limited products are available

Road erosion

Limited amount of signage for unexploded ordnances, making them a big hazard

Unsustainable packaging for imported products

Excessive seaweed on some beaches

SUSTAINABILITY

In 1987, the United Nations Brundtland Commission defined sustainability as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

WHAT DOES SUSTAINABILITY MEAN TO YOU?

Making correct use of the natural resources without putting them at risk

Interdisciplinary sustainability on the island. Ecology could continue to be integrated into the community to help the island support its needs.

HOW CAN WE CREATE A MORE SUSTAINABLE ISLAND?

Transforming the landfill site into a more optimal condition

- Install barriers and nets to avoid the trash sliding into the ocean
- Develop higher standards

Involving the community in conservation and restoration projects, as well as clean-up efforts

Creating affordable housing for locals

Encouraging tourists to support local businesses by eating at the restaurants rather than bringing in their own food

Recycling

Avoiding large-scale development

Becoming a solar powered island

100% composting

Planting seeds and trees

Education

Forming alliances and collaborating with nonprofit organizations and programs with similar goals

Implement sustainability initiatives to help protect Culebra's natural and cultural resources for future generations.

Work with the landfill to create some space where Mujeres de Islas can establish a composting area.

Consider creating a repair shop for appliances to reduce waste and prevent unnecessary disposal.

COMMUNITY PRIORITIES

CONSERVATION AND RESTORATION

Implement red lighting to protect turtles.

Plant mangroves and other native trees.

Enforce fines for environmental violations.

Ensure illegal contracts are not approved.

Prioritize coral reef conservation to help with coastal protection.

Organize coastal clean-ups.

ACCESS

Install proper lighting throughout the island.

Improve sidewalks to make them safer for pedestrians.

Add road and directional signage.

Identify streets and key locations.

Enhance beach access.

Consider trolleys for public transportation.

Close streets for walking or public biking days.

Improve access to public transportation and make it free for residents.

TOURISM

Implement regulations for short term rentals.

Mitigate and try to control tourism to avoid overcrowding.

Encourage nature-based and responsible tourism that aligns with conservation efforts.

Find a balance between tourism and community needs.

Ensure beach safety through signage.

Provide information to tourists about trash and Leave No Trace principles.

Prepare for peak tourism season which is from November to February.

Create educational materials that can be shared with tourists about the island, its history, the wildlife that call it home, and how to protect its natural and cultural resources.

Share maps with tourists and inform them about dining options and hours of operation.

CLEAN ENVIRONMENT

Strategically install trash cans at popular recreation areas and ensure regular collection.

Improve landfill garbage management.

Implement a recycling system or program.

Establish stations for separating waste (plastic, glass, etc.), as all waste is currently mixed.

Promote the reuse of items that would otherwise be discarded.

Recognize animals, even wild ones, are a valued part of the community.

FACILITIES

Clean, maintain, and provide access to Cayo Pirata.

Create and maintain trails that lead to beaches and campsites.

Create facilities for the fishermen of Culebra.

Address the lack of parking.

Install bathrooms and picnic tables at public recreation areas.

Maintain campsites at Punta Soldado.

Revive the Culebra Challenge, a triathlon which was discontinued due to high costs. Could be a fun community event with food and drinks.

Promote aquatic sports, Zumba, or other forms of exercise.

OTHER PRIORITIES

Develop and implement sustainable tourism practices.

Add facilities and amenities that can be easily maintained at beaches such as trash cans, tables, and rinsing areas.

Create new recreational areas and parks.

Mitigate tourism to help conserve the Luis Peña Canal Natural Reserve.

Conduct a community survey to learn about what they conservation and recreational assets they would like to see implemented on the island.





Engaging Culebra's Environmental Leaders

Recognizing the importance of including youth in the planning process, NPS-RTCA participated in a meeting hosted by the Fundación de Culebra (Foundation of Culebra) with the Líderes Ambientales Culebrenses (Environmental Leaders of Culebra). By listening to the island's young leaders, NPS-RTCA gained invaluable insights into their

experiences and their vision for Culebra's future. Their perspectives on conservation efforts and outdoor recreation opportunities were instrumental in shaping this report. This section highlights their memories, favorite places, concerns, and ideas for the future of Culebra, all captured during an engaging workshop.

MEMORIES OF NATURE AND OUTDOOR ACTIVITIES

Participants recalled vivid childhood memories, such as planting gardens at school, celebrating birthdays with their family at the beach, playing tag, marking leatherback turtle nests, searching for animals underwater, and swimming at Larga Beach. They also remembered falling asleep at the beach during New Year's celebrations, playing hide and seek, and running track.

FAVORITE PLACES IN CULEBRA

When asked about their favorite locations, responses included boat trips to Culebrita, as well as time at Tamarindo and Melones beaches. They also enjoy visiting SEVA*, the basketball court, town, and Muelle Coral – the public dock.

**SEVA is a space that uses the old public school's building to welcome community members who want to participate in a variety of learning experiences and services related to art, cooking, sewing, gardening, and more.*

CONCERNS FOR CULEBRA

Concerns were centered around rowdy tourists, trash accumulation, and illegal construction on the island.

FAVORITE PLANTS AND ANIMALS

Participants expressed admiration for the island's unique flora and fauna, including quenepa which is a native fruit to Puerto Rico, turtles, Culebra's cactus species, deer, palm trees, and native flowers such as the roble.

WHAT TO SHOW FIRST-TIME VISITORS

If showing Culebra to a friend, they would visit Flamenco Beach, Zoni Beach, and really all the beaches in general. They would also relax on hammocks, take boat trips to Culebrita and Luis Peña keys, and dine at local restaurants.

IMAGINING CULEBRA IN 10 YEARS

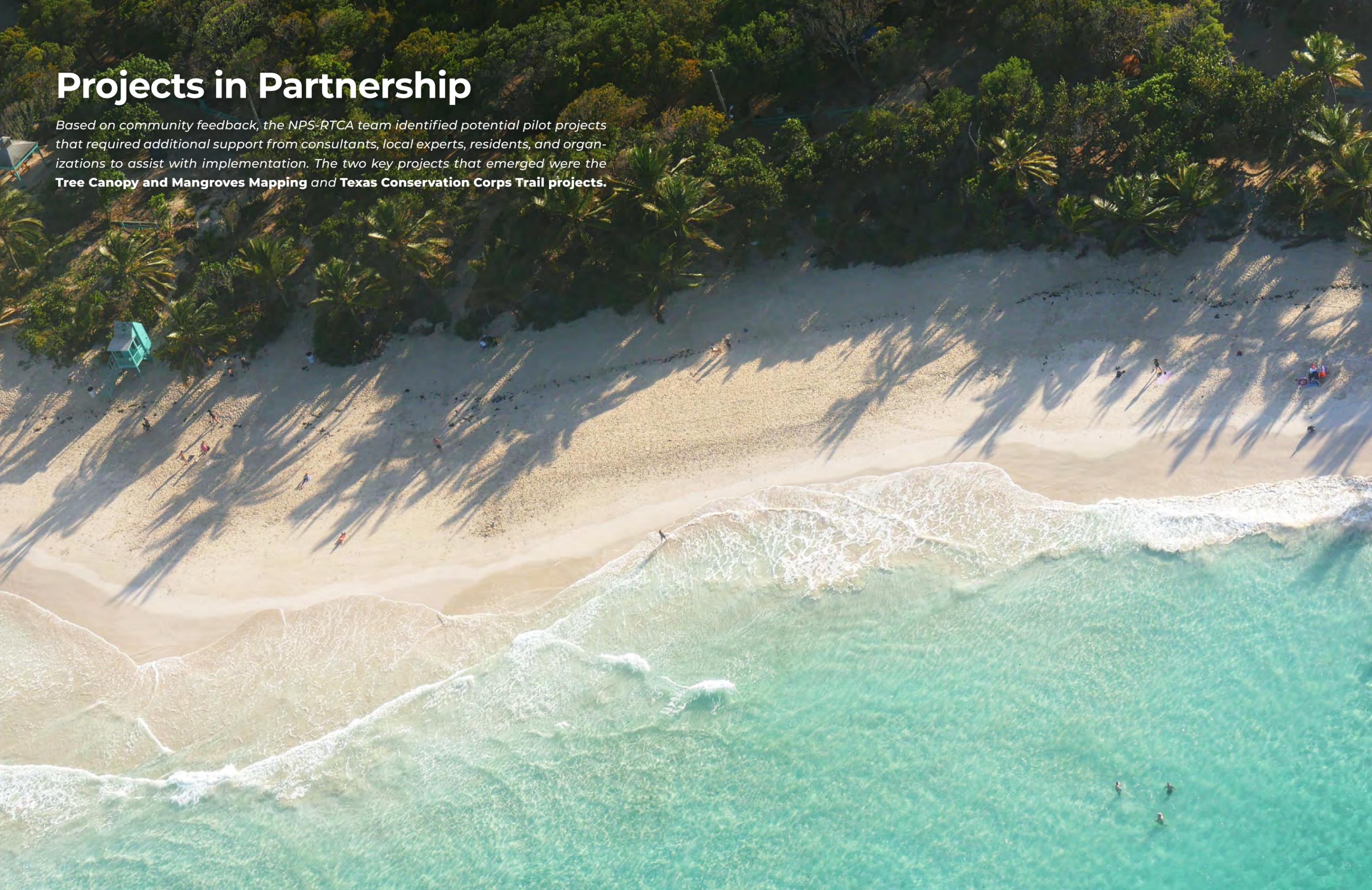
Looking to the future, some envisioned an island filled with strangers and overrun by development, with too many docks and houses. Others hoped for a cleaner environment, but worried about the increasing pressure of tourism and the loss of Culebra's natural beauty.

VISION FOR THE BEST CULEBRA

To make Culebra the best island in the world, participants emphasized the need for clean beaches, responsible tourism, proper waste management, halting construction near beaches, maintaining the island's natural environment, and educating people about conservation. They also mentioned improving roads and ensuring that the island isn't overwhelmed by new development.

Projects in Partnership

*Based on community feedback, the NPS-RTCA team identified potential pilot projects that required additional support from consultants, local experts, residents, and organizations to assist with implementation. The two key projects that emerged were the **Tree Canopy and Mangroves Mapping** and **Texas Conservation Corps Trail** projects.*



TREE CANOPY AND MANGROVES MAPPING: GREEN INFRASTRUCTURE AND CLIMATE RESILIENCE TECHNICAL ASSISTANCE

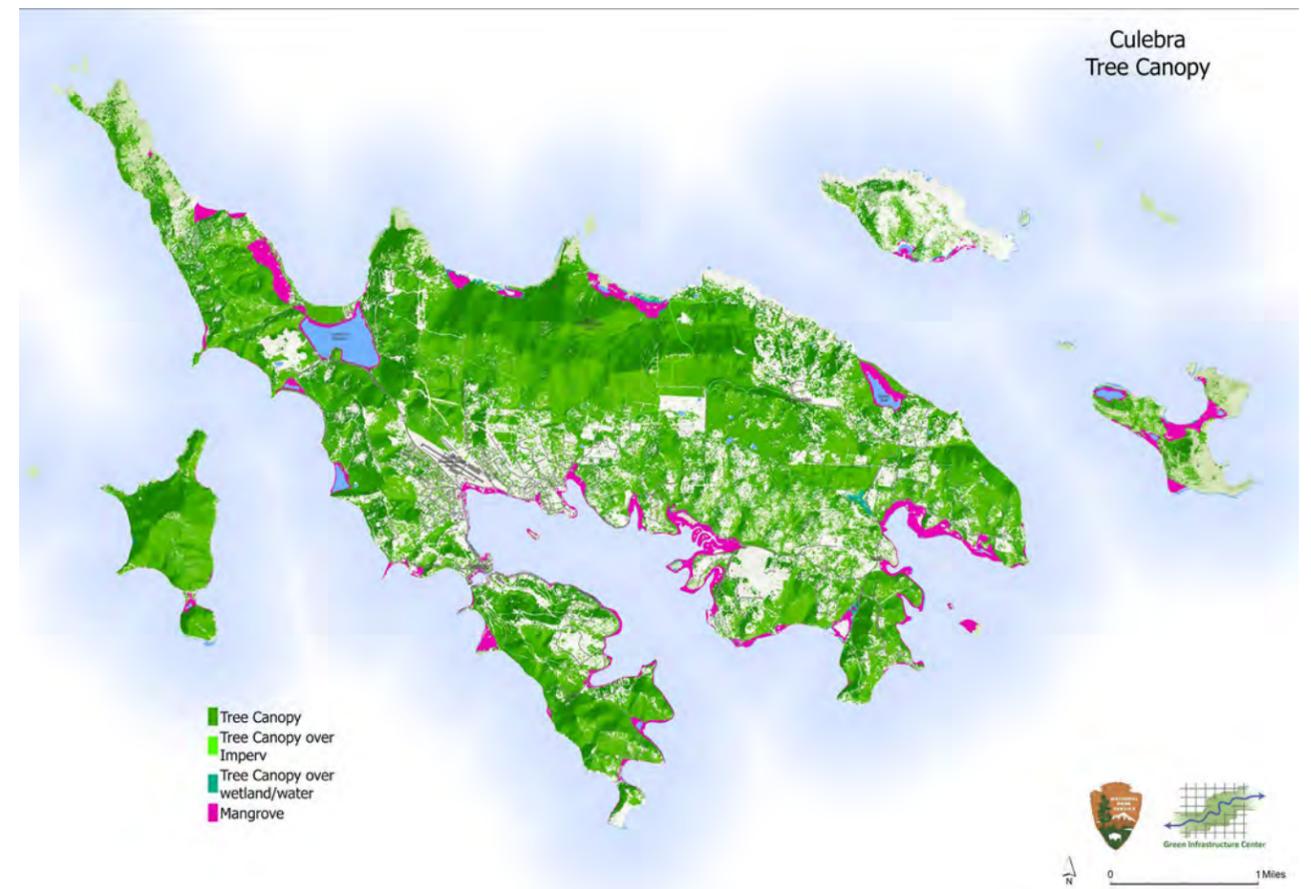
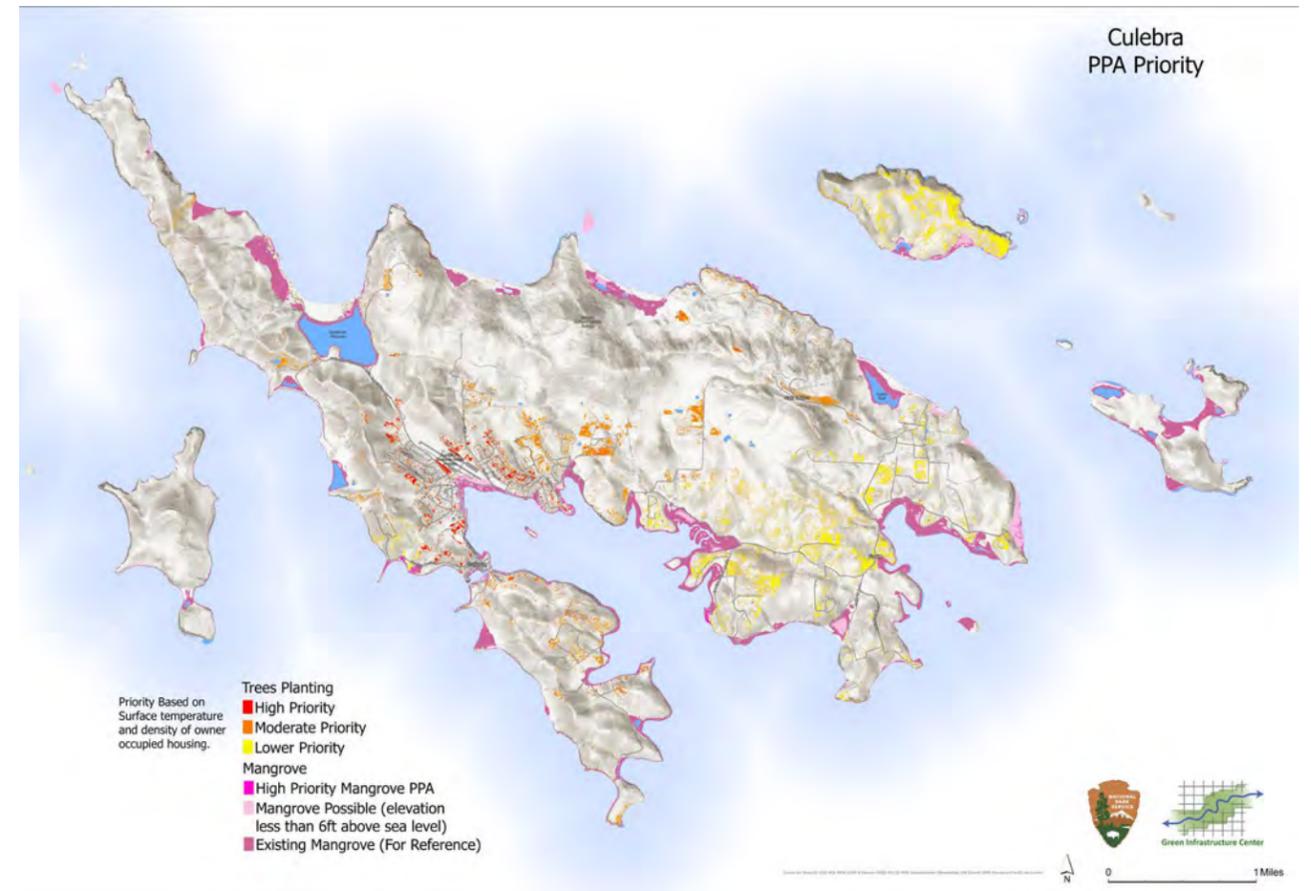
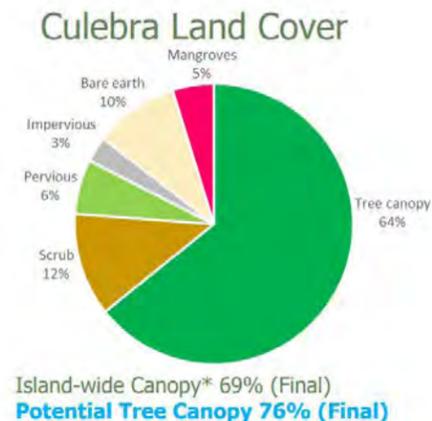
During the public engagement process, the community expressed a strong need for urban tree canopy restoration, highlighting the heat-related impacts caused by canopy loss due to construction and development. Partners and residents also shared the importance of protecting mangroves, recognizing their vital role in preventing coastal erosion, providing habitat for marine life, and serving as a natural buffer against storm surges. To address the tree canopy loss and identify potential mangrove planting sites, NPS-RTCA engaged the Green Infrastructure Center (GIC) as a consultant to develop tools and maps that can help residents and local leaders visualize existing conditions and identify opportunities for reforestation.

GIC, through a funding agreement with NPS-RTCA, provided technical mapping assistance, resulting in several important outcomes and deliverables. GIC led a stakeholder workshop with local nonprofit organizations, the municipality, and USFWS and NPS-RTCA, to review the project's scope and gather input on natural resource issues, specifically related to tree canopy and potential reforestation areas. GIC mapped the island's land cover, including the current extent of mangroves, which were identified as a critical land cover class due to recent damage from storms and boat docks.

GIC and NPS-RTCA worked closely with a mangrove expert to refine the mapping model and shared drafts with stakeholders, encouraging them to provide feedback to the tree canopy, mangroves, and Potential Planting Areas (PPA) data. After incorporating the edits collected by partners, GIC modeled Potential Planting Areas and calculated the ecosystem services that trees and mangroves provide for residents, including air quality improvement, carbon sequestration, heat island mitigation, and stormwater management.

The finalized maps were shared digitally with all project partners, and printed copies were provided to the Municipality of Culebra, Mujeres de Islas, Culebra National Wildlife Refuge, and the Asociación Pesquera de Culebra. The shared maps, data, and GIS information are intended to assist local natural resource professionals in running land-use scenarios using GIC's Trees and Stormwater Calculator. This tool models the benefits of maintaining or increasing the urban canopy by analyzing land cover and soil types. In the final virtual workshop with partners, GIC demonstrated how to use the calculator and reviewed several key data points and maps, including:

- ◆ **Potential Planting Areas** for trees and mangroves.
- ◆ Maps of Culebra's **Tree Canopy, Land Cover, Surface Temperature** to prioritize areas for tree planting for shade.
- ◆ An **Urban Heat Island and Equity map**, highlighting the hottest areas on the island that also have the highest concentration of owner-occupied housing.
- ◆ **Impacts of Tree Loss Stormwater Retention**, showcasing tree canopy locations that retain the greatest stormwater volumes.
- ◆ **Benefits of Planting Trees for Stormwater Retention**, illustrating rainwater captured with added tree canopy.



OUTDOOR RECREATION ENHANCEMENTS BY THE TEXAS CONSERVATION CORPS

In March 2024, a 10-member Texas Conservation Corps (TXCC) team visited Culebra as part of a cooperative agreement with NPS-RTCA to advance community-identified priority projects. With expertise in coastal ecosystems and trail construction in disaster-prone areas, the TXCC team focused on two key projects: improving the campground facilities at Punta Soldado, a popular site maintained by volunteers and families, and enhancing the nature trail at the Culebra National Wildlife Refuge. These projects delivered essential infrastructure improvements while promoting outdoor recreation and supporting local conservation efforts.

PUNTA SOLDADO

The community's top priority was the enhancement of the camping area at Punta Soldado, a popular beach and camping spot for local families, particularly during the spring and summer. At this site, TXCC corps members were able to:

- ◆ Clear overgrown and invasive vegetation.
- ◆ Build a ramp to improve accessibility to the beach.
- ◆ Plant native species along main road.
- ◆ Host a community workday to train residents on coastal restoration.

CULEBRA NATIONAL WILDLIFE REFUGE NATURE TRAIL

The second priority was the improvement and extension of the nature trail at the Culebra National Wildlife Refuge. Located in the central area of Culebra, this trail is the island's only designated pedestrian trail. The trail serves residents, students, and visitors to the refuge and is surrounded by incredible native plant species. At this site, TXCC corps members were able to:

- ◆ Clear overgrown and invasive vegetation.
- ◆ Build 500 feet of a new trail.
- ◆ Create a new trailhead area.
- ◆ Improve 600 feet of existing natural-surface trail.
- ◆ Design and install signage posts.
- ◆ Build a bench and rest area.



Site Studies

In addition to public participation meetings, the NPS-RTCA team conducted several site visits across the island to gain firsthand knowledge of the challenges posed by tourism, natural disasters, and new construction; explore existing recreational opportunities and identify conditions that limit access to those resources; identify methods to protect natural resources while supporting recreational use; and align past studies and reports with current goals and conditions.

The NPS-RTCA team explored municipal parks close to town and residential neighborhoods, visited several beloved beaches, observed public plazas that act as casual gathering spaces, and evaluated ways to improve connectivity between neighborhoods and the downtown area. Site studies with recommendations for improving safety, usage, and accessibility for these areas are highlighted in this section.

BEACHES

Culebra's beaches, each with its own unique appeal, are central to the island's recreational activities for residents and visitors alike. During public engagement meetings, many residents shared stories of family gatherings on the island's beaches. Flamenco Beach, one of the most popular destinations on the island, boasts a mile-long stretch of sandy beach flanked by tree-covered hills. In recent years, vendor kiosks and new bathroom and shower facilities have replaced the older, plywood structures. Food trucks and snorkeling rental gear are also available near the parking lot. However, the upgrades at Flamenco Beach are specific to that location and may not be appropriate for other beaches on the island. Protection of the coral reef, sea turtle nesting areas, and runoff management from surrounding watersheds are of particular concern. Numerous reports have been written outlining best management practices to protect these valuable resources.

Tamarindo Beach stands as an example of potential improvements for other beaches. In 2013, restoration efforts were completed as part of a [pilot project](#) while developing a watershed management plan. Restoration efforts included reforestation of surrounding hillsides with native plants to prevent erosion, the addition of a gravel parking area, and improved accessibility via a new boardwalk. Additionally, educational signage was installed to inform visitors about the habitat and how to care for it. While the road leading to Tamarindo has ongoing erosion issues, the work at the beach has held up over the years, and the vegetation has matured. Given the existing coral restoration and watershed management plans for other beach areas, NPS-RTCA did not conduct individual studies of the beaches, except for Punta Soldado.

Early conversations with partners focused on potential improvements to Punto Soldado and the surrounding kays: Cayo Pirata, Luis Peña, and Culebrita. Many residents shared fond memories of picnicking on Cayo Pirata and expressed a desire to improve it as a recreational area for Culebra residents. A conceptual site plan was developed based on public input.

There was also interest in expanding recreational activities on Cayo Luis Peña and addressing the increase in tourists on Cayo Culebrita. However, opinions were mixed regarding Cayo Luis Peña. Some residents preferred to limit tourism, while others supported adding amenities such as restrooms, picnic shelters, and improving the trail. USFWS planning documents have called for similar improvements on both keys. Given the limited resources available to USFWS to manage visitors to these Wildlife Refuges, the site studies lay out possible improvements, but emphasize the need to evaluate the island's visitor capacity and USFWS's ability to manage it.

SAFE ROUTES AND CONNECTIVITY

Culebra's mountainous terrain makes traveling across the island by vehicle essential. During peak tourism, streets become crowded, parking is limited, and the narrow sidewalks often force pedestrians to walk single-file. Even for experienced cyclists, navigating the island can be difficult without motorized assistance. Despite this, there is public interest in establishing bike trails. Enhancing connectivity between the east and west residential and business areas would make walking and biking more viable. Implementing a sidewalk replacement program, improving accessibility, and adding seating and shade would greatly enhance the pedestrian experience and provide better connections between Culebra's recreational facilities.



PARKS

PARQUE INFANTIL AND PARQUE MARÍA DE LOS ÁNGELES AYALA CARRILLO

Culebra's parks and facilities offer recreational opportunities close to town and the airport, areas which are adjacent to residential neighborhoods. Parque Infantil provides playground structures for a wide age range, exercise equipment, and shaded seating. Not far from Parque Infantil, El Parque de los Viejos offers a shady area to sit with views of the busy 250/251 intersection on one side and partial views of Honda Ensenada on the other. Additionally, there is a baseball field and a popular basketball court near town. On the north side of the airport, near the new theater, there is another basketball court, a tennis court, picnic areas, and a hiking/biking path.

The Municipal Park, located just north of the Escuela Ecológica, offers a range of activities for play and exercise. Anchoring the northeast corner of the park is a community building with a covered patio suitable for picnics and performances. The park is divided into sections by sidewalks painted with playground games, ensuring access to different areas. Recreational opportunities include activities for children aged 2–12 and nine exercise stations designed for teens and adults. While the slides have rubber mats at their exits, the play structures lack adequate safety surfacing. Shade is limited, though there are benches under trees as well as tables and chairs beneath the building canopy.

The park features two gated access points along its north-south walkway. From the north parking lot, a wooden platform with a cinder block step connects to the concrete sidewalk. On the south side, an accessible ramp links the park to a public sidewalk along Cll Luis Muñoz Marín, offering a narrow but functional route to the school.

Enclosing the park is a vibrantly painted concrete wall. Some sections include openings filled with white fencing, allowing street-side views into the park while ensuring a safety barrier from the 250 intersection, the island's primary transportation route.

RECOMMENDATIONS

- ◆ Install safety surfacing at the appropriate depth under all the play structures that are more than 12 inches off the ground.
- ◆ Add shade structures or plant trees to increase shaded areas.
- ◆ Install a pergola over the exercise equipment for partial shade.
- ◆ Widen the gate from the parking lot to 4 feet and add a curb ramp to enhance accessibility.

THEATER AND PARK NEAR AIRPORT

Northwest of the Municipal Airport, the newly constructed Centro de Bellas Artes y Actividades sits on a mid-slope, featuring a 50' x 80' plaza at its southern corner. The location offers sweeping views of the airport and harbor. The theater is accessible through a gated entry with sidewalks flanking the driveway. From the northwest corner of the theater's parking lot, visitors can access a 0.3-mile biking and hiking trail that loops across the hillside. The driveway continues uphill to an additional parking area that serves the adjacent sports complex, a 0.14-mile trail leading to picnic shelters, and as overflow parking for the theater. The sports complex includes recently renovated basketball and tennis courts with upgraded pavement, fencing, bleachers, and lighting.

The nearly 12-foot-wide asphalt trail begins at the northwest corner of the tennis court and passes a 30' x 30' building without signage. Its use should be clarified for the benefit of the public. The trail extends northwest, connecting to a series of picnic shelters spaced about 90 feet apart. Two additional structures, located closer to the woodland, feature built-in tables but no seating. Pedestrian-scaled lighting is installed between the shelters. A large retaining wall supports the hillside northeast of the first five shelters, while an undulating wall lines the trail's southwest side. The trail ends abruptly about 40 feet beyond the last shelter, with no connection to the 0.3-mile loop.

The area is very exposed to the elements since there are no shade structures or trees near the courts, picnic shelters, or along the trails. The limited shade provided by the shelters shifts throughout the day, creating an uncomfortably hot environment that likely discourages usage.

There are no play structures near the trails or sports courts. However, an [article in Primera Hora](#), titled "The Curtain is Almost Raised on the First Theater and Cinema in Culebra," mentions plans for a future park in the area. The article suggests the future park may be located at the northwest end of the 0.14-mile trail, where pedestrian and vehicular access from nearby neighborhoods is limited. If possible, the park should have inclusive play structures, adequate shade, and accessibility features to serve a broader range of ages and abilities. Its location should be in a centralized area, allowing convenient access to picnic shelters, sports courts, and parking, enabling families to enjoy multiple activities without excessive walking.

RECOMMENDATIONS

- ◆ Install shade structures over the basketball and tennis courts.
- ◆ Add seating for tables at the picnic shelters.
- ◆ Plant shade trees along trails, near courts, and around picnic shelters while preserving views of the airport and harbor.
- ◆ Construct a walkway for direct pedestrian access from the city street to the courts and picnic area.
- ◆ Ensure the future park is accessible, has activities for all ages and abilities, and features shade structures and safety surfacing.

PLAZAS

Public plazas serve as passive recreational spaces. Two plazas, Cafeteria Sanquel Plaza (Plaza de Mercado) and Plaza Publica de Culebra, are highly active gathering spots for both locals and tourists, while another plaza, across from the municipal building, has untapped potential despite its waterfront location. Plaza de Mercado features a large, covered area with tables and chairs, colorful umbrellas providing shade, and food vendors serving cafeteria-style meals during the day. At night, it is a lively gathering spot. Plaza Publica de Culebra, located near the ferry, also sees heavy pedestrian traffic and serves as a popular venue for street food vendors and nearby restaurants. In contrast, the plaza across from the municipal building, despite its beautiful view of Ensenada, lacks shade and comfort on hot days.

PLAZA AT ENSENADA HONDA

The plaza has some very positive features. A line of bollards creates a protective barrier, separating the plaza from street traffic, while a wavy concrete wall provides a partially transparent yet effective border with nearby residential properties. Stylish concrete benches on three sides offer ample seating options. Pedestrian-scaled lighting, trees planted in pavement openings, and high-quality pavers enhance the overall aesthetic. However, certain elements detract from the plaza's appeal. The steel guardrail along the cove and the circular sitting area with a steel art piece are both in disrepair. Additionally, the plaza becomes uncomfortably hot on sunny days. Of the four trees, three are surviving but are too small to provide sufficient shade and show signs of stress.

RECOMMENDATIONS

- ◆ Replace the guardrail or repair the balusters using a more durable and resilient material, such as cable railing.
- ◆ Replant the missing tree with one of similar size. Expand the pavement openings around the trees to improve access to air and water, ensuring healthier growth and better shade in the future.
- ◆ Rehabilitate the steel feature in the circular sitting area. If the structure beneath the damaged steel cover is hollow, consider converting it into a raised planter to reduce the heat-absorbing impact of the pavement. Install a pergola over the area to provide reliable shade. The pergola could be designed with an opening to allow sunlight and rain to reach the plantings.
- ◆ Collaborate with local artists to incorporate public art, adding a unique and culturally significant.



KEYS

CAYO PIRATA

Cayo Pirata, a 2-acre island located in the middle of the northwest portion of Ensenada Honda, was once a beloved picnic destination for local residents. Community members fondly recall boating to the island to enjoy its piers, picnic shelters, community hall, and connecting trails.

Over the years, storms have significantly altered the island's landscape. Aerial images from 1994 show intact piers and structures, but by 2023, only remnants of the U-shaped pier remain. A site visit revealed deteriorated docks with missing decking, damaged building roofs, and overgrown thorny vegetation obscuring the former trails.

Many locals and community leaders envision reviving Cayo Pirata as a vibrant recreational destination. Their proposed activities and amenities include:

- ◆ Rehabilitating the community hall as a multi-use space and possible wedding venue.
- ◆ Rebuilding docks and removing damaged structures.
- ◆ Installing camping platforms for tents or "glamping."
- ◆ Restoring trails and picnic shelters.
- ◆ Creating a playground, birdwatching areas, boardwalks, and fishing piers.
- ◆ Adding a small lighthouse.

Significant work is required to make Cayo Pirata safe and usable, starting with repairing at least one pier for access.

The community hall is a standout feature, with its concrete structure, stone veneer exterior, and walls interrupted with sections of floor-to-ceiling railings that offer scenic views and natural ventilation. However, the roof and ceiling are extensively damaged and need to be replaced. Additionally, the walls must be assessed for structural integrity before plans to reuse the structure are set in motion. The eight picnic structures have thick concrete walls, though some have missing chunks and damaged wooden roofs. While these are likely easier to repair than the community hall, there is limited local interest in restoring them.

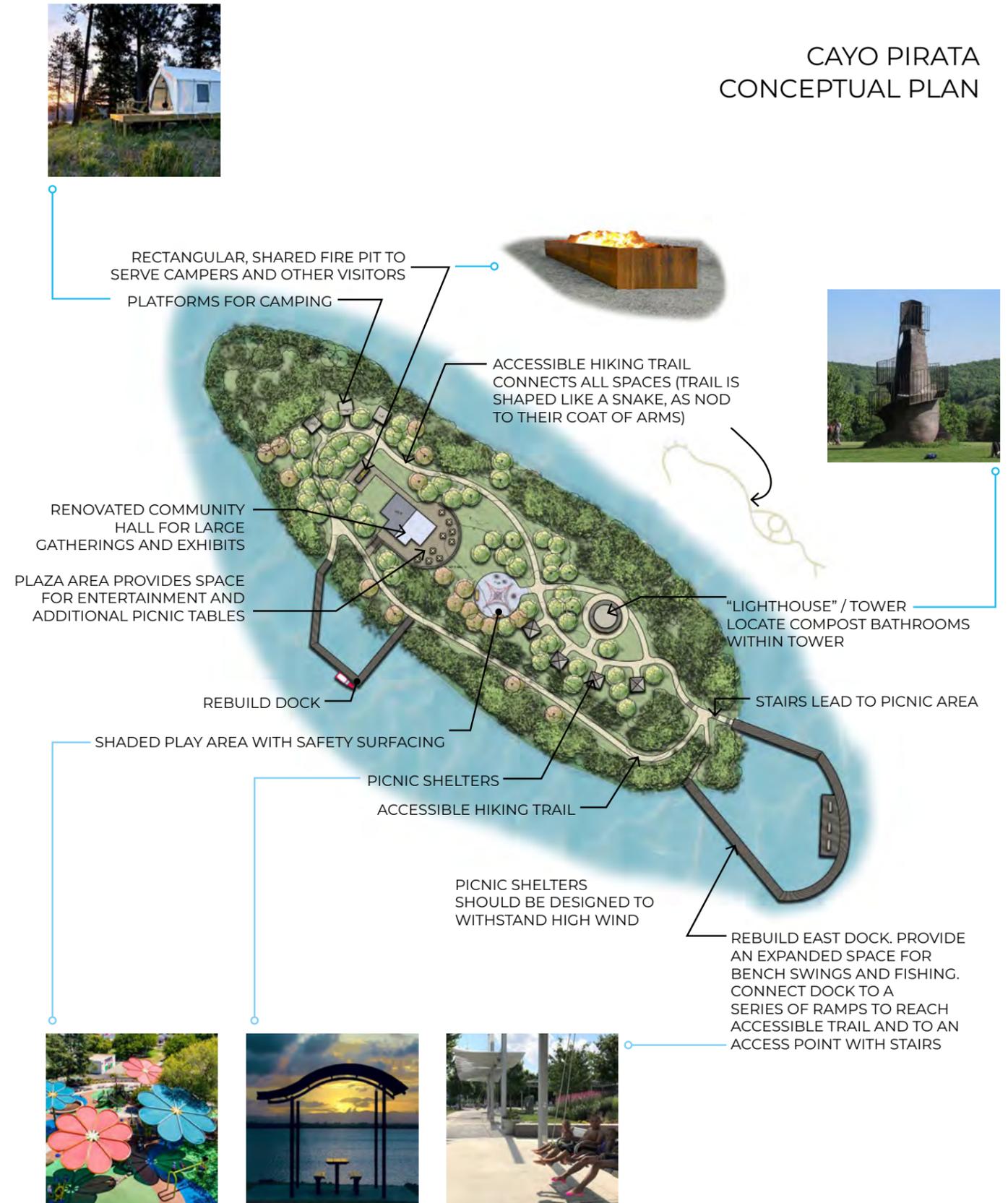
The key's terrain supports the creation of accessible trails. The elevation rises about 14 feet, with the high point located in the southeast third of the island where the picnic shelters are located. Gentler slopes (under 5%) in the center of the island are suitable for trail development. Steeper slopes along the outer edges of the island (averaging 17%, with some as steep as 2:1) should be protected from construction activities and planted with native species where needed. The flatter interior portion of the island lacks shade and is currently dominated by jumping cacti on the rocky ground, posing challenges for trail upkeep. How, and where, to create shaded areas will need to be part of the design consideration. The vegetation along the outer edges and at the northwest point becomes thicker and more difficult to penetrate and should remain undisturbed to help protect the slopes from erosion.

The conceptual plan includes the community's ideas as well as strategies for accessibility and sustainable development.

SUSTAINABLE DEVELOPMENT STRATEGIES

- ◆ Establish vegetation protection zones before construction.
- ◆ Locate trails to avoid sensitive habitats.
- ◆ Construct trails and use them for construction access.
- ◆ Remove invasive species and restore disturbed areas with native plants.
- ◆ Incorporate natural ventilation in all designed structures.
- ◆ Install solar panels for path and building lighting.
- ◆ Use durable, recycled, or recyclable construction materials.
- ◆ Build structures following appropriate standards to withstand high winds.
- ◆ Protect steep slopes by planting native vegetation.

CAYO PIRATA CONCEPTUAL PLAN





CAYO LUIS PEÑA

Cayo Luis Peña, a 484-acre uninhabited key located about a quarter mile off Culebra's west coast, is part of the Culebra National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service (USFWS). The waters along the island's north and east boundaries are protected within the Natural Reserve of the Canal de Luis Peña, prohibiting fishing. Cayo Luis Peña, like other areas of Culebra, was impacted by U.S. military training exercises between 1924 and 1941. A 2015 Community Relations Plan by the U.S. Army Corps of Engineers describes the investigative work undertaken to address environmental impacts on Luis Peña as of the report's date but does not clarify whether the work has been completed. Remnants of a helipad used by the military can be found on Cayo Luis Peña's hilltop. Access to portions of Culebra's surrounding keys and other refuge sites is limited because of potential wildlife conflicts, unsafe terrain, and unexploded ordnance hazards.

During public outreach meetings, there was interest in expanding recreational opportunities on the island but also concern about the potential for attracting unwanted tourism. The [2012 Comprehensive Conservation Plan for the Culebra National Wildlife Refuge](#) highlights the need to balance the core mission of conserving wildlife with "opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of the refuge's wildlife, habi-

tats, and cultural history." Objective 4-2 of the plan emphasizes public access by calling for the identification of sites for access trails on Cayo Luis Peña and Culebrita.

The west and north sides of Cayo Luis Peña feature crystal-clear turquoise waters meeting sandy beaches scattered with coral fragments, offering a tranquil escape from the island's rugged terrain. In contrast, at the base of the cliffs, boulders replace sand and provide habitat for diverse sea life. Remnants of the island's military past emerge along a short walk from the west-facing beach to the east-facing beach, where sections of an old road wind through a thicket of Seagrape. The walk ends on a seaweed-covered beach littered with plastic bottles, fishing nets, bamboo poles wrapped in string, and countless plastic caps tangled among corals and Seagrape branches. The smell of rotting vegetation and the beach's poor condition starkly highlight the threats facing marine habitats.

From the beaches, sandy narrow paths lead uphill to a cracked, deteriorated road that resembles cobblestones. Despite its condition, the road offers a manageable walking trail to the top. An abandoned helipad 480 feet above sea level. The trail, which leads to the helipad that is 480 feet above sea level, is approximately one mile long. The slope from the beach to the top varies but the exposed pavement from the old road provides a ready-made trail with a moderate grade.

As the trail ascends, the lower portions are surrounded by dense, shrubby vegetation, but taller trees soon provide ample shade along most of its length. The cone-shaped island captures breezes that enhance the cooling effect of the shade. While some parts of the trail wind through steep terrain, other sections level out, offering open sea views and a reprieve from the climb. These flatter areas, with minimal understory and scenic vistas, would be ideal locations for picnic shelters, overlooks, benches, and a bathroom.

Currently, water taxis, tour operators, and private boats frequent Cayo Luis Peña, but the lack of a mooring system puts the ocean floor at risk. Signage indicates that the island is a managed recreation area, but there are no amenities. An official trail system with educational platforms along its route could expand recreational opportunities while providing information for visitors to learn about the island's military history, cultural heritage, and ecosystems. However, careful planning is essential to balance visitor use with limited management resources, ensuring the island's natural resources are protected.

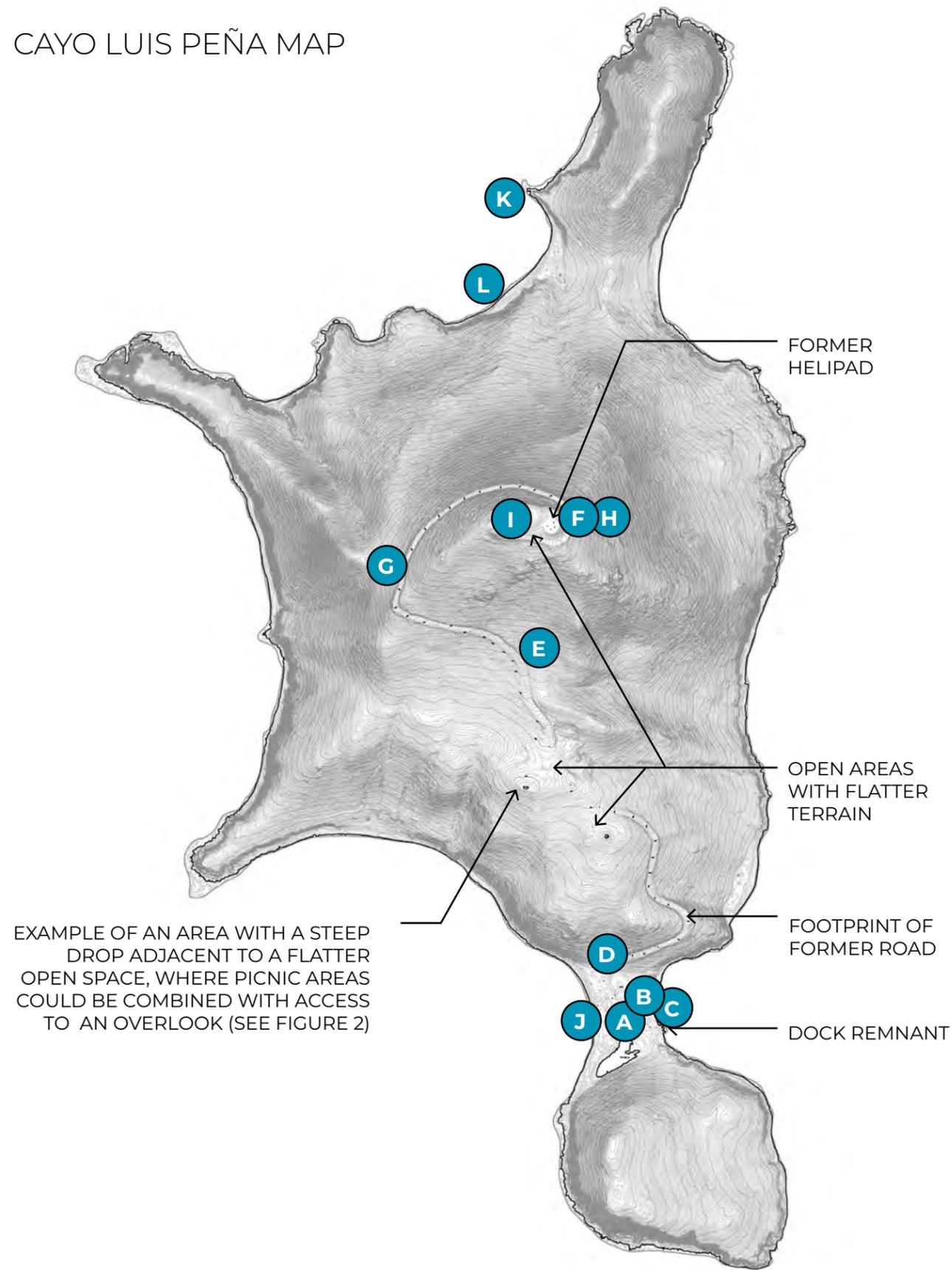
In addition to Objective 4-2 of the USFWS's Comprehensive Conservation Plan, Objective 4-4 focuses on wildlife observation and photography and identifying locations to construct observation towers and photography blinds on Cayo Luis Peña and Culebrita. The

helipad area, located at the top of the island, presents a unique opportunity to enrich the visitor experience. This level site could feature interpretive displays that tell the story of the island's history, culture, and ecosystems through visuals, art, and storytelling. A climbing tower at this site could elevate visitors into the treetops, offering a bird's-eye view of the surrounding environment and creating a memorable experience that blends recreation with education.

Reviewing a topographic map will provide valuable information when planning. In this GIS-generated map of Cayo Luis Peña, the footprint of the former military road, carved into the hillside and winding to the top, is clearly visible. Rather than creating a new trail on the steep terrain, the existing road should be evaluated for renovation as a trail.

The grayscale tones on the map offer additional insights: darker areas indicate steeper terrain, while lighter regions suggest a more moderate slope. These lighter areas could serve as potential locations for bathrooms, picnic areas, or rest stops along the trail. Conversely, the steep slopes shown in darker tones are unsuitable for site improvements. However, where steep areas are adjacent to moderate regions, there may be opportunities to develop short access trails leading to an overlook.

CAYO LUIS PEÑA MAP



Photos on the following pages show the existing conditions on Cayo Luis Peña. The locations of the photos are shown on the topography map.

FIGURE 1





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SUSTAINABLE DEVELOPMENT STRATEGIES

- ◆ Visitor Management: Determine the capacity of the island and develop strategies to maintain visitor numbers at sustainable levels.
- ◆ Marine Protection: Consult with the National Oceanic and Atmospheric Administration (NOAA) to determine optimal placement for mooring buoys to protect sensitive marine habitats and install the buoys in designated areas.
- ◆ Safety Assurance: Ensure all dangerous munitions have been removed or neutralized.
- ◆ Habitat Protection: Remove invasive species and use temporary fencing and signage to protect sensitive habitats during construction.
- ◆ Trail Development:
 - ◇ Mark the trail route and locations for overlooks, bathrooms, and picnic areas prior to construction, adjusting as necessary to avoid impacting large trees or sensitive habitats.
 - ◇ Develop new trails within the footprint of the former road, using on-site materials where possible.
 - ◇ Identify potential areas of interest and extend trail access and put up signage to discourage off-trail activities.
 - ◇ Use trails for construction access to minimize additional habitat disturbance.
- ◆ Runoff Management: Maintain and, if necessary, improve the existing swale along the uphill side of the former road to capture and slow runoff. Install periodic outlets leading to rain gardens to reduce the risk of excess water in the swale (see Figure 2).
- ◆ Wayfinding: Clearly mark trailheads with information and ensure they are accessible both on site and online.
- ◆ Durable Infrastructure: Construct site structures using materials designed to withstand hurricane-force winds.
- ◆ Overlooks: Create designated overlooks to discourage visitors from venturing off-trail in search of good viewpoints.
- ◆ Education and Interpretation:
 - ◇ Use signage to share the history and ecological significance of Cayo Luis Peña.
 - ◇ Promote responsible tourism by encouraging visitors to “leave no trace.”
- ◆ Amenities and Facilities: Provide waysides with benches and picnic areas made from recycled or recyclable materials in light colors to reduce heat absorption.
- ◆ Habitat Restoration: Restore areas disturbed by construction.
- ◆ Trash Management: Remove trash from the east-facing beach and explore methods to prevent future pollution.



CAYO CULEBRITA

Culebrita shares many characteristics with Cayo Luis Peña. This 250-acre uninhabited island, located less than a mile east of Culebra, is also part of the Culebra National Wildlife Refuge, managed by USFWS. Both islands were included in the 2012 Comprehensive Conservation Plan for the Culebra National Wildlife Refuge. However, Culebrita faces unique challenges due to its historic lighthouse and increasing tourism pressure. The Faro de Culebrita (the Culebrita lighthouse) and four surrounding acres were transferred from the U.S. Coast Guard to the Municipality of Culebra, requiring collaboration between the USFWS and the Municipality to create a shared vision for managing the site.

Culebrita, like much of the region, was impacted by the U.S. military who fired live torpedoes at the island during training exercises. In 2016, Culebra and its surrounding keys were highlighted in the U.S. Army Corps of Engineers Remedial Investigation Report. While munitions and fragments have been removed, it is unclear whether the cleanup is fully complete. Updated signage, installed in September 2023, warns visitors of potential hazards, provides guidelines for public use, and identifies the island as part of the National Wildlife Refuge.

Despite the absence of amenities such as bathrooms or picnic areas, visitors are drawn to Culebrita's pristine white sand beaches, unique geological features like its natural pools (also referred to as the baths), and its crystal-clear waters. The surrounding 1,200 acres of reefs and sea grass beds attract sea turtles, making the island a popular snorkeling destination.

Access to Culebrita is only by boat, as there are no docks or mooring buoys. Boats typically anchor off the beach, dropping an anchor off the stern, followed by an anchor off the bow, and visitors access the shore via dinghies or by wading through the water. This repeated activity likely harms marine habitats.

The lighthouse, perched 260 feet above sea level, is a key attraction. Though in disrepair, the 1886 structure remains largely intact, offering a glimpse into the island's history. The hilltop, covered in sparse vegetation, provides panoramic views in all directions. However, the surrounding area has debris, broken glass, and graffiti, creating safety concerns and detracting from the site's appeal. Beyond the lighthouse area, steep hillsides with precarious drops further highlight the need for caution and careful management of the site.

Trails to the lighthouse and beaches are relatively easy to follow. For instance, the trailhead from Tortuga Beach is marked by a sandy opening framed by palm trees and adorned with buoys. However, wayfinding signage is sparse, and some locations, like the baths, lack clear directions. Improved signage in the same colorful style as existing signs would help visitors navigate safely and discourage off-trail activities. Hard-to-detect trails should be marked with rocks or boulders, and signage should clearly indicate destinations, trail distances, and difficulty levels.

Culebrita's trails vary in terrain. Sandy trails near the beaches transition to clay and gravel as they ascend toward the lighthouse. The vegetation along the trails consists mainly of shrubs and small squat trees, with a few larger trees dotting the landscape and providing shade. The trail leading to the lighthouse is narrow and steep in sections but manageable for most hikers. The final 500-foot stretch gains 80 feet in elevation at a 1:6 slope, leading to a hilltop with open views and a historic water catchment system of check dams. The check dams, evenly spaced dams on a slope designed to temporarily hold stormwater runoff within its catchment area, are made from mortared local rocks and have a

storm pipe at the low point to capture and direct runoff away from the slope. It is not clear where the storm drains outlet.

A report by Toro Arquitectos, completed in 2014-2015, outlined a plan for restoring the lighthouse, constructing a dock, and adding facilities like camping areas and bathrooms. The report included schematic designs, plans for new construction on the existing helipad, renovation ideas for the area around the lighthouse, and strategies for bringing water and electricity to the site. Additionally, a planting strategy by Vaccarino Associates identified native and endemic species for restoration efforts.

While the project received multiple design awards, restoration efforts remain ongoing. In 2015, the Municipality of Culebra entered into an usufruct agreement with [Para la Naturaleza](#), granting the group a 20-year period to lead restoration efforts. Fundraising efforts for the restoration are ongoing, but there is an existing plan for the site immediately surrounding the lighthouse. Future efforts to improve the USFWS trails to the lighthouse should align with existing plans to ensure a cohesive approach to restoration and development.

The natural beauty of Culebrita makes it a popular destination, putting its fragile ecosystem at risk. If efforts to renovate the lighthouse succeed, management of construction will be needed to protect sensitive habitats. In addition, the renovated lighthouse is likely to attract even more tourists, making it imperative to assess the island's capacity and determine the resources and personnel needed to manage visitors.

This includes establishing adequate mooring areas for boats and educating the public through signage and public outreach about the proper behaviors needed to protect the island and its marine habitats. The USFWS's Comprehensive Conservation Plan highlights visitor education in Objective 4-5: Environmental Education and Interpretation. The plan identified educational and interpretive services as "high priority" programs, stating that "the refuge should increase environmental education and interpretive contacts wherever possible." It also includes a strategy to "develop and install an interpretive panel on Culebrita Island."

Culebrita, with its diverse recreational opportunities, is a treasured destination for both locals and tourists. While studies are conducted to determine the island's visitor capacity, immediate actions should focus on developing educational materials, improving existing trails, and initiating procedures to protect the reef from already heavy use. A 2016 publication, [An Implementation Framework for NOAA's Habitat Blueprint Focus Area in the Caribbean](#), identified Culebrita, Las Pelas, and Flamenco as locations to install Aids to Navigation (ATON) due to the damaging effects of frequent boat groundings. Priority should be given to installing mooring buoys and enforcing mooring rules to mitigate reef damage.

As with Cayo Luis Peña, topographic mapping provides valuable guidance for planning on Culebrita. This GIS-generated map reveals that existing trails are more visible on steeper slopes but harder to detect in flatter areas. Whenever possible, existing trails should be improved rather than creating new ones to minimize environmental disturbance.

On steep slopes, closely spaced contour lines and darker tones indicate challenging terrain, while lighter areas suggest moderate slopes suitable for site improvements like picnic areas or bathrooms. Darker areas are too steep and should be avoided for development.

SUSTAINABLE DEVELOPMENT STRATEGIES

- ◆ Visitor Capacity: Determine the island's carrying capacity and develop strategies to aid with visitor use management.
- ◆ Marine Protection: Work with NOAA to identify areas to install mooring buoys to protect sensitive marine habitats.
- ◆ Safety: Ensure the removal or neutralization of dangerous munitions.
- ◆ Habitat Protection:
 - ◇ Use temporary fencing and signage to protect sensitive habitats during construction.
 - ◇ Remove invasive species where necessary.
- ◆ Trail Improvements:
 - ◇ Repair and maintain existing trails, focusing on drainage and accessibility.
 - ◇ Use existing trails for construction access to minimize new disturbances. Restore any areas disturbed by construction.
- ◆ Clearly mark trailheads with detailed information on distance, difficulty, and destinations. Highlight this information on site and online.
- ◆ Identify potential areas of interest and extend trail access or post signs to discourage off-trail activities.
- ◆ Runoff Management: Maintain and, if necessary, improve the existing swale along the uphill side of the trails to capture and slow runoff. Install periodic outlets leading to rain gardens to reduce the risk of excess water in the swale.
- ◆ Amenities and Facilities:
 - ◇ Identify suitable locations for bathrooms, picnic areas, and overlooks, prioritizing flatter terrain and avoiding large trees or sensitive habitats.
 - ◇ Structures should be constructed with durable materials designed to withstand hurricane force winds.
 - ◇ Use recycled or recyclable materials in light colors to reduce heat absorption.
 - ◇ Consider adding benches along the trails every 300 feet.
- ◆ Educational Signage: Install interpretive panels highlighting the island's history, ecology, and the importance of conservation.
- ◆ Trash Removal: Remove debris from beaches and implement measures to prevent future pollution.
- ◆ Overlooks: Construct designated overlooks to prevent visitors from blazing their own trails to viewpoints.



The project received design awards from three different entities in 2018, 2019 and 2021, in the category for Un-built Work. In 2015, the Municipality of Culebra entered into a usufruct agreement with Para la Naturaleza to allow the group to lead restoration efforts for a period of 20 years. (p.37, Para la Naturaleza Annual Report 2015). Fundraising efforts for the restoration are ongoing, but because there is an existing plan that includes the site immediately around the lighthouse, future efforts to improve the USWFS trails to the lighthouse should strive to be compatible with existing plans.

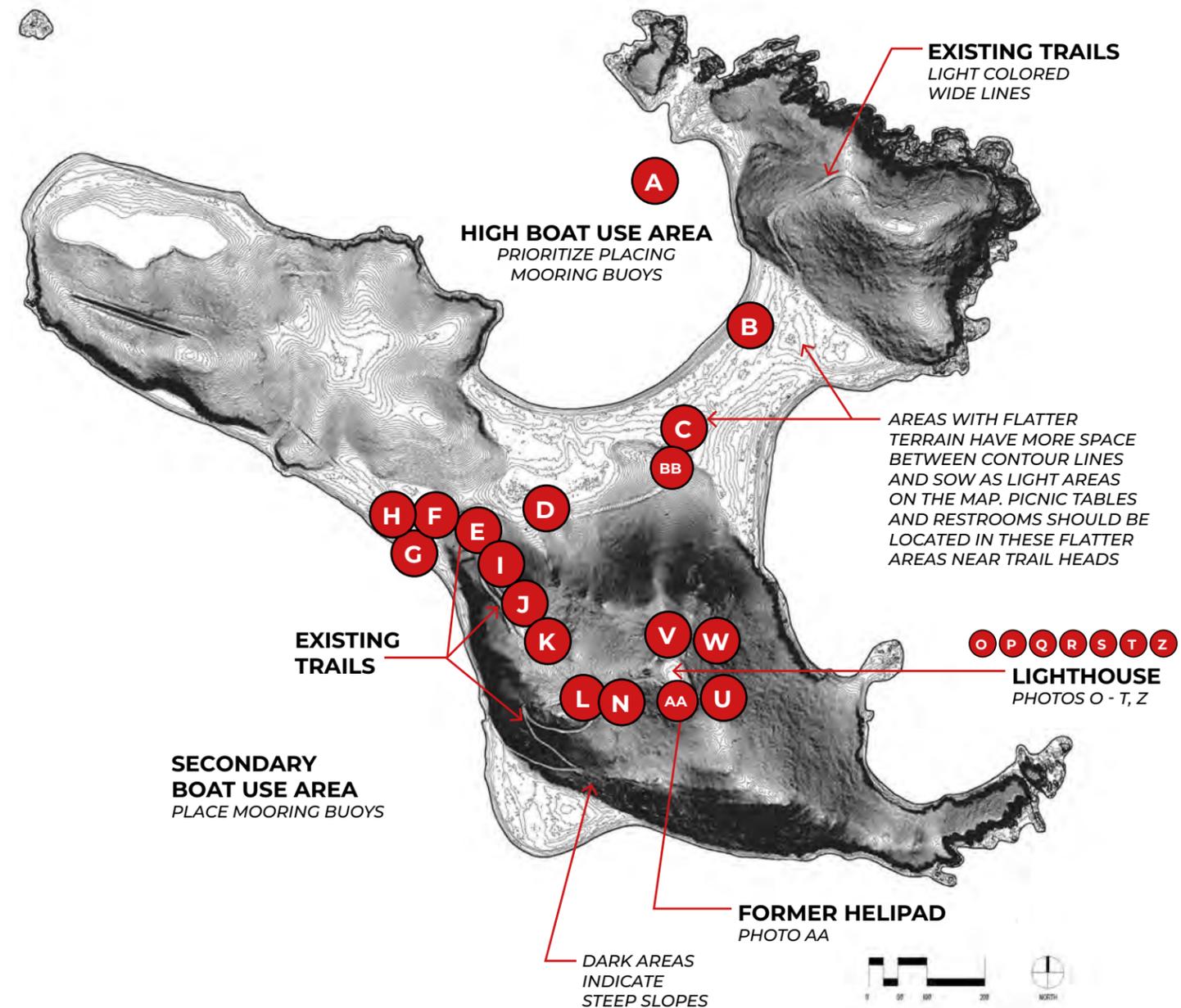
The beauty of Culebrita makes it irresistible to visitors, putting its fragile ecosystem at risk. If efforts to renovate the lighthouse succeed, management of construction and activities will be needed to protect sensitive habitats. In addition, the renovated lighthouse is likely to attract more tourists making it imperative to determine the capacity of the island and the personnel needed to manage visitors.

This will include providing adequate places to moor boats, and to educate the visiting public through signage and public outreach on the proper behavior needed to protect the island and the marine habitat. Visitor education is supported in the Culebra National Wildlife Refuge Comprehensive Conservation Plan, September 2012 (pg. 61) Objective 4-5: Environmental Education and Interpretation. The publication recognizes the limited staff available to provide the educational and interpretive services needed and considers those to be "high priority" programs. It states that "the refuge should increase environmental education and interpretive contacts wherever possible" and includes the strategy to "Develop and install an interpretive panel on Culebrita Island".

On Culebrita, the lighthouse is a natural draw to visitors and the trail to it is established. Therefore, along with increasing the availability of educational information, efforts should be made to make the trails easy to find and navigate. Line hard to detect trails with rocks or boulders and provide wayfinding signage that clearly indicates the route to various destinations to encourage people to stay on the trail. Provide information about trail distance and difficulty to allow visitors to assess their ability to embark on a hike.

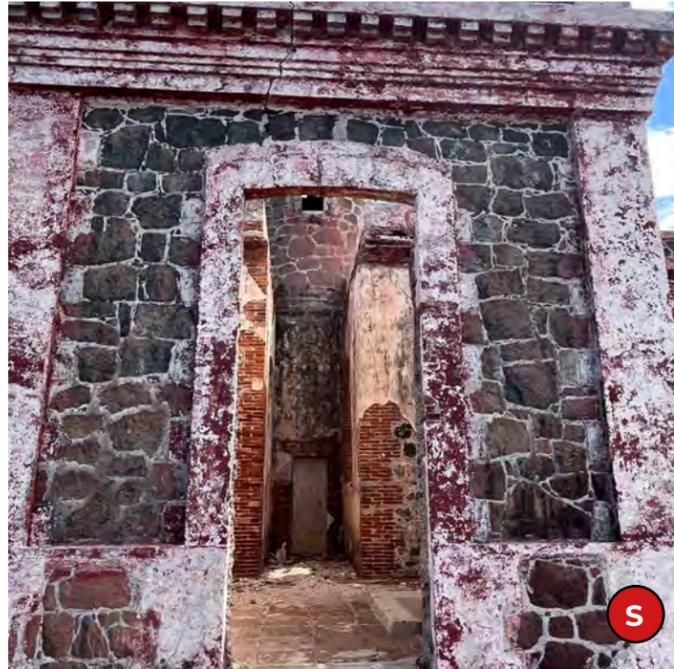
Culebrita, with its array of recreational opportunities, is a true gem appreciated by locals and tourists alike. While visitor capacity for the island is studied, steps to educate visitors and shore up existing trails systems and wayfinding should be continued along with initiating procedures to protect the reef from already heavy use. The 2016 publication, An Implementation Framework for NOAA's Habitat Blueprint Focus Area in the Caribbean – The Northeast Marine Corridor and Culebra and Culebra Island, Puerto Rico, recognized the damaging effects of boat impacts and identified Culebrita, as well as Las Pelas and Flemenco, for ATON (aids to navigation) installation due to the frequent groundings occurring there. (p.15) Efforts to minimizing damage by providing mooring buoys and establishing and enforcing mooring rules should be prioritized.

CAYO CULEBRITA MAP



Photos on the following pages show the existing conditions on Cayo Culebrita. The locations of the photos are shown on the topography map.





PUNTA SOLDADO

In 1982, Punta Soldado, a 328-acre area located on the southernmost point of Culebra, was acquired by the Governor of Puerto Rico from the U.S. Department of the Interior. It is managed jointly by the Municipality of Culebra and the Departamento de Recursos Naturales y Ambientales (DRNA), which translates to the Puerto Rico Department of Natural and Environmental Resources.

Punta Soldado is a popular camping destination, with residents often claiming areas along its eastern shore. The gated entry point, situated at the top of a steep hill 50 feet above the sea, is surrounded by pristine, steeply sloped hills covered in cacti, rising to elevations of 200 to 300 feet. After crossing the gate, the asphalt road transitions to a dirt-and-gravel surface that is prone to erosion and rutting. The 0.35-mile entry drive winds through dense vegetation, offering glimpses of the sea below, and leads to two parking areas that serve the adjacent beaches.

As with many areas of Culebra, Punta Soldado bears the designation of a "formerly used defense site." During the U.S. Navy's presence, it was used for training exercises that involved mortar firing, bombing, and strafing. While the site was slated for a Remedial Investigation and Feasibility Studies, the status of munitions cleanup remains unclear.

During public outreach sessions in Culebra, the municipality shared a conceptual plan for improvements at Punta Soldado. The plan, developed by DRNA, NOAA, Protectores de Cuencas (Protectors of Watersheds), and the Municipality of Culebra, included features such as an observation tower, informational kiosk, interpretive trails, camping areas, picnic shelters, restrooms, and locations for runoff and sediment control.

Although the date of the conceptual plan is unclear, it may have been a response to NOAA's [Culebra Community Watershed Action Plan for Water Quality and Coral Reefs](#) from 2014. Punta Soldado, already a site for coral restoration efforts, was identified as a high priority in the watershed plan. The plan recommended cost and quantity evaluations to address the bare soil parking lot, vehicle access to the shoreline, and erosion along the dirt access road leading to Punta Soldado. Additional stormwater management measures, such as rain gardens and sediment traps, were outlined in the plan.

Some portions of the conceptual plan have been implemented. A [NOAA article from 2017](#) highlights the work completed by local organizations, including the construction of a flood control pond. Additionally, approximately 800 feet (0.17 miles) of the dirt road starting at the parking area near Punta Soldado Beach has been paved with gravel and enclosed with curbs.



PUNTA SOLDADO ENHANCEMENTS BY THE TEXAS CONSERVATION CORPS

With the TXCC scheduled to arrive, public meetings were held to determine how best to use their time. After multiple meetings, partners agreed that trail improvements at Punta Soldado would best serve Culebra's residents due to its easy access and clear ownership. NPS-RTCA reviewed the existing conceptual plan and proposed relocating trails to flatter slopes between the beaches and consolidating camping areas in an open space. However, after reviewing the proposed trail relocation, the partners decided against it to avoid disrupting the habitat and causing potential erosion in an otherwise undisturbed area. They opted to retain the original camping areas and instead focus on enhancing the existing amenities.

A site visit by representatives from NPS-RTCA, TXCC, USFWS, and the Municipality of Culebra resulted in a detailed plan of action. TXCC's tasks included:

- ◆ Clearing vegetation and trash from the curbed driveway and trails.
- ◆ Removing invasive species.
- ◆ Delineating trails to the beaches.
- ◆ Creating an accessible route from the parking lot to the beach.
- ◆ Planting native plants, donated by SEVA, in the parking islands.

The steep dirt drive remains prone to rutting and erosion. Cost-effective erosion control methods should be identified and implemented promptly to preserve access and prevent further damage.



CULEBRA NATIONAL WILDLIFE REFUGE COMPLEX

The TXCC also provided support to the trail behind the Culebra National Wildlife Refuge Complex in Fraile, Culebra. Located south of Route 250 and east of Muelle San Idelfonso, the building sits on a hill overlooking Ensenada Honda. It shares a driveway with the Authority for the Development and Conservation of Culebra (ACDEC), a local government agency.

The USFWS complex features a raised wooden deck and overlook offering stunning views of Ensenada Honda, along with an informational panel about Culebra's bird species. A small grassy parking area is located east of the overlook for visitors. Across the driveway, a kiosk provides information about Culebra's flora and fauna, complemented by shaded concrete picnic tables beneath mature trees.

The headquarters shares its space with a maintenance building and service yard, enclosed by a tall, gated chain-link fence. The administrative office has an accessible entry and a raised landscape bed with native plants.

To the south of the building lies a large open lawn that wraps around the east side of the compound, with trees scattered throughout. This area, which gently slopes between 1% and 5%, is open to the surrounding woodland where a loop trail is located. The lawn is fenced off from the USFWS housing unit to the south.

The existing trail spans approximately 600 feet, winding through wooded hillsides characterized by tall cacti, mature trees, shrubs, and steep rocky terrain. With an average slope of 30% and a 30-foot elevation change, the trail descends to the edge of a mangrove swamp before returning to the open lawn at the top of the hill.



To improve connectivity and visibility, representatives from the USFWS, NPS-RTCA, TXCC, agreed to extend the trail through the lawn to link it with the overlook and picnic area. The following improvements were implemented:

- ◆ Trail Extension: The trail was extended 384 feet to connect to the overlook and picnic tables, passing through the lawn and closing the loop of the existing trail. The extended trail is shown in red.
- ◆ Trail Widening and Slope Management: Improvements were made to the existing trail by widening it and adding steps using onsite boulders to make steep sections more accessible.
- ◆ Benches and Signage: The TXCC installed a bench along the trail and added directional signage at key points.
- ◆ Interpretive Features: Small signs identify significant plants and habitats within the trail system.
- ◆ Trail Delineation: Marked the trail through the lawn with rocks for better definition.

To further enhance the visitor experience, the following goals have been identified:

- ◆ Install trail information signage with details on slope, accessibility, and distance.
- ◆ Add shaded seating at the trailhead.
- ◆ Convert the lawn area into a native meadow, beyond the trail edges.
- ◆ Place additional picnic tables and benches near shade trees between trailheads.
- ◆ Construct a wooden overlook for views into the mangrove swamp, with interpretive panels.
- ◆ Add directional signage at the shared driveway entrance to highlight USFWS facilities.
- ◆ Paint the chain-link fence black to help reduce its visual impact.

The work completed by the TXCC transformed the little-known trail into a recreational destination. Visitors can now enjoy scenic views of Ensenada Honda, relax at the picnic areas, and explore the woodland trail while learning about Culebra's diverse flora and fauna, as well as the efforts of the USFWS to protect them.

RECOMMENDATIONS

PLANNING COMMITTEE AND COMMUNITY ENGAGEMENT

Consider establishing a **steering committee or alliance** that is dedicated to creating accessible outdoor recreation opportunities, implementing climate resiliency projects, and promoting environmental stewardship.

Local leaders and nonprofit organization should actively **engage the community in planning efforts** to ensure inclusive decision-making and foster support for conservation initiatives.

Encourage **youth engagement** through outdoor recreation initiatives and conservation projects.

URBAN GREENING AND CLIMATE RESILIENCE

Use the **Green Infrastructure Center's Tree Canopy and Mangrove Maps** to identify priority tree-planting areas.

Continue developing an **Urban Tree Canopy Plan** to enhance green spaces and mitigate urban heat. Learn how NPS-RTCA collaborated with project partners in Honolulu to enhance their community's tree canopy: [Guide to Enhancing Your Urban Tree Canopy: Trees for Kaimuki](#).

Increase **mangrove restoration** efforts in collaboration with the [USFWS's Coastal Program](#).

TRANSPORTATION AND INFRASTRUCTURE

Develop a [Complete Streets concept](#) to enhance walkability and multimodal transportation, particularly near the airport.

Conduct a **parking study** to optimize parking availability and reduce congestion.

Introduce a **hop-on, hop-off transportation system** to improve accessibility for residents and visitors.

TRAILS

Develop a **trail network** and prioritize **safety** by addressing unexploded ordinances.

Install signage and interpretive panels at trail sites to foster environmental awareness and promote stewardship.

EDUCATION

Launch an **educational campaign** to provide tourists with information on Culebra's unique environment and conservation practices, starting with materials shared on the ferry on their way to the island.

Develop new **educational materials**, including a website, brochures, and other resources, to promote sustainable tourism.

Collaborate with lodging hosts to provide guests with information about local businesses to support, [Leave No Trace](#) principles, and other island-wide conservation efforts.

ACCESSIBILITY

Where possible, design/enhance spaces to ensure they are **accessible to individuals of all abilities**, including beaches, trails, parks, and walkways.

LOCALLY GROWN FOOD

Develop an **action plan for the [Local Foods, Local Places \(LFLP\) program](#)** to support local agriculture, sustainable food systems, and community health.

Boost **economic opportunities** for fishermen, farmers, and local businesses by fostering connections between growers, markets, and consumers.



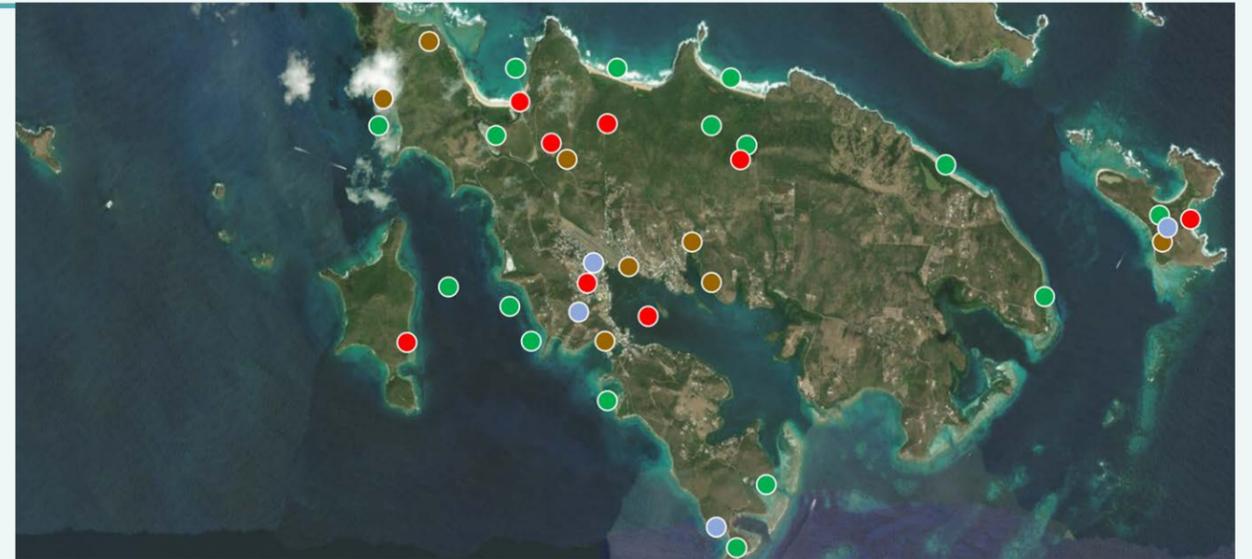
CONSERVATION AND OUTDOOR RECREATION AREAS

WHAT ARE YOUR FAVORITE RECREATIONAL SPACES? (GREEN)

WHAT ARE THE MOST IMPORTANT CULTURAL SPACES FOR THE COMMUNITY? (BROWN)

WHAT PREVENTS YOU FROM ENJOYING THESE SPACES? (RED)

WHAT IDEAS DO YOU HAVE TO SOLVE THESE PROBLEMS? (BLUE)

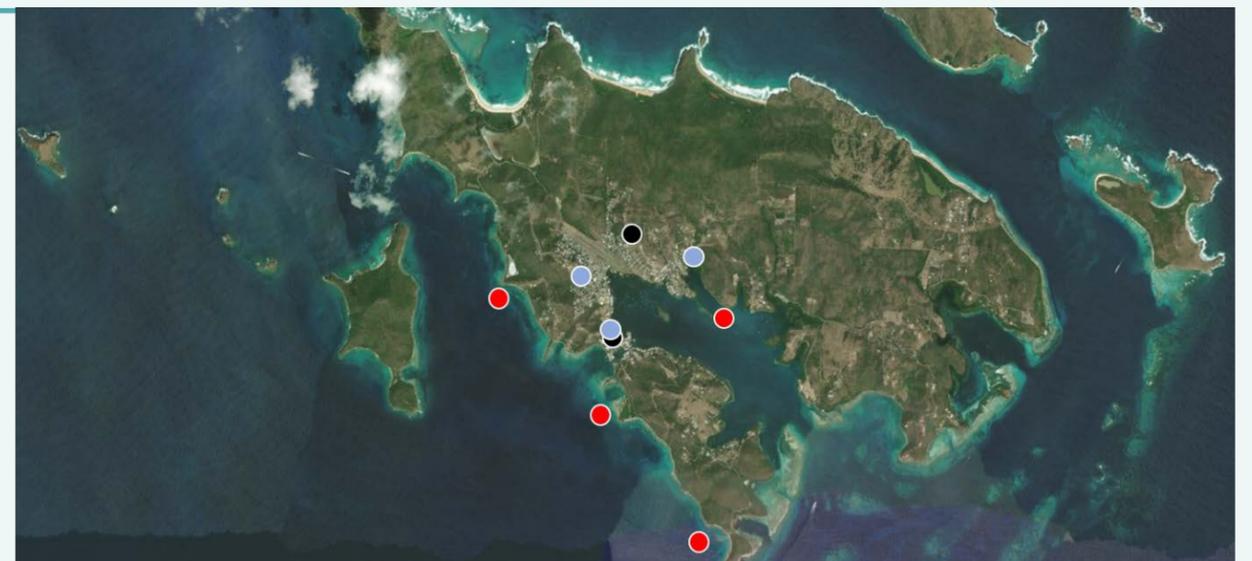


AREAS OF CONCERN

WHAT AREAS ARE EXPERIENCING EROSION OR SOIL LOSS? (RED)

WHAT AREAS SUFFERED THE WORST DAMAGE DURING THE LAST TROPICAL STORMS? (BLACK)

WHAT AREAS ARE THE MOST PRONE TO FLOODING? (BLUE)



TREE CANOPY AND REFORESTATION

WHAT AREAS ARE EXPERIENCING DEFORESTATION OR LOSS OF VEGETATION? (RED)

WHAT AREAS WOULD YOU PRIORITIZE FOR REFORESTATION OR TREE PLANTING? (GREEN)

WHAT AREAS ARE APPROPRIATE FOR PLANTING MANGROVES? (YELLOW)

WHAT AREAS NEED TO BE PROTECTED TO CONSERVE VULNERABLE SPECIES? (BLACK)

