Final
Section 309 Assessment and Strategy
2026 to 2030

Puerto Rico Department of
Natural and Environmental Resources
February 2026

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Introduction

Puerto Rico Coastal Zone Management Program

Puerto Rico has 1,286 km of coastline, 44 coastal municipalities with 2,579,600 people[1] living in the Coastal Zone[2] in 2024.

The Puerto Rico Department of Natural and Environmental Resources (DNER) derives its authority to protect and conserve natural resources from the Puerto Rico Constitution (Article VI, Section 19), which establishes as a fundamental public policy the protection, use, and development of the Commonwealth's natural resources for the benefit of present and future generations. As the lead agency for implementation of the Puerto Rico Coastal Zone Management Program (PRCZMP) designated by the Governor in 1978, the DNER holds principal responsibility for guiding sustainable development in the coastal zone, actively managing coastal and marine resources including territorial waters, submerged lands, the maritime-terrestrial zone, and natural protective features such as mangroves, beaches, dunes, and coral reefs, while exercising surveillance and enforcing conservation regulations to ensure protection of these critical ecosystems for the Commonwealth. This task is carried out in close coordination with the Puerto Rico Planning Board (PRPB), the government agency that oversees the approval of the Federal Consistency Certification Process under PRCZMP.

The approach of the Coastal Zone Management Program is reflected in its guiding principles:

- Guide the sustainable development of public and private sectors in the coastal zone.
- Promote active coastal management.
- Promote environmental education, scientific research, and public participation in the management of coastal resources.

Section 309

The Section 309 Strategy and Assessment, performed every five years under the National Oceanic and Atmospheric Administration (NOAA) guidance, provides an opportunity to assess and develop strategies to make improvements to its management programs in one or more of nine "enhancement areas", including: wetlands, coastal hazards, public access, marine debris, cumulative and secondary impacts, special area management plans, ocean resources, energy and government facility siting, and aquaculture.

If approved by NOAA, this will provide the state with additional funds to achieve these strategies. Funds can be used for personnel, contracts, equipment, travel supplies, and other necessary

[1] American Community Survey 2024. https://www.citypopulation.de/en/puertorico/admin/

[2] One (1) km inland measured from the coastline, as well as additional distance necessary to incorporate key natural systems of the coastal environment. Also, includes territorial waters 9 nautical miles, the islands of Vieques, Culebra, Mona, and small islands within.

items to develop the program changes. However, 309 funds cannot be used for earth-moving, shovel-in-the-ground projects.

This document was developed and structured to conform to CZM Section 309 updated Program Enhancement Guidance, which includes a high-level assessment of each of the nine enhancement areas and identifies the relative priority and importance of each area in consideration of the state's approved coastal management program, existing conditions, and anticipated program changes and implementation activities eligible for funding under section 309.

The PRCZMP 309 Strategies were developed for the selected priority areas in coordination with PRCZMP partners. The strategy integrates initiatives to promote increased cooperation among Federal and Commonwealth agencies to maximize the value of the investment of 309 funds. This introduction summarizes how the assessment and program enhancement strategies were developed and reviewed.

Summary of Recent Section 309 Achievements

Puerto Rico's 2023-2025 Section 309 Strategy identified as its main strategy the creation of the Coastal Resilience Program, as part of the wetlands, coastal hazards, and cumulative and secondary impacts enhancement areas. Below is a summary of the program changes and major achievements since 2023.

Wetlands

Priority: **High** priority in last Assessment

Program change sought:

1. Complete the Comprehensive Wetlands Conservation and Management Plan, develop suggested guidance for wetlands restoration, as well as prioritize and promote natural infrastructure over hard infrastructure, and identify long-term funding sources to implement identified restoration priorities to make up for losses during hurricanes Irma and Maria.
2. Improve the implementation of existing laws and regulations and consider new requirements that serve to conserve coastal wetlands.
    a. review the relevant land use laws and regulations (e.g., Maritime Terrestrial Zone (MTZ) regulations (Regulation 4860), Zoning Regulation for The Coastal Zones and The Access to Beaches and Coasts of Puerto Rico (Joint Permitting Regulations (JPR) Chapter 30), and regulations 13, and 6916 among others) and clarify and limit the standards or criteria for issuing variances, waivers, or exclusions to the normal requirements.
3. PRCZMP will identify and draft prospective opportunities for enhancement of existing laws and regulations or new mechanisms to integrate ecosystem-based adaptation into municipal or commonwealth authorities (e.g., Territorial Ordinance Plans or Land Use Plans or Amendment to Law 314.
    a. improve the efficacy of the Ranger Corps, and the administrative and judicial procedures used in enforcing existing authorities to conserve coastal wetlands, manage the MTZ, and reduce land-based sources of pollution that impact mangroves, seagrass, and other coastal wetlands, or partners with other entities, such as the Puerto Rico Special Police. It would be beneficial to revisit the recommendations made in the strategic plan for the Ranger Corps funded by the Coral Reef Conservation Program.
4. Incorporate coastal erosion and other considerations into the Commonwealth's and coastal municipalities' land use planning to better conserve and allow for the migration of coastal wetlands in the future.
    a. model impacts of sea level rise on wetlands migration in priority areas, and assess recently updated municipal land use plans (updated hazard mitigation components) to determine if they contained climate change considerations that would conserve and allow for the migration of coastal wetlands.

309 projects undertaken:

1. Comprehensive Coastal Wetlands Conservation Plan: The PRCZMP initiated the development of the Plan, and in 2024, the firm *Estudios Técnicos, Inc.* was contracted to complete it. This Plan is ongoing and is expected to be completed by March 2026 The PRCZMP is also in conversations with the local NGO Protectores de Cuencas (who received EPA funding for coastal wetland conservation in Puerto Rico) to advance joint efforts towards coastal wetland management plan implementation.

2-3. The Department of Natural and Environmental Resources (DNER) has taken steps to strengthen the implementation of existing laws and regulations and to evaluate new measures to conserve coastal wetlands. Any person may initiate an adversarial procedure for violations of the laws or regulations under the Department's jurisdiction, as well as for violations of the resolutions and orders issued pursuant to them. In this way, every individual or legal entity is empowered to report any illegal activity that results in the deterioration or destruction of our natural resources. To do so, any complaint, grievance, request, or petition may be submitted via email to: querellas@drna.pr.gov, by using the form provided above-https://www.drna.pr.gov/querellas/, or by contacting the Cuerpo de Vigilantes (Rangers Corps) directly at the following telephone numbers: (787) 724-5700 / (787) 771-1124. Additionally, training sessions for the Rangers and 65 recruits have been carried out since the last evaluation.

4. The Puerto Rico Planning Board (PRPB) is evaluating erosion risks to be incorporated and addressed in the update of Puerto Rico's land use plan. However, the analysis and modeling of wetland migration have yet to be carried out by DNER, nor shared with PRPB to support land use and territorial planning processes.

Coastal Hazards

Priority**: High** priority in last assessment

Program change sought:

1. Improve enforcement of existing laws and regulations (e.g., Law 314 for the public Policy on Wetlands, the Maritime Terrestrial Zone regulation 4860, and Planning Board regulations 13, and JPR Chapter 30) to direct development away from high-hazard areas and conserve natural protective features such as coral reefs, beaches, dunes, and mangroves.
    a. improve orientation and training for DNER Rangers on critical coastal hazard laws, consider instituting an administrative fine or ticketing system, or improving administrative and judicial procedures.
2. Develop a comprehensive "resilience" program building on and integrating other existing programs.
    a. Develop policies for appropriate and allowable shoreline protection measures for specific types of shorelines that would prioritize natural or nature-based approaches, including living shorelines, wherever feasible, identify the suitability

for natural and nature-based protection measures for specific types of shorelines, and identify where shore hardening structures would be prohibited.

b. Enhance or develop specific policies, standardized guidance for the conservation and restoration of natural protective features such as mangroves, beaches, and dunes
c. Enhance or develop policies to establish variable setbacks from high hazard areas and protective features depending on the types of shorelines that incorporate coastal erosion, inundation from storm surge now and as impacted by sea level rise, as well as the FEMA advisory flood hazard areas
d. Identify and require best practices, appropriate adaptation measures for development adjacent to high hazard areas to reduce the vulnerability of people and property, and mitigate impacts to natural protective features
e. Identify areas where development would need to be restricted or existing development moved if the Commonwealth wished to maintain those beaches where natural and nature-based measures will not stop the impingement of beaches.
f. Identify priority areas for restoration projects.

3. Improve implementation of existing laws and regulations for coastal hazards.
    a. Clarify and update the delineation of the Official Reference Line; clarify the criteria for, and limit, variances, exclusions, and waivers to limit the number of exemptions, variances, and waivers to MTZ setback requirements and other relevant land use regulations (e.g.*, the Maritime Terrestrial Zone regulation 4860, and Planning Board regulations 3, 4, 13, and JPR Chapter 30)*.

<u>309 projects undertaken</u>:

1. DNER Ranger Corps units carried out routine surveillance and patrolling of the coastal zone and territorial waters. DNER Rangers Maritime units conducted multiple operations to enforce Puerto Rico's conservation laws and regulations, as well as the specific applicable policies of PRCZMP. The rangers also continue collaboration with federal and Commonwealth agencies, the Puerto Rico Police and Municipal Police departments to carry out preventive surveillance and deter illegal maritime terrestrial zone occupation, illicit garbage disposal, essential fish habitat impacts, sand extraction, as well as to prevent impacts to coastal mangroves or damage to coral reefs, among others. Also, training sessions for the Rangers and recruits have been carried out since the last evaluation.
2. PRCZMP is still in the process of developing the Coastal Resilience Program; however, it has begun work on the Inventory of Coastal Natural Areas in Puerto Rico for Restoration and a Wetland Restoration Guide for Puerto Rico. The inventory will focus on consolidating information on previous and existing projects related to the restoration of Puerto Rico's coastal zones, conduct participatory mapping meetings with other stakeholders to develop a list of existing and proposed restoration projects, and integrate an analysis and use historic sequential aerial photography to identify threats and propose restoration project recommendations, creating a virtual dashboard that highlights existing, proposed, and recommended ecosystem restoration projects that provide coastal protection in coastal

natural areas. The restoration guide will make use of the information gathered through literature review, key informant interviews and meetings with stakeholders across Puerto Rico to develop a coastal wetland restoration guide tailored for use by community and environmental organizations. A protocol for coastal erosion response is also currently in the process of being developed.

3. PRCZMP and The Nature Conservancy coordinated workshops for rangers to discuss and provide training on public domain assets and the Maritime-Terrestrial Zone, with participation from staff of the DNER's Legal and Permits Offices.

Public Access

Priority: **Medium** priority in last Assessment

Program change sought: NONE. The past work done under the public access component of the Sec. 309 program has laid the basis for a more integrated island-wide public access program to be conducted under the regular Sec. 306 program.

309 projects undertaken:

1. DNER Secretary established public access cooperation agreements with coastal municipalities and NGOs.
2. On April 18, 2024, a contract has been signed to complete: (1) A guide to access to the coast, western segment (Aguadilla, Aguada, Añasco, Mayagüez, Rincón y Cabo Rojo), which includes inventories, images, analysis, maps, figures, conclusions and recommendations and (2) an Interactive map of access to the coast, western segment, for publication on the PRCZMP and DNER pages or other compatible platforms, which illustrates the information collected and contained in the Guide to access to the coast, which is visually attractive, easy to understand and use for anyone. The products will combine detailed description of accesses, an updated matrix of uses and facilities, using modern technology such as aerial and ground photography, as well as a georeferenced interactive map, having as a result a complete guide with a visual and accessible tool that will facilitate the analysis and monitoring of coastal accesses throughout the island

Other Public Access Work

1. The PRCZMP was designated as the Executive Secretariat of the Interagency Beach Management Board

Marine Debris

Priority: **Medium** priority in last Assessment

Program change sought: **NONE** This is acknowledged to be an important subject area, but there was other enhancement areas identified as higher priorities for Sec. 309 program funding.

309 projects undertaken: **NONE**

Cumulative and Secondary Impacts

Priority**:** **Medium** priority in last Assessment

Program change sought: **NONE**. This is acknowledged to be an important subject area, but one in which the PRCZMP Office lacks the resources to play a leading role.

309 projects undertaken: **NONE**

Special Area Management Planning

Priority**:** **Medium** priority in last Assessment

Program change sought: **NONE**. Although Federal and Commonwealth agencies' partners and stakeholders recognize the importance of sound sub-regional and watershed planning there were other enhancement areas identified as higher priorities for Sec. 309 program funding.

309 projects undertaken: **NONE**

Ocean Resources

Priority**:** **Medium** priority in the last Assessment

Program change sought**: NONE.** This is acknowledged to be an important subject area, but one in which the PRCZMP Office provides support to other DNER divisions are taking a leading role.

309 projects undertaken: **NONE**

Energy & Government Facility Siting

Priority**:** **Medium** priority in the last Assessment

Program change sought: **NONE**: This is acknowledged to be an important subject area, but one in which the Puerto Rico Coastal Zone Management Program Office lacks the resources to play a leading role.

309 projects undertaken: **NONE**

Aquaculture

Priority**:** **LOW** priority in last Assessment

Program change sought: **NONE.** PRCZMP has collaborated with organizations such as **The Nature Conservancy** and has participated in the educational trip of the SOAR (Supporting Oyster Aquaculture and Restoration) program. In addition, there have been meetings aimed at developing a guide to the permitting processes for aquaculture practices in Puerto Rico.

309 projects undertaken: **NONE**

Program Changes Resulting From 309 Work

To date no program changes have been submitted yet to NOAA OCM resulting from Section 309 work.

Phase I Assessment

Wetlands

Section 309 Enhancement Objective: Protection, restoration, or enhancement of the existing coastal wetlands base, or creation of new coastal wetlands. §309(a)(1)

Phase I (High-Level) Assessment:

Resource Characterization

1. Current state of wetlands as of 2010 (most recent data available): **270,754 acres**

Current Acreage of All Types of Wetlands in Puerto Rico

Type of Wetlands	Current extent (2010) in acres
Palustrine Forested*	50,688
Palustrine Scrub/Shrub*	8,064
Palustrine Emergent*	22,592
Estuarine Forested (Mangroves)*	19,904
Estuarine Scrub Shrub*	4,928
Estuarine Emergent *	6,080
Unconsolidated shore*	4,352
Sub-Total	116,608
Submerged Aquatic vegetation (seagrasses)**	154,145
Total Wetlands	**270,754**

**Source: NOAA C-CAP Land cover data for 2010, **NOAA Benthic Map 2019*

How Wetlands Are Changing

Land Cover Type	Area of Wetlands Transformed to Another Type of Land Cover between 1983-2010 (acres/sq. mi)
Development	-8,703ac / -13.6sqmi
Agriculture	-23,257ac / -36.3sqmi
Barren Land /Degradation	-34,488 ac / -53.8sqmi
Water /Maintained or improved	110,219 ac / 172sqmi

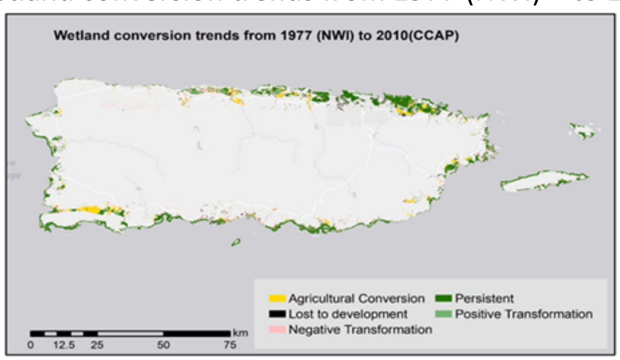
Source: Draft State of the Climate 2021 Work Group 2 - Comparison of NWI-83 and C-CAP 2010 imagery.

Unfortunately, at present there is no consistently collected, recent data on wetlands status and trends, which is a real management need. An update to the Wetland inventory is currently in the works, which should be completed by 2027. There is some conflicting information on the status and trends of Puerto Rico wetlands due to the lack of comprehensive inventories and consistent uniform definitions of wetlands. The NOAA 2010 C-CAP is the most recent, island-wide inventory, after the federal Fish & Wildlife Service National Wetlands Inventory (NWI)-83 inventory. The

2010 C-CAP data, produced from satellite imagery, indicate that there was a total of 116,608 acres of wetlands with 80,344 acres of freshwater (palustrine) and 30,912 acres of estuarine (saltwater) wetlands in Puerto Rico. However, the Puerto Rico 2019 State Comprehensive Outdoor Recreation Plan (SCORP) stated that there are approximately 217,019 acres of wetlands of which 79,781 acres are estuarine, 57,702 acres are marine wetlands--sea grasses and coral reefs, and 79,536 acres are *palustrinos* wetlands. A 2014 Dragoni and Associates, Biogeography Remote Sensing group study, commissioned by PRCZMP identified total wetlands acreage from the inventory maps is 217,118.00 acres with 60,366 acres with 12,028 acres of freshwater and 48,338 acres of saltwater wetlands. The updated wetland inventory DNER will provide sound information to bring clarity and greater consistency on wetlands data for Puerto Rico, while providing a much-needed update to this critical habitat.

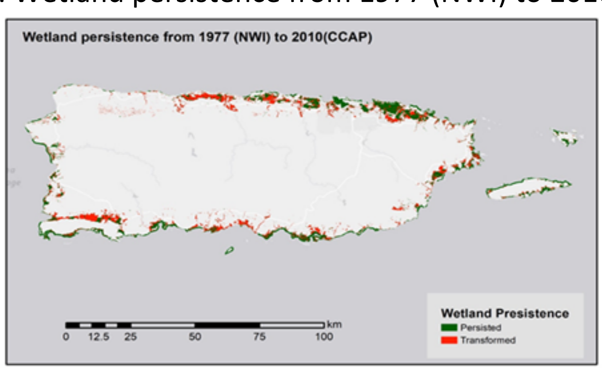
A recent comparison of US FWS's National Wetland Inventory (NWI) data from 1977 and NOAA's Coastal Change Analysis Program (C-CAP) data from 2010 found that large acreages, 15% of estuarine and 30% of palustrine wetlands were transformed in this period due largely to conversion to agriculture, degradation of wetlands, and conversion to developed land to a lesser extent. See images 1 and 2 below. *(Source: Draft State of the Climate II Work Group 2)*.

Image 1: Wetland conversion trends from 1977 (NWI) – to 2010 (CCAP).



Source Draft State of the Wetlands II Working Group 2 Appendix C

Image 2: Wetland persistence from 1977 (NWI) to 2010 (CCAP)



Source Draft State of the Wetlands II Working Group 2 Appendix C

Management Characterization

1. Indicate any significant changes at the state or territory level (positive or negative) since the last assessment that could impact the future protection, restoration, enhancement, or creation of coastal wetlands.

Significant Changes in Wetland Management

Management Category	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y
Wetlands programs (e.g., regulatory, mitigation, restoration, acquisition)	Y

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information.
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

In 2023, the PRPB approved a Joint Land Use Regulation (i.e. *Reglamento Conjunto*) during an emergency procedure on June 16, 2023. This regulation revised land use classifications, including those that apply within wetland and coastal zones. The changes did not alter statutory wetland protection obligations but streamlined administrative processes under the existing Law 161-2009. This regulation consolidated permitting processes under the Permits Management Office (OGPe), modifying how wetland projects obtain development permits. These changes were not driven by Section 309 actions, nor a CZM driven action.

After the approval process of the 2023 Regulation was contested in courts, the PRPB initiated its public comment period between June and September 2025 to ensure it complies with sufficient public participation. It is unclear at present how the public participation process would further alter or modify wetland land use classifications and permitting procedures on wetlands.

The 2023 Sackett v. EPA decision narrowed the federal definition of “waters of the United States” (WOTUS). In June 2025, corresponding EPA/USACE guidance clarified that only wetlands with a continuous surface connection qualify under Section 404 of the Clean Water Act. The judicial decision and the EPA/USACE guidance could have implications for isolated coastal wetlands or other wetlands in Puerto Rico that does conform to the new interpretation from a US Federal standpoint, particularly for enforcement of Section 404. Thus, placing greater reliance of Commonwealth agencies to ensure applicability of Puerto Rico policies, including Law 314-1998. These changes were not driven by Section 309 actions, nor a CZM driven action.

The PRCZM made the following changes to their management of coastal wetlands using 309 funds:

- PRCZMP developed a network of eight sentinel sites (SET stations) to measure the effects of sea level rise on coastal wetlands by establishing baseline conditions and measuring wetlands surface elevation to determine sea level rise vulnerability. SET stations consist of geodetic horizontal and vertical controls to monitor sea level rise and surface elevation changes.
- PRCZMP created a wetlands advisory group, based on Executive Order 2008-53 that creates the Interagency Wetlands Committee consisting of representatives from the Puerto Rico Land Authority, the DNER, the Department of Agriculture, the Department of Housing, the Puerto Rico Land Authority, the Puerto Rico Planning Board, the Office of Special Communities, the National Parks Company, and the Puerto Rico Police Department to ensure more effective protection of wetlands of the Land Authority of Puerto Rico. However, this group has not been meeting lately.

PRCZMP commissioned a Coastal Wetlands Management Plan, which is currently in its final stages of development. It is expected that the Plan would be approved and begin implementation during this 2026-2030 cycle.

DNER made the following change to their management of coastal wetlands through use of CZM Section 306/306A funds:

- PRCZMP staff in coordination with Protectores de Cuencas and the UPR Aguadilla Vida Marina program have identified, post-Maria, wetlands in need of restoration and have developed proposals to fund these wetlands restoration projects. PRCZMP allocated funds to initiate Punta Tuna Natural reserve mangrove design and environmental compliance process.

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

   High __X__
   Medium _____
   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

While there are various existing planning and management programs aimed at conserving coastal wetlands, the 2025 Stakeholder Survey identified coastal wetlands management as a high priority (the second highest priority) issue to address with the 309 Strategy and programs.

Critical wetlands program changes identified in the 2016 – 2020 Section 309 Strategy, including completing a comprehensive Wetlands Conservation and Management Plan and developing and adopting policies and guidelines prioritizing the use of natural infrastructure, have not been fully finalized. As of February 2026, the Wetlands Conservation and Management Plan is around 85% finalized, with an expected completion before the end of 2026. Changes identified in the 2022-2025 Section 309 Strategy that have not been fully completed by 2025 -due to leadership transitions in Puerto Rico government, internal recruitment processes, and transitions in talent acquisition strategies- are being integrated into this 2026-2030 cycle Strategy. The incorporation of a new biologist and the CRP coordinator staff to the PRCZMP roster will greatly advance the implementation of recommended strategies for this cycle. DNER is advancing in the hiring process for the Biologist II position, and is also working on advancing the hiring process for the CRP role.

Moreover, the stakeholders surveyed, as well as recent reports and studies, have also noted that there is an urgent need to enhance restoration programs to enhance community resilience, as well as improve the implementation and enforcement of existing laws and regulations to strengthen their ability to protect existing habitats and resources; and enhance planning and regulatory programs. This 2026-2030 Section 309 Strategy will recommend activities that aims to improve conditions for these recurring issues affecting not only wetlands but hindering overall coastal management initiatives in Puerto Rico.

Coastal Hazards

Section 309 Enhancement Objective: Prevent or significantly reduce threats to life and property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise and Great Lakes level change. §309(a)(2)

Phase 1 (High-level) Assessment:

Resource Characterization:

1. In the table below, indicate the general level of risk in the coastal zone for each of the coastal hazards. The following resources may help assess the level of risk for each hazard. Your state may also have other state-specific resources and tools to consult. Additional information and links to these resources can be found in the "Resources" section at the end of the Coastal Hazards Phase I Assessment Template:
    - The state's multi-hazard mitigation plan
    - Coastal County Snapshots: Flood Exposure
    - Coastal Flood Exposure Mapper
    - Sea Level Rise Viewer/Great Lakes Lake Level Change Viewer

General Level of Hazard Risk in the Coastal Zone

Type of Hazard	General Level of Risk[3] (H, M, L)
Flooding (riverine, stormwater)	H
Coastal storms (including storm surge)	H
Geological hazards (e.g., tsunamis, earthquakes)	M – Tsunami H – Earthquakes
Shoreline erosion	H
Sea level rise	M/H
Great Lakes level change	N/A
Land subsidence	L
Saltwater intrusion	H
Other (Loss of natural protective features, including coral reefs, sea grasses, mangroves and dunes)	H

Source: 2021 Puerto Rico Natural Hazards Mitigation Plan.

2. If available, briefly list and summarize the results of any additional data or reports on the level of risk and vulnerability to coastal hazards within your state since the last assessment. The state's multi-hazard mitigation plan or risk assessment or plan may be a good resource to help respond to this question.

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[3] Risk is defined as "the estimated impact that a hazard would have on people, services, facilities and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage." Understanding Your Risks: Identifying Hazards and Estimating Losses. FEMA 386-2. August 2001

- **USGS — Coastal vulnerability assessments & mapping (2023–2024)** Continued USGS assessments and local vulnerability products show widespread coastal-erosion, shoreline retreat, and increased risk to populated shorelines and infrastructure; USGS mapping tools quantify site-specific flood/erosion exposure under storm and SLR scenarios. USGS
- **NOAA Sea-Level Rise Technical Framework / Digital Coast tools (based on the 2022 SLR scenarios)**
Puerto Rico-specific relative sea-level rise scenarios (Sweet et al., 2022) are being applied across coastal planning tools and show substantial increases in high-tide (nuisance) flooding and greater probabilities of permanent inundation at many low-lying locations under intermediate-to-high scenarios. NOAA SLR,
- **USACE — Puerto Rico Coastal Storm Risk Management (CSRM) feasibility / draft integrated study (2024)**
A multi-site feasibility study (draft) identifies shoreline erosion, storm surge, and coastal infrastructure exposure as priority problems and evaluates structural and nature-based alternatives to reduce coastal storm risk at identified high-priority reaches. USACE-PR Coastal Storm Risk Management (CSRM)
- **NOAA / OSTP Ocean Chemistry & Ocean-Acidification vulnerability work (2023) + NOAA-funded Puerto Rico projects (2021–2024)** Reports and funded projects highlight increasing vulnerability of coral reefs and shellfish (oysters, conch) to ocean acidification and warming — degrading natural coastal buffers (reefs/mangroves) and increasing community exposure and socioeconomic risk. NOAA Ocean Acidification Program
- **FEMA / recovery-to-resilience and local hazard-mitigation planning (2023–2025)**
Post-disaster mitigation reports and island-wide hazard assessments emphasize integrating mitigation funding into permanent projects and prioritizing vulnerable coastal communities and critical facilities for resilience upgrades. recovery.preventionweb.net

Management Characterization

1. In the tables below, indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) have occurred that could impact the CMP's ability to prevent or significantly reduce coastal hazards risk since the last assessment.

Significant Changes in Hazards Statutes, Regulations, Policies, or Case Law

Topic Addressed	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Elimination of development/redevelopment in high-hazard areas[4]	Yes	Yes	No
Management of development/redevelopment in other hazard areas	Yes	Yes	No
Sea level rise	Yes	Yes	No

Significant Changes in Hazards Planning Programs or Initiatives

Topic Addressed	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Hazard mitigation	Yes	Yes	Yes
Sea level rise	Yes	Yes	Yes

Significant Changes in Hazards Mapping or Modeling Programs or Initiatives

Topic Addressed	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Sea level rise	Yes	Yes	Yes
Other hazards	Yes	Yes	Yes

2. Briefly state how "high-hazard areas" are defined in your coastal zone.

High-hazard areas are defined in Puerto Rico's coastal zone by floodable areas, both by rivers and storms (coastal and riverine inundations), areas subject to coastal erosion, and/or to geologic hazards (landslides).

[4] Use the state's definition of high-hazard areas.

3. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

<u>Changes to Authorities</u>:

Executive Order OE-2023-009**,** declared by the Governor in April 2023, established a state of emergency due to coastal erosion across all 44 coastal municipalities of Puerto Rico and allocated over $105 million in federal funds (including $100 million from CDBG-DR/MIT) to implement 17 measures to combat coastal erosion. The Order mandated the DNER and the Department of Transportation and Public Works (DTOP) to implement measures ranging from nature-based solutions (mangrove planting, dune restoration, coral reef restoration) to structural interventions (property acquisition, demolition of abandoned structures, beach replenishment), and established a Coastal Erosion Action Committee. Approximately 94% (16 out of 17) of all measures have been either completed or in process of completion. Approximately $80,000 of Section 309 funds were allocated to support in the consolidation of data to update and review the coastal building inventory, supporting the completion of a key coastal erosion measures mandated in the Executive Order still in progress. Also, DNER is in the process of completing an MOU in coordination with the Puerto Rico Department of Housing towards coordinating for the use of the $100 million CDBG/MIT funds to support coastal erosion mitigation initiatives in Puerto Rico.

<u>Changes to Hazards Planning</u>

Puerto Rico Commonwealth and Local Hazard Mitigation Plans: The 2021 Puerto Rico State Hazard Mitigation Plan is being updated, projected to be completed by late 2026. This plan identifies the natural hazards that could potentially affect Puerto Rico; assesses risk and vulnerability to these hazards and identifies top priority mitigation strategies actions at the State and municipal levels. The projected revision to the Plan will feature updated risk assessments, incorporation of Tsunami readiness requirements, and integration with Puerto Rico Planning Board spatial planning. Municipalities needed to update or develop local hazard mitigation plans, so they are eligible for FEMA hazard mitigation funds in the future. From 2018-2024, the Puerto Rico Planning Board (PRPB) was designated, through FEMA Hazard Mitigation Grants Program, as the agency responsible for reviewing and developing the local Hazard Mitigation Plans in coordination with the municipalities. 43 of the 44 coastal municipalities have updated and have their local hazard mitigation plan approved through PRPB, except Cataño, which had the plan approved in 2018. Many have used NOAA sea level rise data to inform the updates. (*Source: PRPB - Coastal Erosion-HMP Coastal Municipalities.)* These plans are expected to incorporate greater information and recommend actions to mitigate coastal hazards, strengthening the risk reduction capabilities of Puerto Rico coastal communities. This was not a Section 309 funded action, nor a CZM driven action.

Puerto Rico Planning Board Ordinance 43 (22 February 2025) establishes updated guidelines for municipal land use planning, emphasizing integration of disaster risk reduction and hazard mitigation into local plans—especially in coastal municipalities. The ordinance requires that municipal territorial plans account for vulnerability to natural hazards, mandate the identification of risk zones, and incorporate measures that reduce exposure to flooding, erosion, and impacts from hurricanes and sea level rise. By aligning municipal planning with updated hazard data and resilience strategies, Ordinance 43 ensures local governments proactively manage land use to protect both people and critical infrastructure in Puerto Rico's most vulnerable coastal areas (Ordinance 43-2025). Additionally, the Puerto Rico Planning Board is initiating a comprehensive public process to update the Puerto Rico Land Use Plan, aiming to reflect current demographic, economic, and environmental conditions and to set measurable goals for sustainable development and disaster resilience. It is expected that the revised Puerto Rico Land Use plan will be finalized by late 2027 (Personal communication with PRPB, October 2025). This was not a Section 309 funded action, nor a CZM driven action.

The US Army Corps of Engineers South Atlantic Study (SAC): The South Atlantic Study Main Report examines the SACS study area, including Puerto Rico, at a regional scale and describes the Coastal Storm Risk Management (CSRM) Framework (the Framework). The Puerto Rico Appendix applies the Framework to the Commonwealth, considering specific conditions for the Commonwealth, including problems and opportunities, risk assessment, and comprehensive CSRM strategies and recommendations to provide Puerto Rico stakeholders a more tailored analysis with useful information and resources. The study also provided other tools including: 1) the SACS geoportal–consisting of data layers that can be used to assess potential risk to populations, infrastructure, environmental, and cultural resources from coastal storms hazards; 2) the SACS Environmental Analysis Web Application - used to identify the environmental resources potentially at risk from inundation in a future condition with 0.71 meters of sea level rise; and 3) the SACS Measures and Cost Library - a repository of potential structural, nonstructural, and NNBF measures that could be considered for CSRM. USACE maintains the geoportal for public access. This was not a Section 309 funded action, nor a CZM driven action.

<u>Changes to Mapping or Modeling Programs</u>

Advisory Base Flood Elevation Maps (ABFE) 2018: Following Hurricane Maria, FEMA, in coordination with the Puerto Rico Planning Board, used modern engineering and information from the effects of Hurricane Maria to develop new flood zone maps. These Advisory Maps, show the recommended base flooding levels (ABFE) developed for Puerto Rico, for various special flood hazard areas and are intended to be tools for communities to enhance resilience. However, while the ABFE maps more accurately portray flood hazard areas, as of October 2025 they remain advisory and do not replace current effective Flood Insurance Rate Maps (FIRMs) for insurance-related matters. Still, the resulting information from ABFE can help advance disaster risk reduction and natural resource management initiatives across Puerto Rico's coastal zone. This was not a Section 309 funded action, nor a CZM driven action.

Storm Surge Visualization Tool: The PRCZMP contracted Professor Aurelio Mercado, Physical Oceanographer at University of Puerto Rico to update inundation modeling and incorporate wave set up, run-ups and over topping elements into the process. Professor Mercado maintains updated storm surge inundation modelling accessible through CARICOOS and UPR Coastal Hazards portals. This will be used by the Puerto Rico Planning board to inform future coastal hazard analysis (Source: communication with PRPB staff). This tool strengthens Puerto Rico's ability to analyze complex coastal hazard's risk data to improve coastal land use and hazard mitigation decision making processes. This was a 309-driven project, but not a CZM driven action.

GeoFrame Program**:** PRPB and HUD have launched a $50 million project the Puerto Rico Geospatial Framework (GeoFrame) Program, where Puerto Rico Department of Housing will assist Puerto Rico produce a foundation of high-quality, geo-referenced data and building an infrastructure of people, policies, software, hardware, and systems for citizens to access and use spatial data to enable evidence-based decision-making. The goal of the GeoFrame Program is to increase access and transparency of land use and geospatial data in Puerto Rico. The Program is expected to support the ability of all stakeholders, including citizens, non-governmental entities, and governmental agencies, to understand the spatial component of land administration and the place-based nature of property and governance of land and water. The Program updated its cross-cutting guidelines in November 2024, integrating addresses, roads, parcels, structures, ownership, land use, and natural hazard data. The resulting information can help advance disaster risk reduction and natural resource management initiatives across Puerto Rico's coastal zone, as well as promote greater access to reliable geospatial information to the public. This was not a Section 309 funded action, nor a CZM driven action.

USGS 2025 National Seismic Hazard Model: The U.S. Geological Survey released the 2025 National Seismic Hazard Model (NSHM) for Puerto Rico and the U.S. Virgin Islands, representing the first comprehensive update since 2003 and incorporating over 20 years of updated science, engineering data, methods, and models adjusted to and reflecting the conditions of Puerto Rico and the northern Caribbean region. The NSHM provides critical seismic hazard assessments for building code development, infrastructure design standards, emergency planning, and risk mitigation across Puerto Rico's 78 municipalities, including the 44 coastal municipalities vulnerable to both seismic and coastal hazards such as tsunamis and earthquake-induced landslides. The model underwent extensive community review and public workshops to ensure incorporation of the best available science for hazard mitigation purposes, with official publication completed in 2025. This model further expands Puerto Rico's coastal hazard's risk data to improve coastal land use and hazard mitigation decision making processes. This was not a Section 309 funded action, nor a CZM driven action.

Enhanced Continuously Updated Digital Elevation Models (CUDEMs**)**: NOAA's National Centers for Environmental Information (NCEI) developed enhanced Continuously Updated Digital

Elevation Models (CUDEMs) for Puerto Rico at 1/9 arc-second (approximately 3 meters) and 1/3 arc-second (approximately 10 meters) resolution, providing seamlessly integrated bathymetric-topographic elevation data for the coastal zone. These DEMs are referenced vertically to the Puerto Rico Vertical Datum of 2002 (PRVD02) and horizontally to NAD 83, incorporating bathymetric and topographic data from NOAA Office of Coast Survey, NOAA National Geodetic Survey, U.S. Geological Survey, U.S. Army Corps of Engineers, FEMA, and other federal, state, and local agencies. The models are utilized by the NOAA Center for Tsunami Research at Pacific Marine Environmental Laboratory (PMEL) to support tsunami forecasting and warning efforts through the SIFT (Short-term Inundation Forecasting for Tsunamis) system and MOST (Method of Splitting Tsunami) model and are accessible through NOAA's Digital Coast Data Access Viewer. Post-Hurricane María, NOAA updated these models with topobathymetric lidar data collected in 2019 through the National Geodetic Survey to address critical data gaps identified for Puerto Rico. The high-resolution DEMs provide the foundational geospatial infrastructure for coastal inundation modelling, storm surge analysis, sea level rise projections, habitat characterization, and support coastal and marine spatial planning, hazard mitigation, and community preparedness applications across Puerto Rico's 44 coastal municipalities. This model further expands Puerto Rico's coastal hazard's risk data to improve coastal land use and hazard mitigation decision making processes. This was not a Section 309 funded action.

<u>Other Management Tools</u>

UPR Vida Marina Restoration of natural protective features: University of Puerto Rico's Vida Marina staff continue working on the ecological restoration of dune areas in the following municipalities: Isabela, Camuy, Hatillo, Arecibo, Manati, Dorado, San Juan, Loiza and Luquillo with funds from three grants from the NFWF Coastal Resiliency Program. They are also working on the ecological restoration of four mangrove areas in the municipalities of Aguada, Isabela and Camuy. The expected outcome of these projects are to increase the resilience of Puerto Rico's coastal communities and coastal habitats to future storms as well as protecting wildlife through the restoration of important coastal habitats for nesting birds and sea turtles. This is not a Section 309 funded action, nor a CZM driven action.

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

   High __X__
   Medium _____
   Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

The coastal hazards enhancement area remains a high priority for Puerto Rico as threats to the coast continue and are expected to increase due to extreme events, coastal-related hazards, and the continued development pressures on the coast. Changes in mean sea level across the Atlantic and Caribbean continue their upward trend, further transforming the coastline and, in turn, altering the vulnerability and susceptibility of coastal communities and degraded ecosystems against hazards. Respondents to the DNER's 2025 stakeholder survey ranked coastal hazards as the number one enhancement priority to address. Hurricanes Irma and Maria put an exclamation point on this as the highest priority.

A high concentration of population and critical infrastructure continues to be found in low-lying coastal areas, which increases vulnerability to sea level rise and storm surge and magnifies the effects of coastal flooding and beach erosion. Approximately 60% of 3,808 beach transects studied along the coasts of Puerto Rico (799 miles) experienced erosion from the 1970s to 2010 (Barreto, et. al., 2017). During recent decades, there has been an increase in the demand for space in coastal lands to construct second homes and tourism-related facilities. Many shoreline hardening structures, groins, and breakwaters affect littoral processes increasing vulnerability and coastal community's exposure to coastal hazards. These activities are also impacting coastal habitats that serve as nesting and nursing sites for wildlife. Activities in the upper reaches of river basins also have an impact from downstream flooding due to increased runoff. And despite the number of existing and new authorities, plans and tools, development is still occurring in high-hazard areas due to inadequate or poorly implemented and enforced policies.

Public Access

Section 309 Enhancement Objective: Attain increased opportunities for public access, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological, or cultural value. §309(a)(3)

Phase 1 (High-level) Assessment:

Resource Characterization

1. Use the table below to provide data on public access availability within the coastal zone.

Public Access Status and Trends

Type of Access	Current number[5]	Changes or Trends Since Last Assessment[6] (↑, ↓, −, unknown)	Cite data source
Beach access sites	168 Open (public) beaches*	-	SCORP 2020-2025
Shoreline (other than beach) access sites	Not available	Unknown	
Recreational boat (power or non-motorized) access sites	54 boat ramps	-	SCORP 2020-2025
Designated scenic vistas or overlook points	Not available	Unknown	
Fishing access points (i.e. piers, jetties)	19 fishing piers	-	SCORP 2020-2025
Coastal trails/ boardwalks *(Please indicate number of trails/boardwalks and mileage)*	102 trails (island wide)	-	SCORP 2020-2025
Acres of parkland/open space	22 Commonwealth Parks and 2,005 Regional/Municipal Parks	-	SCORP 2020-2025
Access sites that are Americans with Disabilities Act (ADA) compliant[7]	3	↑ (Mar Sin Barreras in Luquillo).	DNER

[5] Be as specific as possible. For example, if you have data on many access sites but know it is not an exhaustive list, note "more than" before the number. If information is unknown, note that and use the narrative section below to provide a brief qualitative description based on the best information available.
[6] If you know specific numbers, please provide. However, if specific numbers are unknown but you know that the general trend was increasing or decreasing or relatively stable or unchanged since the last assessment, note that with a ↑ (increased), ↓ (decreased), − (unchanged). If the trend is completely unknown, simply put "unknown."
[7] For more information on ADA see ada.gov

2. Briefly characterize the demand for coastal public access and the process for periodically assessing demand. Include a statement on the projected population increase for your coastal counties. There are several additional sources of statewide information that may help inform this response, such as the Statewide Comprehensive Outdoor Recreation Plan[8], the National Survey on Fishing, Hunting, and Wildlife Associated Recreation[9], and your state's tourism office.

Puerto Rico's population continues to decline, with recent estimates for July 2024 placing the population between 3.2 million persons—a significant decrease compared to previous decades. Projections from the Puerto Rico Census Bureau and the *Instituto de Estadísticas de Puerto Rico* indicate the island's population may decline further to approximately 2.8 million by 2030. These shifts are particularly notable in coastal municipalities, which are projected to experience faster aging and percentage decline, partially driven by migration and lower fertility rates. By 2030, the median age will rise, and a growing proportion of residents in coastal areas will be over 65.

Despite population loss, the demand for coastal public access remains high. According to the 2020–2025 State Comprehensive Outdoor Recreation Plan (SCORP), coastal recreation is consistently ranked among the most desired types of outdoor activity by Puerto Rico residents. The SCORP survey found that:

- Over 80% of respondents said access to beaches and coastal areas is important for their quality of life.
- Satisfaction with coastal access and amenities has decreased—approximately 70% of surveyed stakeholders in 2021 felt access was insufficient, reflecting the rising importance of coastal recreation as temperatures rise and demand for cooling and outdoor spaces grows.
- Demand for ADA-compliant and senior-friendly access is increasing, paralleling demographic trends.
- Affluent migration (from incentives like Acts 20, 22, and 60) may further diversify access needs but reinforce demand for well-managed coastal amenities.
- Coastal zones host substantial shares of "seasonal" and tourist populations, adding over 2 million annual visitors and emphasizing the need for robust public access, despite overall resident decline.

[8] Most states routinely develop "Statewide Comprehensive Outdoor Recreation Plans", or SCROPs, that include an assessment of demand for public recreational opportunities. Although not focused on coastal public access, SCORPs could be useful to get some sense of public outdoor recreation preferences and demand. Download state SCROPs at.recpro.org/resources--reports/scorp-resources.

[9] The National Survey on Fishing, Hunting, and Wildlife Associated Recreation produces state-specific reports on fishing, hunting, and wildlife associated recreational use for each state. While not focused on coastal areas, the reports do include information on saltwater and Great Lakes fishing, and some coastal wildlife viewing that may be informative and compares 2016 data to 2011, 2006, and 2001 information to understand how usage has changed. The most recent survey was conducted for 2022 but due to a change in methodology, results cannot be compared to previous reports. See fws.gov/program/national-survey-fishing-hunting-and-wildlife-associated-recreation-fhwar

Looking ahead to 2030, the dual trends of population aging and continued outmigration in Puerto Rico's coastal municipalities underline the need for coastal public access that is: equitably distributed, adapted for accessibility and ADA compliance, and responsive to hazards impacts and evolving recreation preferences.

The SCORP recognizes these priorities and highlights the importance of continuous monitoring and periodic plan updates, managed by the Puerto Rico National Park Company, PRDNER, every five years to sustain eligibility for federal funding and to respond to emergent public needs.

In the 2025 DNER stakeholder survey, 64.8% of respondents indicated there was not enough access to the coast and beaches, 28.7% thought there was enough, and 6.5% thought there was too much access. Responses indicate a growing interest and demand for improved access to the coast for recreation. Still, it shows that the conditions of current beach and coastal facilities, infrastructure, and increased coastline development restricting shoreline access are challenges yet to be deemed sufficient for the demand of public access to the coasts.

Regarding the process for periodically updating demand for public access, the Puerto Rico National Park Company has the responsibility of preparing and updating the SCORP for Puerto Rico every five years. The results of their next update, which should cover the 2026-2030 period, may provide additional insight on these issues.

3. If available, briefly list and summarize the results of any additional data or reports on the status or trends for coastal public access since the last assessment.

In the 2020-2025 Puerto Rico SCORP, survey respondents identified key obstacles to outdoor recreation, with the most prevalent barriers including concerns about crime and public safety (11.1%), lack of information regarding locations and available activities (10.2%), and insufficient accessibility for people with disabilities (9.7%). Respondents also cited poor condition of recreational facilities (7.2%), lack of complementary services (food, restrooms, nursing) (5%), limited accessibility or transportation to recreational areas (5%), and insufficient recreational facilities or areas (4.6%).

The results from the 2025 DNER survey, stakeholders were asked about the top public access amenities needed at new or existing public access sites. The results presented infrastructure needs remained a high priority, with parking (51.9%) and restrooms (42.6%) representing fundamental amenities for functional public access sites. The combined basic infrastructure priority of 94.4% indicates that many existing access points lack these essential facilities. Accessibility and universal design emerge as a dominant thematic priority, with a combined 122.2% stakeholder emphasis across three related amenities: facilities for persons with disabilities (48.1%), boardwalks/walkways (46.3%), and dune crossover structures (27.8%).

Management Characterization:

1. Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) that could impact the future provision of public access to coastal areas of recreational, historical, aesthetic, ecological, or cultural value.

Significant Changes in Public Access Management

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y	Y	N
Operation/maintenance of existing facilities	Y	Y	N
Acquisition/enhancement programs	Y	Y	Y

Source: DNER Staff

2. *For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:*
   a. *Describe the significance of the changes;*
   b. *Specify if they were 309 or other CZM-driven changes; and*
   c. *Characterize the outcomes or likely future outcomes of the changes*.

The PRCZMP's innovative approach to establish partnerships to improve beach maintenance and public access, the adopt-a-beach program, has resulted in two new beach segments adopted by private and public entities. A total of eight public-private agreements are currently active through this beach adoption program. The maintenance, cleanup and overall attention to the beach segments adopted are improving public access to these coastal areas, resulting in positive dividends for all interested parties associated with the adopted beaches. An expected outcome from this initiative is the maintenance and potential expansion of the adopt-a-beach program, to further facilitate public private partnerships to improve beach maintenance and public access. This is not a Section 309 funded action.

The UPR Aguadilla Vida Marina Program have supported the creation and improvements of 11 boardwalks between 2023 and 2024, improving public access to 136 acres of coastal lands. These facilities have not only improved access to beaches but also provide benefit for dune restoration and conservation efforts. It is expected these combined benefits of coastal features restoration and improve public access can be expanded and replicated to other coastal segments in Puerto Rico. This is not a Section 309 funded action, nor a CZM driven action.

The PRCZMP continues to serve as the Executive Secretariat of the Interagency Beach Management Board. The Interagency Beach Management Board coordinates efforts among Puerto Rico's government agencies to promote the sustainable use, protection, and enjoyment of the island's beaches. Its work includes improving beach infrastructure, addressing coastal erosion and waste management, enhancing public safety and education, and ensuring compliance with environmental regulations. By aligning the actions of multiple agencies—such as the Department of Natural and Environmental Resources, Planning Board, Tourism Company, and others—the Board helps maintain clean, safe, and accessible beaches for all residents and visitors. These efforts directly support equitable public access to coastal areas, ensuring that beaches remain open, well-maintained, and managed for the benefit of the public. The Board met on several occasions during the 2023-2025 cycle, maintaining open communication channels through the interagency for coordinated alignment of initiatives. Building on its legacy for more than a decade, the Board can build on greater interagency coordination efforts to identify innovative approaches to address increasing demands and needs for improved public access to beaches. This is not a Section 309 funded action, nor a CZM driven action.

3. Indicate if your state or territory has a publicly available public access guide. How current is the publication and how frequently it is updated?[10]

Publicly Available Access Guide

Public Access Guide	Printed	Online	Mobile App
State or territory has? (Y or N)	Yes	Yes	No
Web address (if applicable)	https://www.drna.pr.gov/wp-content/uploads/2016/03/Plan-Maestro-de-Acceso-P%C3%BAblico-a-las-Costas-de-Puerto-Rico.pdf	https://www.drna.pr.gov/wp-content/uploads/2016/03/Plan-Maestro-de-Acceso-P%C3%BAblico-a-las-Costas-de-Puerto-Rico.pdf	No
Date of last update	2014	2014	No
Frequency of update	Not regularly	Not regularly	No

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

High _____
Medium __X__
Low _____

[10] Note some states may have regional or local guides in addition to state public access guides. Unless you want to list all local guides as well, there is no need to list additional guides beyond the state access guide. You may choose to note that the local guides do exist and may provide additional information that expands upon the state guides.

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Participants in the DNER 2025 stakeholder survey identified public access as a **medium** priority just behind Coastal Hazards and Wetlands Enhancement Areas, showcasing increased attention and relevance from the Section 309 2023-2025 cycle. While public access may not be identified as high a priority for the purposes of this Section 309 upcoming cycle and the development of a strategy, DNER acknowledges public access is an important issue in Puerto Rico and there are still needs that can be addressed under the Section 306 program or through other funding opportunities yet to be identified.

Marine Debris

Section 309 Enhancement Objective: Reducing marine debris entering the nation's coastal and ocean environment by managing uses and activities that contribute to the entry of such debris. §309(a)(4)

Phase 1 (High-level) Assessment:

Resource Characterization

1. In the table below, characterize the existing status and trends of marine debris in the state's coastal zone based on the best-available data.

Existing Status and Trends of Marine Debris in Coastal Zone

Source of Marine Debris	**Significance of Source** (H, M, L, unknown)	**Type of Impact**[11] (aesthetic, resource damage, user conflicts, other)	**Change Since Last Assessment** (↑, ↓, −, unknown)
Beach/shore litter	H	Aesthetic, resource damage, user conflicts	-
Land-based dumping	H	Aesthetic, resource damage, user conflicts	-
Storm drains and runoff	H	Resource damage, water quality contamination	-
Land-based fishing (e.g., fishing line, gear)	M	Aesthetic, resource damage,	-
Ocean fishing (e.g., derelict fishing gear)	L	Aesthetic, resource damage,	-
Derelict vessels	H	Resource damage, user conflicts, aesthetics,	-
Vessel-based (e.g., cruise ship, cargo ship, general vessel)	M	Aesthetic, resource damage,	-
Hurricane/Storm	H	Resource damage, user conflicts, aesthetics	-
Tsunami	L	Resource damage, user conflicts, aesthetics	-
Other (Homes in eroding coastline)	M	Resource damage, user conflicts, aesthetics	-

Source*: DNER, 2025.*

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends or potential impacts from marine debris in the coastal zone since the last assessment.

[11] You can select more than one, if applicable.

Ocean Conservancy International Coastal Cleanup Day Data for Puerto Rico

YEAR	People	Pounds	Kilo - grams	Miles	Kilo - meters	Total Items Collected
2024	11,001	105,276	47,753	416.	669.5	324,101
2023	15,746	184,768	83,809	761.2	1,218.0	330,520
2022	4,036	128,281	58,187	404.6	651.1	305,527
2021	6,137	46,664	21,167	399.2	642	423,592
2020	12,031	102,160	46,437	183	294	477,372
2019	9,557	117,739	53,405	274	440	382,064
2018	6,814	65,260	29,601	116	186	251,926
2017	17,943	125,573	57,866	254	408	597,940
2016	12,495	120,457	54,638	255	411	594,375

Source: Ocean Conservancy International Coastal Cleanup Report, 2024-25.

Management Characterization

1. Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) for how marine debris is managed in the coastal zone.

Significant Changes in Marine Debris Management

Management Category	Employed by State/Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Marine debris statutes, regulations, policies, or case law interpreting these	Y	Y	Y
Marine debris removal programs	Y	Y	Y

Changes since last assessment:

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:

   a. Describe the significance of the changes;
   b. Specify if they were 309 or other CZM-driven changes; and
   c. Characterize the outcomes and likely future outcomes of the changes.

Changes to Authorities:
Law 35-2024 defines an abandoned vessel as a “boat or navigation vehicle that has been left, relinquished, or surrendered by its owner, without the intention of resuming any interest or right in it.” It may be in good condition, deteriorated, or destroyed. This legal definition of “abandoned vessels” which will facilitate the Commonwealth request disaster assistance support from FEMA to address and remove abandoned and derelict vessels much more efficiently.

Changes to Programs:
DNER has continued to address the various challenges associated with coastal cleanup and marine debris removal program:

- DNER coordinates derelict vessel removal and cleanup with assistance from USCG and NOAA. This is not funded through Section 309.
- DNER Regional Offices and Beach Maintenance Brigades that conduct weekly cleanups at 434 miles of coastline in Puerto Rico. PRCZMP adopted the Zero Waste Beach approach which focuses on education and outreach to foster a producer, societal and individual responsibility. This is not funded through Section 309.
- National Parks Company is now part of DNER and continues to routinely maintain and conduct special cleanups at “*balnearios*” beaches across the island under their administration. This is not funded through Section 309.
- The DNER is collaborating with The Ocean Foundation, NFWF, the local NGO *Conservación ConCiencia*, and fishing groups, to address undocumented and derelict fishing traps in Puerto Rico. This is not funded through Section 309.
- DNER is partnering with HJR Reefscaping, a private sector company providing marine and coastal habitat restoration and environmental assessment services, and USCG to update the Abandoned and Derelict Vessels (ADVs) database. This is not funded through Section 309.
- DNER is working with sea turtle monitoring groups to do periodic beach cleanups. This was a CZM driven change, but not funded through Section 309.
- DNER is developing Standard Operating Procedures (SOP) for the implementation of Law 35, promoting the “adoption” of ADV by third parties as an action to minimize debris and avoid filling up the landfills. This is not funded through Section 309.
- DNER is collaborating with Isla Mar Research Expeditions in the implementation of a project that is removing ADVs around the Island and develop outreach activities to create awareness on ADVs. This is not funded through Section 309.

Other entities collaborating with DNER on cleanup programs include Scuba Dogs and the Puerto Rico Tourism Company. Scuba Dogs is a non-profit organization that continues to coordinate annual beach cleanups. Voluntary groups in Puerto Rico annually record marine debris data as part of international coastal cleanup activities. The Puerto Rico Tourism Company has a daily contract with Mangual Cleaning Services, Inc. to clean the beaches in Carolina and San Juan.

The NOAA Marine Debris Program (MDP) has implemented projects in Puerto Rico since the last assessment:

- The MDP provides two grant programs: the first offers funding that supports locally driven, community-based marine debris removal projects. These projects benefit coastal habitat, waterways, and wildlife, including migratory fish. The second offers funding that supports marine debris prevention projects that actively engage and educate a target audience in hands-on programs. These projects raise awareness, reduce barriers to marine debris prevention, and encourage and support changes in behaviors to ensure long-term prevention of marine debris.
- The MDP partnered with Puerto Rico Sea Grant to develop an emergency response guide, published in English and Spanish in 2023.
- The MDP, in collaboration with DNER and EPA, also published the 2023-2028 Puerto Rico Strategic Plan to Reduce Aquatic Debris in 2023.
- The MDP efforts were NOT driven by 309 or PRCZMP funding.

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

   High ______
   Medium ___X___
   Low ______

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Participants in DNER's 2025 stakeholder survey ranked Marine Debris as a **medium** priority relative to the other eight enhancement areas. While marine debris is an important issue in Puerto Rico, there are activities being undertaken by PRCZM and NGOs, NOAA, and others, and it is now receiving new funding and support from NOAA's Marine Debris program. As such, marine debris is not as high a priority relative to the other enhancement areas for the use of 309 funding.

There are opportunities for marine debris to be integrated in the Comprehensive Solid Waste Management Plan developed by the Solid Waste Authority, PRDNER. The PRCZMP will continue supporting these ongoing efforts and will coordinate with the Solid Waste Authority in addressing the marine debris problem as part of our 306 funded activities. However, to effectively reduce the volume of marine debris active participation is needed from the Puerto Rico Solid Waste Authority, DNER's Environmental Quality Branch, Puerto Rico Tourism Company, Puerto Rico Ports Authority, PRCZMP, Sea Grant, NGOs, coastal municipalities and multiple stakeholders.

Cumulative and Secondary Impacts

Section 309 Enhancement Objective: Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources. §309(a)(5)

Phase 1 (High-level) Assessment:

Resource Characterization

1. Using National Ocean Economics Program Data on population and housing[12], please indicate the change in population and housing units in the state's coastal counties between 2017 and 2021. You may wish to add additional trend comparisons to look at longer time horizons as well (data available back to 1970), but at a minimum, please show change over the most recent five-year period data is available (2017-2021) to approximate current assessment period.

Trends in Coastal Population and Housing Units

	2017	2021	Percent Change (2017-2021)
Number of people	2,691,430	2,606,870	- 3.14%
Number of housing units	1,083,510	1,142,670	+5.46%

Sources: Data compiled from the U.S. Census Bureau Population Estimates Program (2024), Population and Housing Unit Estimates (PHUED, 2023–2024), NOAA's Economics: National Ocean Watch and Puerto Rico's Ocean Economy 2021 reports

2. Using the tables below as a guide, provide information on land cover changes and development trends. Be as quantitative as possible using state or national land cover data[13]. The tables are a suggestion of how you could present the information. Feel free to adjust column and row headings to align with data and time frames available in your state or territory. If quantitative data on land cover changes and development trends are not available, provide a brief qualitative narrative describing changes in land cover, especially development trends, including significant changes since the last assessment.

[12] www.oceaneconomics.org/. Enter "Population and Housing" section and select "Data Search" (near the top of the left sidebar). From the drop-down boxes, select your state. Select the year (2021) then select "coastal zone counties." The default comparison year will be 2017 so no need to select a comparison year.

[13] National data on wetlands status and trends include NOAA's Land Cover Atlas (coast.noaa.gov/digitalcoast/tools/lca.html) and the U.S. Geological Survey's National Land Cover Database (usgs.gov/centers/eros/science/national-land-cover-database)

Distribution of Land Cover Types in Coastal Counties

Land Cover Type	Land Area Coverage in 2010 (Acres)
Developed, High Intensity	205,750
Developed, Low Intensity	
Developed, Open Space	69,520
Grassland	74,809
Scrub/Shrub	12,992
Barren Land	18,390
Open Water	121,946
Agriculture	2,016,060
Forested	1,285,240
Woody Wetland	83,515
Emergent Wetland	28,658

Source: NOAA C-CAP data from NOAA's Office for Coastal Management

Development Status and Trends for Coastal Counties

	2020
Percent land area developed	18%
Percent impervious surface area	13%

Source: NOAA C-CAP data

3. Briefly characterize how the coastal shoreline has changed in the past five years due to development, including potential changes to shoreline structures such as groins, bulkheads and other shoreline stabilization structures, and docks and piers. If available, include quantitative data that may be available from permitting databases or other resources about changes in shoreline structures.

Data from OGPe and PRPB indicate that coastal construction activity has remained elevated through fiscal year 2023, with total construction investment reaching $5.73 billion—the majority concentrated in coastal regions—though disaggregated permit statistics for the 2023–2025 period by coastal municipality are not yet publicly available. Still, island-wide construction investment increased 18.9% from FY 2023 to FY 2024, reaching $7.14 billion, with most of this activity concentrated in coastal regions (Source: OGPe's Integrated Permit System and PRPB "*Estadísticas Seleccionadas sobre la Industria de la Construcción* 2022, 2023, and 2024).

Development brings additional pressures on natural protective features such as beaches and dunes from foot and vehicle traffic degrading dune vegetation, and illegal extraction of sand from dunes for construction. (*Source: Interview with Robert Mayer, University of Puerto Rico, Aguadilla*).

As sea level rise and extreme events have caused beaches and softer shorelines to shrink, there is more pressure for landowners to harden their shoreline to protect their homes or businesses.

In addition to changes in development along the shoreline, development in the coastal watersheds is having cumulative and secondary impacts on coastal waters and resources. NPS pollution--sediment, nutrient and contaminant loadings in runoff to coastal waters continue to impact coral reefs, seagrasses, and living resources. The cumulative impacts are due to increasing impervious surfaces for road building and urbanization, building sites and unpaved roads that lack appropriate best management practices, failed septic tanks, and introduction of contaminants. Unfortunately, it appears that implementation of sediment and erosion control best management practices is at best not consistent, or are not being enforced. (*Source: Culebra Community Watershed Action Plan for Water Quality and Coral Reefs, 2014*). The issue of erosion, sedimentation and polluted runoff will increasingly be an issue as the Commonwealth experiences more extreme rain events.

These conditions are also affected by institutional constraints that impact enforcement and permitting processes in Puerto Rico's coastal zone. Critical positions within the coastal management program and DNER remain vacant or have been experiencing turnovers, including the Coastal Zone Management Program Director position and the Coastal Zone Management–funded attorney position, as well as key technical positions such as a surveyor necessary for maritime terrestrial zone delineation. These staffing gaps create delays in permit review, hinder its capacity to address increasing demands for legal review of contracts and coastal concessions, and impede the ability to conduct timely maritime zone determinations that would enable the public to better understand potential impacts from coastal development. Additionally, the limited ranger presence across Puerto Rico's extensive coastline restricts capacity for surveillance, monitoring, and compliance verification in areas subject to coastal regulations. DNER had undertaken efforts to address these shortfalls, including the establishment of a new Ranger Corps academy in 2023 to increase enforcement personnel, and recognizes that sustained investment in technical and enforcement staffing, combined with improved inter-agency coordination mechanisms, will be necessary to strengthen DNER's capacity to fulfil its coastal stewardship mission consistent with the requirements of the Coastal Zone Management Act and the Commonwealth's coastal program. In July 2025, 65 new rangers graduated from the academy, providing a much-needed strengthening of staffing to the DNER Ranger Corps.

Coastal development has increased the number of shoreline hardening structures, groins, and breakwaters affect littoral processes, which cumulatively lead to the loss of beaches and, ironically, increase the vulnerability and coastal community's exposure to coastal hazards. As of 2017, researchers identified that 18% of the shorelines in Puerto Rico were "hard structures." (Source Barreto 2020). However, there are no current studies identifying trends in shore hardening along Puerto Rico coasts, although such studies are currently underway. (Source: personal communication with Maritza Barreto). According to the 2021 Surfrider Foundation State of the Beach report, "after Hurricane Maria, emergency permits for additional armoring were readily available, as Puerto Rico lacks any codified statutes that restrict the construction or repair of hard stabilization structures."

4. Briefly summarize the results of any additional state- or territory-specific data or reports on the cumulative and secondary impacts of coastal growth and development, such as water quality, shoreline hardening, and habitat fragmentation, since the last assessment.

The 2014 *Culebra Community Watershed Action Plan for Water Quality and Coral Reefs* found that coastal development in watersheds on Culebra was generating NPS pollution-nutrient, sediment, and toxic loaded runoff--that was negatively impacting coral reefs, and coastal wetlands. These NPS were due to: land clearing that is not coupled with sediment and erosion control practices and is therefore easily erodible and a source of sediment transport to coastal habitats; creation of unpaved roads that do not include BMPs to reduce erosion (water bars, sediment traps, etc.); houses that are not connected to sewer or septic tanks, and septic tanks that are not properly sized or sited and cannot adequately treat sewage. Similar development patterns and impacts have been noted in other priority watersheds where NOAA staff are working (personal communication with NOAA CRCP Staff).

Extreme events, like hurricane Maria, have caused significant polluting events of coastal and marine resources. During Maria, "sediment from tens of thousands of landslides, billions of gallons of sewage from power outages, and over 20 inches of rainfall drained through the streams, rivers, streets, stormwater systems and ultimately discharged to coastal waters across the island. This toxic combination of pollutants led to extreme and prolonged declines in coastal water quality conditions throughout the island" (Hernandez et al., 2018). The coral reefs and seagrass habitats in these locations were exposed to persistent conditions that likely led to a range of coastal habitat impacts including decrease of light penetration needed to support seagrasses; physical smothering of the habitat by sediment; excessive algal growth, which will outcompete coral reefs and seagrass; and coral disease outbreaks caused by exposure to pathogens found in untreated sewage. Coastal water quality degradation, and corresponding likelihood of coral reef and seagrass impacts, were most pronounced in the Arecibo, San Juan Metropolitan Area, Northeast Corridor, and Cabo Rojo and Guánica watersheds." (Source: NC17 Watershed Management and Restoration Courses of Action, 2017). The exposure to hazards such as tropical cyclones and flooding events (both coastal and in-land) can generate similar challenges to coastal and marine resources in the future.

The 2024 Puerto Rico Integrated Water Quality Report (covering monitoring data from October 2021 to September 2023) documented widespread impairments from point and nonpoint sources across coastal and estuarine systems, with Enterococci, total nitrogen, total phosphorus, and turbidity as the most common pollutants affecting wetlands and adjacent marine habitats. Sediment and nutrient loading from poorly managed construction sites, unpaved roads, inadequate septic systems, and agricultural operations remain primary contributors affecting water quality on coastal waters and ecosystems. EPA's 2023 NPDES Program and Permit Quality Review for Puerto Rico found that while permits were generally protective of water quality, water quality-based effluent limitations are not independently derived by EPA and rely heavily on DNER Section 401 certifications, creating potential gaps in pollutant control.

Management Characterization

1. Indicate if the approach is employed by the state or territory and if there have been any significant state-level changes (positive or negative) in the development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources, since the last assessment.

Significant Changes in Management of Cumulative and Secondary Impacts of Development

Management Category	**Employed by State or Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Changes Since Last Assessment** (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y	N	N
Guidance documents	Y	Y	N
Management plans (including SAMPs)	Y	Y	Y

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

There are existing programs addressing Cumulative and Secondary Impacts (CSI) in Puerto Rico. At the federal level the EPA Nonpoint Source Program and the National CZM and Coral Reef Conservation Program provide funding to assist watershed planning and management. At the Commonwealth level the PRCZMP, the Puerto Rico Coastal Nonpoint Program and Coral Reef Conservation programs include policies and authorities to address NPS pollution and support coastal watershed planning to reduce the impacts of this type of pollution. There are also several NGOs led by Protectores de Cuencas and The Nature Conservancy that undertake watershed planning and management with projects, often in partnership with PRCZM and PRCRCP, regarding development of integrated watershed planning, erosion and sediment control, soil stabilization, wetland restoration, implementation of green infrastructure and reforestation. For example, the implementation activities on the Guánica Bay Watershed Management Plan (led in partnership with *Protectores de Cuencas*) and the Río Fajardo Watershed Management Plan (led in partnership with *Centro para la Conservación del Paisaje*) focused on erosion and sediment control measures using nature-based solutions to prevent sediment and nutrients from and reduce contaminants flowing downstream to marine and coastal habitats.

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

High _____
Medium __X__
Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

The CSI stayed a **medium** priority in this assessment. Participants in DNER's 2025 stakeholder survey showcased CSI as a medium priority relative to the other enhancement areas, ranking sixth out of nine. It is important to note that this priority was ranked third in the 2021 stakeholder survey. As such, CSI is not as high a priority relative to the other enhancement areas for the use of 309 funding.

However, there are still opportunities to engage with new partners and enhance engagement with the Coral Program, the Jobos Bay NERR and existing partners to address this critical issue. Despite these programs and activities, numerous studies, reports and articles have noted that there_continues to be significant loss or degradation of coastal and marine resources and increased threat of flooding from runoff, from the cumulative and secondary impacts of development. The principal impacts arise from land development practices resulting in loss of habitat, polluted runoff/land-based sources of pollution, and inadequate stormwater management. Many of the reports note that there is a need for improved enforcement of existing laws and regulations to require implement of best practices that if enforced properly could address many of the CSI issues.

Special Area Management Planning

Section 309 Enhancement Objective: Preparing and implementing special area management plans for important coastal areas. §309(a)(6)

The Coastal Zone Management Act defines a special area management plan (SAMP) as "a comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies; standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone. In addition, SAMPs provide for increased specificity in protecting natural resources, reasonable coastal-dependent economic growth, improved protection of life and property in hazardous areas, including those areas likely to be affected by land subsidence, sea level rise, or fluctuating water levels of the Great Lakes, and improved predictability in governmental decision making."

Phase 1 (High-level) Assessment: *(Must be completed by all states and territories.)*
Purpose: To quickly determine whether the enhancement area is a high-priority enhancement objective for the CMP that warrants a more in-depth assessment. The more in-depth assessments of Phase II will help the CMP understand key problems and opportunities that exist for program enhancement and determine the effectiveness of existing management efforts to address those problems.

Resource Characterization

1. In the table below, identify geographic areas in the coastal zone subject to use conflicts that may be able to be addressed through a SAMP. This can include areas that are already covered by a SAMP, but where new issues or conflicts have emerged that are not addressed through the current SAMP.

Geographic Area	**Opportunities for New or Updated Special Area Management Plans** Major conflicts/issues *
West Coast (Aguadilla to Cabo Rojo)	Predominant concerns are construction pressure, loss of beach access, and erosion in Rincón, Aguadilla, Cabo Rojo, and Mayagüez. Respondents highlight accumulated debris, deteriorating public infrastructure, and poor regulation of tourism and recreation activities. Opportunities emphasized include ecological restoration, reef-based defenses, and research initiatives for erosion management.
South Coast (Lajas to Arroyo):	Respondents from Lajas, Guánica, Ponce, and Salinas focus on habitat degradation, polluted runoff, and development near reserves such as Jobos Bay. Strong sentiment exists around unifying policy enforcement, expanding Marine Protected Areas, and improving wastewater systems. Hazard vulnerability and the need for managed retreat were also recurrent topics.

East Coast (Patillas to Naguabo)	Concerns in Naguabo, Humacao, and Patillas revolve around the loss of mangroves and wetlands, as well as the risk from hurricanes and flooding. The region demonstrates a strong preference for integrated watershed management, sustainable infrastructure, and environmental education programs.
Northeast Coast (Ceiba to Rio Grande, including Vieques and Culebra)	Responses emphasize enforcement gaps and ecosystem degradation in Fajardo, Ceiba, Vieques, and Culebra, including coral reef loss, sedimentation, and boating impacts. Opportunities focus on coordinated protection for the archipelago, anchoring regulation, and community co-management of coastal habitats.
North Coast	Frequent issues include illegal or unplanned construction in the maritime-terrestrial zone, erosion compounded by urban runoff, and weak enforcement in municipalities like Vega Baja, Arecibo, and Loíza. Water quality deterioration in urbanized bays (San Juan and Cataño) is linked to stormwater and sewage mismanagement. Stakeholders emphasize stronger interagency coordination and citizen oversight.
Coast-wide	Multiple entries mention national-scale shortcomings such as fragmented governance, outdated legal frameworks, lack of zoning integration, and weak coordination between agencies. Stakeholders call for new investment in monitoring, national coastal data systems, and active restoration measures—linking enforcement, education, and public participation.

* Based on responses from 2025 Stakeholder Survey

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends of SAMPs since the last assessment.

There were no Commonwealth reports on the status and trends of SAMPs since the last assessment.

Management Characterization

1. Indicate if the approach is employed by the state or territory and if there have been any significant state- or territory-level management changes (positive or negative) that could help prepare and implement SAMPs in the coastal zone.

Significant Changes in Special Area Management Planning

Management Category	**Employed by State or Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Changes Since Last Assessment** (Y or N)
SAMP policies, or case law interpreting these	Y	Y	Y
SAMP plans	Y	Y	Y

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

The PRCZMP currently funds the development of Special Planning Area (SPA) management plans under Section 306 as an ongoing program task. However, there were no designated special planning areas during this period. SPA management plans usually identify best management practices for each land use category and may include recommendations for new natural reserve designations or boundary changes of existing SPAs. Once adopted by the PRPB and approved by the Governor, SPA management plans are adopted as part of the Island-wide Land Use Plan. Policies established through SPA management plans are integrated as a part of Municipal Land Use Plans. No SPA plans have been developed since 2016.

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

    High _____
    Medium ___X___
    Low _____

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Participants in the 2025 DNER stakeholder survey identified Special Area Management Planning as a **medium** priority relative to the other eight enhancement areas. There was little agreement or convergence on specific geographies or management needs for additional management plans (some identified the entire coast, entire municipalities or entire communities) and thus no priorities emerged.

The PRCZMP will continue to support special planning area activities through specific Section 306 tasks, principally funding development, revisions to and implementation of Natural Reserve Plans, and planning and active management efforts for the eight designated special planning areas and the newly Northeast Corridor Natural Reserve. There are, however, several management needs identified in other enhancement areas where the concept of special areas management planning could be employed as a mechanism to address those needs, at either the Commonwealth or municipal level.

Some of the planning needs identified could be met as part of strategies developed for other enhancement areas as available 309 funding will permit. The PRCZMP has been in the process of developing a strategic plan for wetlands conservation and restoration to enhance conservation and promote priority restoration of coastal wetlands – this might be refined by developing strategic plans for specific, priority geographies rather than a coast-wide plan.

In the Coastal Hazards enhancement area, the need to consider developing policies on shoreline hardening structures, setbacks, or a construction control line limiting development in high hazard areas that consider climate impacts could be addressed through a Commonwealth-level shoreline management plan to manage coastal erosion, shoreline development, etc., or as overlay zoning districts in the Island and municipal land use plans. This work could be initiated through smaller geographies to serve as pilot efforts to develop lessons learned to inform a coast-wide plan.

In the Cumulative and Secondary Impacts enhancement area, LBSP/NPS pollution are priority threats. The PRCZMP could partner with the PRCRCP to address some of the identified policy, implementation and enforcement issues through the expansion of watershed management plans and enhance policies to address land-based sources of pollution.

If the nascent offshore energy and or aquaculture industries begin to expand operations, SAMPs could be used as a planning and management mechanism for the location and operation of these facilities.

Ocean Resources

Section 309 Enhancement Objective: Planning for the use of ocean resources. §309(a)(7)

Phase 1 (High-level) Assessment:

Resource Characterization

1. Understanding the ocean and Great Lakes economy can help improve management of the resources it depends on. Using Economics: National Ocean Watch (ENOW)[14], indicate the status of the ocean and Great Lakes economy as of 2021 (the most recent data) in the tables below. Include graphs and figures, as appropriate, to help illustrate the information. Note ENOW data are not available for the territories. The territories can provide alternative data, if available, or a general narrative, to capture the value of their ocean economy.

Status of Ocean Economy for Coastal Counties (2021)[15]

	All Ocean Sectors	Living Resources	Marine Construction	Ship & Boat Building	Marine Transportation	Offshore Mineral Extraction	Tourism & Recreation
Employment (# of Jobs)	*53,736*	*147*	*355*	*NA*	*3,841*	*296*	*49,096*
Establishments (# of Establishments)	*3,607*	*10*	*95*	*NA*	*95*	*20*	*3,464*
Wages (Millions of Dollars)	*$1,014.5*	*$5.8*	*$7.4*	*NA*	*$144.9*	*$7.5*	*$848. 8*
GDP (Millions of Dollars)	*$1,914.3*	*$15,600,000*	*$9,600,000*	*NA*	*$352.5*	*$14.9*	*$1,521.7*

Source: NOAA: Quick Report Tool for Socioeconomic Data

2. Understanding existing uses within ocean and Great Lakes waters can help reduce use conflicts and minimize threats when planning for ocean and Great Lakes resources. Using Ocean Reports[16], indicate the number of uses within the ocean or Great Lakes

[14] 17coast.noaa.gov/digitalcoast/tools/enow.html. If you select any coastal county for your state, you are directed to various data displays for that county. In the upper left of the screen, click the "State" box, to the left of the county box so that the state name will be highlighted. Now the data will reflect statewide data for all the state's coastal counties. Make sure "2021" is selected for the year (top right corner). You can then click through the sector types by selecting the icons along the top and the type of economic data (employment, wages, GDP, etc.), by clicking through the icons on the left.
[15] Trend data is available at the bottom of the page for each sector and type of economic data. Mouse over the data points for 2005 and 2021 to obtain the actual values and determine the change by subtracting 2005 data from 2021.
[16] coast.noaa.gov/digitalcoast/tools/ort.html. Select the "view quick reports" button and enter the name of your state or territory in the search bar. Some larger states may have the "quick reports" for their state waters broken

waters off your state. To avoid duplication, energy uses (including pipelines and cables) are reported under "Energy and Government Facility Siting" in the following template. However, feel free to include energy uses in this table as well if listing all uses within ocean and Great Lakes waters in one place is preferred. Add additional lines, as needed, to include additional uses that are important to your state. Note: The Ocean Reports tool does not include data for the Great Lakes states. Great Lakes states should fill in the table as best they can use other data sources.

Uses within Ocean Waters

Type of Use	Number of Sites
Federal sand and gravel leases *(Completed)*	No data
Federal sand and gravel leases *(Active)*	No data
Federal sand and gravel leases *(Expired)*	No data
Federal sand and gravel leases *(Proposed)*	No data
Beach Nourishment Projects	No data
Ocean Disposal Sites	14
Principle Ports *(Number and Total Tonnage)*	2 (Ponce – 1,494,413 tonnes; San Juan – 11,065,257 tonnes)
Coastal Maintained Channels	5 within 1 nautical mile
Designated Anchorage Areas	8 within 1 nautical mile (0.24% coverage)
Danger Zones and Restricted Areas	3 (6.15% total coverage)
Other (Unexploded Ordnances)	6 within 20 nautical miles
Other (Formerly Used Defense Sites)	34 within 20 nautical miles
Other (Known Wrecks and Obstructions)	69

Source: NOAA Ocean Reports Tool -Puerto Rico.

3. In the table below, characterize how the threats to and use conflicts over ocean and Great Lakes resources in the state's or territory's coastal zone have changed since the last assessment.

into several different reports. Click on the "state waters" reports to view. Note the Ocean Reports tool also generates "quick reports" for national estuarine research reserve boundaries in your state. These reports are just a subset of the "state waters" report(s) so you can ignore the reserve "quick reports." Use the icons on the left-hand side to select different categories: general information, energy and minerals, natural resources and conservation, oceanographic and biophysical, transportation and infrastructure, and economics and commerce. Scroll through each category to find the data needed to complete the table. The top six categories in the table above are in the "energy and minerals" section while the other information to complete the table can be found under the "transportation and infrastructure" section.

Significant Changes to Ocean Resources and Uses

Resource/Use Change in the Threat to the Resource or Use Conflict	**Since Last Assessment** (↑, ↓, −, unknown)
Benthic habitat (including coral reefs)	**↑** *anthropogenic and hurricane impacts and coral disease*
Living marine resources (fish, shellfish, marine mammals, birds, etc.)	**↑**
Sand/gravel	↑onshore -- offshore
Cultural/historic	**↑**
Transportation/navigation	--
Offshore development[17]	--
Energy production	--
Fishing (commercial and recreational)	--
Recreation/tourism	**↑**
Sand/gravel extraction	--
Dredge disposal	--
Aquaculture	--

4. For those ocean and Great Lakes resources and uses in the table above that had an increase in threat to the resource or increased use conflict in the state's or territory's coastal zone since the last assessment, characterize the major contributors to that increase. Place an "X" in the column if the use or phenomenon is a major contributor to the increase.

[17] Offshore development includes underwater cables and pipelines, although any infrastructure specifically associated with the energy industry should be captured under the "energy production" category.

Major Contributors to an Increase in Threat or Use Conflict to Ocean Resources

	Land-based development	Offshore development	Polluted runoff	Invasive species	Fishing (Commercial and Recreational)	Aquaculture	Recreation	Marine Transportation	Dredging	Sand/Mineral Extraction	Ocean Acidification	Sargassum
Benthic habitat	X		X	X			X	X	X		X	x
Living marine resources	X		X	X	X		X	X			X	X
Sand/gravel				X					X	X		
Cultural/ historic				X								
Transportation/ navigation				X								X
Offshore development												
Energy production				X	X							X
Fishing	X		X	X				X				X
Recreation/tourism	X		X	X							X	X
Sand/gravel extraction	X			X								
Dredge disposal												
Aquaculture				X	X						X	

5. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends of ocean and Great Lakes resources or threats to those resources since the last assessment to augment the national data sets.

A recent report entitled, *Strategic Implementation Plan For Catalyzing A Blue Economy In The Us Caribbean 2021* indicated that coastal and marine ecosystems were being degraded and destroyed due to increasing land-based pollution and sedimentation from un-controlled tourism and rapid growth in the cruise industry, urbanization, coastal development. And that coupled with an increased rate of fishery resource extraction, climate change, and other environmental disturbances, these impacts have significantly reduced the quantity and quality of coastal and marine habitats, as well as diminished the ability of disturbed habitats to naturally heal and self-restore.

<u>Corals:</u> Recent monitoring confirms that Puerto Rico's shallow coral reefs have low coral cover, continuing a multi-year declining trend exacerbated by stony coral tissue loss disease (SCTLD), bleaching, and macroalgal overgrowth. In 2023, mean live coral cover in Puerto Rico was approximately 4.4%, and coral cover across U.S. Caribbean regions has declined by 33–59% since

the start of NCRMP surveys (2013–2015). Coral assemblages are now dominated by stress-tolerant and fast-growing species such as *Porites astreoides*, *Siderastrea siderea*, and *Agaricia agaricites*, while many major reef-building and ESA-listed framework species (e.g., *Orbicella annularis, O. faveolata, O. franksi, Acropora palmata*, and *A. cervicornis*) occur at lower densities and show high levels of old partial mortality. NCRMP results indicate that populations of SCTLD-susceptible species such as Meandrina meandrites and Dichocoenia stokesii have experienced substantial declines and are now represented primarily by small colonies, consistent with severe disease-related mortality since SCTLD became established in Puerto Rico. Overall, coral reef condition in Puerto Rico remains highly vulnerable to continued ocean warming, mass bleaching events such as the 2023 Caribbean event, coral disease, and land-based sources of pollution, with impacts from intense hurricanes, warming ocean waters and disease expected to drive further declines detectable in upcoming monitoring cycles.

<u>Seagrass</u>: Puerto Rico has traditionally had abundant seagrass resources. There has been an increase in seagrass coverage between Vieques and the main island of Puerto Rico. Past dredging at the Port of las Americas (Ponce) and the navigation channel for EcoElectrica power plant facilities impacted benthic habitats – namely, seagrass beds and hard bottom habitats. More recently, routine monitoring of the Guayanilla Bay show that no additional effects from power plant operations have been detectable). However, an unknown amount of seagrass habitats is directly impacted by dredging activities and boat propeller scaring from recreational and commercial boating and indirectly by reduced light penetration caused by increased sedimentation or burial from dredging activities (*see wetlands section for additional information*).

<u>Sand Resources</u>: Puerto Rico has limited offshore sand resources for beach nourishment or other uses. Bajo Blanco Shoal identified as a potential offshore sand source, supplying approximately 800,000 cubic yards of sand per SAND Report. (*source USACE Puerto Rico Study, USGS Sand Resources of Puerto Rico Fact Sheet)*. At this time, there are no sand borrow areas identified within Puerto Rico. However, potential sand resources include local navigation channels or upland mines. (*USACE South Atlantic Coastal Study Puerto Rico Appendix*). There are no apparent threats to Puerto Rico offshore sand resources currently. Respondents to stakeholder survey identified sand resources as being threatened; however, they may have been thinking of onshore beach and dune sand resources.

<u>Fisheries</u>: Fisheries in the US Caribbean reflect the trends in the region and have equally suffered from migration, natural disasters, foreign competition, and increased industrialization. All of this has resulted in a decrease in catch and a decrease in fishers (*source: Strategic Implementation Plan for Catalyzing a Blue Economy in The Us Caribbean 2021* While Goliath and Nassau Grouper and Queen Conch were on NOAA's overfished list in 2023 (*source: 2023 Report to Congress on the Status of U.S. Fisheries*), things are rebounding. Nearly all commercial fisheries are being managed. There are species whose populations appear to have increased (common king crab and perhaps lobster) and species that are prohibited to protect them and in compatibility with the federal government. There is no evidence of any collapse of commercial species.

The loss of coastal infrastructure facilities that support the fishing industry has been an issue. Hurricane Maria damaged or destroyed several fishery facilities (e.g., docks piers, etc.) in Añasco, Playa Santa, Guánica, Peñuelas, Yabucoa and Aguadilla. According to Puerto Rico Sea Grant, the fishing community has not been able to get Maritime Terrestrial Zone concessions to replace those facilities, while homes along the coast have been able to get permits in similar areas, suggesting that there may be a need for a stronger water dependency policy. The Department of Agriculture is undertaking a program to provide assistance to these fishing communities to reconstruct damaged infrastructure. *(source: Communications with Puerto Rico Sea Grant staff, DNER Fisheries)*

Marine Transportation: Prior to 2020, the volume of both goods and people being transported into the US Caribbean has continued to rise due to the tourism industry increasing both the cruise ship industry, as well as the demand for and reliance on imported consumer goods from the increased number of tourists and visitors to Puerto Rico. Increased competing uses within the regulated sea space is a result of fewer, but more regulated corridors for maritime transport operators that do not compete or overlap with marine protected areas, recreation and tourism zones, and fishing areas (*source: Strategic Implementation Plan for Catalyzing a Blue Economy in The US Caribbean 2021)*.

The maintenance of dredging of ports and marina facilities, ship groundings, laying of submarine cables, bad anchoring practices and coastal development activities continue to pose significant threats to marine ecosystems along the coastal perimeter and in submerged lands within Puerto Rico Territorial waters.

Management Characterization

1. Indicate if the approach is employed by the state or territory and if any significant state- or territory-level changes (positive or negative) in the management of ocean and Great Lakes resources have occurred since the last assessment?

Significant Changes to the Management of Ocean and Great Lakes Resources

Management Category	**Employed by State or Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Changes Since Last Assessment** (Y or N)
Statutes, regulations, policies, or case law interpreting these	Y (fisheries and submerged lands)	Y	N
Regional comprehensive ocean/Great Lakes management plans	N	Y	N
State comprehensive ocean/Great Lakes management plans	N	N	N
Single-sector management plans	Y	N	Y

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:

   a. Describe the significance of the changes;
   b. Specify if they were 309 or other CZM-driven changes; and
   c. Characterize the outcomes or likely future outcomes of the changes.

On August 30, 2021, the Governor of Puerto Rico, declared a State of Emergency in Puerto Rico's coral reefs due to Stony Coral Tissue Loss Disease (SCTLD) via executive order; OE 2021- 066. On 2022, the Puerto Rico Coral Reef Conservation Program developed the Puerto Rico Coral Disease Action Plan, that described the short-term tasks to be completed to help control and mitigate SCTLD on Puerto Rico's jurisdictional coral reefs and those used to sustain long-term coral reef conservation efforts. Implementation efforts are still underway.

3. Indicate if your state or territory has a comprehensive ocean or Great Lakes management plan.

Comprehensive Ocean Management Plan	State Plan	Regional Plan
Completed plan (Y/N) (If yes, specify year completed)	N	N
Under development (Y/N)	N	N
Web address (if available)		
Area covered by plan	Exclusive Economic Zone	Exclusive Economic Zone

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

   High ______
   Medium __X__
   Low ______

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Participants in the DNER 2025 stakeholder survey ranked Ocean Resources as **a medium** priority relative to the other eight enhancement areas, suggesting that there may be more immediate management needs for the Commonwealth. They did identify living marine resources - corals and fish and submerged aquatic vegetation/seagrasses as the resources most threated. Corals are the primary mission of the Puerto Rico Coral Reef Conservation Program and have been addressed under other enhancement areas. While impacts to fisheries are an important issue in Puerto Rico, the PRCZMP traditional role is through efforts to maintain and improve habitat, identified in previous enhancement areas. The PRCZM could have an expanded role in convening stakeholders to identify and designate marine protected areas.

There are not many significant ocean-use conflicts at present. Recreational boating and fishing pose use conflicts with coral reef protection, but the Puerto Rico Coral Reef Conservation Program is addressing those issues through its regular programmatic work under the Puerto Rico Coral Restoration Action Plan for 2025-2035. Most of the threats to living ocean resources are coming from land-based activities and are addressed under wetland enhancement and coastal hazards enhancement areas. There may be a need to conduct more research on how to sustainably, and cost effectively harvest offshore sand resources for enhancing coastal resilience, so as not to impact other ocean resources.

As the Commonwealth develops a plan for dealing with and possibly harvesting sargassum as both a means of reducing impacts to coastal resources, tourism, and public health and as a new blue-economy business a variety of issues could rise. This is something that the PRCZMP will monitor and academia focus research on.

If aquaculture and offshore wind proposals accelerate there will be a need to work across the PRCZMP agencies to undertake some sort of ocean management planning to determine the suitable and unsuitable sites for those facilities in Puerto Rico waters. DNER, in coordination with TNC, have initiated the development of guidelines to help navigate the permitting and approval processes associated with these activities. This could be part of a broader ocean spatial planning effort in the future.

Energy and Government Facility Siting

Section 309 Enhancement Objective: Adoption of procedures and enforceable policies to help facilitate the siting of energy facilities and Government facilities and energy-related activities and Government activities which may be of greater than local significance. §309(a)(8)[18]

Phase 1 (High-level) Assessment:

Resource Characterization

1. In the table below, characterize the status and trends of different types of energy facilities and activities in the state's or territory's coastal zone based on best-available data. If available, identify the approximate number of facilities by type. For ocean-facing states and territories (not Great Lakes states), Ocean Reports[19] includes existing data for many energy facilities and activities.

[18] CZMA § 309(a)(8) is derived from program approval requirements in CZMA § 306(d)(8), which states:

> "The management program provides for adequate consideration of the national interest involved in planning for, and managing the coastal zone, including the siting of facilities such as energy facilities which are of greater than local significance. In the case of energy facilities, the Secretary shall find that the State has given consideration to any applicable national or interstate energy plan or program."

NOAA regulations at 15 C.F.R. § 923.52 further describes what states need to do regarding national interest and consideration of interests that are greater than local interests.

[19] coast.noaa.gov/digitalcoast/tools/ort.html. Select the "view quick reports" button and enter the name of your state or territory in the search bar. Some larger states may have the "quick reports" for their state waters broken into several different reports. Click on the "state waters" reports to view. Note the Ocean Reports tool also generates "quick reports" for national estuarine research reserve boundaries in your state, but this is just a subset of the "state waters" report(s) so you can ignore the reserve "quick reports." Click on the wind turbine icon on the left ("energy and minerals") for information on energy production. While outside your coastal zone, you may also want to consider facilities/activities in "federal waters" that may have effects on your coastal zone.

Status and Trends in Energy Facilities and Activities in the Coastal Zone

Type of Energy Facility/Activity	**Exists in Coastal Zone** (# or Y/N)	**Change in Existing Facilities/Activities Since Last Assessment** (↑, ↓, −, unknown)	**Proposed in Coastal Zone** (# or Y/N)	**Change in Proposed Facilities/Activities Since Last Assessment** (↑, ↓, −, unknown)
Pipelines	Y	↑	Y	↑
Electrical grid (transmission cables)	Y	↑	Y	↑
Ports	Y	↑	Y	--
Liquid natural gas (LNG)	Y	--	Y	--
Electric Power Facilities (Oil)	Y	--	Y	--
Electric Power Facilities (Gas)	Y	--	Y	--
Electric Power Facilities (Coal)	Y	--	N	--
Electric Power Facilities (Nuclear)	Y (Not active)	--	N	--
Electric Power Facilities (Wave)	Y	--	N	--
Electric Power Facilities (Tidal)	N	--	N	--
Electric Power Facilities (Current, ocean, lake, river)	N	--	N	--
Electric Power Facilities (Hydropower)	N	--	N	--
Electric Power Facilities (Ocean thermal energy conversion)	N	--	N	--
Electric Power Facilities (Solar)	Y	--	N	--
Electric Power Facilities (Biomass)	N	--	Y	--
Other (please specify)				

2. If available, briefly list and summarize the results of any additional state- or territory-specific information, data, or reports on the status and trends for energy facilities and activities of greater than local significance in the coastal zone since the last assessment.

As of 2025, Puerto Rico’s electricity generation is derived primarily from fossil fuels—39% natural gas, 38% unspecified fossil fuels, and 20% coal—with renewables contributing approximately 3%

of total generation, according to the U.S. Energy Information Administration (US EIA - Puerto Rico Energy Profile) .

The Puerto Rico Electric Power Authority (PREPA) remains responsible for generation, while LUMA Energy, LLC manages transmission, distribution, and grid modernization under a 15-year operating agreement. LUMA's 2025 Integrated Resource Plan (IRP) was submitted to the Puerto Rico Energy Bureau (PREB) in late 2024, outlining 10 long-term system scenarios emphasizing renewable capacity growth, reliability, and affordability (LUMA Energy. First Interim 2025 Integrated Resource Plan Filing).

Renewable energy expansion in Puerto Rico is dominated by solar energy growth. LUMA's latest filings indicate that approximately 1.2 gigawatts (GW) of residential and commercial rooftop solar have been installed as of June 2025, accounting for about 10% of total electricity consumption (Institute for Energy Economics and Financial Analysis, September 2025). Additionally, PREPA and LUMA's procurement initiatives aim to integrate up to 3,500 MW of utility-scale solar and 700 MW of 4-hour-duration utility-scale battery storage by 2026 to meet statutory goals .

LUMA is currently connecting roughly 3,650 solar customers per month, supporting over 118,000 total installations across the island. The Customer Battery Energy Sharing (CBES) program and the Accelerated Storage Addition Program (ASAP) are adding 180 MW of industrial-scale battery capacity, reducing load shedding by an estimated $100 million in annual fuel costs .

Puerto Rico's onshore wind resources remain modest, with one operational utility-scale facility (Santa Isabel Wind Farm, 2012). However, the PREB's 2025 IRP scenario structure incorporates offshore wind potential after studies by NREL (U.S. National Renewable Energy Laboratory) and Simply Blue Group, emphasizing coastal areas near Fajardo and Culebra for floating wind structures . Offshore projects are still in the feasibility stage, with no current active permit applications. The Ocean Thermal Energy Conversion (OTEC) facility (PROtech) proposed in Yabucoa remains inactive as of 2025 following the withdrawal of a key private partner. No wave or tidal energy projects are under review by PREB or DRNA .

3. Briefly characterize the existing status and trends for federal government facilities and activities of greater than local significance[20] in the state's coastal zone since the last assessment.

Stakeholders identified electric transmission lines, oil and gas pipelines, solar energy arrays, liquefied natural gas, and offshore wind facilities as among the most complex to site.

[20] The CMP should make its own assessment of what government facilities may be considered "greater than local significance" in its coastal zone, but these facilities could include military installations or a significant federal government complex. An individual federal building may not rise to a level worthy of discussion here beyond a very cursory (if any at all) mention).

Since Hurricanes Maria (2017) and Fiona (2022), FEMA, HUD, and DOE have directed substantial funding toward rebuilding Puerto Rico's energy system. As of 2025, FEMA has disbursed approximately $9.8 billion for electrical system restoration projects, primarily through the Electric Grid Modernization Program managed with PREPA, LUMA, and Genera PR. HUD's CDBG-DR and CDBG-MIT programs have invested over $1.8 billion in energy resilience and renewable energy initiatives, including the Energy Reliability and Resilience (ER2) and Community Energy and Water Resilience Installations (CEWRI) programs. The U.S. Department of Energy's (DOE) Grid Deployment Office has also allocated more than $365 million under the Puerto Rico Energy Resilience Fund (PR-ERF) to install rooftop solar and battery systems in vulnerable communities along coastal municipalities like Yabucoa, Loíza, Guayama, Mayagüez, and Rincón. Collectively, these programs represent a sustained federal investment of over $12 billion in energy-specific recovery and resilience across Puerto Rico's municipalities

Management Characterization

1. Indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) that could facilitate or impede energy and government facility siting and activities have occurred since the last assessment.

Significant Changes in Energy and Government Facility Management

Management Category	Employed by State or Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Changes Since Last Assessment (Y or N)
Statutes, regulations, policies, or case law interpretations	Y	Y	Y
State comprehensive siting plans or procedures	N	Y	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
   a. Describe the significance of the changes;
   b. Specify if they were 309 or other CZM-driven changes; and
   c. Characterize the outcomes or likely future outcomes of the changes.

Significant changes in Commonwealth policy have occurred with regards to energy and climate change public policy. In 2019, Puerto Rico adopted Law 17 "Puerto Rico Energy Public Policy Act" for the purposes of establishing the Puerto Rico public policy on energy. In combination with Puerto Rico Electric Power Authority's (PREPA's) Integrated Resources Plan the Puerto Rico Energy Public Policy Act, requires that PREPA increase the

Renewable Portfolio Standard to 40% of its electricity from renewable resources by 2025, 60% by 2040, and 100% by 2050. This helped drive development of more solar energy generation projects, and proposals for wind and geothermal energy generation.

Puerto Rico Law 1-2025, enacted in March 2025, amended the Puerto Rico Energy Public Policy Act (Law 17-2019) by eliminating the interim renewable energy targets of 40% by 2025 and 60% by 2040 that were originally established under Law 17-2019, and extended the coal elimination deadline from 2028 to 2032, while retaining the overarching mandate of achieving 100% renewable energy generation by 2050 that was established under Law 82-2010 and reaffirmed by Law 17-2019. Despite these modifications, Puerto Rico's statutory framework still requires the gradual integration of renewable energy sources, promotes energy efficiency improvements, supports distributed generation and microgrids, prioritizes natural gas as a transition fuel, and maintains renewable portfolio standards enforced by the Puerto Rico Energy Bureau to advance the Commonwealth's long-term renewable energy transition. These are not Section 309 funded actions, nor CZM funded actions.

While these laws have ignited the interest of additional renewable energy facilities such as geothermal or offshore wind facilities to be developed in the coastal zone, modest proposals have emerged and most of them have failed to reach an implementation stage. Still, the amount and timing of future energy facility projects along the coastline remain uncertain at present.

Federal incentives to advance renewable energy projects have shifted since early 2025, with considerable cuts to funding opportunities and other incentives. The effect of this federal policy shifts on the development of energy projects along the coastline is still uncertain.

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

High _____
Medium _____
Low __X__

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Participants in the DNER's 2025 stakeholder survey identified Energy & Government Facility Siting as a **low** priority relative to the other eight Enhancement Areas, suggesting that there may be more immediate management needs for the Commonwealth. This does not necessarily equate, however, to a lack of importance in Puerto Rico. A number of factors make it likely that there will be increased demand for siting new energy facilities in the not too distant future including: Hurricane Maria's impact on existing energy facilities, the islands need to develop a more resilient grid, its policies to develop alternative clean energy facilities and repair a significant amount of critical infrastructure, as FEMA funding becomes available.

There is a long-term need to undertake planning to determine suitable sites for various ocean uses including energy facilities in the coastal zone. The PRCZMP previously believed that energy facility siting and ocean resources could be addressed through the proposed Puerto Rico component of the Caribbean Regional Ocean Partnership between Puerto Rico and the U.S. Virgin Islands. However, planning efforts have stopped with the termination of federal funds in 2014. This effort could possibly be reinvigorated as there are some Regional Ocean Partnership (ROP) funds in this Administration's infrastructure funding.

Aquaculture

Section 309 Enhancement Objective: Adoption of procedures and policies to evaluate and facilitate the siting of public and private aquaculture facilities in the coastal zone, which will enable states to formulate, administer, and implement strategic plans for marine aquaculture. §309(a)(9)

Phase 1 (High-level) Assessment:

Resource Characterization

1. In the table below, characterize the existing status and trends of aquaculture facilities in the state's coastal zone based on the best-available data. Your state Sea Grant Program may have information to help with this assessment[21].

Status and Trends of Aquaculture Facilities and Activities

Type of Facility/Activity	Number of Facilities[22]	Approximate Economic Value	Change Since Last Assessment (↑, ↓, −, unknown)
Companies with a permit to culture fish in Puerto Rico's territorial waters	0	0	−
Marine fish culture	0	0	−
Freshwater fish on land	41 (Tilapia and Shrimp)	unknown	−
Freshwater fish hatcheries	0	0	−
Small-scale coastal aquaculture operations	1 pilot seaweed farm by the University of Chicago's Marine Biological Laboratory.	0	↑

2. If available, briefly list and summarize the results of any additional state- or territory-specific data or reports on the status and trends or potential impacts from aquaculture activities in the coastal zone since the last assessment.

There does not appear to be a consistent, centralized data or information source at present on aquaculture operations in Puerto Rico. There is probably a need for the

[21] While focused on statewide aquaculture data rather than just within the coastal zone, the Census of Aquaculture (agcensus.usda.gov/Publications/Census_of_Aquaculture/) may help in developing your aquaculture assessment. The census is conducted every 10 years, and the last report was released in 2018. The report provides a variety of state-specific aquaculture data to understand status and recent trends.

[22] Be as specific as possible. For example, if you have specific information of the number of each type of facility or activity, note that. If you only have approximate figures, note "more than" or "approximately" before the number. If information is unknown, note that and use the narrative section below to provide a brief qualitative description based on the best information available.

Commonwealth to identify a lead agency to collect and provide authoritative data on this industry. The following table summarizes data available from the 2012, 2018 and 2023 Agriculture Census by the US Department of Agriculture.

Aquaculture Farms and Total Sales in Puerto Rico, 2012-2023

Item	2012	2018	2023
Total aquaculture farms reporting sales	51	40	38
Total aquaculture sales (USD)	$ 687,976	$ 832,725	$ 715,978

Source: US Department of Agriculture, Census of Aquaculture.

The ISER-Caribe Caribbean Reef Project (2023–2027), funded with $10.6 million from NOAA, is the largest coral reef restoration and restorative aquaculture initiative in Puerto Rico’s history. Through its land-based nurseries in Ceiba and La Parguera, ISER-Caribe cultivated and deployed more than 124,000 coral microfragments, 12,000 sea urchins, and 6,400 crabs—key herbivores for reef recovery—while training hundreds of students and community volunteers. The project’s main challenges included infrastructure deterioration, limited long-term funding, and high operational costs, yet it set a benchmark for combining coral aquaculture with ecosystem restoration and local capacity-building. As the grant period ended in 2027, ISER-Caribe transitioned to a maintenance and monitoring phase, emphasizing the need for stable funding, interagency partnership, and workforce development as critical lessons for future aquaculture and reef restoration programs.

While aquaculture does not currently represent a significant number of facilities in Puerto Rico, the potential for an increase in facilities could be a feasible initiative in the medium to long term. The lessons learned and experiences from the ISER-Caribe project can serve as basis for new aquaculture opportunities in Puerto Rico.

Management Characterization

1. Indicate if the approach is employed by the state or territory and if there have been any state- or territory-level changes (positive or negative) that could facilitate or impede the siting of public or private aquaculture facilities in the coastal zone.

Significant Changes in Aquaculture Management

Management Category	**Employed by State or Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Changes Since Last Assessment** (Y or N)
Aquaculture comprehensive siting plans or procedures	N	N	N
Other aquaculture statutes, regulations, policies, or case law interpreting these	Y	N	N

2. For any management categories with significant changes, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information:
    a. Describe the significance of the changes;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

The Blue Economy Strategic Implementation Plan identifies opportunities for mariculture/aquaculture projects. Permitting, particularly the EPA NPDES permit, is considered the main obstacle for these projects. In the broader global perspective, aquaculture, has rapidly expanded over the last two decades due to new technology, improvements in formulated feeds, greater biological understanding of farmed species, increased water quality within closed farm systems, greater demand for seafood products, site expansion and government interest. There is a need for the PRCZMP to continue to monitor aquaculture activities, and potential for collaboration and support any leading efforts form the Puerto Rico Department of Agriculture in promoting aquaculture across the Commonwealth.

Enhancement Area Prioritization

1. What level of priority is the enhancement area for the coastal management program?

    High _____
    Medium _____
    Low __X__

2. Briefly explain the reason for this level of priority. Include input from stakeholder engagement, including the types of stakeholders engaged.

Participants in the DNER's 2022 stakeholder survey identified aquaculture siting and operation as a **low** priority (the lowest) in relation to the other eight enhancement areas, suggesting that there are more immediate management needs for the Commonwealth.

At the global scale, small-scale coastal aquaculture may pose a significant environmental risk from the discharge of low-quality effluent and runoff, and the introduction of exotic organisms and pathogens to fresh and marine waters. There is no sizable aquaculture industry currently in existence in Puerto Rico, therefore this enhancement area is given a low priority.

While it is not a pressing a need right now, in the medium-term Puerto Rico might consider developing aquaculture siting planning and procedure, such as suitability mapping for aquaculture siting especially If proposals for nearshore offshore aquaculture or mariculture activity accelerate [*Source: communication with Puerto Rico Sea Grant*].

If aquaculture operations were to accelerate the PRCZMP, given their roles as the principal coastal planning entity, and the DNER, given their responsibilities for administering the Maritime Terrestrial Zone regulations, would have a clear role in working with the Puerto Rico Department of Agriculture and other relevant stakeholders to design and develop aquaculture policies, siting plans, operational procedures, and aquaculture education strategies. This might include suitability analysis, mapping for aquaculture siting and other relevant analysis, materials and information.

Phase II Assessment

Wetlands

In-Depth Resource Characterization

1. What are the three most significant existing or emerging physical stressors or threats to wetlands within your coastal zone? Indicate the geographic scope of the stressor, i.e., is it prevalent throughout your coastal zone, or are there specific areas that are most threatened? Stressors can be development/fill; hydrological alteration/channelization; erosion; pollution; invasive species; freshwater input; sea level rise/Great Lakes level change; or other (please specify).

	Stressor/Threat	**Geographic Scope** (throughout coastal zone or specific areas most threatened)
Stressor 1	Coastal Development	Island-wide.
Stressor 2	Hydrological Alterations	No systematic locational data available, but it is known to occur in some agricultural areas adjacent to wetlands, some coastal development, inland waterway access projects and in some cases, it is done purposefully to create different habitats
Stressor 3	Contamination	Island-wide.

2. Briefly explain why these are currently the most significant stressors or threats to wetlands within your coastal zone. Cite stakeholder input and/or existing reports or studies to support this assessment.

Participants of the DNER stakeholder survey in 2025 indicated that the top three wetlands' stressors were 1) coastal development, 2) hydrologic alteration to wetlands, and 3) degradation of wetlands caused by contamination. These stressors have been reported as drivers of wetland degradation on previous assessments, including the most recent assessment for the 2023-2025 cycle.

Coastal development remains the foremost threat to mangrove and other coastal wetlands, driven by ongoing residential, tourism, and transportation infrastructure expansion. Mangrove systems continue to be filled for housing developments, highways, and landfills. Data from OGPe and PRPB indicate that coastal construction activity has remained elevated through fiscal year 2023, with total construction investment reaching $5.73 billion—the majority concentrated in coastal regions—though disaggregated permit statistics for the 2023–2025 period by coastal municipality are not yet publicly available. Still, island-wide construction investment increased 18.9% from FY 2023 to FY 2024, reaching $7.14 billion, with most of this activity concentrated in coastal regions. NOAA's 2025 evaluation of Puerto Rico's Coastal Management Program identified concerns regarding interagency coordination on coastal permitting and enforcement within the maritime terrestrial zone, where wetlands are particularly vulnerable. Stakeholders from NOAA and local NGOs have emphasized that coastal gentrification is exacerbating habitat loss by incentivizing new construction in zones previously occupied by natural wetlands while displacing communities and fragmenting habitats.

Hydrologic alteration represents a second critical stressor, fundamentally compromising wetland structure and function. Road construction, flood diversion schemes, and drainage modifications have disrupted tidal exchange and freshwater inputs essential for wetland health. Long-term hydrological monitoring by the U.S. Geological Survey (USGS) has documented substantial interannual variability in precipitation and streamflow patterns across Puerto Rico, with periods of below-average rainfall and aquifer depletion recorded during multi-year drought cycles, such as the 1986-2004 period when the South Coast aquifer experienced significant storage depletion. More recently, drought conditions were observed across Puerto Rico through late 2023 and early 2024, with particularly severe impacts on groundwater levels in the south-southeast coastal zone. The 2024 Puerto Rico Integrated Water Quality Report documented widespread hydrologic alterations through 358 assessment units, noting that degraded connectivity and altered hydrology remain primary limiting factors for wetland function and restoration success.

Contamination from land-based sources continues to degrade wetland water quality and ecological integrity across Puerto Rico's coastal zone. EPA's 2023 NPDES Program and Permit Quality Review for Puerto Rico found that while permits were generally protective of water quality, water quality-based effluent limitations are not independently derived by EPA and rely heavily on DNER Section 401 certifications, creating potential gaps in pollutant control. The 2024 Puerto Rico Integrated Water Quality Report (covering monitoring data from October 2021 to September 2023) documented widespread impairments from point and nonpoint sources across coastal and estuarine systems, with Enterococci, total nitrogen, total phosphorus, and turbidity as the most common pollutants affecting wetlands and adjacent marine habitats. Sediment and nutrient loading from poorly managed construction sites, unpaved roads, inadequate septic systems, and agricultural operations remain primary contributors to wetland degradation.

3. Are there emerging issues of concern but which lack sufficient information to evaluate the level of the potential threat? If so, please list. Include additional lines if needed.

Emerging Issue	Information Needed
Outdated wetland inventory	Updated island-wide wetland inventory

In-Depth Management Characterization

Purpose: To determine the effectiveness of management efforts to address identified problems related to the wetland's enhancement objective.

1. For each additional wetland management category below that was not already discussed as part of the Phase I assessment, indicate if the approach is employed by the state or territory and if significant state- or territory-level changes (positive or negative) have occurred since the last assessment.

Significant Changes in Wetland Management

Management Category	**Employed By State or Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Changes Since Last Assessment** (Y or N)
Wetland assessment methodologies	Y	Y	N
Wetland mapping and GIS	Y	Y	Y
Watershed or special area management plans addressing wetlands	Y	Y	Y
Wetland technical assistance, education, and outreach	Y	Y	N

2. For management categories with significant changes since the last assessment, briefly provide the information below. If this information is provided under another enhancement area or section of the document, please provide a reference to the other section rather than duplicate the information.
    a. Describe significant changes since the last assessment;
    b. Specify if they were 309 or other CZM-driven changes; and
    c. Characterize the outcomes or likely future outcomes of the changes.

Planning: Puerto Rico is finalizing its Comprehensive Wetland Conservation and Management Plan for coastal wetlands, which is due to finalize approvals and publications over the coming months. This planning instrument is expected to improve land use and natural resource conservation processes in Puerto Rico.

3. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the State's or territory's management efforts in protecting, restoring, and enhancing coastal wetlands since the last assessment. If none, is there any information that you are lacking to assess the effectiveness of the State's or territory's management efforts?

There are several published and unpublished studies and reports that provide findings, highlight needs, and offer recommendations on the effectiveness of Puerto Rico's existing coastal wetlands management regime—some of the most relevant are described below.

Research/Data/Information: The Commonwealth is lacking current and consistent data and information on wetlands status and trends; impacts information on coastal mangroves, wetlands, and seagrasses; and standard methods for mapping and classification of the coastal areas that would allow the program to much more accurately assess management efforts, identify priority threats, and prioritize restoration efforts. Puerto Rico also lacks a baseline characterization of wetlands and a monitoring system that could be used to compare the before and after conditions once restoration or enhancement projects are implemented. That monitoring system could also be used in support of coastal monitoring, improving zoning, and designing more effective regulations. (*Source: Conversations with William Gould, January 2021; DNER 2020, Conversion and recovery of Puerto Rican mangroves: 200 years of change (2008)*). Additionally, Puerto Rico also lacks island-wide wetland migration studies to determine potential effects from sea level rise, such as wetland type conversion due to increases in salinity. Site-specific studies have been conducted by the U.S. Fish and Wildlife Service using SLAMM (Sea Level Marsh Migration Modeling) in two refuges on the South Coast, but other studies are not known at this time. (DNER conversation)

Enforcement/Planning and Policy Development: The response by stakeholders to the DNER stakeholder survey question under previous Section 309 cycles, as well as a number of other reports and studies, consistently stated that some of the greatest opportunities/needs to improve management of wetlands in Puerto Rico are (1) improving enforcement of existing authorities, (2) making improvements to the Puerto Rico land use plans, and (3) improving prioritized restoration. For coastal and marine systems, coastal zone management or land use policies and plans should address erosion, impacts from coastal hazards, extreme events to seagrass and corals, and be more proactive towards promoting restoration projects and sound management of human activities in seagrass and coral habitats. (*Sources: Draft State of the Coast Work Group 2 Ecosystems and Biodiversity and Work Group 3- Society & Economy (2022); 2021 Courses of Action (COAs) to correct, mitigate and prevent the effects of climate change in the Puerto Rico Coastal Zone Puerto Rico Climate Change Experts and Advisors Committee (CEACC); 2021 South Atlantic Coastal Study Puerto Rico Appendix (US Army Corps of Engineers).*

Identification of Priorities

1. Considering changes in wetlands and wetland management since the last assessment and stakeholder input, identify and briefly describe the top one to three management priorities where there is the greatest opportunity for the CMP to improve its ability to more effectively respond to significant wetlands stressors. *(Approximately 1-3 sentences per management priority.)*

***Management Priority 1**:* Update scientific data and best management practices for wetland conservation

Description: The PRCZMP needs to scale up its use of best available data and management practices to support effective wetland conservation. To this end, there is a need to finalize the efforts on developing suggested guidance for wetlands restoration and for facilitating the promotion and use of natural infrastructure over hard infrastructure. Also, there is a need to continue modelling impacts from changes in sea level and other environmental conditions prompting wetlands migration in priority areas. In addition, the PRCZMP needs to identify long-term funding sources that complement Section 309 funds to implement identified restoration priorities to make up for losses during hurricanes Irma, Maria, and Fiona.

***Management Priority 2**:* Strengthen the enforcement of laws and regulations for wetland conservation, MTZ delineation, and land use planning

Description: The Commonwealth needs to identify ways to improve the efficacy of the enforcement of policies and regulations to conserve coastal wetlands, improve management of the MTZ, and reduce land-based sources of pollution that impact mangroves, sea grasses, and other coastal wetlands. Also, there is a need to identify how current land use and management practices are considering the dynamic changes from observed and projected migration of coastal wetlands to ensure compliance with existing conservation regulations and improved enforcement practices across Commonwealth agencies.

Priority Needs	**Need?** (Y or N)	**Brief Explanation of Need/Gap**
Research	Y	• Island-wide wetland migration studies to determine potential effects from sea level rise, such as wetland type conversion due to increases in salinity • Economic analyses regarding alternate development materials methods, cost benefit assessment of restoration methods and options for wetlands and related ecosystems • Better understanding of ecosystem services provided by wetlands as part of social-ecological systems
Mapping/GIS	Y	• Setup and review a process that aligns and helps keep updated the official line of reference (“*Sistema de Referencia Oficial para el Deslinde de la Zona Maritimo Terrestre*”). • Finalize current inventory of wetlands • Finalize analysis of wetlands areas in need of restoration, highlighting their provision of ecosystem services to most effectively prioritize restoration efforts
Data and information management	Y	• Baseline characterizations of wetlands that could be used to compare the before and after conditions once restoration or enhancement projects are implemented
Training/capacity building	Y	• Training for rangers, relevant administrative and judicial staff on identifying, reporting, and executing violations. This may include improvements to the

		violation procedures. Training for other police/partners.
Decision-support tools	Y	• Develop a list of priority areas for wetland restoration, to guide restoration actions making best use of limited resources to maximize ecosystem, social and economic benefits.
Communication and outreach	Y	• Develop education programs for relevant regulatory programs for developers, contractors, engineers and the communities. Most of this work will be conducted and/or coordinated through the 306 Program.
Other (policy)	Y	• Improve existing administrative or judicial procedures to more effectively impose fines for violations identified by Rangers • Clarify the use and implications of waivers and exemptions to setback policy and identify options to revise the use and application of waivers and exemptions for permitting and land use considerations. • Revise regulations for post-storm repairs redevelopment of structures to limit the repair of damaged structures in coastal hazard high areas. • Promote integration of observed trends and projections of hydrologic, climatologic, carbon, nitrogen and phosphorus nutrient cycles to assess their impacts in relevant environmental and land use planning regulations in Puerto Rico.
Other (Planning)	Y	• Complete development of the Comprehensive Plan for the Management and Restoration of Coastal Wetlands. • Develop interagency MOU identifying agency roles and responsibilities for wetland protection, restoration and mitigation, identification of conflicts or incompatible uses of wetland resources, and identification of those wetlands that are providing multiple ecosystem services.

Enhancement Area Strategy Development

1. Will the CMP develop one or more strategies for this enhancement area?

Yes ___X__

No _______

2. Briefly explain why a strategy will or will not be developed for this enhancement area.

A strategy will be developed to address management priorities in the Wetlands Assessment. The PRCZMP is proposing to develop a cross-cutting strategy and program change focusing on wetland restoration and coastal hazard mitigation, to promote the (1) implementation of natural and nature-based infrastructure (NNBI), that is, natural systems or engineered systems that mimic natural processes built to minimize flooding, erosion, and runoff; and (2) restoration of natural protective features, such as seagrass beds, mangroves, beaches and dunes and healthy watersheds, to reduce impacts to vulnerable and at-risk communities while enhancing habitats for fish & wildlife and overall ecosystem resilience. This cross-cutting strategy and program change will address management priorities in this Wetlands Assessment as well as the Coastal Hazards Assessment.

Coastal Hazards

In-Depth Resource Characterization

1. Based on the characterization of coastal hazard risk, what are the three most significant coastal hazards[23] within your coastal zone? Also indicate the geographic scope of the hazard, i.e., is it prevalent throughout the coastal zone, or are there specific areas most at risk?

	Type of Hazard	**Geographic Scope** (throughout coastal zone or specific areas most threatened)
Hazard 1	Coastal Erosion	Coast-wide with hotspots in Mayagüez Urban Zone, Arecibo, Arecibo, Barceloneta, Loíza, Luquillo, Rincón Urban Zone, Vega Baja, Arroyo, Cabo Rojo, Guánica, Guánica Zona Urbana, Guayama, Guayanilla, Potala Pastillo Community, Lajas, Ponce, Ponce Urban Zone, Playita Cortada Community, Santa Isabel, Central Aguirre Community, Salinas, Cataño Urban Zone, Ceiba
Hazard 2	Sea Level Rise	Coast-wide with hotspots in Mayagüez Urban Zone, Arecibo, Arecibo Urban Zone, Loíza, Barceloneta, Carolina, Vega Baja, Arroyo, Cabo Rojo, Guánica, Guánica Zona Urbana, Guayama, Guayanilla, Potala Pastillo Community, Lajas, Ponce, Ponce Urban Zone, Playita Cortada Community, Santa Isabel, Central Aguirre Community, Salinas, Cataño Urban Zone, Ceiba
Hazard 3	Flooding	Coastal wide with hotspots in Mayagüez Urban Zone, Arecibo, Arecibo Urban Zone, Vega Baja, Arroyo, Cabo Rojo, Guánica, Guánica Zona Urbana, Guayama, Guayanilla, Potala Pastillo Community, Lajas, Ponce, Ponce Urban Zone, Playita Cortada Community, Santa Isabel, Central Aguirre Community, Salinas, Cataño Urban Zone, Ceiba *

Sources: Final Draft South Atlantic Coastal Study, US Army Corps of Engineers, October 2021 Table 4-2; CDBG Hazard-Mitigation Action Plan, Risk assessment Appendix A, and discussion with NOAA RISA Staff.

2. Briefly explain why these are currently the most significant coastal hazards within the coastal zone. Cite stakeholder input and/or existing reports or studies to support this assessment.

[23] See list of coastal hazards on p. 16-17 of this document.

These are the most significant impacts based on findings from the 2021 update of the State Hazards Mitigation Plan, the CDBG Hazard Risk Assessment Report, the Army Corps South Atlantic Coastal Study, and stakeholder surveys. In addition, the respondents to the DNER 2025 stakeholder survey identified erosion, sea level rise, and flooding as posing the highest threats to the coastal zone, with coastal storms, saltwater intrusion, earthquakes, and tsunamis as lower threats than the top three.

3. Are there emerging issues of concern, but which lack sufficient information to evaluate the level of the potential threat? If so, please list. Include additional lines if needed.

Emerging Issue	Information Needed
Coastal Erosion	Needs better tools and information to continue monitoring coastal erosion and migration of coastal habitats. Identify areas where development would need to be restricted or existing development moved if the Commonwealth wished to maintain those beaches where natural and nature-based measures will not stop the impingement of beaches.
Threats from Droughts, extreme Rain events	Needs more understanding of impacts at a more granular level to reduce uncertainty

In-Depth Management Characterization

Purpose: To determine the effectiveness of management efforts to address identified problems related to the coastal hazards' enhancement objective.

1. For each coastal hazard management category below, indicate if the approach is employed by the state or territory and if there has been a significant change since the last assessment.

Significant Changes in Coastal Hazards Statutes, Regulations, and Policies

Management Category	Employed by State/Territory (Y or N)	CMP Provides Assistance to Locals that Employ (Y or N)	Significant Change Since the Last Assessment (Y or N)
Shorefront setbacks/no build areas	Y	Y	N
Rolling easements	N	N	N
Repair/rebuilding restrictions	Y	Y	N
Hard shoreline protection structure restrictions	N	N	N
Promotion of alternative shoreline stabilization methodologies (i.e., living shorelines/green infrastructure)	Y	Y	Y (dune projects)
Repair/replacement of shore protection structure restrictions	Y	Y	N
Inlet management	N	N	N
Protection of important natural resources for hazard mitigation benefits (e.g., dunes, wetlands, barrier islands, coral reefs) (other than setbacks/no build areas)	Y	Y	N
Repetitive flood loss policies (e.g., relocation, buyouts)	Y	Y	N
Freeboard requirements	Y	Y	N
Real estate sales disclosure requirements	N	N	N
Restrictions on publicly funded infrastructure	Y	N	N
Infrastructure protection (e.g., considering hazards in siting and design)	N	N	N

Significant Changes to Coastal Hazard Management Planning Programs or Initiatives

Management Category	**Employed by State/Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Change Since the Last Assessment** (Y or N)
Hazard mitigation plans	Y	Y	Y
Sea level rise/Great Lake level change or adaptation plans	Y	Y	Y
Statewide requirement for local post-disaster recovery planning	N	N	N
Sediment management plans	N	N	N
Beach nourishment plans	N	N	N
Special Area Management Plans (that address hazards issues)	Y	Y	N
Managed retreat plans	Y	Y	N

Significant Changes to Coastal Hazard Research, Mapping, and Education Programs or Initiatives

Management Category	**Employed by State/Territory** (Y or N)	**CMP Provides Assistance to Locals that Employ** (Y or N)	**Significant Change Since the Last Assessment** (Y or N)
General hazards mapping or modeling	Y	Y	Y
Sea level rise mapping or modeling	Y	Y	Y
Hazards monitoring (e.g., erosion rate, shoreline change, high-water marks)	Y	Y	Y
Hazards education and outreach	Y	Y	Y

2. Identify and describe the conclusions of any studies that have been done that illustrate the effectiveness of the state's management efforts in addressing coastal hazards since the last assessment. If none, is there any information that you are lacking to assess the effectiveness of the state's management efforts?

There are quite a few published and unpublished studies and reports, especially post Hurricane Maria, that provide findings, highlight needs, and offer recommendations on the effectiveness of Puerto Rico's existing coastal hazards management regime. Some of the most relevant include:

- 2021 Courses of Action (COAs) to correct, mitigate and prevent the effects of climate change in the Puerto Rico Coastal Zone Puerto Rico Climate Change Experts and Advisors Committee (CEACC)

- 2021 Puerto Rico Natural Hazards Mitigation Plan
- 2021 Climate/Coastal Vulnerability in Puerto Rico Story Map (CoRePI- Barreto)
- 2021 Army Corps of Engineers South Atlantic Study – Puerto Rico Appendix
- 2021 State of the Beaches Report (Surfrider Foundation)
- 2020 Puerto Rico's Hazard Risk Assessment (Uni. Central Florida)
- 2018 Reimagina Puerto Rico Natural Infrastructure Sector Report (Resilient Puerto Rico Advisory Commission)
- 2018 NCR17 - Reduce Coastal Erosion

These reports noted many needs associated with the current management regime, with several principal themes emerging from the reports and surveys:

1. There is continued development in flood hazard areas, in the MTZ, coastal development continues to destroy or degrade natural protective features, storm damaged structures are allowed to be rebuilt in high hazard areas.
2. There is a need to enhance enforcement of existing land use regulations and other coastal zone management rules and the Puerto Rico Land Use.
3. There is a need to enhance or develop policies to improve management of development along the coastline, for protection of beaches and dunes, that limit shore hardening structures (which have been shown to exacerbate beach erosion), that appropriately set back coastal construction; and limit post-storm redevelopment of storm-damaged properties.
4. There is a need to develop a sediment management plan to address illegal sand mining at river mouths, beaches, and sand dunes, and to assist in managing erosion of the ecologically important sandy coastline.

Identification of Priorities

1. Considering changes in coastal hazard risk and coastal hazard management since the last assessment and stakeholder input, identify and briefly describe the top one to three management priorities where there is the greatest opportunity for the CMP to improve its ability to more effectively address the most significant hazard risks. *(Approximately 1-3 sentences per management priority.)*

Management Priority 1: <u>Improve enforcement of laws and regulations</u>

Description: Inconsistent interagency coordination structures and critical vacancies across key agencies significantly constrain Puerto Rico's ability to enforce existing coastal laws and regulations. Persistent gaps in technical and legal staffing within the DNER, as well as partner planning and permitting entities, reduce capacity for permit review, maritime terrestrial zone delineation, and timely follow-up on violations, while existing coordination mechanisms have not yet achieved consistent, integrated enforcement across jurisdictions. As a result, overlapping mandates, limited information sharing, and uneven field presence undermine the effective application of coastal protection instruments, and highlight the need to strengthen coordination frameworks and address vacancies to ensure that the current legal and regulatory tools can be fully and consistently implemented.

More specifically , there is a need to strengthen the enforcement of existing laws and regulations related to coastal zone management, disaster risk reduction, and land use planning (e.g. the Maritime Terrestrial Zone regulation 4860, and Planning Board regulations 3, 4, 13, the Puerto Rico Land Use Plan, and the Joint Land Use Regulation) through new and innovative legal and administrative pathways that help DNER and other government agencies overcome their enforcement challenges. This entails rethinking current institutional arrangements and governance mechanisms to enable agencies to act more decisively and cohesively in ensuring compliance with coastal zone management policies, including for emerging coastal hazards such as coastal erosion. The Commonwealth would benefit from assessing innovative approaches to improve its ability to apply and enforce statutes effectively and efficiently, ensuring that coastal protection objectives are fully met.

Management Priority 2: Support implementation of the Coastal Resilience Program

Description: Implementation of the Strategy during the 2023–2025 Section 309 funding cycle was affected by leadership transitions within the Puerto Rico government and organizational changes in recruitment and talent acquisition processes at DNER, which impacted the timeline for filling key personnel positions. These institutional transitions affected the staffing of the Coastal Resilience Program (CRP) Coordinator position, which carries responsibility for coordinating cross-cutting Strategy implementation and integration of multiple program activities, thereby prolonging the establishment of full programmatic capacity. Notwithstanding these constraints on staffing continuity, DNER advanced significant technical and policy deliverables during the cycle, including completion of the Adaptive Restoration Guidance and the Puerto Rico Nature-Based and Nature-Nurturing Built Infrastructure (PR NNBI) Guidance.

Following on the initial actions to implement the Coastal Resilience Program under Section 309 2023-2025 cycle, there is a need to continue developing a comprehensive program that includes and reinforces the following activities:

1. Develop policies for appropriate and allowable shoreline protection measures for specific types of shorelines that would prioritize natural or nature-based approaches, including living shorelines, wherever feasible, identify the suitability for natural and nature-based protection measures for specific types of shorelines and identify where shore hardening structures would be prohibited.
2. Enhance or develop specific policies, standardized guidance for the conservation and restoration of natural protective features such as mangroves, beaches and dunes.
3. Enhance or develop policies establish variable setbacks form high hazard areas and protective features depending on types of shorelines that incorporate coastal erosion, inundation from storm surge now and as impacted by sea level rise, as well as the FEMA advisory flood hazard areas.

4. Identify and require best practices, appropriate adaptation measures for development adjacent to high hazard areas to reduce the vulnerability of people and property and mitigate impacts to natural protective features.
5. Identify areas where development would need to be restricted or existing development moved if the Commonwealth wished to maintain those beaches where natural and nature-based measures will not stop the impingement of beaches.
6. Identify priority areas for restoration projects.

Management Priority 3: Promote Commonwealth incorporation of best available science and best management practices

Description: The PRCZMP needs to scale up its use of best available data and management practices to support effective coastal zone management practices, including incorporating hazard mitigation principles to strengthen its management activities. To this end, there is a need to develop suggested guidance for facilitating the promotion and use of natural infrastructure over hard infrastructure. Also, there is a need to continue modelling impacts from changes in sea level and other environmental conditions prompting ecosystem changes in priority areas. In addition, the PRCZMP needs to identify long-term funding sources that complement Section 309 funds to implement identified restoration priorities to make up for losses during hurricanes Irma, Maria, and Fiona.

2. Identify and briefly explain priority needs and information gaps the CMP has for addressing the management priorities identified above. The needs and gaps identified here should not be limited to those items that will be addressed through a Section 309 strategy but should include any items that will be part of a strategy.

Priority Needs	**Need?** (Y or N)	Brief Explanation of Need/Gap

Research	Y	• Research on the effectiveness and appropriateness of various natural and nature-based shoreline protection measures in Puerto Rico • Accurate-updated NOAA-validated sea level rise projections and Accurate LiDAR bathy-topo grid to model sea level rise projections and potential effects and impacts on coastal communities' assets, natural protective features that will inform consideration of sea level rise in regulatory and planning policy changes • Legal and institutional policy analysis to implement portions of comprehensive shoreline /beach management plan • Better model and forecast *compound flooding* from coastal and fluvial events (Corps SACs) as well as urban flooding --storm water backup from imperviousness, extreme rain events and SLR) • Socio-economic and ecological vulnerability studies to inform restoration priorities. • Update Puerto Rico Vertical Datum (PRVD 2002) for Southwest of the main island affected by vertical negative landmass movements after the 2019-2020 earthquakes and seismic sequence
Mapping/GIS/modeling	Y	• Mapping of areas vulnerable to existing erosion storm surge and as they will be impacted by sea level rise to inform and support policy and plan changes
Data and information management	Y	• Enhance or develop visualization/analytical tools tailored to decision makers and other coastal managers to support successful development and adoption of policies and plans
Training/Capacity building	Y	• Develop orientation and training programs for permitting and enforcement officials (Rangers or others) to enhance the understanding of coastal hazards management and laws and regulations intended to enhance resiliency. Trainings could be developed in coordination with Puerto Rico Sea Grant, the Jobos Bay National Estuarine Research Reserve (NERR) Coastal Training Program, NGOs or others
Decision-support tools	Y	• Enhance or develop visualization/analytical tools tailored to decision makers and other coastal

		managers to support successful development and adoption of policies and plans
Communication and outreach	Y	• Education about current and projected erosion and storm surge, the impacts of shore hardening structures, the suitability and effectiveness of conservation of natural protective features and use of natural and nature-based shoreline protection responses for municipalities and elected officials as well as the public
Other (Policy implementation)	Y	• Promoted the use of natural and nature-based infrastructure • Strengthen/develop policies to enhance coastal resilience (e.g., development setbacks) • Promote the incorporation of coastal erosion considerations on land use planning regulations and instruments

Enhancement Area Strategy Development

1. Will the CMP develop one or more strategies for this enhancement area?

   Yes ___X___

   No _______

2. Briefly explain why a strategy will or will not be developed for this enhancement area.

A strategy will be developed to address management priorities in the Wetlands Assessment. The PRCZMP is proposing to develop a cross-cutting strategy and program change focusing on wetland restoration and coastal hazard mitigation, to promote the (1) implementation of natural and nature-based infrastructure (NNBI), that is, natural systems or engineered systems that mimic natural processes built to minimize flooding, erosion, and runoff; and (2) restoration of natural protective features, such as seagrass beds, mangroves, beaches and dunes, and healthy watersheds, to reduce impacts to vulnerable and at-risk communities while enhancing habitats for fish & wildlife and overall ecosystem resilience. This cross-cutting strategy and program change will address management priorities in this Wetlands Assessment as well as the Coastal Hazards Assessment.

Strategy: Advance Coastal Resilience Program

I. Issue Area(s)

A. The proposed strategy or implementation activities will *primarily* support the following high-priority enhancement area(s) *(check no more than two):*

☐ Aquaculture
☐ Energy and Government Facility Siting
X Coastal Hazards
☐ Ocean Resources
☐ Special Area Management Planning
☐ Cumulative and Secondary Impacts
X Wetlands
☐ Marine Debris
☐ Public Access

B. The proposed strategy or implementation activities will also support the following enhancement areas *(check all that apply)*:

☐ Aquaculture
☐ Energy and Government Facility Siting
☐ Coastal Hazards
☐ Ocean Resources
☐ Special Area Management Planning
X Cumulative and Secondary Impacts
☐ Wetlands
☐ Marine Debris
X Public Access

II. Strategy Description

A. The proposed strategy will lead to, or implement, the following types of program changes *(check all that apply):*

☐ A change to coastal zone boundaries;

X New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;

X New or revised local coastal programs and implementing ordinances;

☐ New or revised coastal land acquisition, management, and restoration programs;

☐ New or revised special area management plans (SAMP) or plans for areas of particular concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,

X New or revised guidelines, procedures, and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government, and other agencies that will result in meaningful improvements in coastal resource management.

B. *Strategy Goal:*

The Puerto Rico Coastal Zone Management Program (PRCZMP) proposes to strengthen and advance the Puerto Rico Coastal Resilience Program (CRP hereafter), which began its implementation in 2023. The CRP will continue to promote the implementation of natural and nature-based infrastructure (NNBI), and restoration of natural protective features to reduce coastal hazard impacts to vulnerable and underserved communities, while enhancing habitats for fish & wildlife and overall ecosystem resilience.

Implementation during the 2023–2025 cycle was affected by leadership transitions within the Puerto Rico government and organizational changes in recruitment and talent acquisition processes at DNER, which extended the timeline for filling key personnel positions critical to Strategy execution. The institutional stabilization achieved during this period, marked by establishment of consistent leadership within DNER and refinement of recruitment protocols, positions the agency to advance personnel hiring and capacity building more expeditiously in the 2026–2030 cycle. This trajectory is evidenced by the successful recruitment and graduation of 65 new rangers in July 2025, which demonstrates DNER’s capacity to execute large-scale hiring initiatives and strengthens field enforcement capacity in support of coastal zone management objectives. Also in May 2024, PRCZMP provided a targeted training to DNER Rangers across the island on MTZ and Puerto Rico public domains.

The CRP remains critical to advancing Puerto Rico’s coastal stewardship mission given the continued pressures on coastal ecosystems and communities. Puerto Rico’s shorelines face compounding coastal hazards, including accelerated sea-level rise, increased storm surge and wave action, and coastal erosion, while unauthorized coastal development and the loss of natural protective features—including mangroves and wetlands—continue to reduce ecosystem resilience and increase risk exposure for coastal infrastructure and at-risk populations. Enforcement of coastal permitting and development oversight is constrained by persistent gaps in inter-agency coordination mechanisms among DNER, the Permits Management Office (OGPe), Planning Board, and municipal authorities, despite the existence of regulatory frameworks established through Law 161-2009 and subsequent Joint Permitting Regulations, which underscores the need to strengthen collaborative implementation structures across jurisdictional and institutional boundaries. The Coastal Resilience Program provides a mechanism through which DNER can mobilize technical capacity, facilitate inter-agency coordination, advance nature-based solutions, and strengthen the institutional and regulatory foundations necessary to operationalize existing coastal protection mandates and build disaster risk reduction capacity in the face of accelerating coastal change. Sustained investment in this Program is essential to ensure that Puerto Rico's diverse coastal communities and at-risk ecosystems can effectively manage coastal hazard exposure and maintain resource conservation standards.

The CRP will prioritize restoration efforts that benefit at-risk coastal communities. This Program will be a cross-cutting strategy and program change that will address, in part, all three of the high priority enhancement areas identified in the Assessment including: enhancing community resilience to coastal hazards, enhancing natural protective features that provide habitat by restoring coastal sea grasses, mangroves beaches and dunes devastated during hurricane Maria, and reducing cumulative impacts from excessive runoff from implementation of green infrastructure.

The CRP will have several elements that will be developed over time. Those elements include initiating and continue developing the following:

(1) adaptive guidance to guide the design, construction, maintenance and monitoring of restoration and NNBI projects, tailored to Puerto Rico;
(2) a mitigation sequence to guide shoreline erosion response measures that prioritizes green or hybrid NNBI whenever possible;
(3) a Memorandum of Understanding (MOU) that will promote the use of NNBI in Puerto Rico and require the use of the Restoration and NNBI guidance by Commonwealth agencies and any federal or NGO signatories;
(4) more diversified and reliable funding opportunities for restoration and NNBI projects in Puerto Rico; and
(5) a process that will prioritize enhancing resilience of at-risk coastal communities.

The continuation of the CRP will be undertaken with a wide range of partners including: the DNER, PRPB, the OGPe, affected municipalities, Puerto Rico Sea Grant and others in academia, US EPA Caribbean Office, FEMA Coastal Resilience Center, NOAA Office for Coastal Management, DOI Forest Service, US Army Corps of Engineers and relevant NGOs (e.g., TNC, Protectores de Cuencas, etc.). It will keep building on numerous existing national, regional, and other CZM Program restoration and NNBI guidance documents, past risk and vulnerability and resilience assessments, and ongoing initiatives. The CRP will continue to be an interdisciplinary effort with input from coastal biologists, ecologists, geologists, planners, engineers, landscape architects, legal counsel and the communities it will impact. Moreover, the continuity of this program will serve to harmonize the future restoration, and NNBI implementation efforts across various agencies and NGOs.

C. Description

The CRP will be guided by a CRP Coordinator, who will be funded by 309 funds. The Coordinator will oversee day to day development of all aspects of the CRP from contract management, progress report writing, meeting and call planning, report and document editing among other things. The Coordinator will also lead the prioritization of restoration sites and development of the CRP Memorandum of Understanding (MOU) tasks. The recruitment of the CRP Coordinator is currently under way, as this role present a vital element to the success of the Strategy.

In the first part of the Strategy, the CRP will prioritize restoration sites as well as finalize developing two guidance documents for coastal restoration and implementation of natural and nature-based infrastructure projects.

Prioritize Natural Features Restoration Sites

The Coordinator and an ad-hoc advisory group will develop criteria to prioritize natural protective features (e.g., sea grasses, dunes, mangroves) and build on work done on the Comprehensive Wetlands Conservation and Management plan and existing inventories and apply criteria to determine priority restoration sites for the CRP. These criteria would include factors such as the degree to which the restoration will: enhance community resilience; target at-risk communities; enhance habitat, and water quality values; among other criteria. This work will build on the 2020 Coastal Resilience Assessment (NFWF, et. al) and the USACE SACS Environmental Analysis Web Application, and other relevant decision support tools.

Adaptive Restoration Guidance

A consultant will be hired to work with the Jobos Bay NERR, PR Sea Grant and other academics, relevant Commonwealth and federal agencies, municipalities and NGOs to develop the best available science-based restoration guidance tailored to Puerto Rico. This guidance will focus on developing a more friendly and easy to use guide for stakeholders in Puerto Rico, building upon the various tools and information available to transform information into action.

This work will build on existing Caribbean and other recent restoration guidance (e.g., “Manual for The Ecological Restoration of Mangroves for The Wider Caribbean Region,” “Reducing Caribbean Risk: Opportunities for Cost-Effective Mangrove Restoration and Insurance,” “Guidelines on Mangrove Ecosystem Restoration for the Western Indian Ocean Region,” “Coastal Engineering Handbook I, II and III”, and the Second State of Puerto Rico’s Climate Report). This guidance will standardize best practices for the design, construction, monitoring and maintenance of successful restoration projects for coastal natural protective features that will maximize habitat and resilience benefits. Regarding dune restoration, this guidance should include a protocol for the relocation of sand that is displaced by storms as well as protocols for the protection of sea turtles and their nests. The guidance is intended to be adaptive, as it would be based on the existing best available science. It is intended to be a living document that could be updated in the future, informed by new research and studies.

Develop Natural and Nature-Based Infrastructure Guidance:

A consultant will collaborate with academics, Colegio de Ingenieros y Agrimensores, relevant Commonwealth and federal agencies, the Coastal States Organization and other relevant State or territorial Coastal Programs, municipalities and NGOs to develop an actionable guide to assess, implement and evaluate outcomes of natural and nature-based infrastructure for Puerto Rico. This actionable guidance will use the best available, science-based and evidence-based information available to aid stakeholders (e.g., landowners, planners, coastal engineers, contractors, permitting staff and NGOs). identify the effectiveness, cost and suitability of various NNBI in Puerto Rico. The guide will also standardize best practices for the design, construction, monitoring and maintenance of successful NNBI projects specifically for Puerto Rico.

This guidance will build on existing guidance, including:

- Compendium of Federal Nature-Based Resources for Coastal Communities, States, Tribes, And Territories.
- FEMA's Building Community Resilience with Nature-Based Solutions: A Guide for Local Communities.
- FEMA's Natural and Nature-Based Solutions Job Aids
- The Army Corps of Engineers International Guidelines on Natural and Nature-Based Features for Flood Risk Management.
- The IDB's Nature-Based Solutions in Latin America and the Caribbean.
- The Second State of Puerto Rico's Climate Report.
- NOAA Guide to Assessing Green Infrastructure Costs and Benefits for Flood Reduction.
- Best practices from other CZM Programs in the US such as Texas, Alabama, Mississippi among others.
- Best Practices form NOAA National Centers for Coastal and Ocean Science (NCCOS).
- Coastal Engineering Handbook I: Best Practices for Puerto Rico.
- Coastal Engineering Handbook II: Nature based Solutions for Tropical Coastal Systems.
- Coastal Engineering Handbook III: Coastal Engineering Project Evaluation Tool in Support of DNER Regulatory Process.
- TNC's Blue Carbon Explorer
- TNC's Caribbean 30x30 Conservation Dashboard

This guidance document will_establish an erosion response mitigation sequence to be followed as well as build on the "NOAA Guide to Assessing Green Infrastructure Costs and Benefits for Flood Reduction". It will describe the effectiveness and cost of various green-to-gray NNBI to be used for coastal hazards, including coastal erosion response, coastal flooding and/or stormwater runoff attenuation in different conditions found in Puerto Rico. The guidance will provide stakeholders with actionable and easy-to-use tools to select, design construct the most cost-effective NNBI responses to coastal flooding and storm surge, erosion, and flooding from runoff. The document will be developed using the current best science and information. It is intended to be updated over the coming years, as informed by new research and studies.

In the second part of the strategy, work will be undertaken to position the CRP to diversify ongoing funding for restoration and NNBI projects, develop a CRP Memorandum of Agreement (MOU), and develop a regulatory component of the program.

Diversify Funding Sources for Restoration or Natural and Nature-Based Projects:

A consultant will be selected to identify dedicated, reliable funding sources that complement CZMA Section 306A and 309 funds to assist with the implementation of the restoration projects and NNBI in Puerto Rico. The consultant will identify the most promising grants, foundation or other funding (e.g. FEMA, HUD, NFWF, CRGP) that could fund/implement priority restoration or NNBI projects. They will develop information on application schedules, contacts, requirements, and examples of successful grant applications to assist in developing future applications for these identified funds.

The consultant will play a pivotal role in identifying, developing, and securing sustainable funding sources to support the implementation of the CRP. This includes working closely with the Department of Treasury to assess the feasibility of allocating permitting violation fines, user fees, or dedicated taxes into DNER's special fund (*fondos propios*) for restoration and NNBI projects. Beyond assessing feasibility, the consultant will proactively design strategies to expand and diversify revenue streams to support the implementation of Puerto Rico's coastal management priorities, including drafting regulatory or legislative language to dedicate specific fees or revenue mechanisms to coastal management efforts. They will collaborate with the PRCZMP leadership to conduct targeted outreach to the Legislature, the Governor's Office, and other key stakeholders to build political and financial support for these initiatives. Also, the consultant will lead efforts to identify and engage potential partners, including NGOs, private sector entities, philanthropic organizations, and federal or multilateral funding programs, aligning investment opportunities with Commonwealth priorities to leverage and maximize available funds for resilient coastal restoration and NNBI implementation.

CRP Memorandum of Understanding (MOU):

The CRP Coordinator will develop a draft amendment to an existing MOU between DNER, PRPB, and OGPe incorporating language that reinforces the interagency cooperation and collaboration to advance the goals of the CRP on restoration and coastal hazard mitigation. The MOU amendment will also set out the various roles of agencies and partners to implement the CRP. The CRP Coordinator will also lead in drafting and developing an interagency implementation workplan, facilitating interagency coordination to operationalize the MOU. The proposed MOU workplan will also bring together other relevant Commonwealth agencies and willing federal agencies and NGOs that will establish shared restoration priorities and the intended use of the guidelines for coastal resilience or other coastal restoration projects and NNBI implementation by the signatories. Finally, the MOU amendment and workplan will establish the use of an erosion response mitigation sequence in permitting erosion response requests by OGPe and autonomous municipalities. The work will involve the following: drafting preliminary MOU amendments; drafting a multi-annual strategic workplan; hosting a series of meetings and/or workshops with potential signatories to explain the purpose of the MOU and obtain feedback on the MOU and workplan; drafting a final MOU amendment and obtaining signatures; and support interagency meetings for MOU implementation. The PRPB and DNER initiated substantive discussions in October 2025 regarding amendments to the existing Memorandum of Understanding (MOU) and have reached consensus on moving forward with this approach, positioning both agencies towards developing a joint work plan for amending the MOU as a next step, to better align inter-agency coordination mechanisms with current Coastal Resilience Program objectives.

Regulatory Implementation:

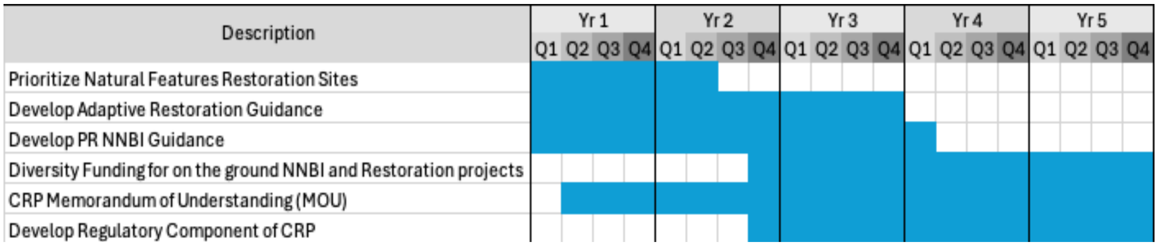
A consultant will explore the feasibility of revising various regulations or developing internal agency guidance to: (1) remove regulatory impediments to permitting NNBI or restoration projects; (2) require relevant coastal permitting actions that consider NNBI as a priority coastal erosion, coastal flooding or runoff response unless documented that NNBI is not a viable option, as well as requiring best practices in designing, constructing, monitoring and maintaining NNBI or restoration of natural protective features; (3) promote or prioritize use of NNBI for coastal flooding or runoff attenuation; and (4) adopt any guidance called for in Bill 855 if that were to become law. In addition, the regulatory consultant will draft white paper analyzing and identifying new strategies to strengthen enforcement of coastal policies and regulations for Puerto Rico. Where feasible, the consultant will develop regulatory language, or procedural guidance containing these requirements for adoption, or inclusion in one or more coastal regulations or permitting procedures, and undertake outreach program to the public, relevant agency leadership, the Legislature, and the Governor’s office to educate these groups on the purpose, needs and benefits of guidance and potential.

Puerto Rico is progressing with the implementation of the CRP based on the assumptions that it can submit and gain approval of an Assessment and Strategy for the 2026-2030 CZMA Section 309 cycle and will be able to use CZMA Section 309 funds to complete the out-year tasks and assuming funding remains constant through 2030.

Given the funding available through the CZMA 309 budget, the PRCZMP had initiated pursue parts of this comprehensive CRP after approval of the 2020-2025 cycle in 2022 and looks to continue leading this effort through the upcoming 2026-2030 cycle.

In addition, given the current level of Section 309 Formula funding available to the Commonwealth, the CRP will be developed using current, best available science. However, if possible, the Puerto Rico Coastal Program is anticipating that it would submit Projects of Special Merit to develop projects to conduct research to gain better science on the effectiveness and costs of various restoration and NNBI practices, and thus refine the final guidance based on those findings. Otherwise, those refinements would have to wait development of that information using out-year Commonwealth, NOAA or other funding.

Timeline for implementation of Puerto Rico CRP – 2026-2030



Completion of the MOU and development of the regulatory component of the CRP, will be dependent on completion of the priority restoration and resilience sites and the restoration and NNBI guidance; however, there are parts of both of those projects that can and would be initiated before the guidance was finalized.

The following deliverables would be completed by the end of the current CZMA Section 309 2026-2030 cycle:

1. Develop maps and lists of Priority resilience restoration sites
2. List of best restoration practices
3. White paper on the effectiveness of current restoration practices
4. Identification of significant gaps in effectiveness of restoration data
5. Final Report on best restoration practices
6. Library of NNBI practices and menu of practices tailored for Puerto Rico
7. Report on Costs of NNBI in Puerto Rico and identifying critical gaps
8. Draft interagency MOU amendment and workplan for broader CPR implementation
9. White paper on strategies to strengthen enforcement of coastal policies and regulations in Puerto Rico

This cross-cutting strategy and program change be undertaken with a wide range of partners including: the DNER, PRPB, OGPe, selected municipalities, Academia (UPR, Puerto Rico Sea Grant); US-EPA Caribbean Office, FEMA Coastal Resilience Center, NOAA Office for Coastal Management, DOI US Fish & Wildlife Service, US DOA Forest Service, USACE and relevant NGOs (e.g., TNC, Protectores de Cuencas, etc.).

Once the Strategy is completed, PRCZMP will use Section 309 funds for two years, per NOAA guidance, to support a CRP Coordinator to assist with the implementation and provision of technical assistance for the CRP Program, as well as a grants specialist to develop applications for eligible agency and foundational funding to complement approved funds to implement priority projects.

III. Needs and Gaps Addressed

The development of the CRP will address the management priorities and needs identified in the Assessment and summarized below.

The Coastal Hazards Assessment identified the need to develop a more comprehensive coastal hazards program that include policies for appropriate and allowable shoreline protection measures that prioritize natural or nature-based approaches; standardized guidance for the conservation and restoration of natural protective features such as mangroves, beaches, and dunes; and identification of priority areas for restoration projects. The Coastal Wetlands Assessment identified the need to develop guidance for wetlands restoration, prioritize and promote natural infrastructure over hard infrastructure, and identify long-term funding sources to implement priority wetlands restoration projects.

Both the coastal hazards and wetlands assessments identified institutional capacity constraints that limit effective implementation of existing coastal management authorities. The coastal hazards assessment notes that interagency coordination challenges and critical vacancies across key agencies constrain Puerto Rico's ability to enforce coastal laws and regulations. Persistent gaps in technical and legal staffing within DNER and partner planning and permitting entities reduce capacity for permit review, maritime-terrestrial zone delineation, and timely follow-up on violations, and existing coordination mechanisms have not yet achieved consistent, integrated enforcement across jurisdictions. The wetlands assessment similarly identifies enforcement as a top management priority, with stakeholder survey respondents emphasizing that most respondents view enforcement improvements as the primary opportunity for enhanced wetlands management. Addressing these institutional capacity gaps will require filling critical positions, including the Coastal Resilience Program Coordinator, and developing training programs for permitting and enforcement officials on coastal hazards management and wetlands conservation laws and regulations.

Both assessments also document important data and information gaps that constrain evidence-based coastal management. The wetlands assessment highlights the lack of consistently collected, recent data on wetlands status and trends, noting that the most recent island-wide inventory dates to 2010 and that conflicting information exists due to the absence of comprehensive inventories and uniform definitions. Puerto Rico lacks baseline characterizations of wetlands and a monitoring system to compare conditions before and after restoration or enhancement projects, as well as island-wide wetland migration studies to determine potential effects from sea level rise. The coastal hazards assessment identifies needs for updated sea level rise projections, improved elevation data, and enhanced mapping and analytical tools to support regulatory and planning decisions.

IV. Benefits to Coastal Management

This Strategy addresses a central challenge for the Commonwealth of Puerto Rico and the PRCZMP to strengthen at-risk coastal communities and ecosystems from the adverse effects of multiple hazards and extreme events. The PRCZMP is in a unique role to convene relevant Commonwealth agencies, academics, NGOs and other stakeholders to begin to develop a comprehensive CRP. The Strategy will benefit coastal management by fulfilling demonstrated needs to enhance coastal resilience by (1) promoting restoration of priority natural protective features using standardized best available practices and methods and (2) promoting implementation of appropriate natural and nature-based infrastructure responses tailored for Puerto Rico to reduce erosion, flooding and stormwater runoff while improving ecosystem resilience.

Specifically, the CRP should result in an increase in restoration and natural or nature-based infrastructure projects with the development of a diversified funding strategy that can complement and augment current commonwealth and CZM program funding. Changes in the regulatory review of restoration or NNBI projects would also reduce the time needed to permit these projects and result in additional projects over time. The environmental benefits of additional restoration or NNBI projects include: creating additional aquatic and terrestrial plant and animal habitat; increasing water filtration and improving water quality in coastal waters; promoting nutrient uptake; retaining sediment on lands and out of waterways; reducing erosion and damage to structures by lessening wave energy impacts; preserving beaches; enhancing recreation, and education opportunities; and enhancing denitrification and carbon sequestration in the Commonwealth. It will also result in a more coordinated and consistent approach to the implementation of restoration and NNBI projects using best available science with more uniform guidance and enhanced partnerships with Commonwealth agencies, municipalities, NGOs (e.g., Protectores de Cuencas, TNC, among others), and possibly federal agencies.

V. Likelihood of Success

This Strategy will be supported by a CRP Coordinator, a full-time position likely to be environmental planner, landscape architect, natural resource manager, environmental scientist or related discipline, with assistance from coastal engineering, geologist, planning and other experts and by a range of Commonwealth, Federal and NGO partners. A new recruitment process to secure the Coastal Resources Program (CRP) Coordinator is currently underway. The PRCZMP is coordinating with DNER's new leadership and human resources teams, with expectation to secure a qualified candidate by mid-2026, which will enable full integration and coordination of cross-cutting Strategy implementation activities. To advance Strategy momentum while the CRP Coordinator recruitment is finalized, the PRCZMP may mobilize internal staffing resources as needed to provide transitional support and coordination in key program areas, ensuring continuity of implementation activities and maintaining forward progress on established priorities through the anticipated arrival of the new Coordinator.

While the PRCZMP believes that the prioritization of restoration activities and restoration guidelines and best practices, can be completed in five years, the development of guidelines for effectiveness, cost and suitability of various NNBI practices, the development of an MOU and development of regulatory component could take additional years to complete.

VI. Strategy Work Plan

The following work plan provides an overview of the activities that will be undertaken over the course of up to **five years** to develop the CRP. Specific work that will be completed in the next two years is identified, as well as work in years three through five to complete the program changes.

Strategy Goal: Advance Puerto Rico CRP
Total Years: 5
Total Budget: $750,000

YEAR 1:

Description of activities: The activities in year one will provide continuity to the efforts on the CRP from the 2023-2025 cycle. It will focus on the hiring of a CRP Coordinator, completing the work on prioritizing Natural Features Restoration Sites, continue with the development of the Puerto Rico specific Adaptive Restoration Guidance**,** the Adaptive NNBI Guidance, and **initiate** the development of the CRP interagency Memorandum of Understanding (MOU). The CRP Coordinator will be paid for by 309 funds each year during the development of the Program. The CRP Coordinator will be responsible for overseeing the day-to-day development of all aspects of the CRP (contract development management, report writing, meeting and call planning, report and document editing), as well as for leading restoration prioritization and the development of the CRP MOU.

Specific activities include:

1. The CRP coordinator will establish Ad-Hoc Prioritization Advisory Group (PAG)
2. The consultant working with CRP Coordinator will establish a small ad hoc Coastal Ecological Restoration Advisory Group (NNBI advisory Group) consisting of appropriate ecological restoration experts from Commonwealth, federal agencies, academia or NGOs
3. The NNBI consultant, with input from the advisory group will Identify Menu of NNBI practices potentially suitable for Puerto Rico.
4. The NNBI consultant, with input from the NNBI advisory group, will review existing national and regional NNBI and green infrastructure guidance as well as any additional studies or reports on the effectiveness and suitability of NNBI practices for attenuating

minimizing erosion, flooding and stormwater runoff specific to the Caribbean generally and to Puerto Rico specifically.

5. The NNBI consultant, with input from the NNBI advisory group will review existing literature and research that evaluates the cost of designing, constructing, permitting and maintaining the various NNBI practices for attenuating erosion, flooding and stormwater runoff specific to Puerto Rico in comparison with gray infrastructure.
6. The NNBI consultant, with input from the NNBI advisory group will complete the review of existing literature that evaluates the cost of constructing and maintaining the various NNBI practices for attenuating erosion, flooding and stormwater runoff specific to Puerto Rico in comparison with gray infrastructure
7. The NNBI consultant will fill gaps in NNBI cost information in Puerto Rico
8. The NNBI consultant, with input from the NNBI advisory group will complete a review of existing guidance and information on effectiveness and costs from previous work and complete a draft Adaptive Guidelines for the implementation of NNBI. This guidance will include a mitigation sequence for erosion response approaches that prioritizes the use of NNBI. This guidance will address: (1) Principles; (2) Community Engagement; (3) Performance/ Effectiveness (4) Monitoring (5) Maintenance (6) Costs; (7) Adaptive Management.
9. The NNBI consultant will develop a report on the effectiveness of the menu of NNBI available to Puerto Rico and any significant gaps in effectiveness data.
10. The restoration consultant working with the restoration advisory group will develop a list of best restoration practices relevant to the US Caribbean generally and Puerto Rico specifically and develop white paper on the effectiveness of current restoration best practices.
11. The restoration consultant working with the CRP Coordinator will convene a workshop with the restoration advisory group and any other appropriate experts to Identify restoration best practices and methodologies.
12. The restoration consultant working with the CRP Coordinator will host one or two workshop(s) with Advisory group and any other relevant ecological restoration experts, and municipal representatives to develop a consistent set of adaptive guidelines and methodologies for selecting, designing, constructing, monitoring and maintaining various restoration projects for beaches, dunes, mangroves, and seagrasses. These guidelines will address: (1) Restoration Principles (e.g., such as community engagement, protection of sea turtles and nests, etc.). (2) Standards of Practice - standards for planning and design; implementation; monitoring, documentation, evaluation, and reporting; and post-implementation maintenance; (3) Leading Practices: Reference models for ecological restoration, and appropriate ecological restoration approaches.
13. The CRP Coordinator will develop a preliminary CRP MOU amendment and workplan that establishes 1) shared restoration priorities; 2) the use of the Guidelines for coastal resilience restoration projects and NNBI implementation to enhance resilience; 3) the erosion response mitigation sequence to be used in permitting erosion response requests by OGPe and autonomous municipalities, and 4) the various roles of agencies and partners to implement the CRP.

14. The CRP Coordinator will host workshop or meetings with representatives from DNER, Departments of Transportation and Housing, the Planning Board, Permitting Office, Autonomous Municipal officials and other relevant Commonwealth agencies, to explain the purpose of the MOU amendment and obtain comments critiques and feedback on Preliminary MOU and inform the workplan.

Major Milestone(s):

1. Updated inventory of natural protective features in need of restoration as well as areas needed for transition or migration of these natural protective features
2. Restoration Prioritization Criteria
3. Annotated List of Restoration Guidance
4. White paper on the effectiveness of current restoration practices
5. Identification of significant gaps in effectiveness of restoration data
6. Preliminary CRP MOU.
7. Preliminary CRP MOU workplan.

Year 1 Budget: $150,000

YEAR 2

Description of activities: The activities in year two will focus on completing work on prioritizing Natural Features Restoration Sites, and on developing the Puerto Rico specific Adaptive Restoration Guidance. It will also continue the work on the Adaptive NNBI Guidance and on the CRP interagency MOU. This year will also begin the activities on diversify funding for on-the-ground NNBI and restoration projects, as well as developing the regulatory component of the CRP.

Specific activities include:

1. The NNBI consultant, with input from the NNBI advisory group will complete the review of existing literature that evaluates the cost of constructing and maintaining the various NNBI practices for attenuating erosion, flooding and stormwater runoff specific to Puerto Rico in comparison with gray infrastructure
2. The NNBI consultant will fill gaps in NNBI cost information in Puerto Rico
3. The NNBI consultant, with input from the NNBI advisory group will complete a review of existing guidance and information on effectiveness and costs from previous work and complete a draft Adaptive Guidelines for the implementation of NNBI. This guidance will include a mitigation sequence for erosion response approaches that prioritizes the use of NNBI. This guidance will address: (1) Principles; (2) Community Engagement; (3) Performance/ Effectiveness (4) Monitoring (5) Maintenance (6) Costs; (7) Adaptive Management.
4. The NNBI consultant will develop a report on the effectiveness of the menu of NNBI available to Puerto Rico and any significant gaps in effectiveness data.
5. The NNBI consultant, with assistance from the CRP Coordinator will host a workshop or series of workshops with NNBI advisory group and other relevant Commonwealth

agencies, local Home Builders Association, General Contractors Association, Professional Engineers Society, Engineers and Surveyors Association, Architects Association, Puerto Rico Chapter of the US Green Building Council, other relevant NGOs and others to review Draft NNBI Guidance and provide feedback.

6. The CRP coordinator will host a workshop with subject matter experts to apply criteria and Prioritize Natural Features Restoration Sites.
7. The CRP Coordinator will continue to host workshop or meetings with representatives from DNER, Departments of Transportation and Housing, the Planning Board, Permitting Office, Autonomous Municipal officials and other relevant Commonwealth agencies, to explain the purpose of the MOU amendment and obtain comments critiques and feedback on Preliminary MOU.
8. The CRP Coordinator will revise preliminary MOU amendment and workplan based on feedback from workshop and draft Final MOU amendment. The CRP Coordinator will then share Draft Final MOU amendment and workplan with agency representatives, revise if necessary and get clearance from them, and revise final MOU amendment and workplan if necessary.
9. The CRP Coordinator will set up one on one meetings with signatories and PRCZMP Program Manager to obtain signatures to finalize MOU.
10. The restoration consultant, working with the CRP Coordinator, will convene a workshop with appropriate SMEs to obtain feedback on best practices and methodologies and white paper, and revise the final set of best practices
11. The restoration consultant will draft and submit the final Adaptive Restoration Guidance.
12. The CRP Coordinator and the CZM Program Manager will select a consultant to undertake the regulatory element of the CRP
13. The regulatory consultant will begin working on investigating the feasibility of developing a regulatory approach to (1) remove regulatory impediments to permitting NNBI projects; (2) develop internal guidance for permitting staff to use in permitting shoreline response measures (green to gray) (3) promote or prioritize use of NNBI for coastal flooding or runoff attenuation; and (4) adopting any guidance called for in Bill 855 if that were to become law.
14. The CRP Coordinator and the CZM Program Manager will select a consultant to develop funding element of the CRP
15. The funding consultant will identify the most promising grants (e.g., FEMA, HUD, NFWF CRGP, or others) and foundation funding that could fund/implement priority restoration projects, or implement NNBI and develop information on application schedules, contacts, requirements, and examples of successful applications to assist in developing future applications
16. The funding consultant and CRP Coordinator will identify and engage NGOs whose funds could be used to leverage federal or foundation grant funds or Commonwealth funds to implement restoration or NNBI projects.

Major Milestone(s)

1. Final Adaptive Restoration Guidelines
2. Library of NNBI practices and menu of practices tailored for Puerto Rico
3. Report on Costs of NNBI in Puerto Rico not in original report
4. Report on Costs of NNBI in Puerto Rico and identifying critical gaps
5. Workshop Reports
6. Final CRP MOU amendment language submitted for agencies approval.
7. Final CRP MOU workplan submitted for agencies approval.

Year 2 Budget: $150,000

YEAR 3

Description of activities: The activities in year three will focus on completing work on the development of the Adaptive NNBI Guidance**.** Year three will also continue work on diversifying funding for on-the-ground NNBI and restoration projects, developing the regulatory component of the CRP, and implementing the interagency CRP MOU.

Specific activities include:

1. The NNBI consultant, with input from the advisory group and the CRP Coordinator will incorporate feedback from workshop(s) and finalize the Puerto Rico NNBI Guidance
2. The regulatory consultant will continue investigate the feasibility of developing a regulatory approach to (1) remove regulatory impediments to permitting NNBI projects; (2) develop internal guidance for permitting staff to use in permitting shoreline response measures (green to gray) (3) promote or prioritize use of NNBI for coastal flooding or runoff attenuation; and (4) adopting any guidance called for in Bill 855 if that were to become law.
3. The regulatory consultant will begin developing a white paper analyzing and identifying new strategies to strengthen enforcement of coastal policies and regulations for Puerto Rico.
4. DNER will investigate the possibility of bringing on a coastal fellow or Sea Grant Legal fellow to assist with the development of the regulatory approach.
5. The funding consultant will continue identify the most promising grants (e.g., FEMA, HUD, NFWF CRGP, or others) and foundation funding that could fund/implement priority restoration projects, or implement NNBI and develop information on application schedules, contacts, requirements, and examples of successful applications to assist in developing future applications.
6. The funding consultant and CRP Coordinator will continue to identify and engage NGOs whose funds could be used to leverage federal or foundation grant funds or Commonwealth funds to implement restoration or NNBI projects
7. The funding consultant will work with Department of Treasury office and other agencies to investigate the feasibility of receiving permitting violation fines, taxes including concessions and authorizations, in addition to additional fees or taxes into DNER's

"*fondos propios*" that and which could be specifically directed to be allocated for restoration and NNBI projects.

_ **Major Milestone(s)**

1. Final Puerto Rico NNBI Guidance
2. Report identifying fees, fines or taxes could be directed to DNER's *fondos propios* (special fund).

Year 3 Budget: $150,000

YEAR 4

Description of activities: The activities in year four will focus on completion of the work on the Adaptive NNBI Guidance, and continuation of the work on diversifying funding for on-the-ground NNBI and restoration projects; developing the CRP MOU, and developing the regulatory component of the CRP. It would also include contracting a grants specialist who will assist DNER apply for restoration and coastal hazard mitigation grants identified in the diversifying funding work, while DNER seek general fund options for this position.

Specific activities include:

1.
1. The regulatory consultant will develop draft regulatory language to address or remove those impediments to permitting restoration or NNBI projects and share with relevant agencies and counsel.
2. The regulatory consultant will complete the white paper analyzing and identifying new strategies to strengthen enforcement of coastal policies and regulations for Puerto Rico.
3. If feasible, the regulatory consultant will work with relevant agencies staff and DNER legal counsel to identify impediments to permitting on restoration or NNBI projects.
4. If feasible, the regulatory consultant will work with DNER and OGPe staff, and legal counsel to develop draft regulatory language to revising Joint Permitting or MTZ Regulations or develop internal guidance for DNER or OGPe staff to use that will require use of mitigation sequencing of soft, then hybrid and lastly hard NNBI alternatives for shoreline erosion response /shore hardening proposals
5. If feasible, the funding consultant will continue to work with the Department of Treasury, other agencies and DNER Counsel to develop regulatory or legislative language to direct certain fees, or taxes to the account and specific directions for its use for restoration / NNBI Implementation.
6. The funding consultant, working with PRCZMP Leadership, will conduct outreach with Legislature and Governor to educate them on the purpose and need for the account and why they should support the fund.
7. Develop and execute a contract with Grants specialist.
8. Grants' specialist will develop and submit applications for funding priority restoration or NNBI projects.

Major Milestone(s)

1. Report on CRP Funding Sources.
2. Report to PRCZMP on the feasibility of various regulatory approaches to implementing CRP.
3. Report Identifying permitting impediments to the implementation of restoration or NNBI projects.
4. Draft legislative, regulatory language (1) to direct certain fees, or taxes to the DNER special account and specific directions for its use for restoration / NNBI Implementation.
5. Outreach materials describing the purpose and need for the directed funding, removing permitting hurdles, sequencing erosion response measures, and/or other regulatory changes and why they should support the fund to be used engaging Puerto Rico Leadership; and list of Puerto Rico leadership engaged.
6. Grants applied for implementation of restoration project.

Year 4 Budget: $150,000

YEAR 5

Description of activities: The activities in year five will focus on the continuation of work on diversifying funding for on-the-ground NNBI and restoration projects; implementing the CRP MOU, and developing the regulatory component of the CRP.

Specific activities include:

1. The CRP Coordinator will assist the PRCZMP leadership and relevant agencies to submit any language to Legislature or other adopting bodies to implement the regulatory component of the CRP for adoption.
2. The CRP Coordinator will assist the PRCZMP leadership and relevant agencies to submit any language to Legislature or other adopting bodies to implement the regulatory component of the CRP for adoption.
3. If feasible, the funding consultant working with CZMP leadership will submit language on Special Restoration Account to Legislature for adoption.
4. If feasible, the regulatory consultant will continue to work with DNER and OGPe staff, and legal counsel to develop draft regulatory language to revising Joint Permitting or MTZ Regulations or develop internal guidance for DNER or OGPe staff to use that will require use of mitigation sequencing of soft, then hybrid and lastly hard NNBI alternatives for shoreline erosion response /shore hardening proposals.
5. If feasible, the regulatory consultant will work with DNER and OGPe staff, other relevant agencies and legal counsel to develop draft regulatory language to create NNBI sequencing; revise joint permitting or other regulations to require, or prioritize use of NNBI for coastal flooding or runoff attenuation; ensure the use of restoration guidelines for restoration projects; and adopt any guidance called for in bill 855 if that were to become law.

6. The regulatory consultant and relevant PRCZMP agencies staff will conduct outreach to the legislature, Governor's Office, other adopting/ implementing bodies and stakeholders and to give regulatory guidance the best chance of being adopted.

Major Milestone(s)

1. Report on NGO engagement.
2. Draft regulatory language to revise Joint Permitting or other regulations to require or prioritize use of NNBI for coastal flooding or runoff attenuation.
3. Draft regulatory language in response to Bill S855.
4. Briefing and outreach materials and documentation of engagement to support adoption of legislative or regulatory language.
5. Final submitted legislative or regulatory language.

Year 5 Budget: $150,000

VII. Fiscal and Technical Needs

A. Fiscal Needs: *If 309 funding is not sufficient to carry out the proposed strategy, identify additional funding needs. Provide a brief description of what efforts the CMP has made, if any, to secure additional state funds from the legislature and/or from other sources to support this strategy.*

The Puerto Rico Coastal Management Program will rely on 309 enhancement program funding as the primary source for this strategy but will contribute some additional staff and management time from the networked agency's state budget. Hiring the Coastal Resilience Program Coordinator is essential to completing the program changes. However, over the longer term, funding will be needed to enhance capacity to provide technical assistance for the Program once developed – although it is too early to tell which types of expertise will be most critical.

B. Technical Needs: *If the state does not possess the technical knowledge, skills, or equipment to carry out all or part of the proposed strategy, identify these needs. Provide a brief description of what efforts the CMP has made, if any, to obtain the trained personnel or equipment needed (for example, through agreements with other state agencies).*

Puerto Rico CZMP currently does not have the coastal engineering, ecological, or landscape architectural expertise to develop guidelines for implementing NNBI. They also lack grants writing capacity to apply for additional resilience grants. The PRCZMP may also need additional legal expertise to work alongside PRCZMP and DNER staff in completing the proposed activities. There is a need to acquire coastal engineering, landscape architecture, and/or other restoration expertise as needed in DNER to provide technical assistance in the development and implementation of the program and projects.

VIII. Projects of Special Merit (Optional)

To accelerate the development of an improved and innovative guidance and decision making procedure for implementing restoration and NNBI projects in Puerto Rico, DNER may considering developing several proposals for projects of special merit to NOAA including (1) Conducting research to fill gaps regarding the effectiveness and suitability of the array of NNBI practices for attenuating minimizing erosion, flooding and stormwater runoff specific to conditions in Puerto Rico; (2) Conduct an economic analysis of the costs/benefits of NNBI practices specific to Puerto Rico, that builds on the *NOAA Guide to Assessing Green Infrastructure Costs and Benefits for Flood Reduction;* or (3) developing decision making tool (such as a decision tree) to aid agencies and permitting staff, NGOs, or landowners determine appropriate green or nature based infrastructure for specific conditions on the site.

5-Year Budget Summary by Strategy

The following budget table summarizes the PRCZMP's anticipated Section 309 formula funding expenses by strategy for each of the eight years identified in the work plan. We should note again that Puerto Rico is developing the CRP based on the assumption that: it can submit and gain approval of an Assessment and Strategy for the 2026-2030 Section 309 cycle that will includes a continuation of the 2023-2025 strategy included; that the Commonwealth will be able to use CZMA Section 309 funds to complete the out-year tasks; and that 309 funding levels remain constant. These funds should cover all costs associated with the Strategy over the 2026-2030 cycle. While it is unlikely that the PRCZMP is going to get additional funding through general funds due to restrictions from Puerto Rico Oversight, Management, and Economic Stability Act Board (PROMESA), the PRCZMP will be looking to identify other funding to assist with the Strategy.

Strategy Title	Anticipated Funding Source (309 or Other)	Year 1 Funding	Year 2 Funding	Year 3 Funding	Year 4 Funding	Year 5 Funding	Total Funding
Puerto Rico CRP	309 Funds	$150,000	$150,000	$150,000	$150,000	$150,000	$750,000
Total Funding		$150,000	$150,000	$150,000	$150,000	$150,000	$750,000

Summary of Stakeholder and Public Comment

The 2026-2030 stakeholder assessment revealed comprehensive insights and perspectives for Puerto Rico's coastal management priorities, challenges, and opportunities as the Commonwealth navigates post-hurricane recovery, and sustainable development pressures. The survey results, representing 108 stakeholders including government agencies (36.1%), private citizens (24.1%), NGOs (11.1%), and academic institutions (8.3%), provide critical guidance for the PRCZMP's enhancement strategy.

High-Priority Enhancement Areas:

Two enhancement areas emerge as the highest stakeholder priorities requiring focused PRCZMP attention during the 2026-2030 period:

Coastal Hazards Mitigation ranked as the top priority, reflecting Puerto Rico's vulnerability to hurricanes, flooding, erosion, and sea level rise intensified by recent extreme weather events, including Hurricanes Irma, María and Fiona. This represents the single highest priority across all nine enhancement areas, with 86.5% of respondents rating it as high priority—the strongest mandate in the entire assessment. Top threat identified was coastal erosion, with 79.4% stakeholders rating it as the highest possible threat. Opportunities for improved management from stakeholder's perspectives focused on balanced planning (49.1%), enforcement (48.1%), and strong restoration support (42.6%).

Wetlands Management ranked as the second priority, with stakeholders identifying coastal development (90.7%) as the principal threat to these foundational ecosystems. Top opportunities identified also navigated between enforcement (58.3%), planning (43.5%) and strong restoration support (41.7%) for nature-based solutions.

Additional information on the stakeholder survey input can be found on Annex 1.

Annex 1: Stakeholder Input

REPORT ON THE SURVEY TO GATHER STAKEHOLDER INPUT FOR THE DEVELOPMENT OF THE PUERTO RICO SECTION 309 ASSESSMENT AND STRATEGY FY 2026-2030

Survey Period: June-July 2025
Total Responses: 108
Prepared for: Puerto Rico Department of Natural and Environmental Resources
Date: October 2025

1. INTRODUCTION

The Puerto Rico Coastal Zone Management Program (CZMP) conducted a comprehensive stakeholder engagement survey from June to July 2025 to gather input for the development of the Section 309 Assessment and Strategy for fiscal years 2026-2030. This report presents the analysis of stakeholder responses that will guide program priorities and enhancement strategies for Puerto Rico's coastal zone management efforts over the next five-year period.

This stakeholder input process represents a critical component of the Section 309 assessment, ensuring that community voices, scientific expertise, and management experience inform the prioritization of the nine enhancement areas established under the Coastal Zone Management Act. The survey was designed to capture diverse perspectives on coastal threats, management opportunities, and priority needs across Puerto Rico's coastal municipalities.

The 2026-2030 assessment period comes at a particularly crucial time for Puerto Rico's coastal zone, as the island continues to address ongoing challenges and impacts from natural hazards, increasing coastal development pressures, and the need for enhanced resilience following recent natural disasters. Stakeholder input provides essential ground-truth data to ensure that programmatic priorities align with current and emerging coastal management needs.

2. METHODOLOGY

The stakeholder engagement survey was implemented using the Microsoft Forms platform and was available in both Spanish and English to ensure broad accessibility across Puerto Rico's diverse communities. The survey was distributed through multiple channels, including government agencies, academic institutions, non-governmental organizations, private sector entities, and community groups throughout the coastal zone.

Survey Design and Distribution: The survey instrument was structured to gather both quantitative rankings and qualitative insights across all nine enhancement areas mandated under Section 309. Questions were designed to elicit specific information about threats, opportunities, and geographic priorities while allowing for detailed explanatory responses. The bilingual approach ensured that language barriers did not limit participation.

Response Collection Period: Data collection occurred over a focused two-month period from June through July 2025, with intensive outreach conducted through professional networks, public meetings, and digital communication channels. This concentrated collection period ensured timely completion while allowing for comprehensive stakeholder engagement across Puerto Rico's 44 coastal municipalities.

Data Analysis Approach: Quantitative responses were analyzed using both simple averaging and weighted scoring methodologies to identify priority rankings, threat assessments, and demographic patterns. The weighted analysis assigned higher point values to top-ranked priorities (9 points for 1st place, 8 points for 2nd place, etc.) to better capture the intensity of stakeholder preferences. A Friedman test was also used to confirm statistically significant differences between priority areas. Qualitative responses were systematically reviewed and categorized to identify common themes, specific geographic concerns, and management recommendations.

3. SURVEY RESPONSES

Priority Ranking for the Nine Enhancement Areas for Puerto Rico:

The 2026-2030 stakeholder survey received 108 complete responses from participants across Puerto Rico's coastal zone, representing a robust sample for priority assessment. Survey participants demonstrated strong engagement, with an average completion time of 41 minutes and 33 seconds, indicating thoughtful consideration of the complex coastal management issues presented.

Language participation reflected Puerto Rico's bilingual character, with 87% of respondents (94 individuals) completing the survey in Spanish and 13% (14 individuals) in English, ensuring broad linguistic representation in the assessment process.

Priority Analysis Results:

To better capture the intensity of stakeholder preferences, a weighted scoring methodology was applied. This approach assigns higher point values to higher-ranked positions (9 points for 1st place, 8 points for 2nd place, etc.), providing the most robust analysis for ordinal ranking data. The weighted average and percentage were calculated to begin identifying trends in the results.

Additional analysis was performed to identify rankings between priorities. The average mean ranking was calculated, also highlighting the ranking of priorities identified by respondents. Then, a Friedman test performed on the raw survey ranking data confirmed that there are statistically significant differences between the priority areas (Friedman statistic ≈ 345.66, $p < 0.0001$), validating that stakeholder rankings are not random but show clear preferences.

The results presented the following thresholds between rankings:

- High priority: Mean rank: ≤ 4.13
- Medium priority: Mean rank: 4.13 ≤ 5.87
- Low priority: Mean rank: > 5.87

These thresholds are based on half a standard deviation above and below the overall mean rank (overall mean = 5.0, $\sigma \approx 1.73$), which is a commonly accepted method for classifying tiers when working with survey rankings.

The analysis reveals two clear high-priority areas, five medium-priority areas, and two lower-priority enhancement areas:

High-Priority Enhancement Areas:

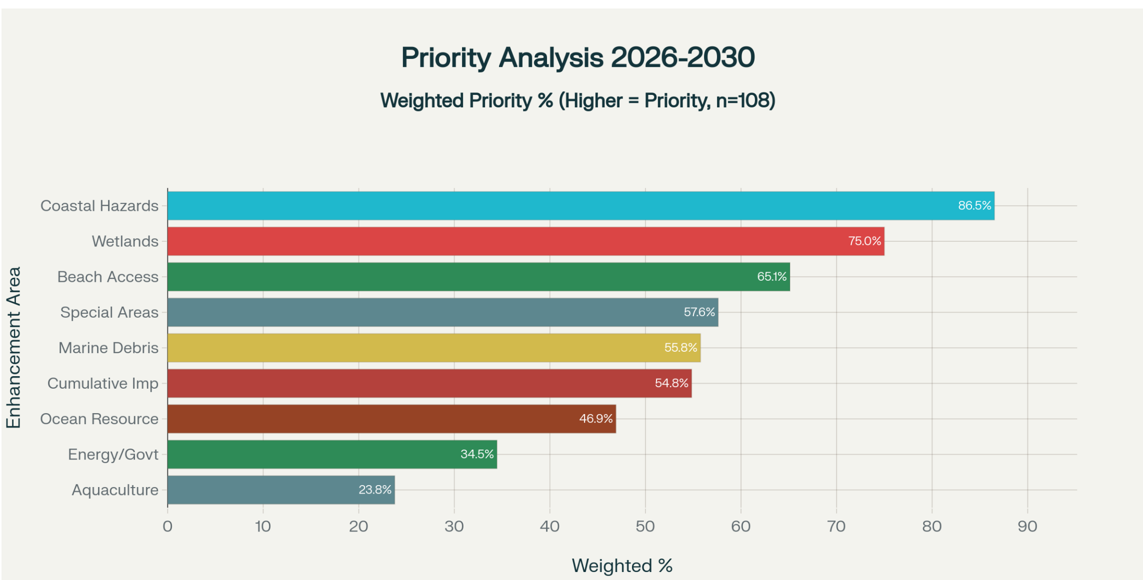
1- Coastal Hazards: Mean Rank - 2.21; weighted percentage – 86.5%
2- Wetlands: Mean Rank - 3.25; weighted percentage – 75%

Medium Priority Enhancement Areas:

3- Public Access: Mean Rank - 4.14; weighted percentage – 65.1%
4- Special Area Management Planning: Mean Rank—4.81; Weighted Percentage—57.6%
5- Marine Debris: Mean Rank—4.98; Weighted Percentage—55.8%
6- Cumulative and Secondary Impacts: Mean Rank – 5.06; Weighted Percentage – 54.9%
7- Ocean Resources: Mean Rank – 5.78; Weighted Percentage – 46.9%

Lower Priority Enhancement Areas:

8- Energy and Government Facility Siting: Mean Rank – 6.90; Weighted Percentage – 34.5%
9- Aquaculture: Mean Rank – 7.86; Weighted Percentage – 23.8%



Graphic 1: Weighted priority analysis for enhancement areas.

3.1. Threats and Opportunities to Coastal Wetlands

Stakeholder responses identified nine distinct threat categories affecting coastal wetlands, with respondents selecting up to three primary concerns. The analysis reveals a clear hierarchy of threats, with development pressures dominating stakeholder concerns:

Top Three Critical Threats:

1. Coastal Development—90.7%
2. Hydrological Alterations—57.4%
3. Contamination—53.7%

Secondary Threats:

4. Sea Level Rise - 48.1%
5. Boat Erosion and Activities—18.5%
6. Freshwater Input Changes - 15.7%
7. Invasive Species—13.9%

Coastal development emerges as the overwhelming primary threat, identified by 90.7% of stakeholders, representing near-universal concern about development pressures, including wetland filling, excavation, and infrastructure construction within wetland areas. This extraordinarily high response rate indicates broad stakeholder awareness of development impacts across Puerto Rico's coastal municipalities.

The combined impact of the top three threats represents 201.9% of total response capacity, indicating that most stakeholders view multiple threats as simultaneously affecting coastal wetlands. This pattern suggests complex, interconnected threat scenarios rather than isolated individual pressures.

3.1.1. Opportunities for Improved Wetland Management

Analysis reveals ten management opportunity categories, with stakeholders expressing clear priorities for regulatory enforcement, strategic planning, and ecosystem restoration:

Rank	Management Opportunity	Percentage
1	Regulatory Enforcement	58.3%
2	Planning	43.5%
3	Restoration	41.7%
4	Policy/Statute Development	30.6%
5	Research	30.6%
6	State and Municipal Training & Capacity Building	29.6%
7	Education and Outreach	20.4%
8	Decision Support Tools	15.7%
9	Data Management	14.8%
10	Mapping	13.9%

Table 1: Priority Opportunities for Wetland Management Enhancement.

3.1.2. Strategic Opportunity Themes

Responses reveal four major strategic themes for wetland management enhancement:

- Enforcement & Compliance (58.3% priority): Regulatory enforcement emerges as the single highest priority opportunity, identified by over half of all stakeholders. This overwhelming response indicates widespread concern about the implementation gap between existing wetland protection regulations and on-the-ground compliance, reflecting stakeholder experiences with inadequate enforcement of filling restrictions, excavation controls, and development standards within wetland areas.
- Ecosystem Restoration (41.7% priority): Active restoration ranked third among all opportunities, indicating stakeholder support for proactive rehabilitation of degraded wetlands rather than protection alone. This priority reflects understanding that many Puerto Rico wetlands have already experienced significant alteration and require active intervention to restore ecological functions.
- Planning & Policy Frameworks (74.1% combined priority): The combined emphasis on comprehensive planning (43.5%) and normative development (30.6%) demonstrates stakeholder recognition that effective wetland management requires both strategic spatial planning and enhanced policy instruments. This theme encompasses needs for improved land use planning, special area management plans, policy guidance development, and statutory strengthening.
- Knowledge & Capacity Building (125.0% combined priority): The highest combined priority among thematic areas encompasses research (30.6%), training (29.6%), education and outreach (20.4%), decision support tools (15.7%), data management (14.8%), and mapping (13.9%). This comprehensive priority pattern indicates stakeholder awareness that effective wetland management requires strengthened

technical capacity, improved information systems, enhanced public awareness, and evidence-based decision-making.

3.2. Threats and opportunities from Coastal Hazards

The stakeholder assessment included a comprehensive evaluation of seven distinct coastal hazard types, with respondents rating each hazard on a scale from 1 (highest threat) to 5 (lowest threat). The analysis received 101-107 responses per hazard category, representing a 93-99% response rate across all hazard types.

Survey results reveal a clear hierarchy of coastal hazard threats, with climate-related hazards dominating the highest threat categories:

Rank	Hazard Type	Average Score
1	Coastal Erosion	1.36
2	Sea Level Rise	1.77
3	Flooding	1.82
4	Coastal Storms	1.84
5	Saltwater Intrusion	2.44
6	Earthquakes	2.97
7	Tsunamis	3.13

Table 2: Coastal Hazard Threat Rankings (Scale: 1 = Highest Threat, 5 = Lowest Threat).

Coastal erosion emerges as the single most critical hazard threat, achieving the lowest average threat score (1.36) and highest consensus among all assessed hazards. The level of stakeholder concern is evidenced by 79.4% of stakeholders rating coastal erosion as the highest possible threat (score 1).

Sea level rise (1.77 average score) and flooding (1.82 average score) rank second and third respectively, with nearly identical threat perceptions. The close alignment of these scores (0.05 difference) suggests stakeholders understand their interconnected nature.

3.2.1. Opportunities for Improved Management of Coastal Hazards

Analysis reveals top-ten distinct management opportunity categories with stakeholders expressing nearly equal priorities for planning and enforcement, alongside strong support for ecosystem-based restoration:

Rank	Opportunity	Percentage
1	Planning	49.07%
2	Regulatory Enforcement	48.15%
3	Restoration	42.59%
4	Policy/Statute Development	33.33%
5	State and Municipal Training and Capacity Building	25.93%
6	Research	25.00%
7	Data Management	21.30%
8	Decision Support Tools	20.37%
9	Education and Outreach	19.44%
10	Mapping	12.96%

Table 3: Priority Opportunities for Coastal Hazards Management Enhancement

3.2.2. Strategic Opportunity Themes

The stakeholder responses reveal four major strategic themes for coastal hazards management enhancement:

1. Strategic Planning & Policy Development (82.4% combined priority): Planning emerges as the top single priority (49.1%), combined with normative development (33.3%), demonstrating stakeholder emphasis on proactive, comprehensive approaches to coastal hazards management. This priority reflects recognition that hazard mitigation requires long-term strategic frameworks including hazard mapping, vulnerability assessments, land use planning, mitigation plans, and special area management plans for high-risk coastal zones.

2. Regulatory Enforcement (48.1% priority): Nearly equal to planning, enforcement represents stakeholders' concern about implementation gaps in existing coastal construction standards, setback requirements, and development restrictions in hazard-prone areas. The virtual tie between planning (49.1%) and enforcement (48.1%) indicates stakeholder understanding that both proactive planning and effective implementation are essential for hazards management.

3. Ecosystem-Based Restoration (42.6% priority): Restoration's strong third-place ranking demonstrates significant stakeholder support for nature-based solutions and green infrastructure approaches to coastal hazards. This includes restoring coastal wetlands, mangroves, coral reefs, and dune systems that provide natural protection against storms, erosion, and flooding—reflecting growing recognition of ecosystem services for hazard mitigation.

4. Capacity & Knowledge Building (125.0% combined priority): The highest combined thematic priority encompasses training and capacity building (25.9%), research (25.0%), data management (21.3%), decision support tools (20.4%), education and

outreach (19.4%), and mapping (13.0%). This comprehensive priority demonstrates stakeholder awareness that effective hazards management requires enhanced technical capacity, improved hazard information systems, climate science integration, public awareness, and institutional strengthening at both state and municipal levels.

3.3. Public Access to the coast for recreation

Public access to beaches and coastal resources remains a contentious and critical issue in Puerto Rico, where coastal development pressures, privatization concerns, and equitable access questions intersect with conservation and recreational needs. The 2026-2030 stakeholder assessment sought to evaluate current perceptions of public access adequacy across Puerto Rico's coastal zone.

Respondents were asked to assess whether public access to beaches and coastal resources in Puerto Rico is insufficient, adequate, or excessive. The results reveal strong stakeholder consensus on access limitations:

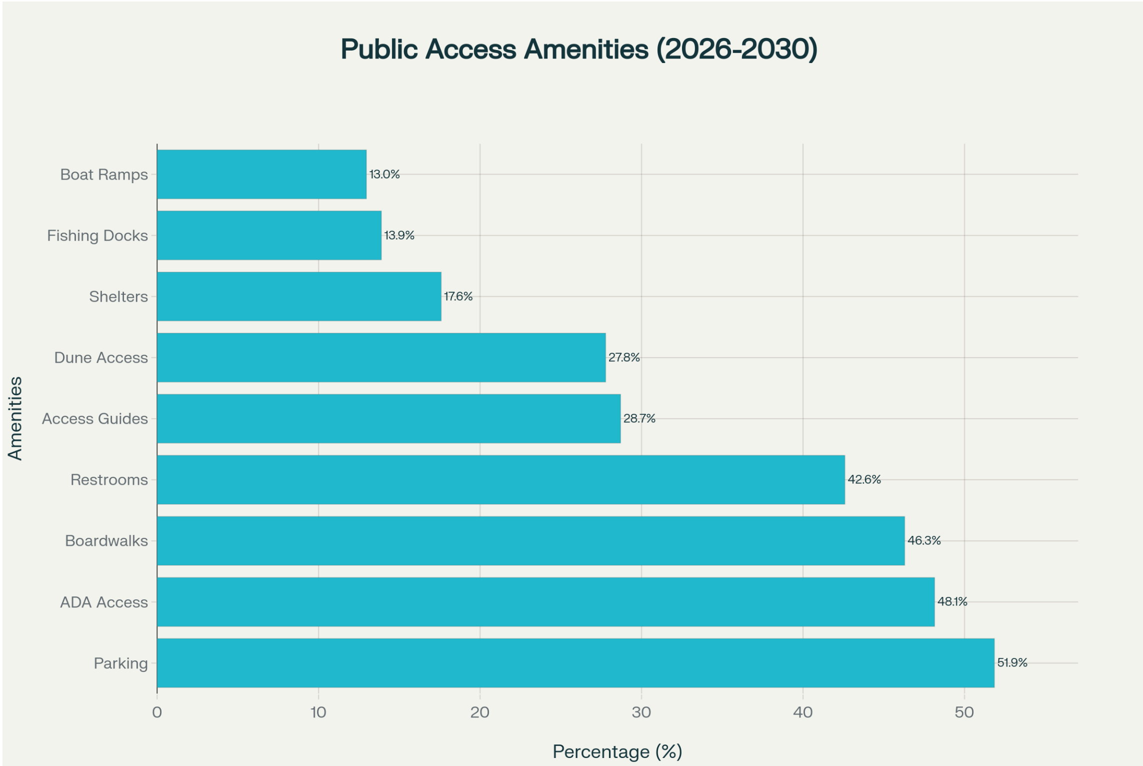
- Insufficient: 64.8%
- Adequate: 28.7%
- Excessive: 6.5%

The findings demonstrate that nearly two-thirds of stakeholders view public access as insufficient, representing a slight decrease from the 2022-2025 assessment where 70% identified access as inadequate . This persistent concern reflects ongoing challenges including coastal development restricting shoreline access, inadequate infrastructure at existing access points, limited accessible facilities for persons with disabilities, and insufficient public awareness of legal access rights under Puerto Rico law.

The 28.7% of respondents rating access as adequate may reflect regional variations, with some municipalities maintaining better public access infrastructure than others. The small percentage (6.5%) viewing access as excessive likely represents concerns about overuse at specific high-traffic locations or environmental impacts from concentrated visitation at sensitive sites.

3.3.1. Types of Public Access Amenities Needed

Stakeholders were asked to identify the three most important types of amenities needed at new or existing public access sites. The results reveal clear priorities for basic infrastructure, accessibility improvements, and supporting facilities.



Graphic 2: Top Public Access Amenities Identified by Stakeholders.

The results demonstrate that basic infrastructure needs remain the highest priority, with parking (51.9%) and restrooms (42.6%) representing fundamental amenities for functional public access sites. The combined basic infrastructure priority of 94.4% indicates that many existing access points lack these essential facilities.

Accessibility and universal design emerge as a dominant thematic priority, with a combined 122.2% stakeholder emphasis across three related amenities: facilities for persons with disabilities (48.1%), boardwalks/walkways (46.3%), and dune crossover structures (27.8%). This priority reflects growing awareness of the Americans with Disabilities Act requirements, demographic shifts toward an aging population, and equity considerations ensuring all residents can access coastal resources.

Information and wayfinding needs (28.7%) reflect stakeholder concerns about public awareness of legal access rights and existing access point locations. Many residents and visitors remain unaware of available public access sites, hampering utilization of existing infrastructure.

Compared to the 2022-2025 assessment, the 2026-2030 results show increased emphasis on accessibility features, particularly facilities for persons with disabilities, which moved into the second-highest priority position. This shift may reflect heightened awareness of universal design principles and demographic changes increasing demand for accessible coastal recreation.

3.4. Challenges and Management Opportunities for Marine Debris

Marine debris represents a persistent and multifaceted challenge in Puerto Rico's coastal zone, affecting water quality, ecosystem health, navigation safety, and aesthetic values. Stakeholders were asked to identify the three most important problems related to marine debris from a comprehensive list of potential sources.

The top marine debris challenges and sources identified include:

Rank	Marine Debris Challenge/Source	Percentage
1	Beach Litter	73.1%
2	Deteriorated Coastal Structures	63.0%
3	Illegal Dumping of Domestic Waste	50.9%
4	Runoff Pollution	49.1%
5	Abandoned Vessels	22.2%
6	Commercial Vessel Waste	22.2%
7	Derelict Fishing Gear	16.7%

Table 4: Top Marine Debris Challenges and Sources Identified

The results demonstrate that land-based debris sources overwhelmingly dominate stakeholder concerns, with a combined 173.1% priority across beach litter (73.1%), illegal dumping (50.9%), and runoff pollution (49.1%).

Beach litter emerges as the single most critical marine debris problem, identified by nearly three-quarters of all stakeholders (73.1%). The prominence of beach litter indicates ongoing challenges with solid waste collection systems, insufficient trash receptacles at beach access points, inadequate public education about littering impacts, and limited enforcement of anti-littering regulations.

Deteriorated coastal structures rank second (63.0%), representing an emerging concern that bridges debris management and coastal infrastructure issues. This category includes abandoned buildings, collapsed piers, damaged seawalls, and other failing structures that contribute debris to coastal waters during storms and through gradual deterioration. The high priority assigned to this problem reflects Puerto Rico's inventory of hurricane-damaged infrastructure, abandoned development projects, and aging coastal facilities requiring removal or stabilization.

Illegal dumping of domestic waste (50.9%) and runoff pollution (49.1%) represent the third and fourth priorities, with virtually identical stakeholder concern levels. Illegal dumping encompasses unauthorized disposal of household refuse, and other materials in coastal areas that subsequently enter the marine environment.

Marine-based debris sources including abandoned vessels (22.2%), commercial vessel waste (22.2%), and derelict fishing gear (16.7%) receive substantially lower priority than land-based sources, collectively representing 61.1% combined priority. While significant, these marineorigin debris types affect more limited areas compared to the widespread impacts of land-based sources. The equal priority for abandoned vessels and commercial vessel waste suggests both recreational and commercial maritime activities contribute to debris problems.

Compared to the 2022-2025 assessment, the 2026-2030 results show increased emphasis on deteriorated structures as a major debris source, likely reflecting the accumulated impacts of hurricanes Irma and Maria and ongoing infrastructure deterioration . This shift highlights the intersection between marine debris management and post-disaster recovery, infrastructure maintenance, and coastal development regulation.

3.4.1. Opportunities for Improved Marine Debris Management

Stakeholders identified priority opportunities to strengthen marine debris reduction and management efforts during the 2026-2030 period. The top six marine debris management opportunities identified include:

Rank	Management Opportunity	Percentage
1	Regulatory Enforcement	84.1%
2	Debris Removal Programs	62.6%
3	Communication, Education & Outreach	56.1%
4	Municipal & Government Training and Capacity Building	40.2%
5	Policy/Statute Development	38.3%
6	Data Management	13.1%

Table 5: Priority Opportunities for Marine Debris Management

The results reveal regulatory enforcement as the overwhelmingly dominant priority, identified by 84.1% of stakeholders—representing the highest single opportunity priority across all enhancement areas assessed in this survey. Debris removal programs rank second (62.6%), demonstrating stakeholder recognition that effective marine debris management requires both prevention through enforcement and active remediation of existing contamination. The substantial gap between enforcement (84.1%) and removal programs (62.6%) indicates stakeholders view prevention as more critical than cleanup, though both remain important.

Education and outreach achieve 56.1% priority, reflecting stakeholder understanding that long-term debris reduction requires behavioral change among residents, visitors, and commercial operators.

Compared to opportunities identified for wetlands and coastal hazards management, the marine debris enhancement area shows dramatically higher emphasis on enforcement (84.1% versus 58.3% for wetlands and 48.1% for hazards). This distinction likely reflects the direct connection between debris problems and individual behaviors that existing laws already prohibit, making enforcement the most immediate need rather than new planning frameworks or policy development.

3.5. Cumulative and secondary impacts of coastal growth and development on coastal resources

Coastal development generates multiple interconnected impacts that accumulate across space and time, affecting ecological systems, coastal resilience, water quality, and public access. Stakeholders were asked to identify the three most significant cumulative and secondary impacts of coastal development on Puerto Rico's coastal resources.

The top cumulative and secondary impacts identified include:

Rank	Impact Type	Percentage
1	Loss of Natural Protective Features	76.9%
2	Habitat Loss/Fragmentation from Development	64.8%
3	Habitat Degradation & Water Quality (Runoff)	57.4%
4	Population Increase in High-Risk Coastal Zones	38.9%
5	Water Quality Impacts from Septic Systems	22.2%
6	Loss of Public Access to Coastal Resources	21.3%
7	Coastal Hydrology Alterations	17.6%

Table 6: Cumulative and Secondary Impacts of Coastal Development

The results demonstrate that ecological and environmental impacts overwhelmingly dominate stakeholder concerns, with a combined 199.1% priority across three major impacts.

Loss of natural protective features emerges as the single most critical cumulative impact, identified by 76.9% of stakeholders. This priority reflects growing awareness that coastal development removes or degrades beaches, dunes, wetlands, mangroves, coral reefs, and barrier islands that naturally attenuate flooding, storm surge, and coastal erosion. The connection between this top-ranked impact and the earlier identification of coastal hazards as the highest priority enhancement area demonstrates stakeholder understanding that development decisions directly affect hazard vulnerabilities and disaster risk reduction capabilities.

Habitat loss and fragmentation rank second (64.8%), indicating stakeholder understanding that coastal development physically eliminates and divides critical coastal ecosystems. Habitat degradation and water quality impacts from runoff (57.4%) represent the third major concern, reflecting stakeholders' understanding that coastal development generates pollution that extends beyond development footprints. Impervious surfaces, altered drainage patterns, and increased contaminant loads from developed areas degrade water quality in receiving coastal waters, affecting coral reefs, seagrass beds, and other sensitive habitats.

3.5.1. Most Significant Uses and Activities Causing Cumulative and Secondary Impacts

Following identification of the cumulative and secondary impacts themselves, stakeholders were asked to identify the specific uses and activities—whether land-based or water-based—

that cause these impacts. Respondents could select up to three activities from a comprehensive list .

The top four uses and activities causing cumulative and secondary impacts include:

- Residential Development - 93.5%
- Commercial Development - 84.3%
- Shoreline Modification - 78.7%
- Agricultural Activities - 17.6%

Additional activities receiving limited mentions include marinas/mooring buoys (6.5%), forestry (2.8%), aquaculture (1.9%), and other individual concerns each below 1%. Collectively these additional activities represent less than 10% priority, signaling that stakeholders view coastal impacts as predominantly land-based phenomena driven by development activities rather than water-dependent uses.

Residential development emerges as the single most significant activity, identified by 93.5% of stakeholders—representing near-universal recognition . This reflects Puerto Rico's extensive coastal residential development, including single-family homes, condominiums, gated communities, and informal settlements along shorelines and in hazard-prone areas. The residential development pattern encompasses both legally permitted construction and unauthorized development in restricted zones.

3.6. Specific Geographic Areas in Need of Additional Planning, Policy Development and Management

Stakeholders were asked to identify specific geographic areas within Puerto Rico's coastal zone that require additional planning, policy development, and management attention. The open-ended responses (n=89; 82.4% response rate) revealed both place-specific priorities and cross-cutting coastal governance issues, offering valuable insight into locally perceived gaps, challenges, and opportunities for improved coastal management.

The qualitative analysis identified six principal coastal regions (North Coast, West Coast, South Coast, East Coast, Northeast Coast, and Island-wide) and seven major categories of issues and opportunities. These categories represent interrelated aspects of environmental governance, ecosystem protection, and community participation.

3.6.1. Regional Priorities:

Stakeholder responses displayed clear spatial differentiation in the types of issues raised and opportunities proposed across Puerto Rico's coastal regions. While some identified island-wide systemic issues in need of reform, others cited site-specific pressures, including uncontrolled development, enforcement failures, and ecosystem degradation.

- **Island-wide** (21%): Many respondents emphasized that governance and planning challenges are not limited by any region. Fragmented legal frameworks, outdated zoning, and insufficient coordination among agencies were consistently viewed as island-wide issues affecting all coasts.
- **North Coast** (19%): Responses highlighted unregulated coastal development, erosion, and pollution linked to urban runoff in municipalities such as Loíza, Dorado, Vega Baja, and Arecibo. Concerns focused on the loss of public access to beaches and the deterioration of water quality near urbanized bays.
- **West Coast** (18%): The dominant themes include shoreline construction pressures, beach erosion, and regulatory lapses, particularly in Rincón, Aguadilla, and Cabo Rojo. Several participants discussed opportunities for ecosystem restoration and reef-based defenses.
- **South Coast** (16%): Participants emphasized the cumulative impacts of habitat degradation, wastewater discharges, and inadequate enforcement in ecologically sensitive areas like Jobos Bay, Guánica, and the Ponce corridor. Issues of vulnerability to hurricanes and sea level rise were commonly cited.
- **East Coast** (13%): Stakeholders raised concerns about mangrove and wetland loss, sedimentation, and flooding in Patillas, Humacao, and Naguabo. Many stressed the need for integrated watershed management approaches and improved infrastructure planning.

- **Northeast Coast** (13%): Respondents referred to coral reef degradation, sedimentation, maritime traffic impacts, and insufficient enforcement in Vieques, Culebra, and Fajardo. Proposed actions included improved coordination among agencies and community co-management of sensitive islands and marine habitats.

3.6.2. Main Challenges and Opportunities for Improved Coastal Management

The qualitative review of all responses yielded seven overarching and interconnected thematic categories that describe the main systemic, environmental, and social factors shaping coastal management effectiveness in Puerto Rico:

1. Weak Enforcement and Institutional Capacity Across all regions, stakeholders stressed limited agency capacity, insufficient oversight, and lack of coordination between central and municipal authorities. Respondents called for stronger implementation of coastal regulations, surveillance, and municipal-level accountability mechanisms.
2. Unsustainable or Illegal Development Unregulated coastal expansion, construction within maritime-terrestrial zones, and inconsistent permitting were frequently mentioned. This issue was particularly recurrent along the North and West coasts, with associated concerns about public access restrictions and landscape alteration.
3. Erosion, and Coastal Hazard Vulnerability: Stakeholders recognized shoreline erosion, sea level rise, and storm impacts as urgent management challenges. The need for coastal setback enforcement and resilience-based planning was emphasized in the South, East, and West coasts.
4. Habitat Degradation, Biodiversity Loss, and Pollution The combined pressures of inadequate wastewater systems, stormwater runoff, and solid waste were directly linked to coral, wetland, and mangrove deterioration. Respondents from La Parguera, Loíza, and Fajardo stressed the need for habitat restoration and pollution control measures as integrated priorities.
5. Policy Gaps and Outdated Frameworks Many participants cited inconsistencies between land-use planning, environmental permitting, and coastal protection laws. The absence of updated zoning and a comprehensive policy framework was identified as a major structural obstacle to sustainable management.
6. Community Participation, Awareness, and Education Stakeholders underscored the potential of local stewardship, citizen involvement, and environmental education. Community-based initiatives and partnerships were viewed as critical for improving compliance, monitoring, and public understanding of coastal dynamics.
7. Restoration, Innovation, and Research Opportunities Respondents pointed to numerous opportunities for ecological restoration, scientific research, data sharing, and nature-

based solutions. They called for investment in coral and mangrove rehabilitation, coastal monitoring, and academic-community collaborations.

3.6.3 Cross-Cutting Observations

Common concerns across all regions demonstrate a strong stakeholder consensus around two key themes: (1) the urgent need for effective enforcement and integrated coastal governance, and (2) the desire for actionable restoration and community-based solutions. Pollution and ecological degradation were reported more often along densely populated and industrialized shorelines (North and South coasts), while erosion and development pressure dominated the West and East coasts.

3.7. Ocean resources under threat

Stakeholders were asked to rank five categories of ocean resources according to their threat level, using a scale where 1 represents the most threatened resource and 6 represents the least threatened. Response rates ranged from 96% to 100% across the five resource categories .

The ocean resources threat rankings, from most to least threatened, include:

Rank	Ocean Resource	Avg. Rank	High Threat %
1	Living Marine Resources (Corals)	1.25	94.4%
2	Submerged Aquatic Vegetation (SAV)	1.7	79.6%
3	Living Marine Resources (Fish)	1.9	74.8%
4	Sand Resources (Beach Nourishment)	2.08	67.3%
5	Cultural/Historical Resources (Shipwrecks)	3.15	35.2%

Table 7: Ocean Resources Threat Rankings (Scale: 1 = Most Threatened, 6 = Least Threatened)

The results demonstrate stakeholder consensus that coral reefs represent Puerto Rico's most threatened ocean resource, achieving an average rank of 1.25—the lowest (most threatened) score across all ocean resources . The level of concern is evidenced by 82.4% of stakeholders rating corals as the single most threatened resource (rank 1) and 94.4% rating them in the top two threat levels . This near-universal recognition reflects direct stakeholder awareness of Caribbean-wide coral reef decline from bleaching events, disease outbreaks, physical damage, and water quality degradation.

Submerged aquatic vegetation ranks second (1.70 average), with 79.6% high threat ratings, indicating strong stakeholder concern about seagrass beds and mangrove forests . These foundational ecosystems provide critical habitat, nursery areas, coastal protection, and water quality functions. The high threat perception likely reflects observed losses from coastal development, dredging, sedimentation, and pollution impacts.

Fish populations rank third (1.90 average) with 74.8% high threat ratings, demonstrating stakeholder awareness of overfishing pressures, habitat degradation affecting recruitment, and declining catches affecting both commercial and recreational fisheries . The concern encompasses reef fish, pelagic species, and coastal fish populations supporting Puerto Rico's fishing communities and marine food webs.

The top three biological resources (corals, SAV, fish) all achieve average ranks below 2.0, clustering them as critical threats with 82.9% average high-threat ratings .

Compared to the 2022-2025 assessment, the 2026-2030 results show sustained or increased concern for coral reefs and continued high prioritization of living marine resources . The consistency suggests persistent and potentially worsening threats to Puerto Rico's marine ecosystems despite ongoing conservation efforts.

3.7.1 Opportunities for Improved Ocean Resources Management

Stakeholders identified priority opportunities to strengthen ocean resources protection and management during the 2026-2030 period. All 108 survey respondents (100% response rate) provided input on management opportunities, selecting up to three priority areas .

The top ten ocean resource management opportunities identified include:

Rank	Management Opportunity	Percentage
1	Regulatory Enforcement	50.0%
2	Restoration	49.1%
3	Planning	45.4%
4	Research	31.5%
5	Policy/Statute Development	29.6%
6	Education & Outreach	22.2%
7	State and Municipal Training and Capacity Building	21.3%
8	Data Management	17.6%
9	Decision Support Tools	15.7%
10	Mapping	15.7%

Table 8: Priority Opportunities for Ocean Resources Management

The results reveal three nearly equal top priorities, with enforcement (50.0%), restoration (49.1%), and planning (45.4%) separated by only 4.6 percentage points . This priority structure distinguishes ocean resources management from other enhancement areas where single approaches dominated, suggesting stakeholders view ocean resource protection as requiring balanced emphasis on regulatory compliance, active ecosystem rehabilitation, and strategic planning.

Compared to opportunities identified for other enhancement areas, ocean resources show the strongest emphasis on restoration and the most balanced priority distribution across enforcement, restoration, and planning . This pattern likely reflects the acute degradation of Puerto Rico's coral reefs and recognition that regulatory approaches alone cannot reverse ecosystem damage, requiring active rehabilitation.

3.8. Energy and Government Facility Siting Challenges

As a new addition to the 2026-2030 stakeholder assessment, respondents were asked to identify the most important existing or emerging challenges for facilitating the identification and location of major government and energy facilities in Puerto Rico's coastal zone. This question received 104 responses (96% response rate), providing insights into siting concerns for infrastructure critical to Puerto Rico's energy transition and economic development .

The top energy and government facility siting challenges identified include:

Rank	Siting Challenge	Percentage
1	Offshore Wind Energy	58.7%
2	Solar Energy	52.9%
3	Wave/Ocean Energy	50.0%
4	Electric Transmission	37.5%
5	Liquefied Natural Gas	35.6%
6	Oil and Gas Pipelines	26.9%
7	Military Installations	8.7%

Table 9: Energy and Government Facility Siting Challenges

The results reveal that renewable energy facilities overwhelmingly dominate siting challenges, with the top three concerns all relating to renewable energy technologies and achieving a combined 161.5% priority . This emphasis on renewable energy infrastructure—represented by more than half of all respondents identifying each type—reflects Puerto Rico's aggressive renewable energy mandates, the Commonwealth's energy crisis following hurricane impacts, and stakeholder awareness that the energy transition will require substantial new coastal zone infrastructure.

Fossil fuel and transmission infrastructure challenges, including electric transmission (37.5%), LNG facilities (35.6%), and oil/gas pipelines (26.9%), combine for 100.0% priority, substantially lower than renewable energy but still significant . These concerns reflect the ongoing reliance on fossil fuel infrastructure, the vulnerability of coastal energy facilities to storm damage, environmental risks from fuel storage and transmission, and the challenge of maintaining existing systems while transitioning to renewables.

Military installations rank lowest (8.7%), likely reflecting their established presence and separate federal regulatory frameworks that limit state coastal management program jurisdiction . The minimal concern suggests military facility siting was not viewed by stakeholders as an emerging challenge requiring new coastal program attention when the survey was administered.

3.9. Aquaculture operations in PR Coastal Zone: Challenges and Opportunities

Stakeholders were asked to identify the types of aquaculture operations—cultivation of freshwater and/or saltwater populations under controlled conditions—that are occurring or could occur in Puerto Rico's coastal zone. Respondents could select multiple aquaculture types, with 103 responses received (95% response rate) .

Three main aquaculture operation types were identified:

- Fish - 85.4%
- Shellfish/Mollusks - 76.7%
- Algae/Seaweed - 55.3%

Additional types mentioned individually include corals, crustaceans (shrimp, lobster), and other specialized operations .

Specialized aquaculture types including coral cultivation for reef restoration, crustacean farming (shrimp, lobster), and other operations received individual mentions . While representing limited stakeholder identification, these specialized types indicate awareness among some respondents of emerging aquaculture applications beyond traditional finfish and shellfish farming. Coral aquaculture connects to stakeholder identification of corals as the most threatened ocean resource, suggesting potential support for restoration-focused aquaculture.

The results demonstrate broad stakeholder awareness of diverse aquaculture potential in Puerto Rico, with respondents averaging 2.2 aquaculture types selected, indicating recognition that multiple cultivation approaches could operate in the coastal zone. Compared to the 2022-2025 assessment, the 2026-2030 results show sustained high recognition of fish and shellfish aquaculture and potentially increased awareness of algae cultivation as an emerging sector

3.9.1. Challenges to establishing aquaculture and mariculture

Stakeholders were asked to identify the three most important challenges to facilitating aquaculture development in Puerto Rico's coastal zone. The question received 107 responses (99% response rate), revealing multiple interconnected barriers limiting aquaculture expansion.

The top seven aquaculture challenges identified include:

Rank	Challenge	Percentage
1	Environmental Impacts	62.60%
2	Contradictory or Difficult to Implement Regulations	48.60%
3	Conflicting Uses	41.10%
4	Natural Disasters	41.10%
5	Economic Viability	36.40%
6	Education	34.60%
7	Lack of Data on Benthic Habitats, Water Column, etc.	29.90%

Table 10: Aquaculture Development Challenges

The results demonstrate that environmental impact concerns dominate stakeholder perspectives on aquaculture challenges (62.6%), reflecting awareness that aquaculture operations can affect water quality, benthic habitats, wild fish populations, and ecosystem processes . Regulatory complexity emerges as the second major challenge (48.6%), indicating stakeholder perception that Puerto Rico's aquaculture regulatory framework presents implementation difficulties . Conflicting uses and natural disaster vulnerability tie for third priority (41.1% each), representing distinct but equally significant challenges .

Grouping the seven main challenges into thematic categories reveals:

- Environmental Concerns: 62.6% single category priority
- Spatial Conflicts & Hazards: 82.2% combined priority (use conflicts + disasters)
- Economic & Knowledge Barriers: 100.9% combined priority (economy + education + data)
- Regulatory & Institutional: 48.6% single category priority

The concentration of challenges across environmental, regulatory, economic, and knowledge domains demonstrates that aquaculture development faces multifaceted barriers requiring comprehensive program approaches . No single intervention can address the challenge spectrum, suggesting successful aquaculture facilitation requires simultaneous attention to environmental safeguards, regulatory streamlining, economic support, spatial planning, and capacity building.

Compared to the 2022-2025 assessment, environmental impact concerns and regulatory complexity remain the top barriers, indicating these fundamental challenges persist despite ongoing efforts to facilitate aquaculture development .

3.9.2. Opportunities for CZMP to improve aquaculture/mariculture management

Stakeholders identified priority opportunities to strengthen aquaculture and mariculture facilitation and management during the 2026-2030 period. A total of 106 respondents (98% response rate) provided input on management opportunities, selecting up to three priority areas .

The top ten aquaculture management opportunities identified include:

Rank	Management Opportunity	Percentage
1	Planning	53.8%
2	Research	52.8%
3	Policy/Statute Development	34.9%
4	Regulatory Enforcement	28.3%
5	Data Management	26.4%
6	Municipal and State Government Training and Capacity Building	25.5%
7	Restoration	25.5%
8	Education & Outreach	19.8%
9	Decision Support Tools	17.9%
10	Mapping	12.3%

Table 11: Management Opportunities for Aquaculture

The results reveal planning and research as nearly equal top priorities (53.8% and 52.8%), separated by only 1.0 percentage point .

Planning ranks first (53.8%), signaling stakeholder recognition that Puerto Rico lacks comprehensive aquaculture planning frameworks including spatial analysis of suitable sites, carrying capacity assessments, conflict resolution mechanisms, and integration with broader coastal zone management objectives .

Research achieves virtually identical priority (52.8%), demonstrating stakeholder awareness that aquaculture development depends on scientific understanding of Puerto Rico's conditions including species suitability, site characteristics, production technologies, market feasibility, and environmental effects . The research priority connects directly to challenges identified in the previous section, particularly data gaps on benthic habitats (29.9%), suggesting stakeholders view knowledge generation as prerequisite to responsible aquaculture expansion.

Grouping opportunities into thematic categories reveals:

- Knowledge & Research: 109.4% combined priority (highest thematic emphasis)
- Planning & Policy Development: 88.7% combined priority
- Implementation & Action: 53.8% combined priority
- Capacity Building & Education: 45.3% combined priority

The dominance of knowledge and planning priorities over implementation approaches demonstrates stakeholder recognition that aquaculture represents a nascent sector requiring foundational work . This priority structure contrasts sharply with other enhancement areas where implementation (enforcement, restoration) often dominated, reflecting aquaculture's different developmental stage in Puerto Rico.

Compared to the 2022-2025 assessment, the continued emphasis on planning and research indicates these foundational needs remain unmet despite ongoing recognition . The persistent priority pattern suggests Puerto Rico has yet to develop the planning frameworks, knowledge base, or institutional capacity necessary to facilitate responsible aquaculture expansion, maintaining aquaculture as a largely unrealized coastal zone opportunity.

4. Demographics

The 2026-2030 stakeholder survey collected demographic information to characterize respondents and assess the representativeness of stakeholder participation.

Language Preference & Organization Type:

Respondents had the option to complete the survey in English or Spanish, reflecting Puerto Rico's bilingual context. A total of 108 participants indicated their language preference:

- Español (Spanish): 94 responses (87 %)
- English: 14 responses (13%)

The strong preference for Spanish (87%) demonstrates the survey's appropriate linguistic accessibility, with the Spanish version serving as the primary instrument for Puerto Rico, while English availability accommodated federal stakeholders and English-proficient participants .

All 108 respondents (100% response rate) indicated the organization or sector they represent, revealing broad stakeholder participation across government, civil society, private sector, and academic communities:

Organization Type	Percentage
Commonwealth Government Agencies	36.10%
Private Citizen	24.10%
Non-Governmental Organization	11.10%
Private/Commercial Industry	10.20%
University/Academic	8.30%
Federal Government	5.60%
Municipal Government	2.80%
Fishing Community	0.90%
Private Consulting	0.90%

Table 12: Organizational Type of respondents

Commonwealth government agencies represent the largest respondent category (36.1%), indicating strong participation from Commonwealth Government staff and other state agency personnel with direct coastal management responsibilities .

Private citizens comprise the second-largest category (24.1%), demonstrating significant public engagement with coastal management issues . Citizen participation represents concerned residents, resource users, and environmental advocates without organizational affiliations, providing grassroots perspectives complementing institutional stakeholder views.

Non-governmental organizations (11.1%) and academic institutions (8.3%) combine for 19.4% participation, representing environmental advocacy groups, research institutions, and educational organizations that provide scientific expertise and conservation perspectives .

Municipal government representation remains limited (2.8%), consistent with the 2022-2025 assessment where municipal governments were similarly underrepresented . This persistent gap suggests opportunities for enhanced municipal stakeholder engagement in future assessment cycles, particularly given municipalities' critical roles in local coastal planning and permit review.

Puerto Rico Residence and Municipality of Residence

Respondents were asked whether they reside in Puerto Rico. The overwhelming participation of residents of Puerto Rico (99.1%) ensures that survey results reflect on-island stakeholder perspectives from individuals with direct experience of Puerto Rico's coastal resources and management challenges .

Among the 107 Puerto Rico residents, participants represent 39 different municipalities, demonstrating geographically diverse stakeholder participation. The top 15 municipalities include:

- San Juan: 28 (26.2%)
- Cabo Rojo: 7 (6.5%)
- Aguadilla: 5 (4.7%)
- Ponce: 5 (4.7%)
- Vieques: 4 (3.7%)
- Luquillo: 4 (3.7%)
- Bayamón: 4 (3.7%)
- Carolina: 4 (3.7%)
- Culebra: 3 (2.8%)
- Vega Baja: 3 (2.8%)
- Guaynabo: 3 (2.8%)
- Gurabo: 3 (2.8%)
- Mayagüez: 3 (2.8%)
- Yauco: 3 (2.8%)
- Isabela: 2 (1.9%)

San Juan dominates respondent distribution (26.2%), reflecting the capital municipality's population concentration, concentration of government agencies and NGOs, and role as Puerto Rico's administrative center . The San Juan concentration parallels the 2022-2025 pattern (15 respondents from San Juan representing the highest single municipality) .

West coast municipalities including Cabo Rojo (6.5%), Aguadilla (4.7%), Isabela (1.9%), and Mayagüez (2.8%) combine for substantial representation.

Island municipalities Vieques (3.7%) and Culebra (2.8%) achieve notable representation despite small populations, reflecting these islands' significant coastal management challenges and active stakeholder engagement .

The representation of 39 municipalities (approximately 50% of Puerto Rico's 78 municipalities, including 89% of the 44 coastal municipalities) demonstrates geographically diverse stakeholder participation, though opportunities exist to enhance participation from underrepresented municipalities in future assessment cycles.

5. Conclusions

The 2026-2030 stakeholder assessment reveals comprehensive insights into Puerto Rico's coastal management priorities, challenges, and opportunities as the Commonwealth navigates post-hurricane recovery and sustainable development pressures. The survey results, representing 108 stakeholders including government agencies (36.1%), private citizens (24.1%), NGOs (11.1%), and academic institutions (8.3%), provide critical guidance for the Puerto Rico Coastal Zone Management Program's enhancement strategy .

High-Priority Enhancement Areas:

Two enhancement areas emerge as the highest stakeholder priorities requiring focused CZMP attention during the 2026-2030 period:

<u>Coastal Hazards Mitigation</u> ranked as the top priority, reflecting Puerto Rico's vulnerability to hurricanes, flooding, erosion, and sea level rise intensified by recent extreme weather events, including Hurricanes María and Fiona . This represents the single highest priority across all nine enhancement areas, with 86.5% of respondents rating it as high priority—the strongest mandate in the entire assessment. Top threat: coastal erosion (1.36 avg rank). Management emphasis on balanced planning (49.1%) and enforcement (48.1%), plus strong restoration support (42.6%) for nature-based solutions.

<u>Wetlands Management</u> ranked as the second priority, with stakeholders identifying coastal development (90.7%) as the principal threat to these foundational ecosystems. Top opportunity: enforcement (58.3%), indicating implementation gaps despite strong protections.

Cross-Cutting Themes:

The Enforcement Imperative

A critical cross-cutting theme emerges throughout the assessment: stakeholders consistently prioritize regulatory enforcement across multiple enhancement areas as the single greatest management opportunity. Enforcement achieves highest priority for marine debris (84.1%), wetlands (58.3%), and ocean resources (50.0%), while maintaining substantial priority for coastal hazards (48.1%) and aquaculture (28.3%) . This extraordinary emphasis on enforcement—appearing as the top or second-highest opportunity in five of eight applicable enhancement areas—demonstrates stakeholder perception that Puerto Rico possesses comprehensive environmental protection laws but experiences persistent implementation gaps.

The enforcement priority reflects stakeholder awareness of unauthorized coastal construction, illegal wetland filling, unpermitted development in maritime-terrestrial zones, inadequate anti-littering compliance, and insufficient monitoring of environmental violations. Multiple open-ended responses emphasize that existing regulations, if properly enforced, would substantially address coastal management challenges. This finding suggests the CZMP should prioritize institutional capacity building, inter-agency coordination, penalty enhancement, and compliance monitoring as core enhancement strategies.

The Planning, Restoration, and Knowledge Foundation

Beyond enforcement, stakeholders emphasize planning, restoration, and knowledge generation as complementary management priorities:

Planning achieves top-three priority across six enhancement areas, with particular emphasis for aquaculture (53.8%), coastal hazards (49.1%), and ocean resources (45.4%) . The planning priority encompasses marine spatial planning, special area management, hazard mitigation frameworks, and comprehensive resource assessments—reflecting stakeholder recognition that Puerto Rico requires strategic frameworks to guide sustainable coastal development.

Restoration receives exceptional stakeholder support, particularly for ocean resources (49.1%)—the highest restoration emphasis across all enhancement areas—and significant priority for wetlands (41.7%) and coastal hazards (42.6%) . This restoration emphasis demonstrates stakeholder understanding that Puerto Rico's degraded ecosystems require active rehabilitation including coral restoration, wetland enhancement, mangrove replanting, and dune stabilization to recover ecological function and resilience.

Research and knowledge infrastructure achieve highest combined priority for aquaculture (109.4%) and substantial emphasis for ocean resources (31.5%) and coastal hazards (25.0%) . The knowledge priority addresses data gaps on benthic habitats, water quality, species populations, and suitable sites for various uses—reflecting stakeholder awareness that evidence-based management requires comprehensive environmental information systems.

Additional considerations:

Stakeholder responses reveal other important considerations:

Nearly two-thirds of stakeholders (64.8%) rate public access to beaches and coastal resources as insufficient, with priorities for accessible facilities for persons with disabilities (48.1%), parking (51.9%), and boardwalks (46.3%). The sustained public access concern, combined with stakeholder identification of loss of public access as a cumulative impact (21.3%) and open-ended comments about coastal gentrification and privatization, demonstrates that equitable access to coastal resources remains a contentious issue requiring CZMP attention through access point development, enforcement of access rights, and prevention of privatization.

Stakeholders identify coral reefs as Puerto Rico's most threatened ocean resource with overwhelming consensus (82.4% rating as most threatened, 1.25 average rank) . The coral priority, combined with high concern for submerged aquatic vegetation (1.70 rank) and fish populations (1.90 rank), demonstrates stakeholder awareness of catastrophic declines in Puerto Rico's marine ecosystems requiring urgent intervention through enforcement, restoration, and planning .

Land-based debris sources dominate stakeholder concerns (173.1% combined priority) with beach litter (73.1%), deteriorated coastal structures (63.0%), and illegal dumping (50.9%) as top issues . The marine debris priorities reveal a fundamental challenge: while Puerto Rico generates substantial regulatory and programmatic attention to debris issues over decades, stakeholders perceive persistent and possibly worsening conditions requiring enhanced enforcement (84.1%), removal programs (62.6%), and public education (56.1%)

Energy and Government Facility Siting (new section for 2026-2030) demonstrates that renewable energy infrastructure dominates siting challenges, with offshore wind (58.7%), solar energy (52.9%), and wave energy (50.0%) identified as top concerns .

Aquaculture presents a conundrum of recognized potential but unrealized development. While stakeholders demonstrate awareness of diverse aquaculture types including fish (85.4%), shellfish (76.7%), and algae (55.3%), they identify substantial barriers including environmental impact concerns (62.6%), regulatory complexity (48.6%), and use conflicts (41.1%) .

Annex 2: Comments and Responses to Public Draft

Comments and Responses to draft Section 309 report FY26-30			
Comments: NOAA			
Comment ID	Page	Comment	Response
1	11	Delete the instructions from the document.	Thank you for your comment. We will delete all instructions from the final 309 document.
2	11	This data is from 13 years ago and before hurricane Maria. I don't think these values reflect the current state of wetlands. They do provide a more qualitative explanation of why the NOAA data is so outdated and provide numbers from the C-CAP project and the other data. I think they have provided enough information to accurately provide a picture of the status of wetlands.	Thank you for your comment. We have received your comment and determined that no further action is required at this time.
3	12	Use this data instead? More recent than the 2010.	Thank you for your comment. We have reviewed your suggestion and determined that no further action is required at this time.
4	15	Please explain why it was not completed and how are they going to make sure they get completed now?	Thank you for your comment. We will clarify what work was completed in the previous

		They should make sure that if they are included work based on previous strategies that they are clear what is work from the previous cycle, why it wasn't completed during the previous cycle, and what's different in the strategy for this cycle. It's fine if all of that is included in the strategy section rather than right here. If the reason it wasn't completed was due to something that changed the overall landscape of wetlands management, they should mention that here.	cycle, explain the reasons for any incomplete activities, and describe how our revised approach in this cycle addresses those challenges to ensure successful completion.
5	15	How will this be achieved? Enforcement has been a recurring issue that is never solved. That is something I would expect them to outline in the strategy section. If there is no strategy around this, I would question why if it's the high priority the stakeholders have indicated here.	Thank you for your comment. We recognize enforcement as a high-priority stakeholder concern and will ensure the strategy section provides concrete actions and mechanisms to address this recurring issue effectively.
6	19	Characterize the outcomes or likely future outcomes of the changes. Agreed.	Thank you for your comment. We will add a sentence or phrase describing actual or expected outcomes of OE-2023-009.
7	19	This is not 309 or CZM driven changes. It's fine if they are not, but that should be indicated in the description.	Thank you for your comment. We will add phrase stating this is not a section 309 change.
8	19	Are this 309 or other CZM-driven changes Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add phrase stating whether actions are or are not 309 driven changes and clarify the actual or expected outcomes of the changes.
9	20	309 or CZM driven change? Future outcomes?	Thank you for your comment. We will add phrase stating whether actions are or are not 309 driven changes and clarify the actual or expected outcomes of the changes.

10	20	Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add a phrase characterizing the likely outcomes of this activity.
11	21	Are these 309 or other CZM-driven changes Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add phrase stating whether actions are or are not 309 driven changes and clarify the actual or expected outcomes of the changes.
12	21	Are these 309 or other CZM-driven changes Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add phrase stating whether actions are or are not 309 driven changes and clarify the actual or expected outcomes of the changes.
13	21	Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add a phrase characterizing the likely outcomes of this activity.
14	22	Are these 309 or other CZM-driven changes Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add phrase stating whether actions are or are not 309 driven changes and clarify the actual or expected outcomes of the changes.
15	26	Specify if they were 309 or other CZM-driven changes; and Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add phrase stating whether actions are or are not 309 driven changes and clarify the actual or expected outcomes of the changes.
16	26	Specify if they were 309 or other CZM-driven changes; and Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add phrase stating whether actions are or are not 309 driven changes and clarify the actual or expected outcomes of the changes.
17	26	Characterize the outcomes or likely future outcomes of the changes.	Thank you for your comment. We will add a phrase characterizing the likely outcomes of this activity.

18	29	Can they specify how they gathered this data? It seems arbitrary.	Thank you for your comment. The information provided on the table was completed and reviewed by the lead DNER staff expert leading efforts on marine debris management in October 2025.
		More information would be helpful, but it shouldn't hold up finalizing the document if it's not included.	
19	31	Please describe how DNER is collaborating with these NGOs. Is the program providing funds or technical assistance?	Thank you for your comment. We will clarify whether these actions are funded through Section 309 and be more specific on the type of collaboration with NGOs mentioned.
20	33	I would expect a discussion of the permitting and enforcement challenges in this section or in the wetlands section. Since they cover coastal development in this section, it seems the most appropriate to me.	Thank you for your comment. We will enhance this section to include additional information on the permitting and enforcement challenges.
21	71	Why? What is the current issue with permitting enforcement?	Thank you for your comment. We will provide clarity on the current issues identified with enforcement and permitting processes related to CZM.
22	72	need a more detailed explanation of why the strategy was not completed in the previous cycle, and why this is still a continued need. That explanation needs to also be reflected in the strategy.	Thank you for your comment. We will provide additional input as to the implementation challenges in the previous cycle, the need to provide continuity and the intent of the renewed approach on this upcoming cycle.
23	76	Again, more information about why this work wasn't completed in the previous cycle would be helpful. In addition, any information you can provide in the feasibility section about how those challenges have been addressed would be helpful.	Thank you for your comment. We will provide additional input as to the implementation challenges in the previous cycle, the need to provide continuity and the intent of the renewed approach on this upcoming cycle.

24	77	Is this someone who is already on staff or will they need to hire? More detail on this would be helpful in the feasibility section.	Thank you for your comment. We will clarify on previous challenges to hire a CRP, as well as work being done by PRCZMP staff to help advance the Section 309 programming in the absence of the CRP coordinator and actions to move forward on this hiring.
25	80	Any information you can provide about the status of any previous conversations about this would be helpful to assess feasibility.	Thank you for your comment. We will provide additional information on the advances in talks between DNER, PRPB related to the MOU, including October 2025 talks.
26	82	More information needed in this part.	Thank you for your comment. Additional information on the Needs and Gaps Addressed Section was incorporated, reflecting on the results from the assessment analysis.
27	83	Success depends on the hiring of a CRP coordinator. Will this coordinator be on board within the first year? Would recommend extend the guidance development out by another year. The end of this part could overlap with the beginning of the conversations regarding the MOU and the regulatory component development.	Thank you for your comment. We will evaluate the recommendation to extend the guidance development timeline by one year to align with CRP coordinator hiring and provide clarification on the status and process for securing the CRP position.
Comments: Junta de Planificación de Puerto Rico (JP)			

Comment ID	Page	Comment	Response
28	6	La redacción actual utiliza un concepto amplio y no definido en la legislación local ("climate change considerations"). Para efectos de planificación territorial, la JP se rige por terminología jurídica y técnica establecida, tales como riesgos naturales, erosión costera, zonas inundables, marejadas ciclónicas, procesos geomorfológicos, y otros parámetros incluidos en reglamentos como el Plan de Uso de Terrenos, los mapas de riesgo y las disposiciones de la Ley 75-2020. Se recomienda ajustar la redacción para que se alinee al marco normativo aplicable y evite interpretaciones regulatorias ambiguas que puedan afectar la implantación de política pública a nivel municipal y estatal.	Thank you for your comment. We will revise the terminology to align with the local legal framework with disaster risk management language that reflects established concepts such as natural hazards, coastal erosion, and flood zones.
29	6	El borrador sugiere que la JP realiza análisis y modelaciones sobre la migración de humedales, cuando en realidad esa no es una función institucional asignada por ley. La JP no produce modelos ecológicos ni biogeoquímicos, sino que evalúa propuestas mediante la integración y uso de datos oficiales provenientes de entidades como NOAA, FEMA, USGS, UPR, DRNA y USACE, para apoyar decisiones de uso de terrenos. Se recomienda corregir la descripción para reflejar la función real de la JP como integrador de información, no como generador de modelaciones ecológicas.	Thank you for your comment. We will correct language to ensure PRPB is not attributed with the wetland modelling exercise. Highlight PRPB role as data integration for land use decision making processes.

30	12	El documento atribuye al SCORP datos provenientes de la Junta de Calidad Ambiental (EQB) como si esta fuera la entidad responsable del inventario oficial de humedales. Debe aclararse que la EQB no realiza el inventario de humedales, y que las fuentes oficiales históricamente reconocidas son: • USFWS – National Wetlands Inventory (NWI) • NOAA – Coastal Change Analysis Program (C-CAP) Esta aclaración es esencial para evitar malinterpretaciones sobre qué entidad produce los datos utilizados para decisiones regulatorias.	Thank you for your comment. We will review document to ensure EQB is not being mentioned as the lead in wetland inventory.
31	26	El borrador presenta logros recientes de la Junta de Playas; sin embargo, según conocimiento institucional, esta Junta no se ha reunido de manera regular en los último años. Se recomienda actualizar la sección para evitar atribuirle acciones o proyectos que no corresponden a su realidad operacional actual, garantizando fidelidad al desempeño vigente de los entes interagenciales.	Thank you for your comment. We will clarify language to ensure it clarifies the actions from the Junta de Playas and their interagency meetings between 2023 and 2025.

32	26	La JP subraya la necesidad de reforzar la planificación para garantizar el acceso público al litoral, conforme al mandato constitucional. Se recomienda que el PMZCPR: • priorice inventarios de accesos existentes y obstruidos, • incorpore protocolos de mantenimiento, • promueva accesibilidad universal mediante infraestructura adecuada, • atienda conflictos por privatización de facto, • y coordine esfuerzos interagenciales para su protección. El acceso a playas es un componente esencial de la planificación territorial y del bien público.	Thank you for your comment. We acknowledge the constitutional mandate for public coastal access and will look to highlight how the strategy can also support this mandate while using targeted Section 309 funds to address needs on Wetlands and Coastal Hazards priority areas. There are needs from this assessment area that can be addressed under the Section 306 program or through other funding opportunities yet to be identified.
33	46	La información utilizada en el documento, basada en datos previos a 2006, no representa la condición actual de los ecosistemas coralinos en Puerto Rico. Dado el blanqueamiento masivo de 2023–2024, el aumento en temperaturas marinas y la evidencia científica reciente de deterioro acelerado, se recomienda incluir datos actualizados de: • NOAA Coral Reef Watch • Programa de Arrecifes de Coral del DRNA • UPR–CESAM • Investigaciones 2021–2024 El uso de datos obsoletos puede llevar a conclusiones incorrectas sobre vulnerabilidad costera.	Thank you for your comment. We will review data on corals incorporated on report, update as necessary.

34	46	El sargazo constituye un fenómeno recurrente con impactos severos sobre:• salud pública,• ecosistemas costeros,• infraestructura,• turismo,• operaciones de plantas generatrices,• navegación y actividades recreativas.El borrador no aborda este tema, lo cual representa una omisión significativa. La JP recomienda incluir una estrategia formal que contemple monitoreo, alertas tempranas, manejo, mitigación, identificación de zonas críticas y coordinación interagencial.	Thank you for your comment. DNER continues to identify and implement strategies to address sargassum blooms impacts on Puerto Rico coasts, and its scope lies outside of the proposed Section 309 funds.
35	54	La JP recomienda aclarar expresamente que: • la Ley 17-2019 continúa vigente, • la Ley 1-2025 enmendó, pero no derogó, varios artículos de la Ley 17 y la Ley 82-2010. Esta actualización es necesaria para reflejar la política energética real del Gobierno de Puerto Rico.	Thank you for your comment. We will review data and update as pertinent.
36	N/A	El borrador menciona repetidamente que se necesita más información para diversas acciones. Sin embargo, existe abundante data disponible proveniente de: • NOAA, FEMA, USGS, EPA, USACE • UPR, UMET, CARICOOS y otros centros académicos • ONG científicas y ambientales	Thank you for your comment. DNER will continue to conduct recurrent comprehensive compilation of existing data from federal, academic, and NGO sources to avoid duplication, and then clearly identify any remaining data gaps that require new studies to support effective coastal resource management.

		La JP recomienda que, antes de solicitar estudios nuevos, se realice una compilación comprensiva de información existente, evitando duplicidad de esfuerzos y uso ineficiente de fondos federales.	
37	N/A	La Junta de Planificación reconoce y acepta la designación de aquaculture como prioridad baja dentro del marco del PMZCPR; sin embargo, considera necesario atender este tema de manera estratégica y anticipada. El aumento sostenido en solicitudes ante la Oficina de Compatibilidad Federal evidencia que la actividad acuícola está experimentando un crecimiento que, de no planificarse adecuadamente, podría generar conflictos con otros usos del litoral, impactos ambientales acumulativos y retos regulatorios para las agencias encargadas de la implantación de política pública. La JP recomienda que el tema de acuacultura sea monitoreado activamente, se fortalezca mediante datos del Departamento de Agricultura y se integre a una estrategia preventiva de planificación territorial para asegurar un desarrollo ordenado, compatible y ambientalmente responsable.	Thank you for your comment. We will highlight in the Aquaculture analysis the importance of data and the interagency coordination to further explore these activities.
Comments: Maryguel Fuentes Lacén			
Comment ID	Page	Comment	Response
38	N/A	Tendrian el documento disponible en español o esta unicamente en ingles?	Thank you for your comment. We have reviewed your suggestion and determined that no further action is required at this time.
Comments: Arrecife Condado, Inc.			

Comment ID	Page	Comment	Response
39	N/A	Aprovecho para enfatizar que cualquier protección de la zona costanera debe incluir la construcción y formación de una red de rompeolas paralelos a la costa para reducir la energía de las olas y poder desarrollar dunas de arena, en los lugares más propensos a destrucción por las marejadas y el oleaje. Solo sugiero que miren la costa de Málaga en España, la costa de Okinawa y el Hotel Dorado Beach, para que se ilustren cariñosamente con el efecto de poner una barrera paralela horizontal a la costa, pero fuera de la costa. Reitero que aquí hay los científicos costeros, el material, y recursos para lograr una defensa en la costa norte por lo menos en forma de emergencia para Luquillo, Río Grande, Loiza, Isla Verde, Punta Las Marías, Condado, Cataño, Vega Baja, Barceloneta, Arecibo, Aguadilla, y Rincón.	Thank you for your comment. Your suggestion the use of coastal protection technologies will be considered for future coastal zone management planning initiatives.
Comments: Sandra Bravo Rivera			
Comment ID	Page	Comment	Response

40	7	Recommend adding the following at the end text: *(...or restricted if existing over 30 years)*	Thank you for your comment. The recommended edits were made to the "Summary of Recent Section 309 Achievements", which describes the actions made during the 2023-2025 cycle. We will consider if proposed edits should align better with proposed actions for future coastal zone management planning initiatives.
41	7	Recommend adding the following at the end of text: (*...or for existing development, while restraining new construction)*	Thank you for your comment. The recommended edits were made to the "Summary of Recent Section 309 Achievements", which describes the actions made during the 2023-2025 cycle. We will consider if proposed edits should align better with proposed actions for future coastal zone management planning initiatives.
42	7	Recommend adding the following at the end of text: (*...Existing development will be considered special zones if it complies with protection measures such as reforesting or upgrading the landscape and has been in area for over 30 years. No further construction permits will be authorized)*.	Thank you for your comment. The recommended edits were made to the "Summary of Recent Section 309 Achievements", which describes the actions made during the 2023-2025 cycle. We will consider if proposed edits should align better with proposed actions for future coastal zone management planning initiatives.

43	7	Recommend adding the following at the end of text: *(Need to review guidelines in order to be flexible depending on the geographical features of the area, our shorelines and beaches vary across the land).*	Thank you for your comment. The recommended edits were made to the "Summary of Recent Section 309 Achievements", which describes the actions made during the 2023-2025 cycle. We will consider if proposed edits should align better with proposed actions for future coastal zone management planning initiatives.
44	N/A	Considero pertinente que la ZMT cree unos espacios especiales en areas ya impactadas con viviendas y otros desarrollos turísticos o recreativos y se proceda a establecer restricción a nuevos desarrollos en esos espacios. Se debe requerir esfuerzos entre pobladores y municipio para reforestar en la medida que sea posible y crear lugares mas resilientes en estas areas.	Thank you for your comment. Your suggestion regarding special designations for already-impacted areas with restrictions on new development and reforestation requirements will be considered for future coastal zone management planning initiatives.
Comments: Maria Camacho			

Comment ID	Page	Comment	Response
45	N/A	Enfoque en desarrollo sostenible como si el DRNA promoviera el desarrollo costero y no en la conservación y protección de los recursos costeros.	Thank you for your comment. We will revise the document to clearly emphasize DNER's primary mission of conservation and protection of coastal resources, ensuring this focus is appropriately balanced with sustainable development considerations within PRCZMP priorities.
46	N/A	Falta de inlcusión de los ecosistemas de los ríos, quebradas y riachuelos, los sistemas hídricos e hidrogeológicos (cuencas hidrográficas e hidrogeológicas).	Thank you for your comment. We note that no additional action is required, as this can be considered part of new initiatives to strengthen coastal zone management planning processes.
47	N/A	poca infomración sobre la validez de la zona marítimo terrestre como lugar importante de areas de aniaje para aves y tortugas marinas.	Thank you for your comment. We will review and update as necessary highlighting the importance of the maritime-terrestrial zone as critical habitat for nesting birds and sea turtles.
Comments: Junta Asesora Comunitaria Reserva Natural Canal Luis Peña			
Comment ID	Page	Comment	Response

48	N/A	El borrador 309 reconoce problemáticas claves (humedales, amenazas costeras, impactos acumulativos, etc), pero carece de intervenciones estratégicas concretas que atiendan sus causas estructurales; por ejemplo- (a) delegación y uso indebido de Exclusiones categóricas por Profesionales Autorizados (b) fiscalización insuficiente de Profesionales Autorizados, (c) falta de financiamiento operativo ligado a planes de manejo de áreas marinas protegidas, (d)desconocimiento de actores causantes/relevantes, (e)limitada fiscalización ambiental. Recomendamos que el PMZCPR utilice la Sección 309 para financiar intervenciones estratégicas que atiendan las raíces de las problemáticas costeras identificadas en el borrador mediante 1)herramientas GIS-operativas que faciliten la toma de decisiones, 2)cartografía y línea de referencia oficial de la zona marítimo terrestre de Culebra, 3)financiación para implementación colaborativa de planes de manejo de Areas Marinas Protegidas (AMP) y 3)programas de educación continua y capacitación para sectores de interés (operadores de maquinarias pesada, etc) y entes fiscalizadores (Cuerpo de Vigilantes, ACDEC).	Thank you for your comment. We confirm that education and training programs are included in the Strategy. We note that establishing the maritime-terrestrial zone reference line and financing AMP implementation may be better addressed through alternative funding mechanisms outside the Section 309 strategy.

49	N/A	La figura del Profesional Autorizado (PA), al amparo del Reglamento Conjunto 2023, puede expedir permisos ministeriales y determinaciones, incluyendo determinaciones de cumplimiento ambiental vía exclusión categórica (DEC). La emisión "automática" de DECs carece de un mecanismo público de notificación y periodo de comentario obligatorio antes de convertirse en una determinación final. Tampoco parece existir un sistema de aviso (flagging automático o bloqueo preventivo) cuando un trámite involucra parcelas dentro/contiguas a polígonos de áreas marinas protegidas o áreas ecológicamente sensitivas. Estas debilidades sumado a la limitada fiscalización de los PA, ha provocado un abuso de las DEC para proyectos de construcción, reconstrucción y segregación de terrenos en Culebra, que no cumplen con los requisitos establecidos por el DNRA, incluyendo deforestaciones adyacentes a la RNCLP. Auditoría de DECs aprobadas en Culebra entre 2017-2025- financiar un estudio y georreferenciación de autorizaciones para identificar patrones de riesgo y proponer cambios procesales que eviten el abuso de DECs en Culebra.	Thank you for your comment. We note that auditing could be part of a broader coastal hazard risk and threat assessment, which merits internal discussion through the interagency process. The assessments of permitting processes, such as DEC, are part of broader interagency discussions at present. Actions may be better addressed through alternative funding mechanisms beyond Section 309 funds for this cycle.

Comments: Pausa 365

Comment ID	Page	Comment	Response
50	N/A	Public access along Puerto Rico's coastline is experiencing accelerated deterioration, influenced by physical coastal change, regulatory ambiguity, socio-economic pressures, and gaps in long-term community stewardship. While NOAA's 2025 Final Evaluation Findings accurately identify deficiencies in enforcement, inventory completeness, and transparency, PAUSA365's field experience demonstrates that these issues are more extensive, dynamic, and interconnected than documented through regulatory review alone. For these reasons, we suggest public access should be elevated as a high strategic priority under Section 309; not only as a matter of recreational equity, but as a core component of coastal governance, hazard mitigation, ecological connectivity, and community resilience.	Thank you for your comment. We acknowledge that the comments highlights importance of public access to address impacts to coastal zone management. There are needs from this assessment area that can be addressed under the Section 306 program or through other funding opportunities yet to be identified.
51	N/A	Balnearios serve as the island's primary recreational coastal infrastructure, yet the SCORP nor the PRCMP Section 309 Assessment and Strategy Draft does not position them as a priority within access planning. When balnearios are closed or degraded, public use shifts toward ecologically sensitive areas, dunes, wetlands, berms, and unregulated shoreline segments, where high foot traffic accelerates erosion, increases ecological disturbance, and poses safety risks.	Thank you for your comment. We have reviewed your suggestion and determined that no further action is required at this time.

		Prioritizing balnearios within the 309 strategies would help redistribute public use to areas equipped to handle higher load, reducing ecological impacts elsewhere, and improving safety and equity in coastal access.	
52	N/A	Key opportunities include linking inventories with hazard and ecological layers, incorporating updated MTZ and deslinde determinations, formalizing parallel and visual access categories, and improving alignment across DNER, OGPe, the Planning Board, and municipalities. Strategies may include passive and active stewardship measures such as enhanced signage, controlled delineation, simplified public reporting tools, and capacity building programs designed to adapt to transient population dynamics and formal access adoption programs. Capacity building efforts should also extend to licensed land surveyors, whose technical expertise is essential for producing accurate coastal boundary delineations that directly influence the identification, protection, and legal recognition of public access points and coastal easements. These measures are necessary to address the erosion of stewardship capacity due to demographic change and shifting population patterns.	Thank you for your comment. We will consider whether to extend education training modules and capacity building to licensed land surveyors as part of the education and capacity building efforts within the Strategy.
Comments: The Nature Conservancy (TNC)			

Comment ID	Page	Comment	Response
53	N/A	Wetland Priority AreaWe are encouraged by the initiatives outlined in the draft strategy, including the update to the Wetland...TNC Blue Carbon Explorer (BCE) - A decision-support tool that enables governments and practitioners to track mangrove changes and identify priority areas for conservation and restoration, enhancing ecological recovery and carbon storage.Caribbean 30x30 Conservation Dashboard - A science-based platform designed to help governments across the Caribbean identify the most ecologically valuable areas for protection. The dashboard highlights regionally significant ecosystems, supports transboundary conservation, and integrates Marxan results for wetlands to achieve biodiversity representation while minimizing costs.	Thank you for your comment. We will add this as list of references and resources available to strengthen and enhance the NNBI and the Adaptive Restoration Guidance activities under the CRP Strategy.
54	N/A	We encourage CZMP to consider the Natural and Nature-Based Solutions Job Aids published by FEMA Hazard Mitigation in 2024, developed specifically for Puerto Rico with support from TNC and Protectores de Cuencas, Inc	Thank you for your comment. We will add this as list of references and resources available to strengthen and enhance the NNBI and the Adaptive Restoration Guidance activities under the CRP Strategy.

Annex 3: Acronyms

ACRONYM	DEFINITION
ABFE	Advisory Base Flood Elevation
ADV	Abandoned and Derelict Vessels
C-CAP	NOAA's Coastal Change Analysis Program (regional land cover and change)
CARICOOS	Caribbean Coastal Ocean Observing System
CDBG	Community Development Block Grants (U.S. Dept. of Housing and Urban Development)
CEACC	Puerto Rico Climate Change Experts and Advisors Committee
CFF	Coastal Forest Fisheries
CMP	Coastal Management Program
CRCP	Coral Reef Conservation Program
CRP	Puerto Rico Coastal Resilience Program
CSI	Cumulative and Secondary Impacts (of development)
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act of 1972
EQB	Environmental Quality Board
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FWS	U.S. Fish and Wildlife Service
GeoFrame	Puerto Rico Geospatial Framework Program
HMP	Hazard Mitigation Plan
HUD	U.S. Department of Housing and Urban Development
JPR	Joint Permitting Regulations
LBSP	Land Based Sources of Pollution
MDP	NOAA Marine Debris Program
MOU	Memorandum of Understanding
MTZ	maritime terrestrial zone
NCEI	National Centers for Environmental Information
NEMAC	National Environmental Modeling and Analysis Center
NERR	National Estuarine Research Reserve program

NFWF	National Fish & Wildlife Foundation
NGO	Non-Governmental Organizations
NNBI	natural and nature-based infrastructure
NNBF	Natural and Nature-Based Features
NOAA	National Oceanic & Atmospheric Administration
NOAA CRCP	NOAA’s Coral Reef Conservation Program
NPS	Non-Point Source pollution
NSHM	National Seismic Hazard Model
NWI	National Wetlands Inventory (US Fish & Wildlife Service)
OCM	NOAA's Office for Coastal Management
OGPe	Spanish acronym for Puerto Rico Permit Management Office
OTEC	Ocean Thermal Energy Conversion
PAG	Prioritization Advisory Group
PMEL	Pacific Marine Environmental Laboratory
PRCRCP	Puerto Rico Coral Reef Conservation Program
PRCZMP	Puerto Rico Coastal Zone Management Program
PREB	Puerto Rico Energy Bureau
PREPA	Puerto Rico Electric Power Authority
PROtech	Puerto Rico Ocean Technology Complex
PRPB	Puerto Rico Planning Board
SAC	Site Assessment and Characterization
SAMP	Special Area Management Plan
SCORP	State Comprehensive Outdoor Recreation Plan
SCTLD	Stony Coral Tissue Loss Disease
SIFT	Short-term Inundation Forecasting for Tsunamis
SLAMM	Sea Level Marsh Migration Modeling
SLR	Sea Level Rise
SOP	Standard Operating Procedures
SPA	Special Planning Area (SPA)
TCFR	Tropical Coastal Forest Resources
UPR	University of Puerto Rico
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard

USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey (Department of the Interior)