

DRAFT
ASSESSMENT AND STRATEGIES
FY 2016 – FY 2020

Prepared in accordance with:
COASTAL ZONE MANAGEMENT ACT - SECTION 309

By:
PUERTO RICO COASTAL MANAGEMENT PROGRAM

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1 INTRODUCTION

The following Assessment and Strategy was developed pursuant to Section 309 of the Coastal Zone Management Act (CZMA). The document is structured to conform to CZMA Section 309 Program Enhancement Guidance issued by NOAA Office of Ocean and Coastal Resources Management covering the period FY2016-2020.

The PRCZMP 309 Assessment is based on information generated at DNER's Coastal Management Office or provided by Federal and Commonwealth agencies, municipalities, as well as information provided by the public. The assessment summarizes trends and current status of resources pertaining to the priority enhancement areas identified for Puerto Rico.

The PRCZMP 309 Strategies were developed for the selected priority areas in coordination with PRCZMP partners. The strategies integrate initiatives to promote increased cooperation among Federal and Commonwealth agencies in order to maximize the value of the investment of 309 funds. This introduction summarizes how the assessment and program enhancement strategies were developed and reviewed. A summary of the public comments and how they were addressed is provided under section F.

This version is a draft as of March 31, 2015. Once NOAA OCRM provides comments on the draft PRCZMP 309 Assessment and Strategy, CMO will edit and publish the final document.

A. Conformance to OCRM Guidance

In June 2014, NOAA/OCRM issued the final draft guidance for the Section 309 Program which considerably streamlines the Assessment and Strategy. This document has adhered as closely as possible to those guidelines.

The Strategy covers the five year period FY 2016– FY 2020. It is understood that OCRM's acceptance of the Assessment and Strategy is an eligibility requirement for receiving new Section 309 funding beginning in FY 2016.

The main body of the report is organized by program enhancement area. For the two priority program areas ---Wetlands and Coastal Hazards – the strategy section follows the assessment. No strategies were developed for enhancement areas with a medium or low priority ranking .

B. Prior Cycle of Sec.309 Assessment and Strategy

In June 2011, PRDNER submitted an updated and revised Section 309 Assessment and Strategy to OCRM. In the intervening period between the 2011 submission and the present, coastal development trends have remained largely unchanged due to slow economic activity and a major contraction in the construction sector.

The economic downturn beginning in 2008 and continuing to the present has brought a halt to most new building development in both the private and public sectors. Puerto Rico's macroeconomic indicators reflect that the Commonwealth's economy is centered on high value- added services and manufacturing. During 2013, the gross domestic product was nearly \$67 billion, with a GDP per capita of over \$24,000. The Gross National Product¹ was 62.8 billion. As of February 2010, the labor force was around 1.3 million strong, of which 1.1 million were employed. Mean household income was over \$28,000 (Source: Government Development Bank).

According to the Government Development Bank, the Puerto Rico GDP composition by sector (2013) is distributed as follows: Manufacturing, 45.5%; finance, insurance and real estate, 19%; services, 12.8%; government, 9.7%; trade, 7.8%; transportation and other public utilities, 3.2%; construction and mining, 1.9%; and agriculture, 0.7%.

As in 2009, statistics in 2015 reflect a major contraction in the construction and transportation sectors. While planning, project design and permitting processes for future coastal development are continuing, only a few construction projects are actively underway. Budgetary constraints and employment reductions have likewise moderated governmental activities with respect to public works and new program initiatives.

Proposed Section 309 program activities are consistent with inputs received from key Commonwealth and federal agencies. These include the Puerto Rico Planning Board, Department of Recreation and Sports, National Parks Company, Environmental Quality Board, U.S. Fish and Wildlife Service, U.S. Forest Service, International Institute of Tropical Forestry, National Marine Fisheries Service, the Natural Resources Conservation Service, the Caribbean Landscape Conservation Cooperative, and the Caribbean Regional Ocean Partnership. Results from a PRCZMP survey designed to obtain public comment on 309 program priorities will be integrated in Phase II of the Assessment and Strategy development. The three highest priority areas were Coastal Hazards and Coastal Habitats, Wetlands, and Public Access followed by Marine Debris, Ocean Resources, Aquaculture, Energy Facility Siting, Special Planning Areas and Cumulative Impact Analysis.

2 SUMMARY OF RECENT SECTION 309 ACHIEVEMENTS

A number of accomplishments were achieved by the PRCZMP since 2011. This section highlights some of the accomplishments under the PRCZMP public access, wetlands and coastal hazards strategies:

Public access:

- DNER Secretary submitted public access cooperation agreements to the mayors of the 44 Coastal Municipalities.
- Six cooperation agreements between DNER and Coastal Municipalities have been signed.
- Coastal access guides have been completed for all coastal sectors of the main Island of Puerto Rico.
 - Coastal access guides for Culebra and Vieques islands will be completed using 309 funds.
 - All Puerto Rico, Culebra and Vieques islands access guides will be integrated as part of the Island-wide coastal access master guide).
 - PRCZMP completed the Puerto Rico Coastal Areas Public Access Master Plan
 - PRCZMP completed the Puerto Rico Beach Conservation and Maintenance Plan
 - The PRCZMP was designated as the Executive Secretariat of the Interagency Beach Management Board.

Wetlands:

- PRCZMP completed the atlas of coastal wetlands and wetlands land tenure.
- PRCZMP completed the draft guidelines for submerged lands zoning.
- PRCZMP prepared the draft zoning for submerged lands of the Southeast of Puerto Rico. This document was submitted to PRPB for evaluation and adoption as part of the Island-wide Land Use Plan.
- Governor of Puerto Rico issued Executive Order 2008-53 creating the Interagency Wetlands Committee.
 - PRCZMP completed the inventory of coastal geomorphic features, coastal habitats and wetlands.
 - DNER and the USACE signed a Memorandum of Understanding to develop a method to assess the condition of the Antilles WetlandsPRCZMP leads the development of the method to assess wetlands condition in Puerto Rico as part of a project funded by the USEPA. The project identified 8 wetland classes and will establish 24 permanent wetlands reference sites which PRCZMP-CMD is recommending as potential sentinel

sites to assess climate change vulnerability using the first assessments as baseline conditions to support long-term studies. PRCZMP also recommended to the USEPA and EQB the use of the 24 reference sites as permanent monitoring stations for water quality

Coastal Hazards:

- PRCZMP completed the evaluation of coastal features functions as non-structural forms of coastal hazards mitigation..
- PRCZMP supported the collection of aerial photography that were used to model a 1 meter sea level rise scenario.
- PRCZMP identified critical infrastructure of the metropolitan area vulnerable to a 1 meter sea level rise.
- PRCZMP evaluated coastal areas that would be potentially affected by sea level rise.
- PRCZMP and the UPR-CariCOOS modelers identified a problem of accuracy associated to the lack of enhanced elevation data for Puerto Rico. NOAA National Geodetic Survey addressed this issue and completed the development of the new Puerto Rico Vertical Datum 2002.
<http://www.ngs.noaa.gov/datums/vertical/>

- Based on the corrected LiDAR PRCZMP, CariCOOS, and the UPR-Marine

Sciences Department commissioned and completed the higher accuracy inundation projections are completed, PRCZMP can use Maximum of Maximums (MOM) inundation lines and reassess vulnerable areas . These products are available at: pr-ccc.org

- Governor of Puerto Rico created the Puerto Rico Advisory Committee via Executive Order.2008-09.

- PRCZMP Director and NOAA Coastal fellow led the development of the first “State of the Puerto Rico Climate Report (2010-2013)”. This reports assesses Puerto Rico’s socio-ecological vulnerabilities, as well as potential effects and impacts of climate change on coastal communities, critical infrastructure, and biodiversity.
- Governor of Puerto Rico established the mandate that all infrastructure agencies develop vulnerability assessments and adaptation plans based on the PRCCC “State of the Puerto Rico Climate 2010-2013” report via Executive Order 2013-016

3 PROGRAM ENHANCEMENT ASSESSMENTS

3.1 WETLANDS ASSESSMENT

SECTION 309 ENHANCEMENT OBJECTIVE

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

Note: For the purposes of the Wetlands Assessment, wetlands are “those areas that are inundated or saturated at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” [33 CFR 328.3(b)]. See also pg. 17 of the CZMA Performance Measurement Guidance for a more in-depth discussion of what should be considered a wetland.

Resource Characterization

- Using provided reports from NOAA’s Land Cover Atlas¹ or high-resolution C-CAP data² (Pacific and Caribbean Islands only), please indicate the extent, status, and trends of wetlands in the state’s coastal counties. You can provide additional or alternative information or use graphs or other visuals to help illustrate or replace the table entirely if better data are available. Note that the data available for the islands may be for a different time frame than the time periods reflected below. In that case, please specify the time period the data represents. Also note that Puerto Rico and the Commonwealth of the Northern Mariana Islands (CNMI) currently only have data for one time point so will not be able to report trend data. Instead, Puerto Rico and CNMI should just report current land use cover for all wetlands and each wetlands type.

Coastal Wetlands Status and Trends		
Current state of wetlands in 2011 (acres)	244,293,624.84538 m ² /60366.28 acres **	
Percent net change in total wetlands (% gained or lost)*	from 1996-2011	from 2006-2011
	N/A for PR	N/A for PR
Percent net change in freshwater (palustrine wetlands) (% gained or lost)*	from 1996-2011	from 2006-2011
	N/A for PR	48,677,303.34823 m ² **

¹ <http://www.csc.noaa.gov/ccapatlas/>. Summary reports compiling each state’s coastal county data are provided on the ftp site.

² <http://www.csc.noaa.gov/digitalcoast/data/ccaphighres>

	from 1996-2011	from 2006-2011
Percent net change in saltwater (estuarine) wetlands (% gained or lost)*		195,446,941.598712 m²** (___%N/A for PR)

**CZMP/Dragoni (2013)

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 coastal wetlands since the last assessment to augment the national data sets.

Total wetlands acreage from the inventory maps is 217,118.00 acres. Relevant information on the extent of protected wetlands in Puerto Rico before 2006 is included in the table. Actually, a total of 61,233.98 acres (29036.18 acres, 48.1%)** of wetlands are protected by federal and local government designations. The remaining 152,933.96 wetlands acreage is distributed along private properties, altered wetlands, or wetlands remaining in their natural condition. In order to make informed policy recommendations for other coastal regions, comprehensive data for specific coastal sub regions is needed.

Table 2: Coastal habitats protected by federal and local government designations

Designation	Estuarine (acres)	Lacustrine (acres)	Marine (acres)	Palustrine (acres)	Riverine (acres)
State Forest	7474.57	0	413.67	447.86	0
State Forest- Buffer zone	15.60	0	.33	0	0
Marine Reserve	49.01	0	96.16	447.83	0
National Estuarine Research Reserve	1244.29	0	9.26	161.59	0
Natural Reserve	769.09	0	26.19	1169.61	7.22
Natural Reserve- Buffer zone	0	0	0	0	0
Natural Reserve- Marine extension	2437.50	0	1718.67	0	0
Wild Life Refuge	578.59	31	0	1.11	0
Conservation Trust of Puerto Rico	3363.25	0	17215.31	862.95	11.65
US Fish and Wildlife Service	2545.56	0	317.51	.03	0
*DNER acquired properties (2)	2138.50	0	40.83	291.10	0
TOTAL	25,496.01	31	35,306.03	3,382.13	18.87

* To be designated

Management Characterization

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

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

Enhancement area prioritization

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

High X
Medium
Low

2. Justification for priority ranking

Wetlands provide coastal protection:

Wetlands as well as reef systems represent an essential, low cost means of providing natural, low- impact infrastructure to minimize loss of life and property damage from climate change and sea level rise. Coastal and intertidal wetlands together with reef systems and other marine ecosystems offer the first line of defense against inland flooding from storm surge and hurricane driven waves from severe weather events.

Need to counter continuing threats to marine ecosystems:

Maintenance dredging of ports and marina facilities, ship groundings, laying of submarine cables, bad anchoring practices and commercial and recreational fisheries activities continue to pose significant threats to marine ecosystems along the coastal perimeter and in submerged lands within PR territorial waters.

Wetlands protect coastal water quality:

Wetlands and marine vegetation filter sediments and other pollutants originating in upland areas and draining to the sea through nonpoint source runoff and through river and stream flow. The destruction of these critical ecosystems represents an increased threat to coastal water quality, with potential impacts.

3.1.1 In-Depth Resource Characterization: WETLANDS

Purpose: To determine key problems and opportunities to improve the CMP's ability to protect, restore, and enhance wetlands.

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

	Stressor/Threat	Geographic Scope (throughout coastal zone or specific areas most threatened)
Stressor 1	Development/Fill	Extensive
Stressor 2	Alteration of hydrology	No systematic locational data available but known to occur in some agricultural areas adjacent to wetlands
Stressor 3	Erosion	Limited
Stressor 4	Pollution	Extensive
Stressor 5	Channelization	Extensive in riverine areas
Stressor 6	Nuisance or exotic species	No systematic data
Stressor 7	Freshwater input	No systematic location data but occurring in some agricultural areas adjacent to wetlands
Stressor 8	Sea level rise	Extensive along the entire coastal perimeter
Stressor 9	Other (see notes below)	Extensive damage to submerged lands from multiple sources

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

Sea level rise

Projected mean sea level rise for the north coast of PR has been calculated to average 2.8mm/yr, and 3.1 mm/yr for the south coast. The sea level trends are based on records from 1993 to 2015 from La Puntilla (San Juan) and Magueyes Island (Lajas) tide gauges. Using these projections, salinity impacts on selected estuaries and coastal freshwater habitats were forecast. A verified

increase in salinity of a coastal lagoon was recorded in the Humacao Natural Reserve. DNER, in coordination with the USGS, EQB, SJBE, and university researchers, are continuing to monitor sea level rise in coastal waters.

While the threats resulting from sea level rise are not readily apparent, the long term implications of climate change and global warming are predicted to significantly raise sea level elevations in the coming decades. This is a recognized threat to ocean islands worldwide. Given the concentration of Puerto Rico’s population, infrastructure, and economic activity in the coastal zone, the submerged lands, intertidal wetlands, and reef systems, in addition to their ecological value, play a vital function in providing the “soft infrastructure” that protects life and property by buffering inland areas from the impacts of storm surge and other coastal hazards.

Other

Port and marina maintenance, dredging, ship groundings, laying of submarine fiber optic cables, increased demand of boating activities, poor anchoring practices and commercial and recreational fisheries activities, pose growing threats to marine ecosystems. Today they represent only a few of existing multiple ocean uses

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
Refer to stressors in section 3.1.1	Sea level rise is an emerging issue as previously stated and while the program has contributed to knowledge about potential effects and impacts on wetlands, more information is needed for management.

In-Depth Management Characterization:

Purpose: To determine the effectiveness of management efforts to address identified problems related to the wetlands 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.

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 (In-progress: Antilles Wetland Condition Rapid Assessment)	Y	Y (Antilles Wetland Condition Rapid Assessment; long-term monitoring program development)
Wetland mapping and GIS	Y	Y	Y (2013 Updated inventory of coastal habitats and geomorphic features)
Watershed or special area management plans addressing wetlands	Y	Y	N
Wetland technical assistance, education, and outreach	Y	Y	N
Other (please specify)			

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.

Antilles Wetland Condition Rapid Assessment: The PRCZMP has initiated the development of a rapid assessment framework to evaluate the ecological condition of wetlands and their associated riparian areas throughout Puerto Rico. The Antilles Wetland Condition Rapid Assessment Method is currently being developed through an agreement with the USACE and funding from USEPA to support on-going efforts to promote effective management and protection of the state's wetland resources. The overarching goal is to provide the necessary information to help prevent the continued loss and decline of Puerto Rico's scarce and important wetland resources and support regulatory agencies' decision making processes.

2013 Updated Inventory of Coastal Habitats and Geomorphic Features: The DRNA through the PRCZMP financed the delineation of the ecosystems, habitats and geomorphic features of Puerto Rico in support of the process to delineate the Maritime Terrestrial Zone, the coastal public trust lands. Among other intertidal wetlands, marshes, estuaries, salt flats, identified consistent with Regulation 4860, Article 3.3.A.

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?**

The Commonwealth is currently lacking baseline characterizations of wetlands that could be used to compare the before and after conditions once restoration or enhancement projects are implemented. 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 USFWS using SLAMM (Sea Level Marsh Migration Modeling) in two refuges on the South Coast but other studies are not known at this time.

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: Promote the conservation of wetlands through sustainable development activities.

Description: Land use planning at both the island-wide and municipal levels coupled with effective implementation of existing regulations should greatly contribute to wetlands protection in the short-term. Ecosystem-based adaptation (EbA) and a better understanding of potential effects and impacts of sea level rise and climate change on wetlands in the long-term should also be integrated into zoning regulations as the best available scientific information becomes available.

Management Priority 2: Improve interagency and multi-partner coordination including the coordination of the implementation of erosion and sediment control requirements by the Puerto Rico Planning Board and Environmental Quality Board.

Description: Through improved interagency and multi-partner coordination Puerto Rico could fill the knowledge gaps and conduct baseline characterizations of wetlands that could be used to compare the before and after conditions once restoration or enhancement projects are implemented. This coordination could also address the lack of island-wide wetland migration studies by financing appropriate studies to determine potential effects from sea level rise, such as wetland type conversion due to increases in salinity.

Management Priority 3: Development of wetland restoration strategies and monitoring plans

Description: Based on the updated Coastal Habitats and Geomorphic Features Inventory (2013), the PRCZMP could recommend target areas and priorities for wetland restoration and enhancement (i.e., Guanica Lagoon Restoration Project supported by the US Coral Reef Task Force as part of their Watershed Stewardship Initiative).

- Identify and briefly explain priority needs and information gaps the CMP has to help it address the management priorities identified above. The needs and gaps identified here do not need to 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	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	Wetland habitat characteristics and conditions. In order to make informed policy recommendations and develop multilayered strategic zoning districts for other coastal regions, comprehensive data for specific coastal sub regions is needed. Identification of vulnerable wetlands and coastal communities.
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. Island-wide wetland migration studies to determine potential effects from sea level rise, such as wetland type conversion due to increases in salinity.
Training/capacity building	Y	Training for rangers to identify and report violations.
Decision-support tools	Y	Comprehensive plan for the management and restoration of coastal wetlands. Identify potential, feasible mechanisms. Develop guidelines considering institutional issues with respect to agency roles and responsibilities for wetland protection, restoration and mitigation. Integration into the Puerto Rico/Caribbean MSP Region Plan Draft and the Coastal Hazard Management Program.

Communication and outreach	N	In previous assessment is was mentioned how DNER consolidated its public education and community outreach resources under an Assistant Secretariat for Information and Education. While some outreach activities will be undertaken, similar to those performed in the 2006-2010 and 2011-2015 program cycles, the preponderance of this work will be conducted and/or coordinated through the 306 program.
Other (Specify)		

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.

Yes, a strategy will be developed as a response to short and long-term needs and acute and chronic stressors affecting Puerto Rico’s wetlands. There is an increasing recognition of the importance of wetland assets to increase coastal communities’ resilience, therefore the PRCZMP is using an integrated approach of ecosystem services, protection of natural infrastructure, and the promotion of nature-based infrastructure methods.

3.2 COASTAL HAZARDS ASSESSMENT

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)

Note: For purposes of the Hazards Assessment, coastal hazards include the following traditional hazards and those identified in the CZMA: flooding; coastal storms (including associated storm surge); geological hazards (e.g., tsunamis, earthquakes); shoreline erosion (including bluff and dune erosion); sea level rise; Great Lake level change; land subsidence; and saltwater intrusion.

Resource Characterization

1. **Flooding:** Using data from NOAA’s *State of the Coast* “Population in the Floodplain” viewer³ and summarized by coastal county through NOAA’s Coastal County Snapshots for Flood Exposure,⁴ indicate how many people were located within the state’s coastal floodplain as of 2010 and how that has changed since 2000. You may use other information or graphs or other visuals to help illustrate.

Population in the Coastal Floodplain			
	2000	2010	Percent Change from 2000-2010
No. of people in coastal floodplain ⁵	254,166 ⁶	297,098	14.45%
No. of people in coastal counties ⁷	2,412,486 [63%]	2,317,189 [62.19%]	0.81%
Percentage of people in coastal counties in coastal floodplain		12.82%	-----

Other relevant information: 297,098 families live below the poverty level and live in the floodplain. \$18,342-household mean income living in floodplain. Populations living in floodplains: 15% 65 years or older 26% under 18 years. 6,053 people living in storm surge risk areas.

³ <http://stateofthecoast.noaa.gov/pop100yr/welcome.html>. Note FEMA is in the process of updating the floodplain data. This viewer reflects floodplains as of 2010. If you know the floodplain for your state has been revised since 2010, you can either use data for your new boundary, if available, or include a short narrative acknowledging the floodplain has changed and generally characterizing how it has changed.

⁴ www.csc.noaa.gov/digitalcoast/tools/snapshots

⁵ To obtain exact population numbers for the coastal floodplain, download the Excel data file on the State of the Coast “Population in the Floodplain” viewer: <http://stateofthecoast.noaa.gov/pop100yr/welcome.html>. Summary population data for each coastal state is available on the ftp site.

⁶ Puerto Rico Coastal Zone Management Program, Review and update- Executive Summary (2008)

⁷ To obtain population numbers for coastal counties, see spreadsheet of coastal population and critical facilities data provided or download directly from <http://www.csc.noaa.gov/digitalcoast/data/stics>. Summary population data for each coastal state is available on the ftp site.

2. **Shoreline Erosion** (for all states other than Great Lakes and islands; for Great Lakes and islands, see Question 5): Using data from NOAA’s *State of the Coast* “Coastal Vulnerability Index,”⁸ indicate the vulnerability of the state’s shoreline to erosion. You may use other information or graphs or other visuals to help illustrate or replace the table entirely if better data is available. *Note: For New York and Pennsylvania that have both Atlantic and Great Lakes shorelines, fill out the table below for the Atlantic shoreline only.*

***To be calculated based off of the Puerto Rico Sea Level and Storm Surge Atlas (2014), the updated Coastal Habitats and Geomorphic Features Inventory (2013) as well as the recently updated Puerto Rico Beach Inventory (2015)⁹*

Vulnerability to Shoreline Erosion		
Vulnerability Ranking	Miles of Shoreline Vulnerable ¹¹	Percent of Coastline ¹⁰
Very low (>2.0m/yr) accretion	**	**
Low (1.0-2.0 m/yr) accretion)	**	**
Moderate (-1.0 to 1.0 m/yr) stable	**	**
High (-1.1 to -2.0 m/yr) erosion	**	**
Very high (<-2.0 m/yr) erosion	**	**

3. **Sea Level Rise** (for all states other than Great Lakes and islands; for Great Lakes and islands, see Question 5): Using data from NOAA’s *State of the Coast* “Coastal Vulnerability Index,”¹¹ indicate the vulnerability of the state’s shoreline to sea level rise. You may provide other information or use graphs or other visuals to help illustrate or replace table entirely if better data is available. *Note: For New York and Pennsylvania*

⁸ <http://stateofthecoast.noaa.gov/vulnerability/welcome.html> (see specifically “Erosion Rate” drop-down on map). The State of the Coast visually displays the data from USGS’s Coastal Vulnerability Index.

⁹ Study by Dr. Maritza Barreto, UPR Rio Piedras

¹⁰ To obtain exact shoreline miles and percent of coastline, mouse over the colored bar for each level of risk or download the Excel data file.

¹¹ <http://stateofthecoast.noaa.gov/vulnerability/welcome.html> (see “Vulnerability Index Rating” drop-down on map). The State of the Coast visually displays the data from USGS’s Coastal Vulnerability Index.

that have both Atlantic and Great Lakes shorelines, fill out the table below for your Atlantic shoreline only.

Coastal Vulnerability to Historic Sea Level Rise		
Vulnerability Ranking	Miles of Shoreline Vulnerable ¹¹	Percent of Coastline
Very low	**	**
Low	**	**
Moderate	**	**
High	**	**
Very high	**	**

** To be calculated based off of the Puerto Rico Sea Level and Storm Surge Atlas (2014), the updated Coastal Habitats and Geomorphic Features Inventory (2013) as well as the recently updated Puerto Rico Beach Inventory (2015)¹²

4. **Other Coastal Hazards:** In the table below, indicate the general level of risk in the coastal zone for each of the coastal hazards. The state’s multi-hazard mitigation plan is a good additional resource to support these responses.

Type of Hazard	General Level of Risk ¹³ (H, M, L)
Flooding (riverine, stormwater)	**
Coastal storms (including storm surge) ¹⁴	**
Geological hazards (e.g., tsunamis, earthquakes)	**
Shoreline erosion ¹⁵	**
Sea level rise ^{13,14,15}	**
Great Lake level change ¹⁴	**
Land subsidence	**
Saltwater intrusion	**
Other (please specify)	**

¹² Study by Dr. Maritza Barreto, UPR Rio Piedras

¹³ 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*

¹⁴ In addition to any state- or territory-specific information that may help respond to this question, the U.S. Global Change Research Program has an interactive website that provides key findings from the 2014 National Climate Assessment for each region of the country, including regions for the coasts and oceans, and various sectors. The report includes findings related to coastal storms and sea level rise that may be helpful in determining the general level of risk. See <http://nca2014.globalchange.gov/>.

¹⁵ See NOAA State of the Coastal Vulnerability to Sea Level Rise Tool (select “Erosion Rate” from drop-down box)

<http://stateofthecoast.noaa.gov/vulnerability/welcome.html>. The State of the Coast visually displays the data from USGS’s Coastal Vulnerability Index.

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 climate change risk assessment or plan may be a good resource to help respond to this question.

This information to be provided at a later date using information compiled in the State of the Puerto Rico Climate 2010-2013 (available at pr-ccc.org) as well as *using information from the Puerto Rico Sea Level and Storm Surge Atlas (2014), the updated Coastal Habitats and Geomorphic Features Inventory (2013) as well as the recently updated Puerto Rico Beach Inventory (2015)*¹⁶

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) have occurred that could impact the CMP's ability to prevent or significantly reduce coastal hazards risk since the last assessment.

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 that address:			
<i>elimination of development/redevelopment in high-hazard areas</i> ¹⁷	Y	Y	N
<i>management of development/redevelopment in other hazard areas</i>	Y	Y	N
<i>climate change impacts, including sea level rise or Great Lake level change</i>	Y	Y	Y (Executive Orders)
Hazards planning programs or initiatives that address:			
<i>hazard mitigation</i>	Y	Y	Y (Building Codes)
<i>climate change impacts, including sea level rise or Great Lake level change</i>	Y	Y	Y (Executive Orders)
Hazards mapping or modeling programs or initiatives for:			
<i>sea level rise or Great Lake level change</i>	Y	Y	Y
<i>other hazards</i>	Y	Y	Y (storm surge modeling/mapping)

¹⁶ Study by Dr. Maritza Barreto, UPR Rio Piedras

¹⁷ Use state's definition of high-hazard areas.

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).

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.

There have been significant changes since the last assessment.

The Caribbean Regional Association (CaRA) and the University of Puerto Rico – Mayaguez had jointly established the Alliance for Numerical Modeling and Coastal Forecast before the last assessment. The PRCZMP contracted the Alliance to perform Coastal Zone inundation modeling using ADCIRC, SWAN and COULWAVE for all storm categories (1-5) and since the last assessment contracted them to conduct sea level rise and storm surge modeling studies. This was partially funded through Section 309 funds. Additionally, the Alliance has improved their modeling of coastal winds, coastal waves, coastal currents, and offshore currents. These efforts are partially funded by non-309 funds of the CZMP. Collectively these studies developed the Puerto Rico Sea Level Rise and Storm Surge Atlas as a result of S309 strategy implementation in the last cycle.

As a result of S309 strategy implementation in the last cycle, the Governor of Puerto Rico issued two climate change-related executive orders that explicitly recognized the Puerto Rico State of the Climate 2010-2013 report. Executive Order 2013-016 establishes the mandate for infrastructure agencies to conduct climate change vulnerability assessments and develop adaptation plans. Executive Order 2013-015 mandates the completion of the island-wide land use plan and the integration of climate change adaptation.

Enhancement Area Prioritization

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

High	<u> X </u>
Medium	<u> </u>
Low	<u> </u>

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

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 communities exposure to coastal hazards. Activities in the upper reaches of river basins also have an impact on erosion changing the sedimentation patterns in the coast by reducing sediment inputs into the system.

In Puerto Rico there are 8,431 hectares classified as coastal barriers, located principally in the southwest and northeast. These are fragile coastal areas and natural systems vulnerable to increasing sea level rise and exposure to storms, floods, and other natural hazards. Coastal hazard policies are an integral part of the PRCZMP. However, there is a need to further define specific policies and management strategies to address current and potential impacts associated with climate change, sea level rise, and associated coastal hazards in light of new knowledge and model projections.

Given the significant threat posed by coastal hazards and climate change and the resulting need for promoting community resiliency, this enhancement area is considered a high priority.

3.2.1 In-Depth Resource Characterization: **COASTAL HAZARDS**

Purpose: To determine key problems and opportunities to improve the CMP’s ability to prevent or significantly reduce coastal hazard risks by eliminating development and redevelopment in high-hazard areas and managing the effects of potential sea level rise and Great Lakes level change.

1a. **Flooding In-depth** (for all states besides territories): Using data from NOAA’s *State of the Coast* “Population in the Floodplain” viewer¹⁸ and summarized by coastal county through NOAA’s Coastal County Snapshots for Flood Exposure,¹⁹ indicate how many people at potentially elevated risk were located within the state’s coastal floodplain as of 2010. These data only reflect two types of vulnerable populations. You can provide additional or alternative information or use graphs or other visuals to help illustrate or replace the table entirely if better data are available. *Note: National data are not available for territories. Territories can omit this question unless they have similar alternative data or include a brief qualitative narrative description as a substitute.*

2010 Populations in Coastal Counties at Potentially Elevated Risk to Coastal Flooding ²⁰				
	Under 5 and Over 65 years old		In Poverty	
	# of people	% Under 5/Over 65	# of people	% in Poverty
Inside Floodplain	**	**	**	**
Outside Floodplain	**	**	**	**

***To be calculated as part of the S309 2016-2020 coastal hazards strategy and based off of the Puerto Rico Sea Level and Storm Surge Atlas (2014), the updated Coastal Habitats and Geomorphic Features Inventory (2013) as well as the recently updated Puerto Rico Beach Inventory (2015)²¹*

1b. **Flooding In-depth** (for all states besides territories): Using summary data provided for critical facilities, derived from FEMA’s HAZUS²² and displayed by coastal county through NOAA’s Coastal County Snapshots for Flood Exposure,²³ indicate how many different establishments (businesses or employers) and critical facilities are located in the FEMA floodplain. You can provide more information or use graphs or other visuals to help illustrate or replace the table

¹⁸ <http://stateofthecoast.noaa.gov/pop100yr/welcome.html>

¹⁹ <http://www.csc.noaa.gov/digitalcoast/tools/snapshots>

²⁰ To obtain exact population numbers for the coastal floodplain, download the excel data file from the State of the Coast’s “Population in Floodplain” viewer.

²¹ Study by Dr. Maritza Barreto, UPR Rio Piedras

²² <http://www.fema.gov/hazus>; can also download data from NOAA STICS <http://www.csc.noaa.gov/digitalcoast/data/stics>. Summary data on critical facilities for each coastal state is available on the ftp site.

²³ <http://www.csc.noaa.gov/digitalcoast/tools/snapshots>

entirely if better information is available.

Critical Facilities in the FEMA Floodplain ⁴⁴						
	Schools	Police Stations	Fire Stations	Emergency Centers	Medical Facilities	Communication Towers
Inside Floodplain	N/A	N/A	N/A	N/A	N/A	N/A
Coastal Counties**	310 in the coastal zone	N/A	N/A	N/A	57 hospitals in Puerto Rico, the majority of which lie within the coastal zone	N/A

**For the purposes of this draft we used the WPI Critical Infrastructure Study²⁴ numbers for quantity of critical infrastructure facility types in the coastal zone. More detailed information will be provided by HAZUS in the final version and a fine-tuned analysis will be calculated through this coastal hazards strategy.

- Based on the characterization of coastal hazard risk, what are the three most significant coastal hazards²⁵ within the coastal zone? Also indicate the geographic scope of the hazard, i.e., is it prevalent throughout the coastal zone or are specific areas most at risk?

	Type of Hazard	Geographic Scope (throughout coastal zone or specific areas most threatened)
Hazard 1	Sea level rise	Coasts-wide
Hazard 2	Storm surge	Coasts-wide
Hazard 3	Erosion	Sub-regions
Hazard 4	Geological hazards (e.g., tsunamis and earthquakes)	Coasts-wide

²⁴ WPI Critical Infrastructure Study: http://www.wpi.edu/Pubs/E-project/Available/E-project-050411-121701/unrestricted/Assessing_Critical_Infrastructure_in_the_Puerto_Rico_Coastal_Zone.pdf

²⁵ See list of coastal hazards at the beginning of this assessment template.

- 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.
- 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
Sea Level Rise	Accurate NOAA-validated sea level rise projections; Accurate LiDAR bathymetry grid to model sea level rise projections and potential effects and impacts on coastal communities' assets, biodiversity and habitats.

In-Depth Management Characterization:

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

- 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.

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)
Statutes, Regulations, and Policies:			
<i>Shorefront setbacks/no build areas</i>	Y	Y	N
<i>Rolling easements</i>	N	N	N
<i>Repair/rebuilding restrictions</i>	Y (<50% damages)	Y	N
<i>Hard shoreline protection structure restrictions</i>	N	N	N
<i>Promotion of alternative shoreline stabilization methodologies (i.e., living shorelines/green infrastructure)</i>	Y	Y	Y (Dune stabilization/Dune Restoration projects)
<i>Repair/replacement of shore protection structure restrictions</i>	Y	Y	N
<i>Inlet management</i>	N	N	N

<i>Protection of important natural resources for hazard mitigation benefits (e.g., dunes, wetlands, barrier islands, coral reefs) (other than setbacks/no build areas)</i>	Y	Y	N
<i>Repetitive flood loss policies (e.g., relocation, buyouts)</i>	Y	Y	Y (Insurance/Reinsurance Study, developed through S309 implementation)
<i>Freeboard requirements</i>	Y (FEMA-based)	N (PRPB yes)	N
<i>Real estate sales disclosure requirements</i>	N	N	N
<i>Restrictions on publicly funded infrastructure</i>	Y (Hud and other federal programs)	N	N
<i>Infrastructure protection (e.g., considering hazards in siting and design)</i>	N	N	N
<i>Other (please specify)</i>			
Management Planning Programs or Initiatives:			
<i>Hazard mitigation plans</i>	Y	Y	N
<i>Sea level rise/Great Lake level change or climate change adaptation plans</i>	Y	Y	Y (Executive Orders)
<i>Statewide requirement for local post-disaster recovery planning</i>	N	N	N
<i>Sediment management plans</i>	Ongoing	Ongoing	N
<i>Beach nourishment plans</i>	N	N	N
<i>Special Area Management Plans (that address hazards issues)</i>	Y	Y	N
<i>Managed retreat plans</i>	Y	Y	N
<i>Other (Community-based Climate Adaptation Pilot Projects)</i>	Y	Y	Y (On-going)
Research, Mapping, and Education Programs or Initiatives:			
<i>General hazards mapping or modeling</i>	Y	Y	Y
<i>Sea level rise mapping or modeling</i>	Y	Y	Y
<i>Hazards monitoring (e.g., erosion rate, shoreline change, high-water marks)</i>	Y	Y	Y

<i>Hazards education and outreach</i>	Y	Y	Y
<i>Other (please specify)</i>			

- 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?

No specific studies have been conducted to assess the effectiveness of the state’s management efforts regarding coastal hazards. However, the 2016-2020 S309 strategy proposes to assess the community-based climate adaptation planning processes conducted for five coastal municipalities during the previous S309 cycle (2011-2015).

Identification of Priorities:

- 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: Mapping and research efforts to fill critical knowledge gaps needed for risk and vulnerability reduction, planning, and implementation.

Description: Gaps to-be-filled include accurate NOAA-validated sea level rise projections; Accurate LiDAR bathymetry grid to model sea level rise projections and potential effects and impacts on coastal communities’ assets, biodiversity and habitats as well as up-dates to the Puerto Rico State of the Climate report.

Management Priority 2: Assessment of the effectiveness of the state’s management efforts regarding coastal hazards.

Description: This strategy will propose to assess the community-based climate adaptation planning processes conducted for five coastal municipalities during the previous S309 cycle (2011-2015).

- 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	Accurate NOAA-validated sea level rise projections; Accurate LiDAR bathymetry grid to model sea level rise projections and potential effects and impacts on coastal communities' assets, biodiversity and habitats; social-ecological vulnerability studies; economic analyses; legal and institutional policy analysis; innovative nature-based strategies for adaptation
Mapping/GIS/modeling	Y	Critical facilities and other assets; vulnerable communities; vulnerable wetlands and other habitats
Data and information management	Y	Enhancement of data portals and visualization/analytical tools;
Training/Capacity building	Y	To be developed in coordination with the Jobos Bay NERR Coastal Training Program
Decision-support tools	Y	Enhancement of data portals and visualization/analytics tools
Communication and outreach	Y	Specific needs are for municipalities and elected officials as well as the general public
Other (Specify)		

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.

Yes, a strategy will be developed in order to increase Puerto Rico's capability to cope with current and future hazards in line with the findings with previously mentioned studies, principally the Puerto Rico State of the Climate Report 2010-2013 (www.pr-ccc.org) developed with the voluntary support of over 150 scientists, planners, architects, engineers, social scientists, and communicators.

3.3 PUBLIC ACCESS ASSESSMENT

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)

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 ²⁶	Changes or Trends Since Last Assessment ²⁷ (↑, ↓, -, unknown)	Cite data source
Beach access sites	>300 at 44 coastal municipalities	-	PRCZMP Public Access Master Plan 2014
Shoreline (other than beach) access sites	Not available	Not available	Not available
Recreational boat (power or nonmotorized) access sites	Not available	Not available	Not available
Number of designated scenic vistas or overlook points	Not available	Not available	Not available
Number of fishing access points (i.e. piers, jetties)	Not available	Not available	Not available
Coastal trails/boardwalks	Not available	Not available	Not available

²⁶ 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.

²⁷ 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 "unkwn."

Public Access Status and Trends			
Type of Access	Current number ²⁶	Changes or Trends Since Last Assessment ²⁷ (↑, ↓, -, unknown)	Cite data source
	Miles of Trails/boardwalks		
Number of acres parkland/open space	Total sites	Not available	Not available
	Sites per miles of shoreline		
Other (please specify)		Not available	Not available

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.²⁸ There are several additional sources of statewide information that may help inform this response, such as the Statewide Comprehensive Outdoor Recreation Plan,²⁹ the National Survey on Fishing, Hunting, and Wildlife Associated Recreation,³⁰ and your state’s tourism office.

Much of this information is not known at the time of this draft but the assessment will be enhanced with the results of the public survey and partner input.

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.

²⁸ See NOAA’s Coastal Population Report: 1970-2020 (Table 5, pg. 9): <http://stateofthecoast.noaa.gov/coastal-population-report.pdf>

²⁹ 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, SCROPs could be useful to get some sense of public outdoor recreation preferences and demand. Download state SCROPs at www.recpro.org/scorps.

³⁰ 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 2011 data to 2006 and 2001 information to understand how usage has changed. See www.census.gov/prod/www/fishing.html.

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.

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	Y (PRCZMP serves as Executive Secretariat of the Interagency Beach Management Board)
Operation/maintenance of existing facilities	Y	Y	N
Acquisition/enhancement programs	Y	Y	Y (new coastal lands acquired by the state but PRCZMP doesn't fund the acquisition)

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.

PRCZMP now serves as Executive Secretariat of the Interagency Beach Management Board.

New coastal lands have been acquired by the state but the PRCZMP does not fund those acquisitions.

3. Indicate if your state or territory has a publically available public access guide. How current is the publication and how frequently it is updated?³¹

Public Access Guide	Printed	Online	Mobile App
State or territory has? (Y or N)	Y	Y	N
Web address (if applicable)	http://www.drna.gobierno.pr/oficinas/arn/recursosvivientes/costasreservasrefugios/pmzc/acceso-publico-a-la-costa	http://www.drna.gobierno.pr/oficinas/arn/recursosvivientes/costasreservasrefugios/pmzc/acceso-publico-a-la-costa	N
Date of last update	2014	2014	N
Frequency of update	10 years	--	N

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.

Justification for assigning a medium priority to public access is due to the most recent SCORP, the results of CMO staff findings, and by the anticipated public response to the survey conducted by DNER in formulating the 2016-2020 Sec. 309 program.

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.

³¹ 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. However, you may choose to note that the local guides do exist and may provide additional information that expands upon the state guides.

3.4 MARINE DEBRIS ASSESSMENT

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)

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.

Source of Marine Debris	Existing Status and Trends of Marine Debris in Coastal Zone		
	Significance of Source (H, M, L, unknown)	Type of Impact ³² (aesthetic, resource damage, user conflicts, other)	Change Since Last Assessment (↑, ↓, -, unkwn)
<i>Land-based</i>			
Beach/shore litter	H	Aesthetic, resource damage, user conflicts	-
Dumping	H	Aesthetic, resource damage, user conflicts	-
Storm drains and runoff	H	Resource damage, non-point contamination	-
Fishing (e.g., fishing line, gear)	L	Aesthetic, resource	-
Other (please specify)			
<i>Ocean-based</i>			
Fishing (e.g., derelict fishing gear)	L	Resource damage, user conflict	-
Derelict vessels	M	Resource damage	-
Vessel-based (e.g., cruise ship, cargo ship, general vessel)	H	Aesthetic, resource damage, non-point contamination	↑

³² You can select more than one, if applicable.

Hurricane/Storm	H	Resource damage	-
Tsunami	L	Resource damage	-
Other (please specify)			

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.

Eighty percent of marine debris is land-based generated. The management and disposal of solid waste in Puerto Rico is intensified by the limited disposal area available on an island community with a delicately balanced ecosystem. Puerto Rico's per capita volume of solid waste generation is higher than on the mainland, while recycling rates are lower. Much of Puerto Rico's solid waste ends up in one of island's 32 landfills, most of which do not comply with Commonwealth and federal landfill requirements. The solution calls for a comprehensive and integrated solid waste management plan to reduce solid waste generation, increase recycling, use waste to produce energy, and efficiently manage all landfills.

Key Commonwealth agencies with responsibilities in this area are the Solid Waste Authority, the Environmental Quality Board, and DNER's Regional Offices which, through their Beach Maintenance Brigades, conduct weekly beach cleanups. Voluntary organizations are also active.

Voluntary groups in Puerto Rico annually record marine debris data as part of international coastal cleanup activities. During the 2010 Beach Cleanup Day, 12,659 volunteers worked together to collect more than 198,858 pounds of solid waste from our beaches, lakes, and waterways. **Vida Marina, Caribbean Center for the Reduction of Aquatic Debris, University of Puerto Rico.** Collection of microscopic particles of anthropogenic origin (fragments of plastic, paint, rustships, pieces of synthetic thread, etc.). Currently working on the analysis of a series of samples that were taken on the Puerto Rico Coast on February 2009 from the OSV/Bold.

Monofilament Recovery and Recycling Program of Puerto Rico, University of Puerto Rico. Implementation of the first monofilament recovery and recycling program in Puerto Rico. The Agricultural extension program will construct and install 45 monofilament recovery stations throughout Puerto Rico at various high volume fishing locations with the help of volunteers. All the lines collected will be shipped to a monofilament recycling compound.

ACC's Plastic Division (formerly APC), in conjunction with the **Center for Marine Conservation,** is researching ways to identify effective methods to reduce litter through reduction and improved waste handling. With support from the plastic industries, the National Model Communities Program launched a marine debris remediation program targeting six communities, one of which is Pinones. Visitors frequent small roadside stands and open air restaurants in the Pinones area leaving large amounts of trash that is a threat to endangered species and to the largest mangrove forest remaining in Puerto Rico.

Marine Reserve Tres Palmas has established a marine waste handling disposal project. The objective aims to restore existing coral reefs habitats by eliminating waste through an educational awareness program for schools and voluntary work.

Amigos de Amoná, Inc., a non-profit based organization, implemented the Mona Channel Marine Debris Removal (2004). One of their goals was to remove the marine debris that affected marine life and coastal habitats. Thirty volunteers donated 1,363 hours of labor to survey 26.5 Km of coastline. They removed 3,235 Kg.(7117.0 lbs) of marine debris classified as fishing gear (48%), plastics (13%), glass(14%), metal (8%), and others (17%) . Additionally a conservation guide was developed for visitor and boaters.

Scuba Dogs, Inc. This is a non-profit organization that coordinates the International Coastal Cleanup Days in Puerto Rico.

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.

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	N
Marine debris removal programs	Y	Y	Y (EPA; PR Recycling Partnership; DNER partnerships; City and Municipal efforts; NGO efforts)

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.

Governmental role

Two Commonwealth agencies: Solid Waste Authority and the Environmental Quality Board have the local responsibility for managing the Island's solid waste.

Marine debris management activities:

- Derelict vessel removal and cleanup is coordinated by NOAA, USACE and DNER.
- PRCZMP supports DNER Regional Offices and Beach Maintenance Brigades that conduct weekly cleanups at 434 miles of coastline in Puerto Rico.
- National Parks Company maintains and conducts routine cleanups of 12 public beaches under their administration.
- Municipalities such as Carolina conduct routine maintenance of public beaches under their administration.

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.

In previous surveys agency partners and stakeholders have placed a medium priority for the marine debris enhancement category for the island. Solid waste management is an important and very complex issue for the Commonwealth of Puerto Rico. Marine debris must be integrated in the Comprehensive Solid Waste Management Plan developed by the Solid Waste Authority. PRCZMP will continue supporting ongoing efforts and will coordinate with the Solid Waste Authority in addressing the marine debris problem as part of the comprehensive plan. However, at this point PRCZMP will not develop an enhancement area strategy for marine debris.

To effectively reduce the volume of marine debris active participation is needed from the Puerto Rico Solid Waste Authority, Puerto Rico Environmental Quality Board, Puerto Rico Tourism Company, Puerto Rico Ports Authority, PRCZMP, SeaGrant, NGOs, coastal municipalities and multiple stakeholders.

3.5 CUMULATIVE AND SECONDARY IMPACTS ASSESSMENT

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)

Resource Characterization

- Using National Ocean Economics Program Data on population and housing,³³ please indicate the change in population and housing units in the state’s coastal counties between 2012 and 2007. 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 (2012-2007) to approximate current assessment period.

Trends in Coastal Population and Housing Units				
Year	Population		Housing	
	Total (# of people)	% Change (compared to 2002)	Total (# of housing units)	% Change (compared to 2002)
2007	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
2012	Data not available for Puerto Rico at the website provided		Data not available for Puerto Rico at the website provided	

- Using provided reports from NOAA’s Land Cover Atlas³⁴ or high-resolution C-CAP data³⁵ (Pacific and Caribbean Islands only), please indicate the status and trends for various land uses in the state’s coastal counties between 2006 and 2011. You may use other information and include graphs and figures, as appropriate, to help illustrate the information. Note that the data available for the islands may be for a different time frame than the time periods reflected below. In that case, please specify the time period the data represents. Also note that Puerto Rico and the Commonwealth of the Northern Mariana Islands (CNMI) currently only have data for one time

³³ www.oceaneconomics.org/. Enter “Population and Housing” section. From drop-down boxes, select your state, and “all counties.” Select the year (2012) and the year to compare it to (2007). Then select “coastal zone counties.” Finally, be sure to check the “include density” box under the “Other Options” section.

³⁴ www.csc.noaa.gov/ccapatlas/. Summary data on land use trends for each coastal state is available on the ftp site.

³⁵ www.csc.noaa.gov/digitalcoast/data/ccaphighres. Summary data on land use trends for each coastal state is available on the ftp site.

point so will not be able to report trend data. Instead, Puerto Rico and CNMI should just report current land use cover for developed areas and impervious surfaces.

Distribution of Land Cover Types in Coastal Counties		
Land Cover Type	Land Area Coverage in 2011 (Acres)	Gain/Loss Since 2006 (Acres)
Developed, High Intensity	Data will be provided in the final draft	Data will be provided in the final draft
Developed, Low Intensity	Data will be provided in the final draft	Data will be provided in the final draft
Developed, Open Space	Data will be provided in the final draft	Data will be provided in the final draft
Grassland	N/A	N/A
Scrub/Shrub	Data will be provided in the final draft	Data will be provided in the final draft
Barren Land	Data will be provided in the final draft	Data will be provided in the final draft
Open Water	Data will be provided in the final draft	Data will be provided in the final draft
Agriculture	Data will be provided in the final draft	Data will be provided in the final draft
Forested	Data will be provided in the final draft	Data will be provided in the final draft
Woody Wetland	Data will be provided in the final draft	Data will be provided in the final draft
Emergent Wetland	Data will be provided in the final draft	Data will be provided in the final draft

- Using provided reports from NOAA’s Land Cover Atlas³⁶ or high-resolution C-CAP data³⁷ (Pacific and Caribbean Islands only), please indicate the status and trends for developed areas in the state’s coastal counties between 2006 and 2011 in the two tables below. You may use other information and include graphs and figures, as appropriate, to help illustrate the information. Note that the data available for the islands may be for a different time frame than the time periods reflected below. In that case, please specify the time period the data represents. Also note that Puerto Rico and CNMI currently only have data for one time point so will not be able to report trend data. Unless Puerto Rico and CNMI have similar trend data to report on changes in

³⁶ www.csc.noaa.gov/ccapatlas/. Summary data on land use trends for each coastal state is available on the ftp site.

³⁷ www.csc.noaa.gov/digitalcoast/data/ccaphighres. Summary data on land use trends for each coastal state is available on the ftp site.

land use type, they should just report current land use cover for developed areas and impervious surfaces.

Development Status and Trends for Coastal Counties			
	2006	2011	Percent Net Change
Percent land area developed	Data will be provided in the final draft	Data will be provided in the final draft	Data will be provided in the final draft
Percent impervious surface area	Data will be provided in the final draft	Data will be provided in the final draft	Data will be provided in the final draft

** Note: Islands likely have data for another time period and may only have one time interval to report. If so, only report the change in development and impervious surface area for the time period for which high-resolution C-CAP data are available. Puerto Rico and CNMI do not need to report trend data.*

How Land Use Is Changing in Coastal Counties	
Land Cover Type	Areas Lost to Development Between 2006-2011 (Acres)
Barren Land	Data will be provided in the final draft
Emergent Wetland	Data will be provided in the final draft
Woody Wetland	Data will be provided in the final draft
Open Water	Data will be provided in the final draft
Agriculture	Data will be provided in the final draft
Scrub/Shrub	Data will be provided in the final draft
Grassland	Data will be provided in the final draft
Forested	Data will be provided in the final draft

** Note: Islands likely have data for another time period and may only have one time interval to report. If so, only report the change in land use for the time period for which high-resolution C-CAP data are available. Puerto Rico and CNMI do not report.*

4. Using data from NOAA’s State of the Coast “Shoreline Type” viewer,³⁸ indicate the percent of shoreline that falls into each shoreline type.³⁹ You may provide other information or use graphs or other visuals to help illustrate.

Shoreline Types	
Surveyed Shoreline Type	Percent of Shoreline
Armored	Data will be provided in the final draft.
Beaches	Data will be provided in the final draft
Flats	Data will be provided in the final draft
Rocky	Data will be provided in the final draft
Vegetated	Data will be provided in the final draft

5. If available, briefly list and 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 and habitat fragmentation, since the last assessment to augment the national data sets.

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.

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	N

³⁸ <http://stateofthecoast.noaa.gov/shoreline/welcome.html>

³⁹ Note: Data are from NOAA’s Environmental Sensitivity Index (ESI) Maps. Data from each state was collected in different years and some data may be over ten years old now. However, it can still provide a useful reference point absent more recent statewide data. Feel free to use more recent state data, if available, in place of ESI map data. Use a footnote to convey data’s age and source (if other than ESI maps).

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.

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.

This is acknowledged to be an important subject area, but one in which CMO lacks the resources to play a leading role.

3.6 SPECIAL PLANNING AREA MANAGEMENT ASSESSMENT

Section 309 Enhancement Objective

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

Note: 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.”

Resource Characterization

The Puerto Rico Coastal Zone Management Program defines Special Planning Areas as “important coastal resource areas subject to serious present or potential use conflicts, and, therefore, requiring detailed planning.” Eight Special Planning areas were adopted as part of the PRCZMP in 1978.

SAMPs provide public and private development guidance. PRCZMP currently funds the development of SPA management plans under Section 306 as an active program task. 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 that also require PRPB approval.

In 1978 PRCZMP identified 26 candidate areas for designation as natural reserves. As of 2010, DNER had submitted 35 recommendations for natural reserve designation of which 34 have been approved by the Puerto Rico Planning Board (PRPB). The Puerto Rico Legislature has also adopted, via special statutes, seven natural reserves< although not all are coastal or marine reserves.

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 special area management plan (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
Northeast	<p>Boundaries definition of proposed designation of NE natural reserve</p> <p>Intensive use of coastal waters for recreational navigation. This region hosts 75% of the marinas and 45,000 registered boats in Puerto Rico.</p> <p>Coastal waters sedimentation</p>
Southeast region	Coastal and shoreline erosion and sedimentation
Southwest region	<p>Boating access constraints</p> <p>Coastal waters sedimentation</p> <p>Shoreline erosion</p>
Northwest region	<p>Increase in urban development at the Isabela, Aguadilla Special Planning Area</p> <p>Shoreline erosion in Rincon</p> <p>Sedimentation of the marina at Rincon</p>

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.

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.

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	N
SAMP plans	Y	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.

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.

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. In addition, Special Planning Area activities are covered under the 306 program. PRCZMP will continue supporting planning and active management efforts for the eight designated areas and the new Northeast Corridor SPA .

3.7 OCEAN RESOURCES ASSESSMENT

Section 309 Enhancement Objective

Planning for the use of ocean [and Great Lakes] resources. §309(a)(7)

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),⁴⁰ indicate the status of the ocean and Great Lakes economy as of 2010, as well as the change since 2005, 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 and Great Lakes Economy for Coastal Counties (2010)				
	Establishments (# of Establishments)	Employment (# of Jobs)	Wages (Millions of Dollars)	GDP (Millions of Dollars)
Living Resources	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
Marine Construction	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
Marine Transportation	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
Offshore Mineral Extraction	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
Tourism & Recreation	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
All Ocean Sectors	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided

Change in Ocean and Great Lakes Economy for Coastal Counties (2005-2010)

⁴⁰ <http://www.coast.noaa.gov/enowexplorer/> . If you select any coastal county for your state, you receive a table comparing county data to state coastal county, regional, and national information. Use the state column for your responses.

	Establishments (% change)	Employment (% change)	Wages (% change)	GDP (% change)
Living Resources	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
Marine Construction	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
Marine Transportation	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
Offshore Mineral Extraction	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
Tourism & Recreation	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided
All Ocean Sectors	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided	Data not available for Puerto Rico at the website provided

2. 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.

Significant Changes to Ocean and Great Lakes Resources and Uses	
Resource/Use	Change in the Threat to the Resource or Use Conflict Since Last Assessment (↑, ↓, -, unkwn)
Resource	
<i>Benthic habitat (including coral reefs)</i>	Data not available for Puerto Rico at the website provided
<i>Living marine resources (fish, shellfish, marine mammals, birds, etc.)</i>	Data not available for Puerto Rico at the website provided
<i>Sand/gravel</i>	Data not available for Puerto Rico at the website provided
<i>Cultural/historic</i>	Data not available for Puerto Rico at the website provided
<i>Other (please specify)</i>	Data not available for Puerto Rico at the website provided

Use	
<i>Transportation/navigation</i>	Data not available for Puerto Rico at the website provided
<i>Offshore development</i> ⁴¹	Data not available for Puerto Rico at the website provided
<i>Energy production</i>	Data not available for Puerto Rico at the website provided
<i>Fishing (commercial and recreational)</i>	Data not available for Puerto Rico at the website provided
<i>Recreation/tourism</i>	Data not available for Puerto Rico at the website provided
<i>Sand/gravel extraction</i>	Data not available for Puerto Rico at the website provided
<i>Dredge disposal</i>	Data not available for Puerto Rico at the website provided
<i>Aquaculture</i>	Data not available for Puerto Rico at the website provided
<i>Other (please specify)</i>	Data not available for Puerto Rico at the website provided

3. For the ocean and Great Lakes resources and uses in Table 2 (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.

Major Contributors to an Increase in Threat or Use Conflict to Ocean and Great Lakes Resources												
Resource	Major Reasons Contributing to Increased Resource Threat or Use Conflict											
	(Note All that Apply with “X”)											
	Land-based development	Offshore development	Polluted runoff	Invasive species	Fishing (Comm & Rec)	Aquaculture	Recreation	Marine Transportation	Dredging	Sand/Mineral Extraction	Ocean Acidification	Other (Specify)
<i>Example: Living marine resources</i>		X	X	X	X	X		X	X			
[Resource or Use from Table 2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
[Resource or Use from Table 2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

⁴¹ Offshore development includes underwater cables and pipelines, although any infrastructure specifically associated with the energy industry should be captured under the “energy production” category.

- 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.

Coral Reefs and associated benthic communities

Threats to coral reef ecosystems have increased due to land based sources of pollution, bleaching and mortality from diseases. During 2005, live coral cover was severely impacted by increased sea surface temperatures and disease. Coral reefs have been declining over past decades. NOAA’s Coral Reef Conservation Program has been instrumental in providing greater understanding of the threats to coral reefs.

Seagrass resources

Puerto Rico has 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 EcoElectica power plant facilities has impacted benthic habitats -- seagrass beds and hard bottom habitats. Seagrass habitats are directly impacted by dredging activities and boat propeller scaring and indirectly by reduced light penetration caused by increased sedimentation or burial from dredging activities.

General

The U.S. Army Corps of Engineers, Fish and Wildlife Service, National Marine Fisheries Service and DNER are the key decision-making agencies affecting marine resources use and protection. Although existing policies and regulations provide protection to ocean resources, permitting actions have resulted in development-related impacts to coastal and marine resources. Going forward, climate variability and change may pose a growing threat to these resources.

More information will be provided in the final version.

Management Characterization

- 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?

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 management plans	N (on-going)	Y	Y (CROP/RPB: developing plans)
State comprehensive ocean	N	Y	Y (CROP/RPB: developing

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)
management plans			plans)
Single-sector management plans	Y (fisheries)	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:
- Describe the significance of the changes;
 - Specify if they were 309 or other CZM-driven changes; and
 - Characterize the outcomes or likely future outcomes of the changes.

In 2010 PRCZMP-CMO in coordination with the Office of the Governor of the USVI and TNC developed the proposal for the establishment of the U.S. Regional Ocean Partnership. In the same year a Memorandum of Understanding was signed between the Governor of Puerto Rico and the Governor of the USVI. The Governors of Puerto Rico and the U.S. Virgin Islands have indicated, by way of written intent, their commitment to advancing coastal and marine spatial planning (CMSP) in alignment with the National Ocean Commission. Regional organizations such as the Caribbean Fisheries Management Council, Sea Grant, CaRA-CARICOOS, and the Caribbean Coral Reef Institute support this PRCZMP initiative. PRCZMP has funded marine spatial planning efforts through Sec. 309 coastal habitat and wetlands task activities addressing characterization and zoning needs for marine wetlands, territorial waters and submerged lands. As a result of these efforts a data portal was created at www.caribbean-mp.org and the Caribbean Regional Plan continues to be developed.

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)	No	No
Under development (Y/N)	Yes	Yes
Web address (if available)	www.caribbean-mp.org	www.caribbean-mp.org
Area covered by plan	US Caribbean EEZ	Caribbean EEZ

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.

Coastal managers and stakeholders that were consulted ranked ocean resources as a medium-high priority. Most stakeholders indicated that this enhancement category needs priority attention. Yet, most agreed that there were higher priority needs in Puerto Rico. Nevertheless, the PRCZMP recognizes the importance of addressing Ocean Resources. Accordingly, separate funding has been requested to develop the Caribbean Regional Ocean Partnership. This effort will enable Puerto Rico to comprehensively address issues such as energy facility siting, aquaculture, marine debris, and certain aspects of climate change. This work is proposed to be developed following the guidelines issued by the White House through the Executive Order of President Obama (July 2010).

3.8 ENERGY & GOVERNMENT FACILITY SITING ASSESSMENT

Section 309 Enhancement Objectives

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)42

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. The MarineCadastre.gov may be helpful in locating many types of energy facilities in the coastal zone.

Types of energy facilities in the Puerto Rico coastal zone (e.g., oil and gas, Liquefied Natural Gas, wind, wave, Ocean Thermal Energy Conversion, etc.) based on best available data.

Status and Trends in Energy Facilities and Activities in the Coastal Zone				
Type of Energy Facility/Activity	Exists in CZ		Proposed in CZ	
	(# or Y/N)	Change Since Last Assessment (↑, ↓, -, unkwn)	(# or Y/N)	Change Since Last Assessment (↑, ↓, -, unkwn)
<i>Energy Transport</i>				
Pipelines ⁴³	Y	↑	Y	↑
Electrical grid (transmission cables)	Y	↑	Y	↑
Ports	Y	↑	Y	-
Liquid natural gas (LNG) ⁴⁴	Y	-	Y	↑
Other (please specify)				

⁴² 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 describe what states need to do regarding national interest and consideration of interests that are greater than local interests.

⁴³ For approved pipelines (1997-present): www.ferc.gov/industries/gas/indus-act/pipelines/approved-projects.asp

⁴⁴ For approved FERC jurisdictional LNG import/export terminals: www.ferc.gov/industries/gas/indus-act/lng/exist-term.asp

Status and Trends in Energy Facilities and Activities in the Coastal Zone				
Type of Energy Facility/Activity	Exists in CZ		Proposed in CZ	
	(# or Y/N)	Change Since Last Assessment (↑, ↓, -, unkwn)	(# or Y/N)	Change Since Last Assessment (↑, ↓, -, unkwn)
<i>Energy Facilities</i>				
Oil and gas	Y	-	Y	-
Coal	Y	-	N	-
Nuclear ⁴⁵	Y (Not active)	-	N	-
Wind	Y	↑	Y	↑
Wave ⁴⁶	N	-	N	-
Tidal ³⁶	N	-	N	-
Current (ocean, lake, river) ³⁶	N	-	N	-
Hydropower	Y	-	N	-
Ocean thermal energy conversion	N	-	Y (research)	-
Solar	Y	↑	Y	-
Biomass	N	-	N	-
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.
3. Briefly characterize the existing status and trends for federal government facilities and activities of greater than local significance⁴⁷ in the state's coastal zone since the last assessment.

No significant changes have occurred in the type or number of oil and gas facilities. During the past five years the San Juan power plant has been reactivated and an explosion occurred at the Caribbean Petroleum (CAPECO) storage facility at Cataño. There are six major power plants

⁴⁵ The Nuclear Regulatory Commission provides a coarse national map of where nuclear power reactors are located as well as a list that reflects their general locations: www.nrc.gov/reactors/operating/map-power-reactors.html

⁴⁶ For FERC hydrokinetic projects: www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics.asp

⁴⁷ 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).

located in Puerto Rico's coastal zone. Three of the power plants are located on the north coast: San Juan, Palo Seco, Cambalache and three on the south coast: Ecoelectrica and Costa Sur (Guayanilla), AES (Guayama) and Aguirre (Salinas).

The explosion, fire, and subsequent oil spill at CAPECO's petroleum tank farm created a dangerous situation that impacted the adjacent wetlands and water bodies. This facility is in the middle of a densely populated community. The environmental impacts continue to pose a threat to human health and the environment. cleanup activities are ongoing.

PREPA has proposed to build a LNG pipeline from EcoElectrica's terminal and storage facilities at Guayanilla (south coast of Puerto Rico) to Palo Seco and San Juan power plants on the north coast. Environmental assessments and permitting activities are underway, with completion date indeterminate given project complexities and the number of affected stakeholders.

Four major wind power facilities had been proposed during the last assessment and two were built at Santa Isabel and Naguabo. Government is also considering the construction of a waste-to-energy facility to be built on the north coast of Puerto Rico as a means to address the solid waste issue and to generate electric power.

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.

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
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.

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.

PRCZMP will consult partner agencies, experts and stakeholders regarding the priority level of the Energy and Government Facility siting enhancement area. Most stakeholders in past surveys have indicated that this enhancement category also needs priority attention. Yet, most agreed that there were higher priority needs in Puerto Rico. The PRCZMP has identified that energy facility siting and ocean resources can be addressed through the proposed Puerto Rico component of the Caribbean Regional Ocean Partnership between Puerto Rico and the U.S. Virgin Islands.

3.9 AQUACULTURE ASSESSMENT

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)

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.⁴⁸

Type of Facility/Activity	Status and Trends of Aquaculture Facilities and Activities		
	# of Facilities ⁴⁹	Approximate Economic Value	Change Since Last Assessment (↑, ↓, -, unkwn)
Companies with permit to culture fish in Puerto Rico territorial waters (1)	0	0	-
Marine fish culture (2)	0	0	-
Freshwater fish on land (3)	41 (Tilapia and Shrimp)	unknown	-
Freshwater fish hatcheries (4)	0	0	-
Small-scale coastal aquaculture operations	0	0	-

⁴⁸ While focused on statewide aquaculture data rather than just within the coastal zone, the *Census of Aquaculture* (www.agcensus.usda.gov/Publications/2002/Aquaculture/) may help in developing your aquaculture assessment. The 2002 report, updated in 2005, provides a variety of state-specific aquaculture data for 2005 and 1998 to understand current status and recent trends. The next census is scheduled to come out late 2014 and will provide 2013 data.

⁴⁹ 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.

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.

According to 2012 Agriculture Census by the US Department of Agriculture⁵⁰:

Item	2012	2007
Total aquaculture sales by farm	51	40
Total aquaculture sales by dollars	\$687,976	\$832,725

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.

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.

⁵⁰ USDA Ag Census 2012:

http://www.agcensus.usda.gov/Publications/2012/Full_Report/Puerto_Rico/st72_1_016_017.pdf

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.

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.

4 PROGRAM ENHANCEMENT STRATEGIES

These strategies are pending input from CMP partners such as the Puerto Rico Planning Board, Environmental Quality Board, Department of Recreation and Sports/National Parks Company, U.S. Fish and Wildlife Service, U.S. Forest Service, International Institute of Tropical Forestry, National Marine Fisheries Service, the Natural Resources Conservation Service, the Caribbean Landscape Conservation Cooperative, and the Caribbean Regional Ocean Partnership, as well as pending the results of a stakeholder survey to be conducted May 1st, 2015. The following strategies were developed based on the anticipated needs of the Puerto Rico Coastal Zone Management Program based on staff input, regular meetings, workshops and conferences with partners in stakeholders during normal program activities as well as results from the last S309 strategy implementation.

4.1 WETLANDS STRATEGY

I. Issue Area(s)

The proposed strategy or implementation activities will support the following high-priority enhancement areas (*check all that apply*):

- | | |
|--|---|
| <input type="checkbox"/> Aquaculture | <input type="checkbox"/> Cumulative and Secondary Impacts |
| <input type="checkbox"/> Energy & Government Facility Siting | <input checked="" type="checkbox"/> Wetlands |
| <input type="checkbox"/> Coastal Hazards | <input type="checkbox"/> Marine Debris |
| <input type="checkbox"/> Ocean/Great Lakes Resources | <input type="checkbox"/> Public Access |
| <input type="checkbox"/> Special Area Management Planning | |

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

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: Restoration and enhancement of wetlands to increase coastal communities' resilience. The program changes in this strategy will shift the PRCZMP's wetlands protection approach from purely ecological to an ecosystem services focus using social-ecological and nature-based, infrastructure-use approaches.

C. Describe the proposed strategy and how the strategy will lead to and/or implement the program changes selected above. If the strategy will only involve implementation activities, briefly describe the program change that has already been adopted, and how the proposed activities will further that program change. (Note that implementation strategies are not to exceed two years.)

A number of significant program changes in wetlands management are projected for the next cycle of Sec. 309 program activities that will constitute building blocks of a Strategic Plan for Coastal Wetlands Management and Restoration. The proposed program changes include:

(1) Based on the guidelines developed in previous S309 strategy implementation for protection, conservation and restoration of wetlands, adopt ecosystem-based adaptation (EbA) strategies to build public policy(s) related to assist coastal communities increase their resilience to sea level rise and storm surges.

(2) Adoption of PRCZMP policies and guidelines to support local governments with integration of EbA strategies into their territorial ordainment or land use plans, in partnership with the PRPB (PRCZMP Federal Consistency review lead).

(3) Continue working towards the adoption of legislation to provide tax and other incentives to conserve and restore wetland acreage and function;

(4) Continue working towards the adoption of changes to water quality standards to conserve wetlands acreage and functions, in partnership with EQB. Permanent water quality monitoring stations and baselines will be established at selected wetland classes sites (8 – 24 sites). Results from data collection will support EQB's annual report on the state of water resources in Puerto Rico and also the Puerto Rico State of the Climate 2014-2016.

The projected program changes build on [the work](#) that was conducted during the 2011-2015 program period during which the PRCZMP completed the atlas of coastal wetlands and wetlands land tenure and the inventory of coastal geomorphic features, coastal habitats and wetlands.

In general, PRCZMP will continue coordinating with representatives of the agencies that compose the Antilles Interagency Wetlands Committee, created as a result of the initiative to develop an Antilles Wetland Condition Rapid Assessment method. This work is co-led by the PRDNER and the USACE with funding by the USEPA. Member agencies USFWS, NRCS, NOAA, NMFS, USFS IITF, USEPA and USACE.

New wetlands protection or sustainable use policies will enable the PRDNER and collaborating agencies, such as NRCS, to fund restoration and enhancement of wetlands to increase coastal communities' resilience.

These program changes will shift the PRCZMP's wetlands protection approach from purely ecological to an ecosystem services focus using social-ecological and nature-based, infrastructure-use approaches.

I. Needs and Gaps Addressed

Identify what priority needs and gaps the strategy addresses and explain why the proposed program change or implementation activities are the most appropriate means to address the priority needs and gaps. This discussion should reference the key findings of the assessment and explain how the strategy addresses those findings.

In the Assessment the following needs were identified that this strategy specifically seeks to fulfill:

- The "Draft Comprehensive Plan for the Management and Restoration of Coastal Wetlands", currently in-progress, will identify potential, feasible mechanisms and develop guidelines considering institutional issues with respect to agency roles and responsibilities for wetland protection, restoration and mitigation.
- Outreach and communication
 - PRCCC State of the Climate 2010-2013 report and [data portal](#).
 - Conferences: Antilles Interagency Wetlands Committee, academia, wetlands expert consultants

The strategy for the wetlands component also addresses the following additional needs:

- Promote the conservation of wetlands through sustainable development activities.
- Improve interagency coordination including the coordination of the implementation of erosion and sediment control requirements on agricultural lands by the PRPB and EQB.
- Development of coastal habitat restoration strategies and monitoring plans.
- Support of review of permit applications by regulatory agencies (USACE, USEPA, PRDNER)

II. Benefits to Coastal Management

Discuss the anticipated effect of the strategy, including the scope and value of the strategy, in advancing improvements in the CMP and coastal management, in general.

- Wetlands and wetland functions are inextricably linked to their surroundings, particularly human systems and therefore, wetland conservation must be pursued in the context of sustainable development and climate adaptation. This strategy will contribute to reduce risks to coastal community infrastructure and habitats by supporting efforts by municipalities and PRCZMP partner initiatives.

- There is a great need in Puerto Rico for enhanced recognition of the benefits of services that ecosystems, especially wetlands, provide to coastal communities (collectively called natural infrastructure) and this strategy elevates awareness and attention to these services.

III. Likelihood of Success

Discuss the likelihood of attaining the strategy goal and program change (if not part of the strategy goal) during the five-year assessment cycle or at a later date. Address the nature and degree of support for pursuing the strategy and the proposed program change and the specific actions the state or territory will undertake to maintain or build future support for achieving and implementing the program change, including education and outreach activities.

Support for this strategy exists at the Commonwealth and Federal levels and PRCZMP will seek increased support from municipal governments. Based on past wetlands work the PRCZMP is confident that though building relationships, improving access to critical information (i.e., PRCCC and CROP portals), and implementing the five-year work plan will greatly contribute to achieving the goals of this strategy.

A five-year period is a reasonable time frame for the implementation of a strategy of this nature because it requires intergovernmental coordination through PRCZMP working relationships throughout multiple levels of government as well as innovative outreach and education to the public.

IV. Strategy Work Plan

Using the template below, provide a general work plan that includes the major steps that will lead toward or achieve a program change or implement a previously achieved program change. If the state intends to fund implementation activities for the proposed program change, describe those in the plan as well. The plan should identify a schedule for completing the strategy and include major projected milestones (key products, deliverables, activities, and decisions) and budget estimates. If an activity will span two or more years, it can be combined into one entry (i.e., Years 2-3 rather than Year 2 and then Year 3). While the annual milestones are a useful guide to ensure the strategy remains on track, OCRM recognizes that they may change somewhat over the course of the five-year strategy unforeseen circumstances. The same holds true for the annual budget estimates. Further detailing and adjustment of annual activities, milestones, and budgets will be determined through the annual cooperative agreement negotiation process.

Strategy Goal: Based on the guidelines developed in previous S309 strategy implementation for protection, conservation and restoration of wetlands, adopt ecosystem-based adaptation (EbA) strategies to build public policy(s) related to assist coastal communities increase their resilience to sea level rise and storm surges.

Total Years: 3

Total Budget:

Year(s): 2016-2018

Description of activities:

Identify wetlands adjacent to coastal communities using the PRCZMP GIS-Remote Sensing capabilities and assess vulnerabilities of the coastal communities as well as the potential services wetlands could provide.

Major Milestone(s):

Technical brief of tools and methods available for assessing wetland vulnerabilities

Technical brief of tools and methods available for assessing ecosystem services of wetlands

Using FEMA flood maps, NOAA Office for Coastal Management Sea Level Rise Viewer, PRCCC Storm Surge Atlas and Sea Level Rise projections (developed through last S309 Strategy Implementation), identify communities potentially vulnerable to flooding.

Using the FWS National Wetlands Inventory (1978 draft) and the updated Coastal Habitats and Geomorphic Features Inventory (2013; developed through the last S309 Strategy Implementation) identify vulnerable wetlands.

Use the new layers of vulnerable communities and vulnerable wetlands to identify vulnerable communities that are adjacent to vulnerable wetlands in order to create an information layer (shapefiles with corresponding metadata) that could be used for EbA efforts.

Analysis of Puerto Rico-specific ecosystem services of wetlands based on the technical briefs and focused on the communities previously identified.

Budget: \$175,000

Strategy Goal: Adoption of PRCZMP policies and guidelines to support local governments with integration of EbA strategies into their territorial ordainment or land use plans, in partnership with the PRPB (PRCZMP Federal Consistency review lead).

Year(s): 2019-2020

Description of activities:

Conduct an analysis of the legal and institutional framework of existing laws and regulations that would support EbA in Puerto Rico as well as identification of prospective opportunities for enhancement of existing laws and regulations or development of new mechanisms.

Major Milestone(s):

Legal and institutional framework analysis and recommendations

Budget: \$45,000

Strategy Goal: Continue working towards the adoption of legislation to provide tax and other incentives to conserve and restore wetland acreage and function;

Year(s): 2019-2020

Description of activities:

Conduct meetings and workshops with elected officials to provide education and information as well as to assess the feasibility of adopting new legislation or amending/enhancing existing legislation based on the results of the legal and institutional framework analysis.

Major Milestone(s):

4 regional meetings/workshops

1 Commonwealth-wide meeting/workshop

Educational materials that communicate the results of strategy products

Draft laws or regulations resulting from the legal and institutional framework analysis, the regional and Commonwealth-wide meetings/workshops.

Budget: \$60,000

V. 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.

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).

5-Year Budget Summary by Strategy

At the end of the strategy section, please include the following budget table summarizing your anticipated Section 309 expenses by strategy for each year.

Strategy Title	Year 1 Funding	Year 2 Funding	Year 3 Funding	Year 4 Funding	Year 5 Funding	Total Funding
Adopt ecosystem-based adaptation (EbA) strategies to build public policy(s) related to assist coastal communities increase their resilience to sea level rise and storm surges.	\$75,000	\$50,000	\$50,000			\$175,000
Adoption of PRCZMP policies and guidelines to support local governments with integration of EbA strategies into their territorial ordainment or land use plans				\$25,000	\$20,000	\$45,000
Continue working towards the adoption of legislation to provide tax and other incentives to conserve and restore wetland acreage and function				\$30,000	\$30,000	\$60,000
Total Funding						

4.2 COASTAL HAZARDS STRATEGY

III. Issue Area(s)

The proposed strategy or implementation activities will support the following high-priority enhancement areas (*check all that apply*):

- | | |
|--|---|
| <input type="checkbox"/> Aquaculture | <input type="checkbox"/> Cumulative and Secondary Impacts |
| <input type="checkbox"/> Energy & Government Facility Siting | <input type="checkbox"/> Wetlands |
| <input checked="" type="checkbox"/> Coastal Hazards | <input type="checkbox"/> Marine Debris |
| <input type="checkbox"/> Ocean/Great Lakes Resources | <input type="checkbox"/> Public Access |
| <input type="checkbox"/> Special Area Management Planning | |

IV. Strategy Description

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

- A change to coastal zone boundaries;
- New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;
- 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,
- 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.

E. Strategy Goal: To move the program’s work up the “adaptation ladder⁵¹” and to larger-scale impact. EcoAdapt’s Adaptation Ladder of Engagement is a good mental model of the types of adaptation work. In the 2010-2015 cycle we focused on awareness raising, scientific assessment, and pilot project planning and implementation. Many accomplishments were achieved as well as assistance to Commonwealth efforts for launching executive orders and their implementation. This cycle the program will focus on moving up the ladder to larger-scale planning and implementation efforts by first evaluating the pilot projects successes and lessons learned and those of partners and applying to Commonwealth policies and guidance, integrating efforts, and sharing of knowledge and methods.

State the goal of the strategy for the five-year assessment period. The goal should be the specific program change to be achieved or be a statement describing the results of the project with the expectation that achieving the goal would eventually lead to a program change. For strategies that implement an existing program change, the goal should be a specific implementation milestone. For example, work with three communities to develop revised draft comprehensive plans that consider future sea level rise or, based on research and policy analysis, present proposed legislation on wetland buffers to state legislature or consideration. Rather than a lofty statement, the goal should be achievable within the time frame of the strategy.

F. Describe the proposed strategy and how the strategy will lead to and/or implement the program changes selected above. If the strategy will only involve implementation activities, briefly describe the program change that has already been adopted, and how the proposed activities will further that program change. (Note that implementation strategies are not to exceed two years.)

PRCRMP is will develop a number of program changes related to coastal hazards vulnerability and climate change adaptation policies over the next 5 years. Program changes will result from work conducted under work being conducted by the PRCZMP-CMO through the Puerto Rico Climate Change Council (PRCCC) and by integration of coastal hazards and future climate conditions into new adaptation guidance for communities and new or enhanced coastal legislation. The purpose of this strategy is to advance the management of Puerto Rico’s coasts in consideration of coastal hazards and potential future climate conditions. This strategy is necessary because of the coast’s economic, environmental and cultural significance to the State.

Specifically, during the next five years:

- Facilitate the development of the next State of the Climate 2014-2016, an island-wide, multi-sector vulnerability assessment.
- Continue to develop and refine an open-access hazards data portal that has the best available coastal hazards and climate change information for the Commonwealth.
- Assess the successes of the community-based adaptation pilot programs conducted in the last cycle and develop guidance based on the lessons learned for future community-based climate adaptation plans.

⁵¹ EcoAdapt’s Adaptation Ladder of Engagement: <http://ecoadapt.org/programs/awareness-to-action/climate-savvy-quick-course/ladder-of-engagement>

- Develop draft legislation with legal consultation for policies and recommendations for creation of adaptation mechanisms that protect life and property, specifically real estate through a “right-to-know” or hazard disclosure law.

V. Needs and Gaps Addressed

Identify what priority needs and gaps the strategy addresses and explain why the proposed program change or implementation activities are the most appropriate means to address the priority needs and gaps. This discussion should reference the key findings of the assessment and explain how the strategy addresses those findings.

Coastal hazards need to be elevated as a priority in the Commonwealth of Puerto Rico in order to obtain the policy, management, financial and institutional support that it needs to address these critical issues. This sentiment has been clearly articulated by participants at numerous CMO meetings and dialogues since the last CZMA section 309 assessment and strategy. This Coastal Hazards Strategy reflects the important gaps that have been identified through numerous discussions and collaborations over the years.

Specifically, sound public policies and regulations should be codified in Puerto Rico and certain hazard mitigation approaches should be undertaken by the Commonwealth. This strategy has been developed with a focus on creating a robust foundation of critical data, collaboratively developed and advocated mitigation approaches for a variety of stakeholders (including policies and regulations for Commonwealth and municipal governments) for adoption and implementation, and education-outreach efforts to reduce risks to life and property and to foster the needed push for policy and regulation actions related to these issues.

The Coastal Hazards Enhancement Area Assessment identified a need to address current hazards (i.e. storm surge, erosion, flooding, etc) as well as climate variability and change at the territorial level since there currently does not exist a Puerto Rico-wide vulnerability assessment or adaptation plan. This strategy will complete the risk assessment and guide the development of adaptation strategies for multiple targets (namely government and the private sector).

Guidance, in the form of the best available scientific knowledge and recommended risk reduction strategies, will be developed for all levels of government. This will be accomplished in order for Commonwealth and local governments to incorporate coastal hazard data into their plans, regulations, projects, policies, special area management plans, and future post-disaster development plans. The creation of this vulnerability assessment and recommendations for adaptation strategies for the purposes of this document is called the “Climate Change Vulnerability Assessment and Adaptation Strategy”. Specifically needed to support achievement of the program changes is a comprehensive coastal hazard and geomorphic feature database and library that can be used to assess risks to the coasts. There is an increasing need to identify coastal features that provide current protection to coastal communities. Once this work is complete the PRCMO would begin advocating for the needed policies. Specifically, the PRCMO would work on guidance for standards and design considerations for modifications of natural and man-made features in coastal high hazard areas.

Subsequently, with the aid of legal consultation, legislation will be drafted and submitted to the Commonwealth legislature. The CZM Program will advocate for the adoption of this legislation by presenting legislative testimony on the risks and vulnerabilities of person and structures from hazards and climate change and increasing the effectiveness of our outreach and communications. An

important piece of getting executive and legislative support for the program changes is to increase official and constituent support through outreach and communication efforts.

These vital and important tasks, and implementing an education and outreach plan are critical components of a coastal hazards strategy to build coastal resilient communities.

VI. Benefits to Coastal Management

Discuss the anticipated effect of the strategy, including the scope and value of the strategy, in advancing improvements in the CMP and coastal management, in general.

This strategy will have three principal effects. First, the project will continue to provide much needed data in a usable format, specifically the Puerto Rico Climate Change Council data portal, to guide future planning and project development to a variety of stakeholders. Second, the strategy will continue to foster a more aware, more engaged, and eventually more “resilient” Puerto Rican public. And third, it will lay the groundwork for adoption of effective hazard mitigation policies and actions by the Commonwealth and relevant resource users. The goal is for the CMO through the updated coastal zone vulnerability assessment and recommended adaptation strategies to encourage and advocate for the designation of coastal hazards and climate change impacts as issues that must be considered when developing new legislation or to refine existing legislation, Commonwealth plans and policies, hazard mitigation plans, development projects, local mitigation strategies, civil society activities, etc. Having the necessary assessments, recommendations, and backing of the Puerto Rican public will increase the political will to implement much-needed policies and regulations. Through partnership building and inter-agency collaboration this valuable information may be translated into adoption at different levels of society.

VII. Likelihood of Success

Discuss the likelihood of attaining the strategy goal and program change (if not part of the strategy goal) during the five-year assessment cycle or at a later date. Address the nature and degree of support for pursuing the strategy and the proposed program change and the specific actions the state or territory will undertake to maintain or build future support for achieving and implementing the program change, including education and outreach activities.

The likelihood of success for this strategy is strong because the project will build upon existing work by both CZM-efforts and non-CZM efforts, as well as CMO’s vast experience and partnerships. On the basis of repeated experience with coastal floods, hurricanes, and related events, the Commonwealth has a healthy respect for coastal hazards and their consequences, and, over time, has initiated significant mitigation measures including large-scale relocation. DNER’s strength lies in its knowledge base of coastal conditions and its past work in mitigation planning. Additionally, this project is centered around multi-stakeholder collaboration and will have project partners with great technical resources, such as the Caribbean Coastal Ocean Observing System (CariCOOS), the Caribbean Tsunami Center, The Coastal Hazards Center of Puerto Rico, the Puerto Rico Seismic Network, Puerto Rico Sea Grant, the National Weather Service, the Puerto Rico Emergency Management Agency, the Caribbean Landscape Conservation Cooperative, the Caribbean Regional Ocean Partnership, and the University of Puerto Rico. Each of these organizations are committed to the development of the vulnerability assessment and to recommending actions. Additionally, each group is committed to advocating for the adoption of these documents and recommendations by Commonwealth and local governments.

CMO is cognizant of constraints to successful program outcomes which may be enumerated as follows:

a. Resource availability

Program resources, both personnel and budgetary, must be adequate to the task. Because the budget is limited, an effort must be made draw on parallel resources in other agencies and project partners, both Commonwealth and Federal. This will require both skill and experience on the part of the task leader and careful direction and support from CMO management. Fortunately, through the NOAA Coastal Management Fellowship Program we are guaranteed a graduate fellow for two years of the project to serve as a co-project manager with the CMO Director.

b. Diversity of stakeholder interests

Stakeholder opposition to new design standards on coastal setbacks, building elevations, designation of high vulnerability areas, building prohibitions, and other adaptation strategies are likely to create political impediments to the enactment of measures. Any opposition needs to be countered by effective outreach and public education. There needs to be maximum dialogue with stakeholders in the formative phase, from the beginning of the vulnerability assessment to the formulation of adaptation strategies. Without active stakeholder involvement, sound science, and advocacy by the CMO and partners political opposition could be formidable.

c. Access to senior level decision makers

At key points, the top levels of DNER, PB, and representatives of the Governor's office will need to be involved in the review of issues and policy directions since the resolution of coastal hazard vulnerability issues go well beyond technical considerations. Without senior level involvement and support, technical staff will find it difficult to move program recommendations to the implementation stage.

By collaborating with multiple partners the outcomes of the strategy will have a higher probability of widespread support due to enhanced scientific robustness and stakeholder-supported management recommendations. The realities of potential opposition force a large emphasis on collaboration. Multiple voices from a variety of sectors will assist with reaching out to key decision-makers, the public, and the private sector.

The above actions will maintain or build future support for achieving and implementing the Program change. More specific actions (that may or may not require Section 309 funds) include:

- Continue to convene and engage the Puerto Rico Climate Change Council (PRCCC), a task force of over 150 partners and expert advisors throughout the process. Support and encourage their active participation in CMO coastal hazard efforts.
- Incorporate a peer-review process into the State of the Climate 2014-2016 vulnerability assessment to ensure sound science is used to develop hazard mitigation and climate adaptation strategies.

- Develop outreach and communication materials to educate about coastal hazards, explain the reasoning for recommended policies and strategies, and garner support for such work.
- Stakeholder listening sessions and risk assessment workshops will be held to obtain key inputs for the process and to foster support for outputs.
- Take advantage of opportunities provided by conferences, meetings, workshops to present the work. When the strategy outputs are completed use these forums and others to widely disseminate and advocate.

VIII. Strategy Work Plan

Using the template below, provide a general work plan that includes the major steps that will lead toward or achieve a program change or implement a previously achieved program change. If the state intends to fund implementation activities for the proposed program change, describe those in the plan as well. The plan should identify a schedule for completing the strategy and include major projected milestones (key products, deliverables, activities, and decisions) and budget estimates. If an activity will span two or more years, it can be combined into one entry (i.e., Years 2-3 rather than Year 2 and then Year 3). While the annual milestones are a useful guide to ensure the strategy remains on track, OCRM recognizes that they may change somewhat over the course of the five-year strategy unforeseen circumstances. The same holds true for the annual budget estimates. Further detailing and adjustment of annual activities, milestones, and budgets will be determined through the annual cooperative agreement negotiation process.

Strategy Goal: Facilitate the development of the next State of the Climate 2014-2016, an island-wide, multi-sector vulnerability assessment.

Total Years: 3

Total Budget: \$245,000

Year(s): 2016 - 2018

Description of activities:

Reconvene the four working groups of the PRCCC through a series of meetings and conferences and work together to update existing coastal hazard and climate variability/change information to assess Puerto Rico’s vulnerability to multiple climate stressors, with emphasis on sea level rise and coastal inundation.

Major Milestone(s):

Conduct at least four workshops and meetings per working group (totaling 16).

Determine with partners the lessons learned from the last State of the Climate and develop an operational plan that will improve the process and refine the final publication.

Reactivate and systematically collect relevant climate information (new after July 2013) into the shared Puerto Rico Climate Research Library for use by the partners

Update the present day and possible future scenarios for Puerto Rico's coasts and the most vulnerable regions through quantitative and qualitative methods, specifically utilizing new Puerto Rico-specific climate data from the Caribbean Landscape Conservation Cooperative and USGS Southeast and Caribbean Climate Science Center and from the Puerto Rico Storm Surge and Sea Level Rise Atlas (developed in last S309 Strategy Implementation).

Using U.S. Census data and information (Census tracks-Tiger files) in addition to other geophysical, social, and ecological indicators identify coastal communities currently or potentially vulnerable to coastal hazards and climate change.

Incorporate the new coastal ecosystem and geomorphic features database developed in the last cycle as well as new storm surge and sea level rise models developed by the CMO GIS facility through UPR-CariCOOS to provide new spatially explicit vulnerability graphics in the State of the Climate, that the last State of the Climate 2010-2013 did not.

Annual partnership meeting (PRCCC) (3 total).

Publish policy briefs with the gathered information throughout the process as well as other outreach/education materials (print and online through PRDNER and PRCCC websites as well as social media).

Finalize and publish full report of updated vulnerability assessment in Year 3 with a user-friendly executive summary in both Spanish and English. Work with partners to disseminate report effectively.

Budget: \$245,000

Year(s): 2016-2020

Description of activities:

Continue to develop and refine an open-access hazards data portal that has the best available coastal hazards and climate change information for the Commonwealth.

Major Milestone(s):

User-friendly tool to access hazards related data and information in support of coastal communities resilience planning and awareness.

Develop metrics and a monitoring tool, such as google analytics, to determine tool use and make improvements

Conduct focus group workshops with existing and potential users to improve the tools usability and features

Budget: \$75,000

Year(s): 2017

Description of activities:

Assess the successes of the community-based adaptation pilot programs conducted in the last five years and develop guidance based on the lessons learned for future community-based climate adaptation plans.

Major Milestone(s):

Meeting of the five pilot project teams with PRCZMP staff to determine lessons learned and recommend next steps and method modifications.

Revised adaptation method and strategies based on the lessons learned from five community-based adaptation pilot planning projects (PRCZMP 312 metrics)

Budget: \$35,000

Strategy Goal: Develop draft legislation with legal consultation for policies and recommendations for creation of adaptation mechanisms that protect life and property, specifically real estate through a “right-to-know” or hazard disclosure law.

Year(s): 2016 - 2018

Description of activities: Using past research by PRCZMP on right-to-know laws around the world, draft legislation with legal consultation and conduct meetings and workshops with elected officials to provide education and information as well as to assess the feasibility of adopting such legislation.

Major Milestone(s):

4 regional meetings/workshops

1 Commonwealth-wide meeting/workshop

Educational materials that communicate the results of strategy products

Draft law resulting from the legal consultation, the regional and Commonwealth-wide meetings/workshops.

Total Years: 3

Total Budget: \$65,000

IX. 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.

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).

5-Year Budget Summary by Strategy

At the end of the strategy section, please include the following budget table summarizing your anticipated Section 309 expenses by strategy for each year.

Strategy Title	Year 1 Funding	Year 2 Funding	Year 3 Funding	Year 4 Funding	Year 5 Funding	Total Funding
Facilitate the development of the next State of the Climate 2014-2016, an island-wide, multi-sector vulnerability assessment	\$105,000	\$90,000	\$50,000			\$245,000
Continue to develop and refine an open-access hazards data portal	\$25,000	\$15,000	\$15,000	\$10,000	\$10,000	\$75,000
Right-to-know draft legislation			\$25,000	\$20,000	\$20,000	\$65,000

Total Funding						
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SUMMARY OF STAKEHOLDER AND PUBLIC COMMENT

This section will provide a list of the stakeholder groups or individuals engaged during the assessment development process and a brief summary of their feedback. It will also provide a summary of the public comments received during the public comment period and how the CMP responded to those comments.

The survey is scheduled to be administered May 1, 2015. As such the strategies developed in this draft might need to be modified due to the results of that survey.