
**APPENDIX A4 – ESA CONSULTATION & USFWS
COORDINATION ACT REPORT
for
RIO GUAYANILLA, GUAYANILLA, PR
2018 SUPPLEMENTAL APPROPRIATIONS
FLOOD RISK MANAGEMENT STUDY**



March 2020



**US Army Corps
of Engineers®
Chicago District**

USACE. 2020. Rio Guayanilla, Guayanilla, PR Flood Risk Management Study. Draft Final Integrated Feasibility Report Environmental Assessment. U.S. Army Corps of Engineers, Chicago District, 231 S. LaSalle Street, Suite 1500, Chicago, Illinois 60604.

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DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
231 SOUTH LA SALLE STREET, SUITE 1500
CHICAGO IL 60604

CELRC-PMD-PB

01 NOV 2018

Dear Recipient:

The U.S. Army Corps of Engineers is preparing a National Environmental Policy Act (NEPA) document to evaluate the potential effects of alternatives to manage risks associated with flooding at Guayanilla, Puerto Rico. The Town of Guayanilla is located within the active floodplain of the Rio Guayanilla and has experienced flood damages and socio-economic impacts as a result, with the latest effects stemming from Hurricane Maria.

The study will investigate overbank flooding and erosion threatening infrastructure along the Rio Guayanilla, focusing on prioritizing high risk areas and developing a range of possible structural and non-structural alternatives to reduce flood risk. Measures and alternatives that could be evaluated to reduce flood risk and erosion include: floodwater storage, levees or floodwalls, diversion channels, channel modifications, flow control structures, flood proofing, structure elevations, and buyouts. As part of the NEPA scoping process, the Chicago District would appreciate any comments, concerns or information you might have associated with these preliminary concepts. Topics could include but are not limited to flooding, the human environment, wetlands, rare and unique habitat, threatened and endangered species, and cultural and social resources.

The Chicago District, in collaboration with the Corps' Jacksonville District and the study's nonfederal sponsor, Puerto Rico Department of Natural and Environmental Resources, will host a public scoping meeting on Nov. 28, 2018, from 2 p.m. – 6 p.m. Information for upcoming meetings will be provided on the following webpages: (<https://www.lrc.usace.army.mil/>) (<http://www.saj.usace.army.mil/>) (<http://drna.pr.gov/cat/programas-y-proyectos/>).

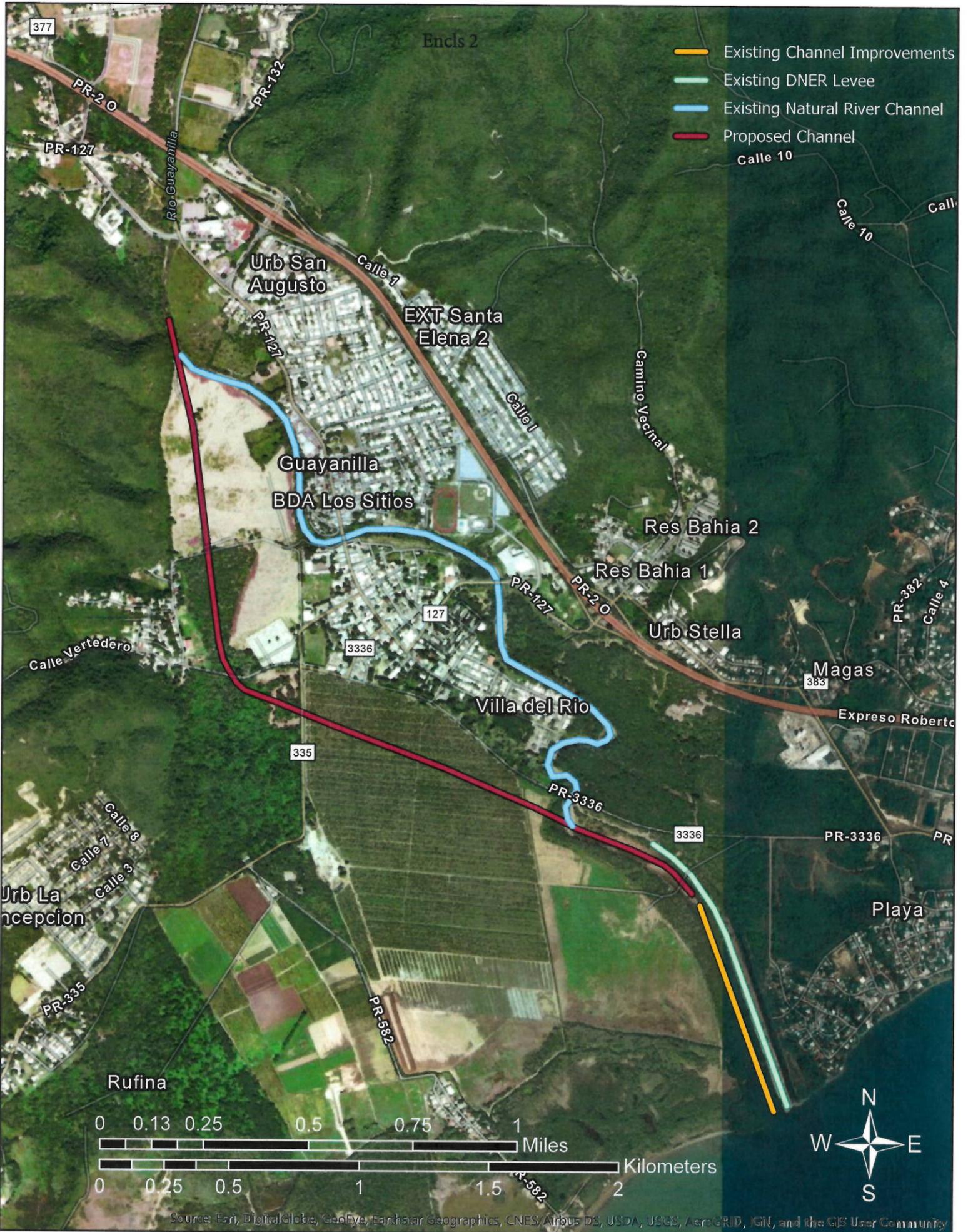
Attached is a list of state and federal agencies and Tribal Nations that are also receiving this request (enclosure 1). A map of the study area is attached (enclosure 2).

The U.S. Army Corps of Engineers values your input to the Rio Guayanilla Feasibility Study. Comments should be received no later than 15 December 2018 for incorporation into the draft NEPA document. Questions, comments and information may be sent to Frank Veraldi at U.S. Army Corps of Engineers, 231 South La Salle Street, Suite 1500, Chicago, Illinois 60604; or via email at Frank.M.Veraldi@usace.army.mil.

Sincerely,


Susanne J. Davis, P.E.
Chief, Planning Branch

Enclosure



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Caribbean Ecological Services

Field Office

P.O. Box 491

Boqueron, PR 00622

DEC 11 2018

In Reply Please Refer To:
FWS/R4/CESFO/72-FC-011

Ms. Susanne J. Davis
Chief, Planning Branch
US Army Corps of Engineers, Chicago District
231 South La Salle St.
Suite 1500
Chicago, IL, 60604

Re: Rio Guayanilla Flood Control Feasibility Study,
Guayanilla, Puerto Rico

Dear Ms. Davis:

This is to follow up on the meeting held on November 28, 2018, regarding the Rio Guayanilla Flood Control Feasibility Study at the town of Guayanilla. Our comments are issues as technical assistance in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act (16 U.S.C. 1531 et seq. as amended).

After the passing of Hurricanes Irma and Maria in Puerto Rico several old flood control projects are being revisited and reevaluated. The U.S. Army Corps of Engineers is currently assessing the various alternatives for the floods caused by the Rio Guayanilla in the town of Guayanilla. Three existing alternatives are being considered from the original flood control project; these are Alternatives 2, 3 & 4. However these alternatives are subject to some design changes as they are further evaluated by the Corps.

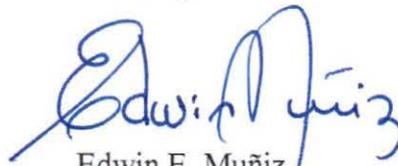
Alternative 3's alignment has the least environmental impact of the various alternatives presented. The proposed channel runs through agricultural fields and previously disturbed lands. This alternative has a levee on the eastern bank allowing for flooding on the western bank which will help maintain the coastal mangrove forest near the mouth of the river by periodically providing freshwater flushing of the excess salts.

The proposed project should incorporate conservation measures to maintain hydrologic connectivity of amphidromous native stream fauna, minimize possible impacts to federally listed species and minimize impacts to sensitive habitats such as the coastal mangrove wetlands and karst hills adjacent to the project. In order to accomplish these we make the following recommendations:

- 1) We recommend using a natural channel designed for bank full discharge as the main conveyance of water. Designing a bankfull stage channel will help keep minimize sedimentation and move bedload; it will also provide a natural channel for native stream fauna. In addition, minimum flow should be maintained in the original channel that runs through the town of Guayanilla. Since this channel would be used primarily for internal drainage, the creation of storm water filter wetlands should be considered to improve water quality prior to discharging back into the main flood control channel.
- 2) The karst hills and forests immediately west of the project site is within the range of the following federally listed species Puerto Rican boa (*Epicrates inornatus*), Puerto Rican nightjar (*Caprimulgus noctitherus*) and the listed plants *Eugenia woodburyana* and *Trichilia tricantha*. These karst areas should be avoided when determining borrow sites for the construction of the levees. If impacts to the the karst areas cannot be avoided, then this would require Section 7 consultation under the ESA. For major consultation activities a Biological Assessment would need to be prepared. For additional information please visit our website <https://www.fws.gov/southeast/caribbean/project-evaluations/>.

Thank you for the opportunity to participate this early in the planning process, if you have any questions please contact Felix Lopez of our staff at 787 851 7297 extension 210.

Sincerely,



Edwin E. Muñiz
Field Supervisor

fhl
cc:
DNER, San Juan

Mr. Edwin Muñiz
US Fish & Wildlife Service
Caribbean Ecological Service Field Office
P.O. Box 491
Boquerón, PR 00622

Dear Mr. Muñiz:

This is a follow up to the Planning Assistance Letter (PAL) dated 11 December 2018 (FWS/R4/CESFO/72-FC-011), regarding the Rio Guayanilla Flood Risk Management Study at the town of Guayanilla. Technical assistance was provided in accordance with the US Fish and Wildlife Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act (16 U.S.C. 1531 et seq. as amended). The following were provided by the USFWS based on the conceptual alternatives presented at the 29 November 2018 planning Charrette for Rio Guayanilla:

- 1) We recommend using a natural channel designed for bank full discharge as the main conveyance of water. Designing a bankfull stage channel will help keep minimize sedimentation and move bedload; it will also provide a natural channel for native stream fauna. In addition, minimum flow should be maintained in the original channel that runs through the town of Guayanilla. Since this channel would be used primarily for internal drainage, the creation of storm water filter wetlands should be considered to improve water quality prior to discharging back into the main flood control channel.
- 2) The karst hills and forests immediately west of the project site is within the range of the following federally listed species Puerto Rican boa (*Epicrates inornatus*), Puerto Rican nightjar (*Caprimulgus noctitherus*) and the listed plants *Eugenia woodburyana* and *Trichilia tricantha*. These karst areas should be avoided when determining borrow sites for the construction of the levees. If impacts to the karst areas cannot be avoided, then this would require Section 7 consultation under the ESA. For major consultation activities a Biological Assessment would need to be prepared. For additional information please visit our website <https://www.fws.gov/southeast/caribbean/project-evaluations/>.

The USACE concurs with the technical assistance provided. Recommendation 1 has been incorporated into the study's alternative analysis with corrections to the types of flows necessary to maintain biological diversity within the Rio Guayanilla natural channel, and any future diversion channels, which is provided in the attached Project Evaluation Report. Recommendation 2 was also reviewed, in which a Project Evaluation Report was drafted to provide the USFWS information to ascertain the appropriate consultation process and associated scope of work.

The U.S. Army Corps of Engineers values your input to the Rio Guayanilla Feasibility Study. The intent of this correspondence and supporting evaluation report is for the USFWS to consider an expedited Section 7 compliance action by means of avoidance, minimization and conservation measures that would be nested within the final alternative plan selected for implementation. The USACE also requests that USFWS provide a general scope of work (SOW) and associated costs for supporting the Fish & Wildlife Coordination Act Report (FWCAR). Please provide us requested guidance at earliest convenience to

ensure required biological and/or habitat surveys can be accomplished within the study timeframe (FY2019). Correspondence may be sent to Frank Veraldi at U.S. Army Corps of Engineers, 231 South La Salle Street, Suite 1500, Chicago, Illinois 60604; or via email at Frank.M.Veraldi@usace.army.mil.

Sincerely,



Susanne J. Davis, P.E.
Chief, Planning Branch

Enclosure

**US Fish Wildlife Service Project Evaluation
For
The Rio Guayanilla Flood Risk Management Study at Guayanilla, Puerto Rico**

1.0 Introduction

This document supports the attached response to the USFWS's Planning Assistance Letter dated 11 December 2018. This information is in support of the request to begin an expedited consultation process for the Rio Guayanilla Flood Risk Management (FRM) Study at Guayanilla, Puerto Rico. The intent of the following existing and conceptual information provided is for the USFWS to consider an expedited Section 7 compliance action by means of avoidance, minimization and conservation measures that would be nested within the final alternative plan selected for implementation. The USACE also requests that USFWS provide a general scope of work (SOW) and associated costs for supporting the Fish & Wildlife Act Coordination Report (FWCAR).

1.1 Authority

The study authority is the Water Resources Development Act of 1986 (P.L. 99-662), Sec 722.

SEC. 722. Guayanilla River Basin, Puerto Rico.

(a) The Secretary shall conduct a feasibility study on providing flood protection in the Guayanilla River Basin, Puerto Rico.

(b) Not later than two years after the date of the enactment of this Act, the Secretary shall submit to Congress a report on the results of such study together with such recommendations as the Secretary determines to be appropriate.

1.2 Purpose & Need

Heavy rainfall combines with very steep slopes in the upper Rio Guayanilla catchment to produce high peak discharges in a relatively short period of time. The 100 year flood may cover over 8 square kilometers of land within the study area. Flooding in the study area can affect over 880 housing units, 147 commercial establishments, 56 public buildings, 21 nonprofit establishments, 3 industrial plants, and 2 public utilities. Average annual damages for existing conditions at the reconnaissance level are estimated at \$1.5 million, while expected annual equivalent damages are expected to reach \$1.8 million without the project.

Significant flood events occurred in the watershed in 1975, 1979, 1982, 1985, 1996, 1998, 2004, 2008, 2012, and 2017. The 1975 flood, Tropical Storm Eloise, caused over \$1.7 million in damages. Several hundred persons were forced from their homes by the floods; 99 houses were destroyed and 276 were damaged. Fatalities were reported in the 1975, 1979, 1985, 1998, and 2017 floods (<http://ecoexploratorio.org/amenazas-naturales/inundaciones/inundaciones-en-puerto-rico/#prettyPhoto>).

In addition, flood-induced waters, erosion and sediment deposition have induced closures of major area roadways and impeded access to critical facilities including a regional hospital and local fire and police stations. In 2017, Hurricane Maria caused significant overtopping of Rio Guayanilla, and the floodwaters washed out a major bridge and destroyed the largest supermarket, a pharmacy, and 106 homes. Several other homes and critical public structures were inundated, banana and coffee fields were destroyed, and the area was left without electricity and telecommunications.

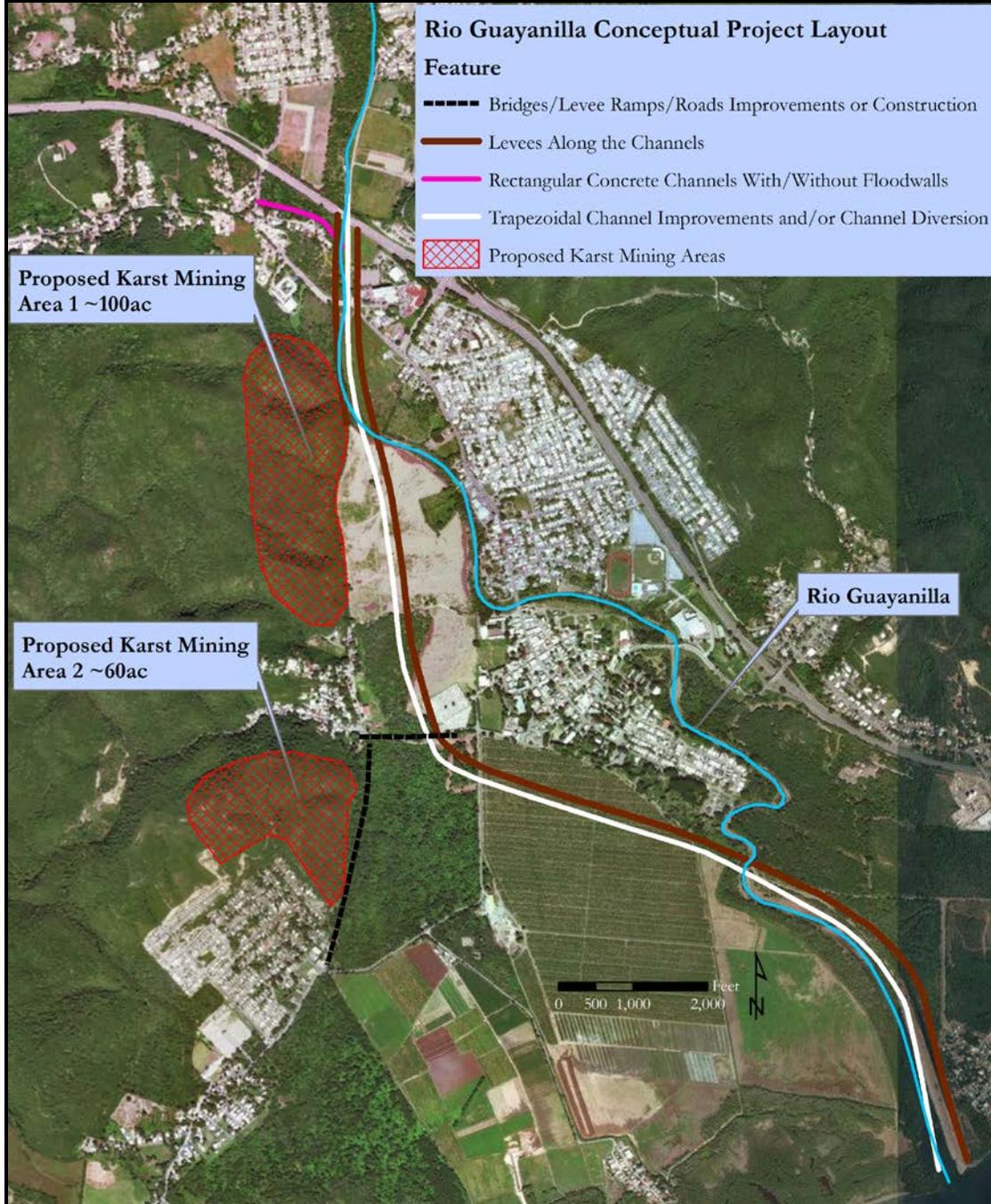
1.3 Coordination Summary to Date

- 2018 November 01 - USACE provides USFWS / NOAA with Scoping Letter
- 2018 November 28 – USACE, USFWS and NOAA discuss species, habitat and potential measures for incorporation into the analysis to ensure effects to T&E critical habitat, species and wetlands are avoided, minimized or mitigated.
- 2018 December 11 – USFWS provides USACE with Planning Assistance Letter; letter provides general guidance for minimizing effects and starting the consultation process.
- 01 March 2019 – USACE provides USFWS with request for consultation under the expedited Section 7 process.

2.0 Project Location

The Rio Guayanilla study area comprises the Guayanilla riverine and coastal floodplain located about 16 kilometers west of the city of Ponce, with focus on the Town of Guayanilla. The town has an urban population of 21,581 (2010 Census) with a lesser number of unincorporated farm communities within the floodplain. A consistent and hazardous flooding problem occurs in Guayanilla as the town is both bisected by the river, and resides in the active floodplain. The center of the study area is located at the following coordinates: 18°01'09"N 66°47'31"W.

Map 1 –Rio Guayanilla (FRM) Study Area; Diversion/Levee Alignment & Proposed Karst Mining



3.0 Study Alternatives

Building off of the Reconnaissance Study (USACE 1990), this feasibility study will investigate a range of alternatives to address flood risk in the watershed including levees, floodwalls, diversion channels, and localized stone mining. Flood damages primarily occur at the Town of Guayanilla and it is expected that alternative plans will specifically address identified problems in this area. Since the Rio Guayanilla is a highly active montane riverine system, natural processes of erosion and deposition have also impacted socio-economic activities in the town. There is no estimated cost for the project at this stage of the study.

3.1 Conceptual Designs

Diversion Structures & Rio Guayanilla Natural Channel Flows

28 November 2018 (USACE/USFWS/NOAA Discussion) – One alternative concept resulting from Charrette discussions between USFWS, NOAA and USACE is based on hydrologic manipulation methods and nature based features. The alternative would include concepts that would fully meet the Flood Risk Management (FRM) objectives, allow for substantial in-bank flows to remain within the main channel of the Rio Guayanilla, and allow the bypass channel to be a natural green way. Although NER (national ecosystem restoration) is not the purpose or intent of the study/project, the opportunity under this alternative concept is seemingly substantial. The resulting project would theoretically achieve both NED and NER benefits as the Rio Guayanilla floodwaters would be removed from the town, the river would retain biological integrity, and the newly constructed diversion channel would convert agricultural and successional old fields to an intermittent cobble bottom with a wet/mesic/dry grass and shrub floodplain (typically termed a two or three stage ditch). Also, a quasi-naturally functioning greenway bypass channel could lower or alleviate O&M requirements and associated costs and resources.

11 December 2018 (USFWS Recommendation 1) – “We recommend using a natural channel designed for bank full discharge as the main conveyance of water. Designing a bankfull stage channel will help keep minimize sedimentation and move bedload; it will also provide a natural channel for native stream fauna. In addition, minimum flow should be maintained in the original channel that runs through the town of Guayanilla. Since this channel would be used primarily for internal drainage, the creation of storm water filter wetlands should be considered to improve water quality prior to discharging back into the main flood control channel.”

04 February 2019 (USACE Response) – The USACE concurs with this recommendation and has added nature based features, bank full targets for the Rio Guayanilla, low flow targets for the Rio Guayanilla, and natural and open channel design for the Diversion Channel to the alternatives analysis, which is presented in the following section. It is noted that the USFWS description of necessary flows to maintain habitat and biodiversity is crossed. In order to retain current biological and habitat diversity within the Rio Guayanilla, it is recommended to maintain bank full or near bank full discharge to continue to move substrates, sustain channel morphology dynamics and to retain a portion of the discharge flows into the ocean to retain signal cues for fish migration. It is not recommended to divert any low flows from the Rio Guayanilla to the diversion channel to keep this manmade feature hydrated or wet, as it would highly impact the Rio Guayanilla ecosystem and would be a confounding variable to establishing a native greenway indicative of a no maintenance hydrology.

Karst Mining Areas

28 November 2018 (USACE/USFWS/NOAA Discussion) – Charrette discussions between USFWS and USACE on stone sources indicated that there is no other viable and affordable source of stone except that

of the karst mountains directly to the west of the proposed diversion channel and levee alternative alignments.

11 December 2018 (USFWS Recommendation 2) – “The karst hills and forests immediately west of the project site is within the range of the following federally listed species Puerto Rican boa (*Epicrates inornatus*), Puerto Rican nightjar (*Caprimulgus noctitherus*) and the listed plants *Eugenia woodburyana* and *Trichilia tricantha*. These karst areas should be avoided when determining borrow sites for the construction of the levees. If impacts to the karst areas cannot be avoided, then this would require Section 7 consultation under the ESA. For major consultation activities a Biological Assessment would need to be prepared. For additional information please visit our website <https://www.fws.gov/southeast/caribbean/project-evaluations/>.”

04 February 2019 (USACE Response) – The USACE has determined that the only cost efficient source of stone for the project would be to mine the karst forest mountains to the west for limestone. It is acknowledged that there would be associated impacts of mining within the locations provided on Map 1 to geology, soils, hydrology, T&E species, and forest communities. The alternative analysis identifies those alternatives that would avoid and minimize aerial impact, and have conservation measures built into the recommended plan. These would be vetted through an Environmental Assessment document and process.

3.2 Current Status of Alternative Formulation

Alternatives Removed from Consideration

Reservoirs – Constructing large reservoirs in montane river units to retain/detain rainwaters was eliminated from further consideration for the Guayanilla FRM study. Reasons for elimination (avoidance) include life safety hazard creation, large scale and irrecoverable environmental damage, and magnitudes of cost.

Canalization – Channelizing the natural channel of the Guayanilla River in montane and coastal plain units to contain and hasten rainwaters to the sea was eliminated from further consideration for the Guayanilla FRM study. Reasons for elimination (avoidance) include creating a life safety hazard through downtown and large scale and irrecoverable environmental damage to diadromous fishes and Essential Fish Habitat.

Alternatives Retained for Economic, Social & Environmental Evaluations

Table 1 – Measures & Alternatives for Rio Guayanilla FRM Study

Measure Type	Measure Description	Alt 0	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
No Action	Existing & FWOP Conditions	X						
Nonstructural Measures	Physical non-structural (e.g. buyouts, floodproofing, elevations)		X					
	Non-physical/non-structural (e.g. flood warning, flood preparedness planning)		X					
Structural Measures	Levees/Floodwalls Single Line Protection				X			X
	Levees/Floodwalls Double Line Protection			X		X	X	
	Bridge & Conveyance Modifications			X	X	X	X	X
	Engineered Features & Bank Protection			X	X	X	X	X
	Diversion Channel (North)					X		
	Diversion Channel (South)			X	X		X	X
	Rehabilitate Phase I (DNER Constructed)			X	X	X	X	X
	Vegetation Control Levees/Floodway			X	X	X	X	X
	Utility Relocation			X	X	X	X	X
	Nature-based Measures	Staged Greenway Terraces						X
Minor Nature Based Features (Channel Stabilization)			X	X	X	X	X	X
Vegetation Control Invasive Species							X	X

Alternative 0 No Action – No Action (avoidance) takes on the Future Without Project Condition (FWOP). There would be no federal action taken at the town of Guayanilla, which would remain subject to frequent flooding and associated damages and social effects. The current natural and manmade resources of geology, soils, hydrology, river, karst forest, secondary growth shrub/grasslands, and agricultural fields would remain in their current state.

Non-Structural

Alternative 1 Nonstructural Measures – Physical non-structural measures such as buyouts, floodproofing, raising structures could be implemented to reduce the risk the flood damages to those structures qualifying under the assessment; not all structures would qualify and could remain subject to frequent flood damages. Non-physical/non-structural measures such as flood warning and flood preparedness planning would be implemented in conjunction with physical non-structural measures. Minor nature based features would also be implemented to address erosional issues at bridges and critical downtown reaches. These features include but are not limited to in-stream rock structures (J-hooks, cross-veins, boulder clusters, glide/riffles) and native plant coverage.

Alt 1 Probable Effects: Implementing non-structural measures would have no effects on natural and manmade resources of geology, soils, hydrology, karst forest, secondary growth shrub/grasslands (Old Field), and agricultural fields. There would be no necessity to mine karst areas for limestone, so there would be no effects to T&E species. The nature based features placed in the natural stream channel of the Rio Guayanilla would have beneficial effects to bank habitats by allowing them to vegetate; whereas the structures themselves would have negligible to beneficial effects to riverine habitat via hydraulic diversification of low flows and substrate sorting.

Structural

The following structural Alternatives 2 -7 include all of the following measures in some fashion:

- a. *Rehabilitating Phase I* (constructed by DNER) would include repairing damage to levees, clearing tree/shrub vegetation from levees, and potentially changing the size of the channel in order to achieve compatibility with other alternative components. Junction points betwixt the constructed Phase I and alternative components would also need to be reconstructed.
- b. *Bridge & Conveyance Modifications* would include replacing, repairing, modifying bridge structures and the cross sectional floodway to allow necessary conveyance volumes and rates per alternative need.
- c. *Vegetation Removal* would include a) removing vegetation per USACE guidance for levee construction; this generally would include keeping levees and engineered channels/structures free of tree/shrub species of plant; herbaceous grasses, flowers and ground cover are generally excluded from removal requirements; and b) concepts of native vs non-native for incidental habitat and erosion control.
- d. *Utility Relocation* would include removing, replacing, relocating, or altering a utility such as electricity, water, natural gas, internet/phone lines, etc. to maintain connectivity and functionality of the municipality and regional system. This would also include the same for agricultural irrigation systems and small vehicular bridges for those lands or roadways bisected by the alternative components.
- e. *Minor Nature Based Features (Channel Stabilization)* would include implementing in-stream structures such as J-hooks, cross-veins, boulder clusters, glide/riffles, etc. that mimic natural riverine geomorphology/materials and utilize riverine flows to accomplish their function. Large woody debris could also be utilized as part of stone revetments to add armored habitat to dynamic reaches while vegetation establishes. Select native grasses and shrubs would also be utilized to stabilize disturbed or repaired areas.
- f. *Engineered Features & Bank Protection* would include engineered features where tolerances of nature based erosion repair and/or protection are not conservative enough to support alternative features or manmade resources. If necessary, these could include riprap (karst limestone), concrete walls, steel sheet-pile, geotextile fabrics, gabions, etc.

Alternative 2 Diversion Channel South Double Line Protection – This alternative would construct a diversion channel at the end of the montane unit and beginning of the coastal plain unit of the Rio Guayanilla, approximately at Route 2. A robust diversion structure would be set in place to divert flows at minus 1 foot bank full width (Option A) or minus 2 foot bank full width (Option B) for the natural Rio Guayanilla channel. The alignment for this alternative directs flood water away from the town and to the west along the karst mountains though agriculture fields, where it bends east though banana fields to join up with constructed Phase I project near PR 3336 (Map 2). A new structure would connect the new project with the in place Phase I. The length of the channel is approximately ___ feet long. The diversion channel itself would be an engineered trapezoidal construction ___ feet wide, with levees on **both sides** of the channel. Levees would be constructed of suitable excavated channel material and stone. All stone would be quarried locally from the karst mountains to the west (Map 1). The bottom of the channel would have robust concrete, gabion, sheet-pile, and/or riprap grade control structures embedded at select points in the channel where hydraulic models indicate incision or meandering potential exists. There may exist the need to also blanket the diversion channel in bedding stone should subsurface materials be identifiable

as mobile substrata during flood events. The levees and channel would be kept free of woody vegetation via clearing or mowing, only allowing grasses and forbs to grow; no invasive plant species management would be done. As indicated, this alternative includes measures a – f, but will be required to focus efforts and costs towards c. Vegetation Removal and f. Engineered Features & Bank Protection.

Alt 2 Probable Effects: Implementing this structural measure alternative would have effects on natural and manmade resources of geology, soils, hydrology, karst forest, secondary growth shrub/grasslands, and agricultural fields. Under this alternative, there would be the greatest necessity to mine karst areas for limestone, so there would be direct effects to T&E species (*Antrostomus*, *Eugenia* and *Trichilla*) if they are present within the delineated mining areas on Map 1.

Karst Ecotype Habitat

- Geology – Adverse; would be changed from its natural state by clearing vegetation and removing rock
- Soils – Adverse; soils accumulated in the gullies that support *Eugenia* and/or *Trichilla* would be removed in the mining process
- Hydrology – Adverse; hydrology would be altered in the gullies, changing the regime and plant community spatial distribution
- Habitat Structure – Adverse; all vegetation and rock material would be removed
- T&E Species – Adverse; although avoidance, minimization and conservation measures would be implemented, which includes moving specimens from the affected mining area, this would qualify at minimum as harassment to species, and there would be potential to physically take specimens as well should they be missed during pre-construction specimen relocation.

Mitigation for karst habitat loss and other habitat loss associated with construction activities would be included in this alternative. There would be no habitat benefits gained for the diversion channel under this alternative since the channel will be engineered and free of vegetation.

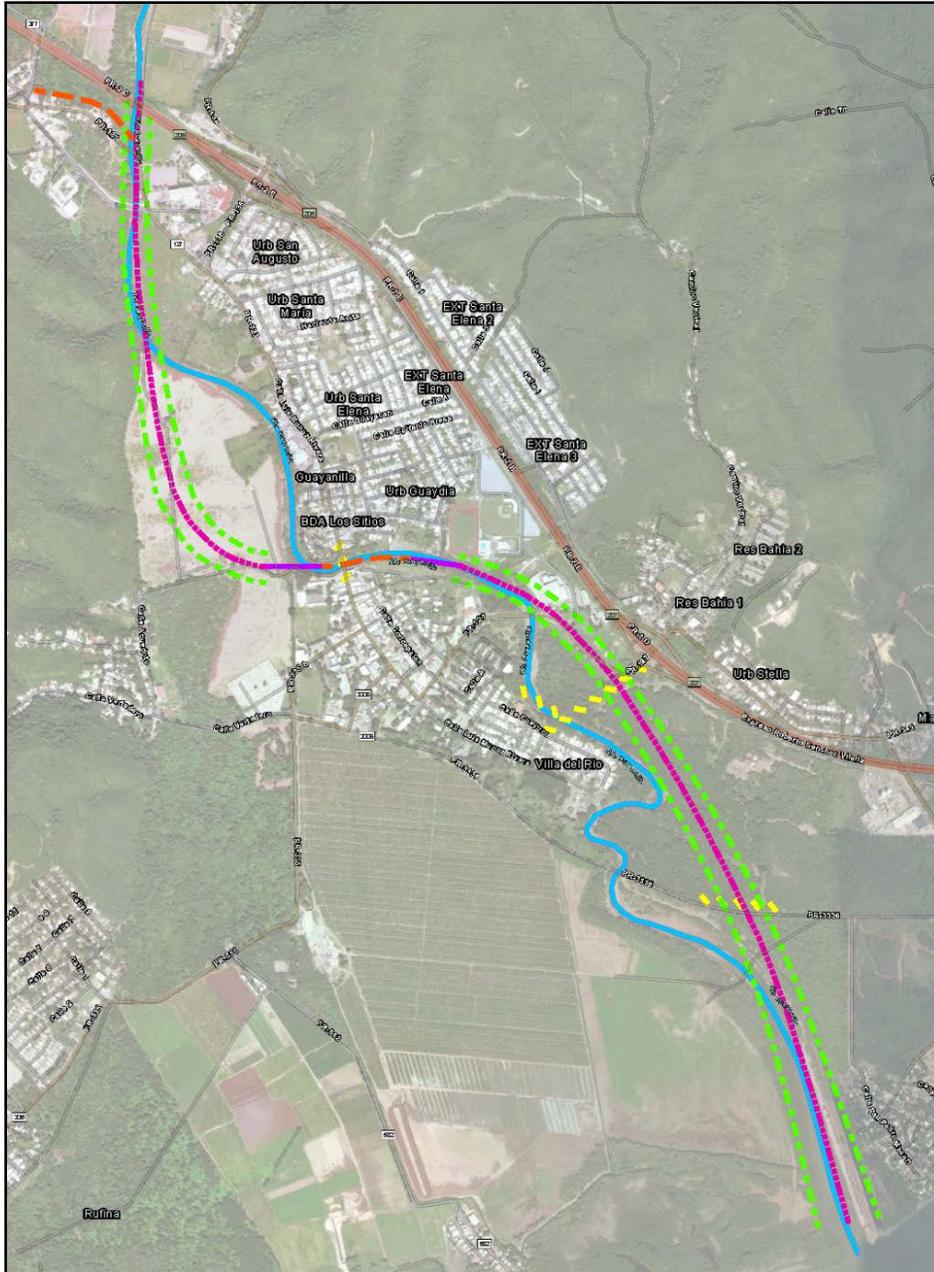
Riverine Ecotype Habitat

- Hydrology – Minor; the natural flood regime would be changed from massive out of bank floods, to a bank full width flood. Although this seems like a huge change, as it would be for riparian floodplain plant communities, the riparian zone in the study area is already cleared or highly degraded by development and agriculture. Hydrology in the channel during non-flood periods would remain in the existing condition.
- Fluviogeomorphic Processes (sustaining habitat) / Hydraulics – Minor; the natural flood regime would be changed from massive out of bank floods, to a bank full width flood, which expedite channel meandering/migration and out of channel habitat creation (backwaters, oxbows, floodplain depressional wetlands, etc.). Although this seems like a huge change, it is not based on the existing condition of the floodplain and constraints placed upon the river channel to meander and migrate by development and agriculture. Hydraulics in the channel during flood and non-flood periods would remain in the existing condition.
- Essential Fish Habitat (EFH) – No effects; riverine and marine habitats will remain connected since no modification to the natural river channel would be implemented. Retaining the 2-year bank full flood within the natural channel will maintain substrate and habitat diversity for diadromous fishes such as Mountain Mullet. Flow quantities into the Estuarine/Marine system would not change, as the amount of water is not being changed, just its path to the ocean.

Alternative 4 Diversion Channel North Double Line Protection – This alternative would construct a combination of new diversion channels and canalization of certain reaches of the Rio Guayanilla. The project would again start at the end of the montane unit and beginning of the coastal plain unit of the Rio Guayanilla, approximately at Route 2. A robust diversion structure would be set in place, however, there is no longer the opportunity to control bank full flows since all of the flow will be directed away from cut off reaches of the Rio Guayanilla. The alignment for this alternative does not direct flood water away from the town, but through it via a combination of new canal and canalization of the Rio Guayanilla. A new canal would be excavated to the north of town, through forest habitat in order to join up with constructed Phase I project near PR 3336 (Map 4). A new structure would connect the new project with the in place Phase I. The length of the channel is approximately ___ feet long. The diversion channel and canalized reaches would be an engineered trapezoidal construction ___ feet wide, with levees on **both sides** of the channel. Levees would be constructed of suitable excavated channel material and stone, and most like concrete in certain section, especially those through town. All stone would be quarried locally from the karst mountains to the west (Map 1). The bottom of the channel would have robust concrete, gabion, sheet-pile, and/or riprap grade control structures embedded at select points in the channel where hydraulic models indicate incision or meandering potential exists. There may exist the need to also blanket the new and natural channel in bedding stone should subsurface materials be identifiable as mobile substrata during flood events. The levees and channel would be kept free of woody vegetation via clearing or mowing, only allowing grasses and forbs to grow; no invasive plant species management would be done. A large woody debris removal plan would need to be implemented to prevent flood back up issues through town. As indicated, this alternative includes measures a – f, but will be required to focus efforts and costs towards c. Vegetation Removal and f. Engineered Bank Protect, and potentially lose all opportunity for measure e. *Minor Nature Based Features*.

Alt 4 Probable Effects: Implementing this structural measure alternative would have effects on natural and manmade resources of geology, soils, hydrology, riverine, karst forest, secondary growth shrub/grasslands, and agricultural fields. Under this alternative, there would be the greatest adverse effects to the natural and manmade environment. There remains a high necessity to mine karst areas for limestone, so there would be direct effects to T&E species (*Antrostomus*, *Eugenia* and *Trichilla*) if they are present within the delineated mining areas on Map 1. There would also be major adverse effects to the Rio Guayanilla natural river channel and Essential Fish Habitat.

Mitigation under this alternative for the fragmentation and large loss of riverine habitat via canalization and severe hydrologic alteration, clearing and excavating forest and other habitats, would drive the cost past justifiable limits for project authorization. This alternative is being eliminated from consideration due to various life safety factors, extreme environmental impacts, excessive real estate acquisition and complications with moving a diversion channel into and out of the Rio Guayanilla natural channel at multiple points.



Map 4 –Alternative 4 Diversion Channel South Single Line Protection

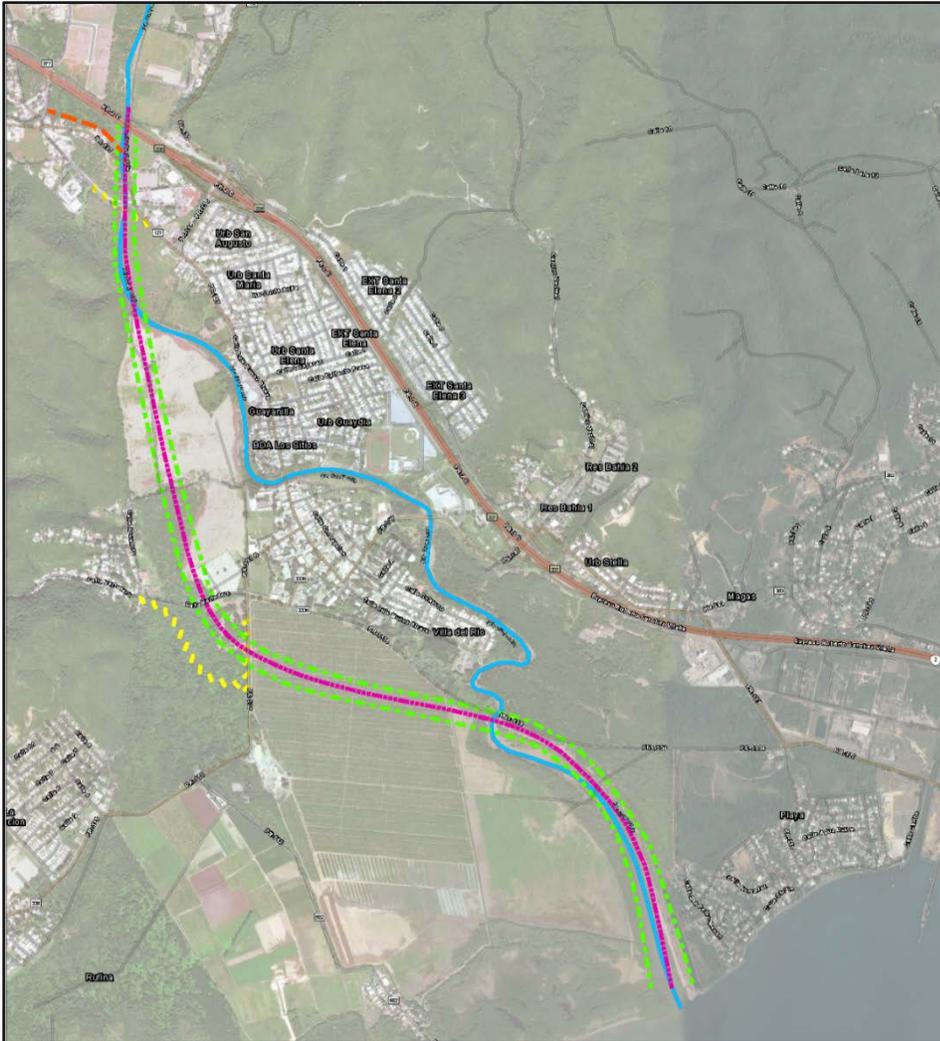
Alternative 5 Diversion Channel South Double Line Protection w/ Staged Greenway Terraces: This alternative would construct a diversion channel at the end of the montane unit and beginning of the coastal plain unit of the Rio Guayanilla, approximately at Route 2. A robust diversion structure would be set in place to divert flows at minus 1 foot bank full width (Option A) or minus 2 foot bank full width (Option B) for the natural Rio Guayanilla channel. The alignment for this alternative directs flood water away from the town and to the west along the karst mountains though agriculture fields, where it bends east though banana fields to join up with constructed Phase I project near PR 3336 (Map 5). A new structure would connect the new project with the in place Phase I. The length of the channel is approximately ___ feet long. The diversion channel itself would be a non-engineered, bowl and terrace shaped construction to allow channel morphology to be formed by flood pulses. This type of channel may be 2 to 3 times wider than Alternative 2 to ensure hydraulic forces do not degrade the integrity of the

levees and terraces. This alternative's channel would be approximately ___ feet wide, with levees on **both sides**. Levees would be constructed of suitable excavated channel material and stone. All stone would be quarried locally from the karst mountains to the west (Map 1). Certain terrace reaches may need stone as well to prevent erosion at critical hydraulic points. The bottom of the channel would have robust boulder and/or boulder and tree structures embedded at select points in the channel where hydraulic models indicate incision or meandering potential exists. Expectations for these features are that they will move and change yearly, and will not be static looking features such as the gabions or sheet-pile would be; never the less performing the necessary function of grade and meander control. There would be no need to blanket the channel bottom with stone since deposition would be greater than erosion in this wider channel; terraces would receive different rates of deposition based on water velocities; once the system comes to dynamic equilibrium, erosion and deposition would check and balance the system making it quite stable, yet dynamic enough for ecosystem communities to develop. The low flow channel and levees would be kept free of woody vegetation via clearing or mowing, only allowing grasses and forbs to grow; second or third terraces could support sparse tree and shrub communities as their effects on flows and levee integrity would be negligible in these locations. Invasive plant species management would be done during construction, which includes keeping a short list of aggressive non-native species out of the project foot print while other native plant communities establish. As indicated, this alternative includes measures a – f, focused efforts and costs towards would be directed towards c. *Vegetation Removal* and e. *Minor Nature Based Features*.

Alt 5 Probable Effects: Implementing this structural measure alternative would have effects on natural and manmade resources of geology, soils, hydrology, karst forest, secondary growth shrub/grasslands, and agricultural fields. Under this alternative, there would be a minimized necessity to mine karst areas for limestone. There would be direct effects to T&E species (*Antrostomus*, *Eugenia* and *Trichilla*) if they are present within the delineated mining areas on Map 1, but to a far lesser degree than Alternatives 2 and 3.

All probable effects identified under Alternative 2 would be the same for this alternative, with the exception that karst mining areas would be minimized in spatial size.

Mitigation for karst habitat loss and other habitat loss associated with construction activities would be included in this alternative. There would also be habitat benefits gained for the diversion channel under this alternative since the channel would be non-engineered and wide enough to accommodate native grassland communities in the main channel, and more diverse plant communities on the upper terrace(s). The conversion of banana fields to a large greenway would result in an increase in habitat.



Map 5 – Alternative 5 Diversion Channel *South Double Line Protection w/ Staged Greenway Terraces*

Alternative 6 Diversion Channel South Single Line Protection w/ Staged Greenway Terraces – This alternative would construct a diversion channel at the end of the montane unit and beginning of the coastal plain unit of the Rio Guayanilla, approximately at Route 2. A robust diversion structure would be set in place to divert flows at minus 1 foot bank full width (Option A) or minus 2 foot bank full width (Option B) for the natural Rio Guayanilla channel. The alignment for this alternative directs flood water away from the town and to the west along the karst mountains through agriculture fields, where it bends east through banana fields to join up with constructed Phase I project near PR 3336 (Map 6). A new structure would connect the new project with the in place Phase I. The length of the channel is approximately ___ feet long. The diversion channel itself would be a non-engineered floodway to allow channel morphology and terraces to be formed by flood pulses. This type of channel may be very wide as there would be only one levee on one side, *the town side or east* of the channel. The levee would be constructed of suitable excavated channel material and stone. All stone would be quarried locally from the karst mountains to the west (Map 1). Certain reaches of the floodway may need preliminary grading to keep flood pulses within the designated floodway. Although limited, robust boulder and/or boulder and tree structures embedded at select points in the floodway’s thalweg where hydraulic models indicate incision or meandering potential exists may be needed. Expectations for these features are that they will move and change yearly, and will not be static looking features such as the gabions or sheet-pile would be; never the less performing the necessary function of grade and meander control. There would be no

need to blanket the channel bottom with stone since deposition would be greater in the beginning than erosion in this wider channel; once the system comes to dynamic equilibrium, erosion and deposition would check and balance the system making it quite stable, yet dynamic enough for ecosystem communities to develop. The thalweg and eastern levee would be kept free of woody vegetation via clearing or mowing, only allowing grasses and forbs to grow; as one moves farther from the thalweg, tree and shrub communities could develop, and potentially compatible farming on the extremities. Invasive plant species management would be done within designated habitat zones during construction, which includes keeping a short list of aggressive non-native species out of the project foot print while other native plant communities establish. As indicated, this alternative includes measures a – f, focused efforts and costs towards would be directed towards c. *Vegetation Removal* and e. *Minor Nature Based Features*.

Alt 6 Probable Effects: Implementing this structural measure alternative would have effects on natural and manmade resources of geology, soils, hydrology, karst forest, secondary growth shrub/grasslands, and agricultural fields. Under this alternative, there would be a minimized necessity to mine karst areas for limestone. There would be direct effects to T&E species (*Antrostomus*, *Eugenia* and *Trichilla*) if they are present within the delineated mining areas on Map 1, but to a far lesser degree than Alternatives 2 and 3.

All probable effects identified under Alternative 2 would be the same for this alternative, with the exception that karst mining areas would be minimized in spatial size.

Mitigation for karst habitat loss and other habitat loss associated with construction activities would be included in this alternative. There would also be habitat benefits gained for the diversion channel under this alternative since the channel would be non-engineered and wide enough to accommodate native grassland communities in the main channel, and more diverse plant communities on the upper terrace(s). The conversion of banana fields to a large greenway would result in an increase in habitat greater than Alternative 5.

4.3 Environmental Assessments

An Environmental Assessment would be completed and integrated into the Feasibility Report for the No Action and Action alternatives. Natural, cultural and human resources would be evaluated for impacts stemming from the No Action or Action alternatives, including T&E species and critical habitats. The U.S. Army Corps of Engineers anticipates completing a mitigated Finding of No Significant Impact (FONSI).

4.4 Wetland Delineations

Effects to wetlands and habitats within the study area would be assessed per alternative scenario. The effects will be presented in an Environmental Assessment and 404(b)(1) analyses. Specific wetlands types within the study are that have the potential to be affected include Riverine (Rio Guayanilla), Estuarine (near shore river mouth Puerto de Guayanilla) and Marine (coral reef within Puerto de Guayanilla).

Plant community, habitat and wetland delineations would be performed for the Environmental Assessment by using existing data and mapping for feasibility level decisions. If complex wetland systems are discovered during this assessment, USACE protocol wetland delineations would be accomplished during design for the 401 Water Certification. Since the riverine and estuarine wetlands have distinct aerial/spatial boundaries, it is currently anticipated that feasibility level delineations and mapping would be sufficient to acquire compliance and permits.

4.5 Essential Fish Habitat (EFH)

Riverine, estuarine and marine fish habitats that are within the study area or may be affected by project alternatives would be described, delineated and assessed for impacts. This would be coordinated with NOAA under the National Marine Fishes Act via the Environmental Assessment.

5.0 Discrepancies in Endangered Species Nomenclature

Based on current published literature, generic nomenclature for the Puerto Rican Nightjar (*Caprimulgus* to *Antrostomus*) and Puerto Rican Boa (*Epicrates* to *Chilaborthrus*) has been changed. USACE is of the understanding that nomenclature for the listed species is critical. Please provide the nomenclature the USFWS uses under laws and policies.

6.0 USACE T&E Species Considerations

The USFWS advised that there is most likely four (4) federally listed species to consider during plan development. These are the Puerto Rican Nightjar (bird) (FE), the Puerto Rican Boa (snake) (FE), *Eugenia woodburyana* (evergreen tree) (FE) and *Trichilia tricantha* (evergreen tree) (FE).

The first species likely to occur within the study area is *Antrostomus noctitherus*; the common name in English is the Puerto Rican Nightjar, and in Spanish, the Guabairo. This species is a small member of the family Caprimuglidae (Nightjars & Nighthawks) that specifically occupy sparse understory habitats of the coastal and montane forests within the study area. This species was downgraded from Critically Endangered to Endangered (FE) based on discovery of a wider range breadth within the southwestern corner of the island. Based on the species' natural history, surveys will need to be conducted for ground nests containing eggs from February thru July. As part of protection of this species, plans should include the concept of no limestone mining from identified Guabairo nesting areas along the foot of the western confining mountain range of the Guayanilla coastal floodplain between February and July, or as coordinated with USFWS. It is recommended to initiate scopes of work and coordination with USFWS to

start surveys in February/March 2019, or risk delaying study decisions and changing feasibility level designs after a plan has been recommended. Potential conservation measures and mitigation for reducing direct physical impacts and habitat disturbance could include moving birds from the mining zones during construction, preventing invasive species regrowth, and planting conspecific tree and shrub species after mining activities.

The second species likely to occur within the study area is *Chilabothrus inornatus* (recently (2013) changed from *Epicrates inornatus*, which is now a binomial synonym); the common name in English is the Puerto Rican Boa, and in Spanish, the Boa Puertorriqueña. This largest nonvenomous species of Puerto Rican snake is a member of the family Boidae (Boas & Pythons), which primarily occupy tree and cave habitats of the subtropical forest units within the study area; however, this species is well adapted and can be found in almost any habitat, including those induced by man. This species is Endangered (FE) primarily due to depredation by introduced mongoose species and man, but not necessarily habitat destruction given its adaptability. Based on the species' natural history and causes of its depletion, surveys are not recommended to be conducted. As part of protection of this species, plans during construction should include measures to eliminate the risk of physically entraining or crushing mothers in parturition (in labor) and new born through adult life stages. Various conservation measures can be implemented to move snakes from the area before earthwork or mining occurs. Other potential mitigation for habitat disturbance could include planting conspecific tree and shrub species after construction. Also, it is very possible that if significant cave structures are found within the potential limestone mining zone, these could be avoided if deemed critical by USFWS.

The third species likely to occur within the study area is *Eugenia woodburyana*, which has no common name. This plant is a small evergreen tree belonging to the family Myrtaceae (Myrtles: Eucalyptus, Tea Tree), a large family that includes from 100 to 140 genera and 3,000 or more species of trees and shrubs, mostly of tropical and subtropical regions. The species is specifically noted to occur within the Guainica Commonwealth Forest located in southwestern Puerto Rico; including the municipality of Guayanilla. *Eugenia woodburyana* is found in the semi-evergreen forests of the bottoms of mesic canyons. The parent material for canyon soils are Tertiary limestone rock. Soils are derived from limestone and are shallow, well-drained, and alkaline in nature. Also, water runs through these canyons during heavy rainfall, but they are dry to mesic the remainder of the year. Silty alluvial soils are left behind from the flowing and eroding water where pockets form among large limestone rock outcrops. These pockets retain a greater moisture content and support greater tree growth. Historic reasons for listing included deforestation and selective cutting for urban and industrial development, agriculture, charcoal production, and fence posts. Current reasons include residential and industrial development, as well as forest management practices. Various conservation measures can be implemented to exclude discovered plots of this species from mining activities, particularly within ravine/gully/canyon valleys. Other potential mitigation for this species could include propagation and reintroduction. Guidance on this species is requested from the USFWS.

The fourth species likely to occur within the study area is, *Trichilia triacantha*; the common name is Bariaco. This plant is a small evergreen tree belonging to the family Meliaceae (Mahogany). The species is specifically noted to occur within the Guainica Commonwealth Forest located in southwestern Puerto Rico; including the municipality of Guayanilla. Bariaco occurs in the same habitat as described for *Eugenia woodburyana*. Historically, the most important factors limiting the distribution have been deforestation and selective cutting for urban and industrial development, agriculture, charcoal production, and the cutting of wood for fence posts. Today residential and industrial development, as well as forest management practices, threaten this species. Various conservation measures can be implemented to exclude discovered plots of this species from mining activities, particularly within ravine/gully/canyon valleys. This species seems to prefer disturbance regimes, especially those established by streams. Its appearance along road ways also lends to this. It seems characterizing and mimicking the specific

disturbance regime post karst mining for this species could be a conservation measure for replanting and propagation.

A fifth species, and indicator species for Rio Guayanilla migratory fishes, likely to occur within the study area, but has no federal designation, but is an important fishery species, is *Dajaus monticola*; the common name in English is the Mountain Mullet, and in Spanish Dajao. This medium sized fish is a member of the family Mugilidae (Mulletts), which primarily occupy the coastal plain stream units of Rio Guayanilla, and are currently believed to spawn in the ocean (Catadromy). This species is not federally listed, but is a species of concern for subsistence and recreational fishing. Based on the species' natural history and its secure status, surveys are not recommended to be conducted. The Essential Fish Habitat assessment and coordination with NOAA would utilize existing data for fishes, particularly those publications by Thomas J. Kwak et al. As part of protection of this species and other aquatic life, measures to ensure sufficient low flows and moderate flood pulses remain in the Rio Guayanilla as part of alternative implementation could be included.



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Caribbean Ecological Services
Field Office
P.O. Box 491
Boqueron, PR 00622

AUG 14 2019

In Reply Please Refer To:
FWS/R4/CESFO/72-FC-011

Ms. Susanne J. Davis
Chief, Planning Branch
US Army Corps of Engineers, Chicago District
231 South La Salle St.
Suite 1500
Chicago, IL 60604

Re: Rio Guayanilla Flood Control Feasibility Study,
Guayanilla, Puerto Rico

Dear Ms. Davis:

This is to follow up the webinar with the U.S. Fish and Wildlife Service (Service) and U.S. Army Corps of Engineers (Corps) staff held on July 30, 2019, regarding the changes to the Rio Guayanilla Flood Control quarry site at the town of Guayanilla. Our comments are issued as technical assistance and planning in accordance with the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act (ESA) (16 U.S.C. 1531 et seq. as amended). This however does not constitute a Section 2b Report under the FWCA.

Originally, the Corps designated about 100 acres of karst hills and forests immediately west of the project site as the quarry site for the project. These hills are within the range of several federally listed species Puerto Rican boa (*Epicrates inornatus*), Puerto Rican nightjar (*Caprimulgus noctitherus*) and the listed plants *Eugenia woodburyana*, *Trichilia tricantha*, *Varronia rupicola* and its Critical Habitat, *Ottoschulzia rhodoxylon*, *Catesbaea melanocarpa*, and potentially other rare endemic plants such as *Randia portoricensis*.

Our initial Planning Aid letter recommended that these karst areas should be avoided when determining borrow sites for the construction of the levees, incursion into the karst areas would require Section 7 consultation under the ESA as well as additional environmental studies, surveys and habitat mitigation.

The Corps reduced the size of the proposed 100 acre quarry to 10 acres but still within the same original karst area. As an alternative, the Service recommended the use of an old quarry area to the south that was previously cleared and used for residential development that is within the Corps project site. The Corps is proposing to use approximately 10-15 acres of this site.

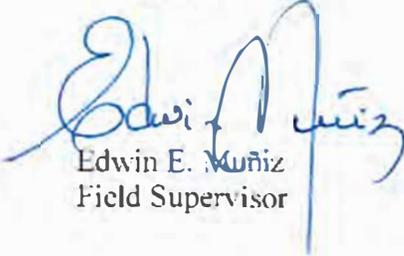
The Service carried out a field visit and rapid assessment of the area on August 5, 2019. The site is composed of four hills separated by three drainages. Although the area was previously cleared, some forested areas were left (Figures 1). These remnant forested areas remained relatively undisturbed to the present day (Figure 2). These areas could contain listed plant species typical of sub-tropical dry forest (Figure 3). However, these patches of undisturbed vegetation are relatively small when compared to the original quarry proposals. Future Service surveys will concentrate on forested these areas. In addition, there still exists the possibility of the Puerto Rico nightjar within this site since the area of karst hills in Guayanilla is known to harbor a population of this federally listed ground nesting bird; in it has been known to nest in previously disturbed areas.

At least one of the drainages ends in a headwall and culvert which diverts water to a storm drain within the residential area. Another interesting find were two round pits about 6 feet across site by side to each other, whether man made or geologic we were not able to determine.

Site access is through the existing residential area, the Corps may have to consider an alternate road access to avoid impacts to the residential area by quarry operations.

Thank you for the opportunity to participate this early in the planning process, if you have any questions please contact Felix Lopez of our staff at 787 851 7297 x 210.

Sincerely,



Edwin E. Muñoz
Field Supervisor

fhf
cc:
DNER, San Juan

Figures



Figure 1. Quarry site during active extraction. Some areas were scraped of vegetation, but not mined. Note forested areas outlined in red.



Figure 2. Forested areas in red. Scraped areas revegetated with scrub shrub vegetation, only a small area of the original quarry remains without vegetation. Near vertical cuts are immediately behind the last row of houses. Any quarry activity will need to leave a sufficient buffer to avoid impacts to those houses.

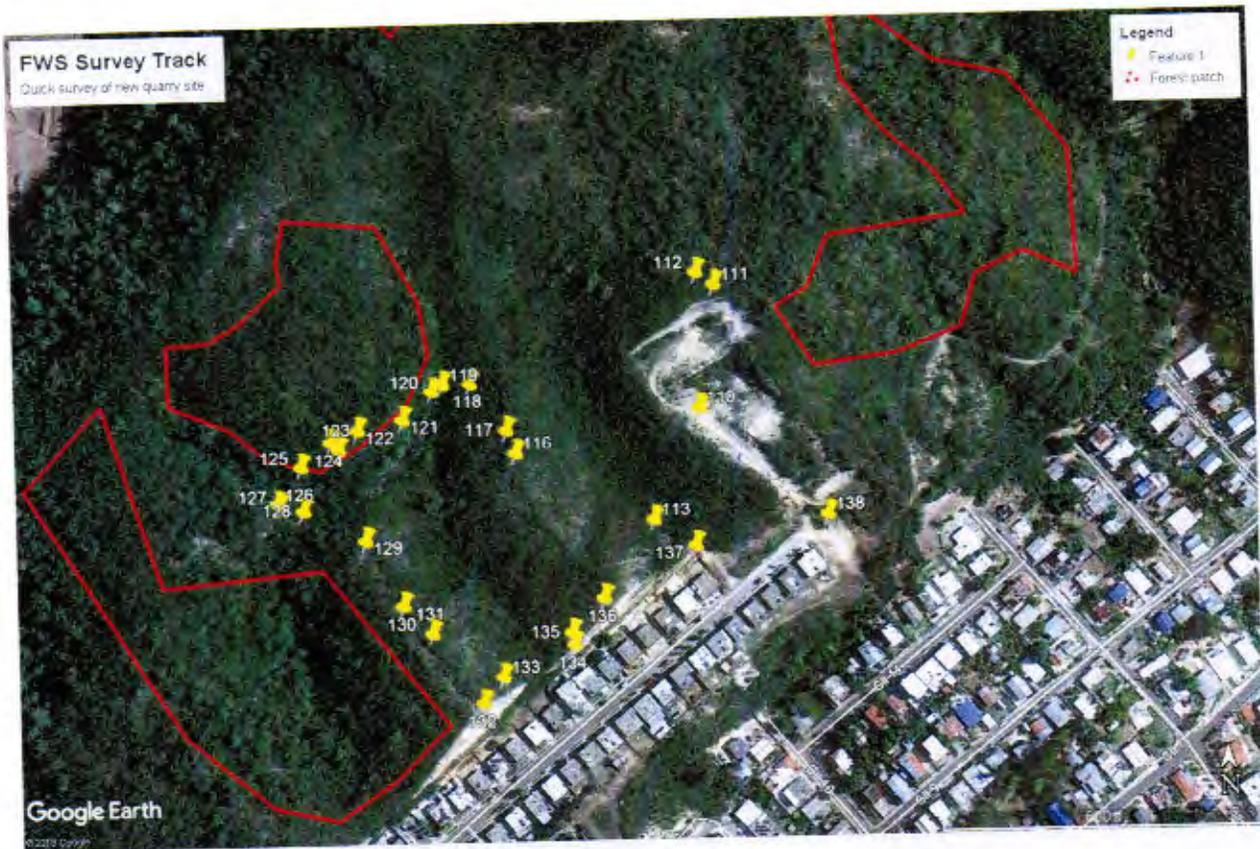


Figure 3. FWS survey track, points 120 to 125 noted a change in vegetation, larger trees, candelabra cacti, increased native species, indicating a more mature forest environment.

Site Photos



Entrance to the existing quarry site. Note low scrub shrub vegetation.



Top of the existing quarry site, the area is mostly bare rock with some scattered vegetation.



Panoramic view of the top of the existing quarry site. Residential area is seen below.



Top of third hill looking east to the existing quarry site. Note low vegetation very few trees.



Vegetation near the edge of one of the forest patches, note the cactus, not seen anywhere else during the survey, also extensive leaf litter and taller trees, fewer shrubs.



Edge of hill 2 looking down at residential area.

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

For

Rio Guayanilla Flood Control Risk Management Study

Guayanilla, Puerto Rico



**U.S. Fish and Wildlife Service
Caribbean Ecological Services Field Office**

Executive Summary

The U.S. Fish and Wildlife Service (Service) has evaluated potential natural resource impacts resulting from the proposed Rio Guayanilla Flood Risk Management (FRM) Study at Guayanilla, Puerto Rico. The evaluation includes habitat within the study area, new channel, potential borrow area, floodwall or levee sites, review of the affected areas and mitigation for expected impacts to jurisdictional wetlands and additional natural resource recommendations.

During 2018 and 2019, The U.S. Army Corps of Engineers (Corps) developed six (6) proposed alternatives to address the Rio Guayanilla flooding issues. Based on the planning concepts of life, safety, environmental effects, real estate, utilities and project sustainability, three out of the 6 action alternatives were chosen for further consideration: Alternative #1 Non-Structural Measures, Alternative #3 Diversion Channel South w/ Single Line Protection, and Alternative #6 Staged Greenway Terraces w/ Single Line Protection.

Based on further analysis, Alternative #3 Diversion Channel South w/ Single Line Protection is the Tentatively Selected Plan (TSP), with additions from Alternative #1 Non-Structural Measures such as flood warning and natural channel conveyance. This combined alternative was chosen over Alternative # 6 as being identified the most cost effective alternative. The TSP includes an engineered diversion channel, a robust diversion structure, a levee along one side of the diversion channel, bridge modifications, berms, a rock quarry, haul roads, staging, and disposal areas. As a result of nature based features and conservation measures included in the alternative to minimize and mitigate project impacts, the TSP has been assessed by the Corps as one with no significant impact on the human environment. Compatible nonstructural measures, from Alternative #1, were also included in the TSP for debris clearing within the natural channel of the Rio Guayanilla and the implementation of a flood warning system to reduce the life safety risk associated with flooding in the project area.

The project is located within the range of the following threatened and endangered species: the Puerto Rican boa (*Epicrates inornatus* aka *Chilabothrus inornatus*), the Puerto Rican nightjar (*Caprimulgus noctitherus* aka *Antrastomus noctitherus*) and the listed plants *Varronia rupicola*, *Eugenia woodburyana*, *Trichilia triacantha*, *Ottoschulzia rhodoxylon*, and *Catesbaea melanocarpa*. Other rare endemic plants such as *Randia portoricensis* which are locally protected may also be in the area. During surveys conducted by Service personnel, federally listed plants were not detected, but presence of the Puerto Rican nightjar and suitable habitat for the Puerto Rican boa were detected within the project site. Endangered species avoidance and minimization measures for the Puerto Rican boa and Puerto Rican nightjar are included in this Draft Coordination Act Report as indicated in the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

There are no designated units of the Coastal Barrier Resources System, as defined by the Coastal Barrier Resources Act of 1982, as amended (CBRA), within the project area.

Based on the information and data obtain during this process the Service recommends the following:

1. Conservation measures outlined in this DCAR for the Puerto Rican boa and Puerto Rican nightjar should be included as avoidance and minimization measures in the Corps' consultation under Section 7 of the Endangered Species Act. These measures should be implemented during work at the proposed quarry.
2. Engineering details regarding construction techniques, maintenance of flows in the original channel, and disposal of excess materials, should be provided to the Service and other natural resource agencies in a timely manner to ensure conservation measures are fully developed and incorporated into our final report.
3. The Service recommends that compensatory mangrove mitigation be conducted adjacent or close to the previous Phase 1 mitigation area or in other areas near the river as follows:
 - a) A detailed mitigation plan should be developed prior to construction and implemented during construction.
 - b) As part of the mitigation plan, a comprehensive Environmental Monitoring and Corrective Action Plan should also be developed. This plan should include mitigation monitoring and success criteria, report requirements, and an adaptive management plan for such mitigation.
 - c) The Corps should coordinate the implementation plan and required corrective measures in coordination with the Service and the Puerto Rico DNER.
 - d) The Corps should consider the beneficial reuse of materials into the plan for wetland and ecosystem restoration.
4. To access the selected quarry for needed material to build the levees, the Service recommends minimizing impacts to native vegetation by re-establishing the existing access road as the least impacting alternative.
5. To minimize riverbed alterations and maintain the natural flow of the existing river channel, the Service recommends a bottomless culvert design to maintain natural riverbed continuity. The proposed stilling basin should be designed to maintain a natural riverbed during periods of normal flows; this would provide the continuity of flow and cues needed by native river fauna for their upstream migration.

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Appendices

Appendix A Conservation Measures for Puerto Rican boa and Puerto Rican nightjar.

1.0 Introduction

The Rio Guayanilla basin is located within the Municipality of Guayanilla on the southwestern coast of Puerto Rico. The Rio Guayanilla originates at a point near the central mountain range at an elevation of about 1,000 meters (3,280 feet) above mean sea level near the municipality of Adjuntas. The river flows in a southerly direction through steep slopes in the upper part of the basin producing fast runoff velocities and allowing minimal infiltration. The total length of the river channel is approximately 23 kilometers (13.9 miles). The total drainage area of the Rio Guayanilla basin is approximately 96 square kilometers (37 square miles) (Corps 2019).

The study area starts in the town of Guayanilla just upstream of highway PR-2 and continues to where it intersects the existing channel work near the Caribbean Sea. Preliminary analysis shows that Rio Guayanilla flooding has a 0.5 Annual Chance of Exceedance (ACE) storm event (which corresponds to a 2-year storm). In the study area, there are approximately 8,800 residents and 1,665 public, commercial, and residential structures at risk of inundation. There are also approximately 400 acres of agricultural land at risk of inundation. Analysis shows the 500-year (0.002 ACE) storm event would cause an estimated \$270 million in structural and other damages. Study analyses completed by the Corps, to develop a sound alternative to prevent flooding, focused on various diversion channel types that would divert floodwaters greater than the 2-year ACE flow around the Town of Guayanilla to the west.

In September 2003, the Puerto Rico Department of Natural and Environmental Resources (PRDNER) began construction of a portion of what the Corps recommended in the 1990 Reconnaissance Report. The plan entailed the channelization of the lower Guayanilla River at the estuary mouth for better evacuation of floodwaters in the Guayanilla floodplain. Major activities included the excavation and dewatering for a diversion channel and main river channel. Phase I of that plan was completed in June 2006 with associated compensatory mitigation. The remaining elements of the Corps plan were never constructed.

This Draft Coordination Act Report (DCAR) is prepared following the guidance contained in “Policy and Guidance on Fulfillment of the Fish and Wildlife Coordination Act Responsibilities in the Corps of Engineers Water Resources Development Program” dated November 2004 and the information contained in the DFS/EA, prepared by the Corps, as required by the Fish and Wildlife Coordination Act.

2.0 Authorization

As established by the Flood Control Act of 1936, flood risk management projects are in the Federal interest if the economic benefits over the period of analysis exceeds estimated costs, and if the lives and security of people would otherwise be adversely affected. The 1990 Reconnaissance Study for this project determined that Federal Interest was warranted. The study authority is the Water Resources Development Act of 1986 (P.L. 99-662), Sec 722, Guayanilla River Basin, Puerto Rico. This DCAR presents updated evaluations of fish, wildlife, and habitat impacts from the proposed project, and discusses mitigation alternatives. The submission of this Draft CAR is in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401), as

amended; 16 U.S.C. 661 et seq.). However, this draft report does not constitute the official report of the Secretary of the Interior as required by Section 2(b) of the Act.

3.0 Project Description

The current project proposed by the Corps builds upon the 2003 Phase 1 project, which consisted of the channelization of the lower Guayanilla River from below the PR 3336 bridge to the mouth of the river. Recently, 2018 and 2019, the Corps in collaboration with the Non Federal Sponsor (NFS) (the PRDNER and Municipality of Guayanilla), added engineering, design, and constructions alternatives to the initial 2003 flood control project. There were 6 alternatives proposed and analyzed. After evaluation, a combination of Alternative #3 (Figure 1) and Alternative #1 was selected as the final TSP.

The Alternative #3 Diversion Channel South w/ Single Line Protection TSP would involve the construction of an engineered diversion channel below the PR-2 bridge. A diversion structure would be set in place across the river channel to split flows, sending all floodwaters to the diversion channel while largely retaining bank-full flows in the natural channel of the Rio Guayanilla, to maintain its ephemeral riverine ecology. The conceptual design of the diversion structure includes riverine connectivity for sediment transport and fish passage. The alignment for this alternative directs floodwaters away from the town and to the west along the confining mountain valley wall, through agriculture fields, where it bends east through banana fields to join up with constructed 2003 Phase I project.

The diversion channel proposed in Alternative #3 would be an engineered trapezoidal construction with a bottom width of 100-feet and 2:1 side slopes. This alternative only includes levees on the east side or town side of the new diversion channel. The west side of the channel would be graded/bermed to certain elevations to ensure waters stay within the designated flowage. Material from the excavated channel would be predominantly gravel and sand, which is not suitable for levee construction, but potentially suitable for concrete components; beneficial reuse of materials could be incorporated into the plan for wetland and ecosystem restoration. The disposal areas for the material to be excavated are shown in red in Figure 1.

The bottom of the new channel may have concrete, gabion, sheet-pile and/or riprap grade control structures embedded at selected locations where hydraulic models indicate that incision or meandering potential exists. The NFS will be responsible for the operation and maintenance of the project in perpetuity. This would include security, periodic inspections, vegetation control, debris removal, litter control, repair of the diversion channel, diversion structure, floodwalls levees and floodway would be kept free of woody vegetation via clearing or mowing, only allowing grasses and forbs to grow. The NFS will also be responsible for reaching out to communities, residents, and businesses in the leveed area about the project risks and the development of an emergency action/ response plan.

In addition to the diversion channel and levees, a floodwall or levee is being proposed along the eastern side of El Faro community to protect it from any residual flooding. This structure will permanently impact approximately 5.8 acres of basin mangrove wetlands and may temporarily impact additional acres during construction.

Based on Service’s Planning Aid Report, the borrow area was eventually reduced in size but still located in the karst hills. After several site visits and studying the area, the Service recommended an alternative borrow site, which was previously used for the construction of a residential development (Figure 3). Although this site is also in the karst area, the aerial photographs show that it was excavated and cleared of vegetation on more than one occasion. Currently, the area is undergoing slow ecological succession; however, the site provides less habitat value than the previously proposed borrow sites. Therefore, this area has been selected by the Corps as the preferred Quarry Zone (Figure 3).

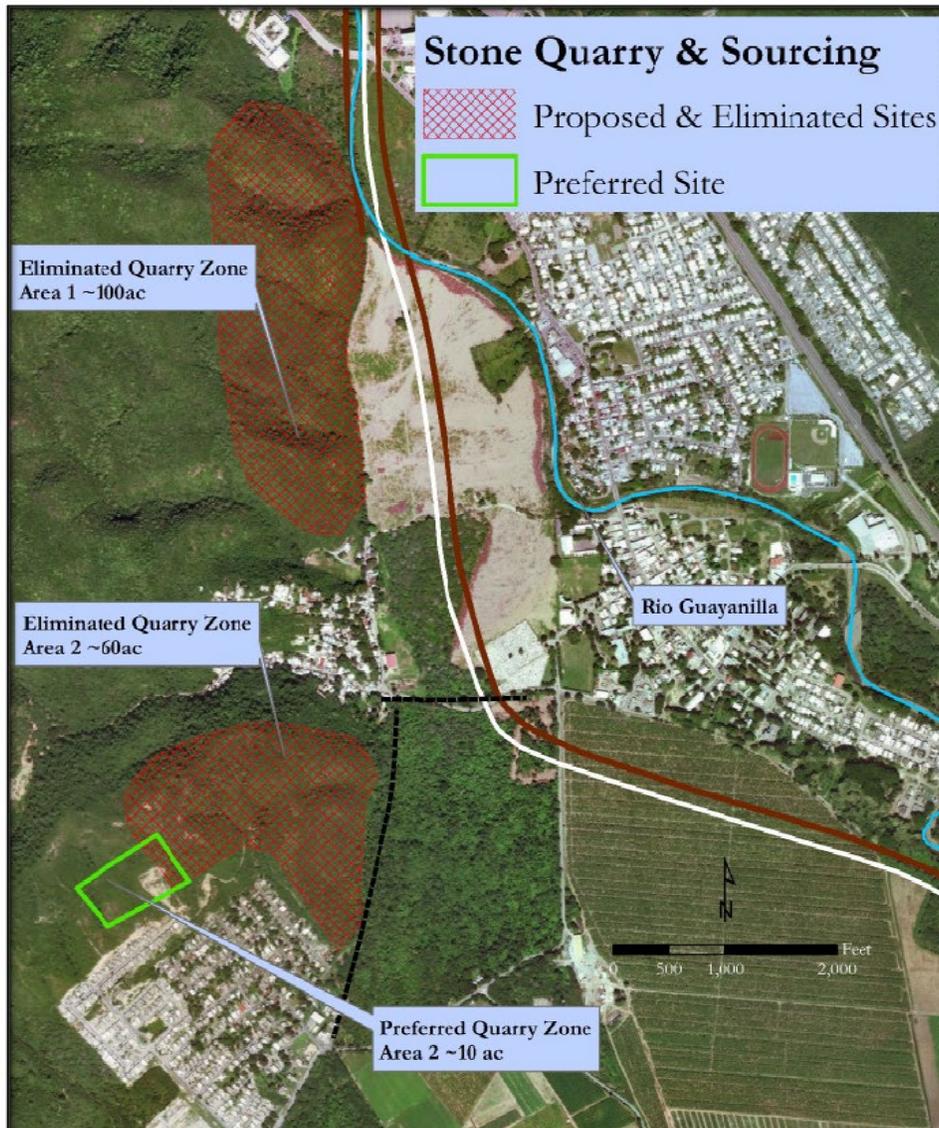


Figure 3. Proposed and Preferred quarry areas for the levee material. This area has been previously disturbed for the construction of a residential area. There are however small patches of remnant dry forest nearby and there exists the possibility of the area being used by native wildlife. (Corps 2019)

4.0 Description and Discussion of the Affected Environment

The Rio Guayanilla is naturally an ephemeral river typical of many of Puerto Rico's south coast rivers. The short coastal plain and sharp rise in elevation tends to cause flash flooding of short duration but of high water volumes. The river valley and floodplain have been in agricultural production for over 100 years. Sugarcane agriculture has given way to banana farming in the lower floodplain. South of the Highway #2 bridge, karst hills on the west and the town on the east border the Guayanilla River. The town of Guayanilla established itself along the river and eventually the town expanded to encircle the river. The river's floodwaters enter the town creating a consistent flood risk. The mouth of the Rio Guayanilla has been previously channelized up to the PR 3336 bridge. During periods of low flow, the mouth can close off with a sand berm forming a brackish water "lagoon" in the channel (Figure 4). This is typical of south coast rivers in Puerto Rico during the island's dry season. The river mouth has an associated mangrove wetland and salt flat area, hydrology for this wetland is via groundwater, overbank flooding and storm surge. Seasonal flooding of this area maintains the salt levels in the soils at a tolerable level for the mangroves. A wetland mitigation site for previous channel work also exists on the western banks of the river.

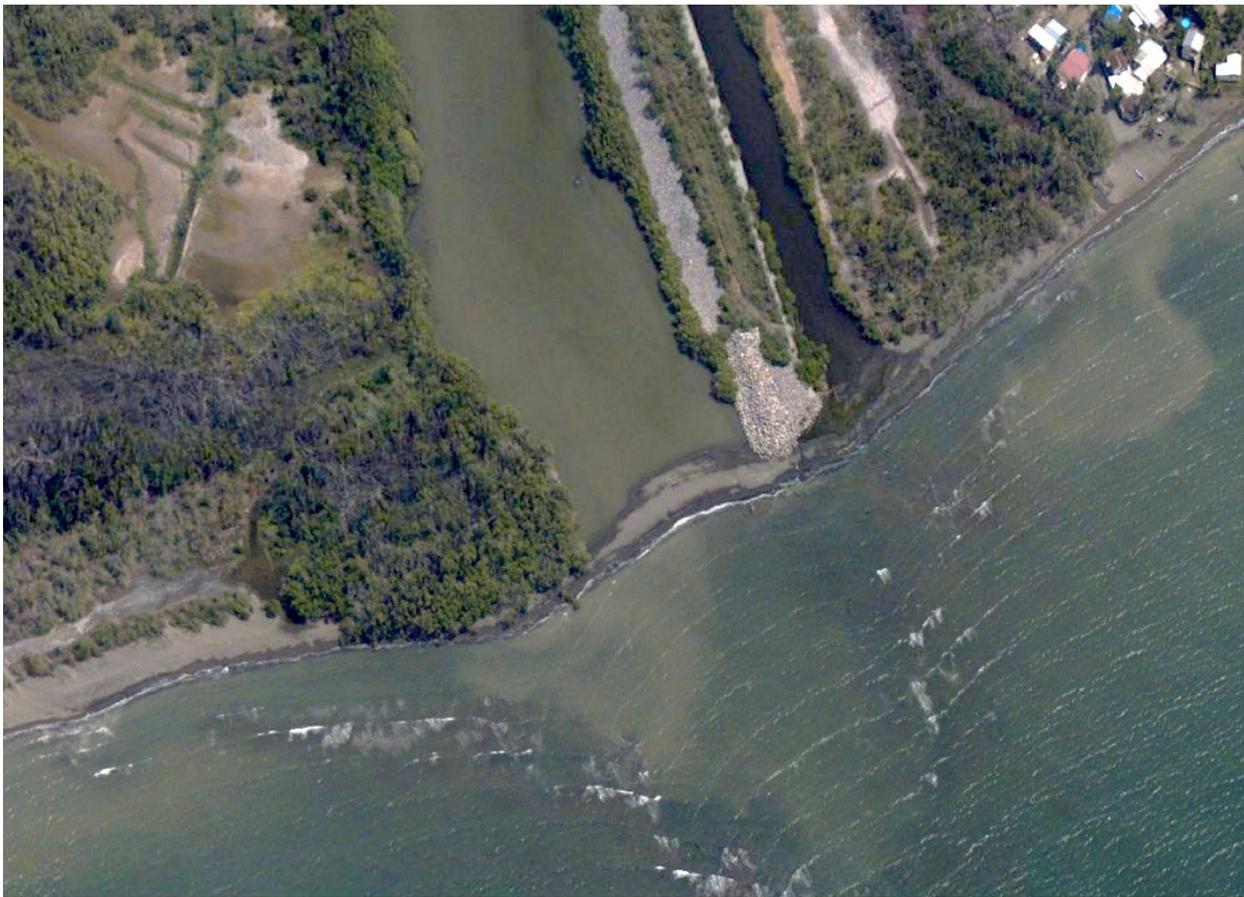


Figure 4. Satellite Photo showing Guayanilla River mouth cut off by sand berm during the dry season.

4.1 River Channel Sections

Natural channel improvements would begin just north of the Puerto Rico Highway #2 (PR 2) and continue to where the river starts turning towards the town. These improvements would involve excavating back material and debris that has fallen into the river channel and re-defining bank slopes as necessary. The banks would be further stabilized with riprap to prevent further erosion. A road borders the eastern bank of the river; this road provides access to Jagua Tuna Ward. A trunk sewer also runs along this road. In this area, the river is incised between the road and the higher opposite bank. In some areas, the river has undercut the road fill and existing sidewalk. Channel improvements would most likely have to occur on the western bank since there is very little space on the eastern bank between the river and the roadbed. The river bottom in this area is composed of small cobbles, gravel and sand. We recommend disturbing the river bottom as little as possible while working on the riverbanks. The PR 2 bridge serves as a slight constriction in the river channel. Remains of gabion baskets, riprap and concrete are evidence of attempts at erosion protection. At this bridge, the western bank is also higher than the eastern bank, with the relatively unarmored roadbed receiving most of the erosion impacts. Evidence of flood levels is evident on the bridge, support piles and the bank erosion (Figure 5).



Figure 5. East bank of PR 2 bridge, note undercut concrete apron, and large cobbles in river. Downstream of the PR 2 marks the start of the levee and floodwall system. These structures will be located along the eastern bank of the river.

Below the PR 127 bridge there is some evidence of previous in channel work. Gabion drop structures are visible 100 meters downstream. The Corps should evaluate whether these structures need to be removed as part of the proposed channel improvements.



Figure 6. Rio Guayanilla south of PR 127 Bridge.

Beyond this point, a large stilling basin for sedimentation/debris will be constructed to allow normal and low flow storm events as well as maintain riverine connectivity for sediment transport and fish passage through an engineered culvert into the natural river channel, which will continue through the town. This area is composed of abandoned agricultural fields and scrub shrub vegetation.

Flood flows above bankfull, would spill into the diversion channel and bypass the town, connecting with the channelized portion below Road PR 3336. The engineered diversion channel is primarily a concrete-lined trapezoidal channel. The channel base is 100-foot wide with 2-to-1 side slopes extending to natural ground. This alternative would have a levee on the east side of the diversion channel. The west side of the channel would remain at grade and allow certain magnitudes of flood to spread wider to the west, flooding undeveloped lands, agricultural lands and the mangroves wetlands associated with the river mouth. The diversion channel's side slope of the levee would be lined with riprap to prevent erosion. Upstream of the diversion channel, a combination of levees and floodwalls would be installed on the eastern side of the river channel.

The diversion channel will run in between the existing cemetery and the Piedras Blancas community. There are some woodlands in this area with large fruit trees such as mango, tamarind, and West Indian almond. Once the channel crosses PR 3336, it goes into the existing banana fields until it joins into the existing channel work.

Throughout the different sections of the project, Service biologists were able to identify both native and introduced fish and shrimp species indicating that local river fauna are using all sections of the river.

4.2 Mangrove Levee

In order to protect the El Faro community from any overbank flooding, a levee or floodwall is being proposed. The levee would start in the existing banana fields. Two drainage channels from the banana fields drain into the mangrove and run parallel to the houses east of Road PR 582 (Figure 7).



Figure 7. El Faro area showing the approximate location of the existing agricultural drainage channels. Some of these channels may be impacted by the proposed flood levee.



Figure 8. Proposed levee alignment El Faro community (Corps 2019)

The levee is estimated to impact some 8.2 acres of mangrove wetlands permanently and some additional acreage during construction (Figure 8). This is a basin type mangrove obtaining its hydrology from extreme high tides, coastal flooding and river flooding. Freshwater input provided by the agricultural drainage canals and overbank flooding by the Rio Guayanilla helps maintain salinity levels.

This mangrove basin includes leather fern (*Acrostichum* spp) and cattails (*Typha* spp) along the fringes of the drainage ditches with red mangroves (*Rhizophora mangle*), away from the drainage ditch as salinities increase, this may result into black (*Avicennia nitida*) and white mangroves (*Laguncularia racemosa*). It also contains a bare salt flat.

Compensatory mitigation for impacts to this mangrove wetland area should be considered once a final design is developed and a final estimate on wetland impacts is established. There are several opportunities for onsite, in kind, wetland creation and enhancement near the mouth of the Guayanilla River.

4.3 Quarry

Based on aerial photography, the selected quarry site was previously used for the construction of the La Concepcion Urbanization. Most of the area was scraped of vegetation in 2003, but by 2006 some areas were starting to recover. Some small areas were not cleared and the vegetation found in these areas tends to be completely different in nature from the previously cleared areas.

Service and PRDNER biologists surveyed the site on November 4, 2019. During this survey, no federally listed plant species were found. However, the area has been recovering for the last 13 years and has reached a canopy height and cover that may support wildlife resources. During the vegetation surveys two wildlife recorders were deployed to document any evidence of listed species using the area.. The recorders were recovered on November 13, 2019. The result from the recorders showed the presence of the federally endangered Puerto Rico nightjar. Furthermore, suitable habitat for the Puerto Rican boa was documented at the site.

4.3.1 Quarry Access Roads

Current access to the quarry is through the La Concepcion urbanization; however, there is a previously used road to the east, the Corps has proposed a road access to the north joining with the existing landfill access road. The Corps' proposed quarry access road would require clearing additional relatively undisturbed vegetation and building a new road from the highpoint of the quarry to the landfill access road which runs through the Piedras Blanca Community. The landfill road access is a narrow asphalt road with residential structures on either side, thus, we believe that there is no room to widen or improve this road for heavy traffic.

The former quarry access road is visible in satellite photos up until 2010. This road is an unimproved dirt road running east, around the Sector Beldum community and eventually joining Road 335. This road can be re-established and allow quarry material to exit from a lower elevation. This area was previously surveyed by the Service and is still open in some areas; scrub shrub vegetation dominates the rest. The alternative that would be least impacting would be to re-establishing the old access road.

4.4 Disposal Areas

There are three proposed disposal areas for excavated material; the amount of material to be disposed of depends on the quantity and quality of the material found during channel excavation and bank restoration. Two of the disposal areas are located between the proposed basin and the town cemetery on either side of the diversion channel. This area is composed of unimproved pasture which has little wildlife value and some woodlands composed mainly of fruit trees (mango and tamarind) and fast growing colonizing species. The third disposal area is located between the channel and Road 3336; this disposal area may impact existing banana fields.

5.0 Natural Resource Impacts

With the exception of the previous channel work done in the lower part of the river, and the section that runs through the town of Guayanilla, the Guayanilla River and its associated riverine habitat is relatively intact north of the PR-2 bridge. Puerto Rico's stream fauna is mostly amphidromous with many of the species having to release eggs or larvae to be carried out into Guayanilla Bay. Once in salt water these eventually migrate back upstream as juvenile of the species. Studies carried out by PRDNER identified the following 8 species of fish at the PR-127 bridge crossing (Kwak 2007):

Species	Common Name	Nativity
<i>Anguilla rostrate</i>	American Eel	Native
<i>Oreochromis mossambicus</i>	Mosambique Tilapia	Introduced
<i>Eleotris perniger</i>	Smallscaled Spinycheeked Sleeper	Native
<i>Gobiomorus dormitor</i>	Bigmouth Sleeper	Native
<i>Awaous banana</i>	River Goby	Native
<i>Sicydium plumeri</i>	Sirajo Goby	Native
<i>Pomadasys crocro</i>	Burro Grunt	Native
<i>Agonostromus monticola</i>	Mountain Mullet	Native

A site visit of the riverine sections of the project was carried out by Service biologists Alexandra Galindo, Jose Martínez and Félix López on November 1, 2019. The following aquatic species were visually identified:

Species	Common Name	Nativity
<i>Agonostromus monticola</i>	Mountain Mullet	Native
<i>Oreochromis mossambicus</i>	Mosambique Tilapia	Introduced
<i>Awaous banana</i>	River Goby	Native
<i>Xiphocaris elongate</i>	River shrimp	Native

Previous fieldwork has concentrated on the fish species found in the rivers of Puerto Rico, however, there is an entire suite of freshwater shrimp that make up a large part of the native river fauna. It is safe to assume that in addition to *Xiphocaris*, the following macroinvertebrates probably could be found in Rio Guayanilla:

Species	Common Name	Nativity
<i>Macrobrachium acanthurus</i>	River shrimp	Native
<i>Macrobrachium carcinus</i>	River shrimp	Native
<i>Macrobrachium faustinum</i>	River shrimp	Native

<i>Micratya poeyi</i>	River shrimp	Native
<i>Potimirim glabra</i>	River shrimp	Native

Maintaining continuity between the river mouth and the upper reaches of Rio Guayanilla is vital to maintaining the freshwater fauna biodiversity of the river. The Corps is proposing to maintain natural flow through the existing river channel via a culvert size to estimate bank full flows. We recommend a bottomless culvert design to maintain natural riverbed continuity. The proposed stilling basin should be designed to maintain a natural riverbed during periods of normal flows, this would provide the continuity of flow and cues needed by native river fauna for their upstream migration.

Any non-structural bank stabilization and improvements should strive to maintain the existing river width and depth. Increase widening of the river channel can cause lower velocities and increase deposition of bed load, altering the riverbed characteristics.

5.1 Proposed Quarry Area

Although the currently proposed quarry area has been previously impacted and the vegetation for the most part composed of early successional and invasive vegetation, there is enough canopy and ground cover to provide habitat for wildlife species. On November 4, 2019, Service biologists Omar A. Monsegur-Rivera, Marielle Peschiera, José G. Martínez, and Félix López along with José Sustache-Sustache (Puerto Rico PRDNER) surveyed the proposed quarry area and its surroundings for listed plant species and sensitive habitats.

The site is located within the subtropical dry forest life zone overlying a limestone substrate (Ewel and Whitmore 1973), and is part of the geographical range known as Montes de Barinas (group of hills along the boundary of the municipalities of Yauco and Guayanilla). This site is just adjacent to the designated critical habitat of *Varronia rupicola* (threatened) (Montes de Barina Unit). However, the project site is adjacent to an urban area, and the site was used as a quarry in the past. An assessment of aerial images shows the project site was bulldozed by 2003.

With the exception of a small remnant forest associated with a hilltop immediately west of the proposed quarry, the area has had landscape alteration in the past. The best quality habitat is associated with the hilltop remnant of native forest. This area showed an open understory with little evidence of exotics, although we did not identify any federally listed species. Puerto Rico endemics identified were *Ipomoea steudelii*, *Thouinia striata* var. *portoricensis* and *Machaonia portoricensis*, all of which are considered common in dry forest habitat. The quarry boundary curves around this hilltop following a natural drainage, the vegetation structure of the quarry area is an early successional forest dominated by species such as *Bouyeria succulenta*, *Leucaena leucocephala*, *Croton* spp. and *Lantana involucrata*. In fact, the majority of the site is dominated by stands of *Leucaena leucocephala* and *Megathyrsus maximus*. The only federally listed plants that may occur under such disturbed site may be *Varronia rupicola* and *Catesbaea melanocarpa*. However, no federally listed plants were identified within the proposed project

area. The likelihood for the presence of *V. rupicola* and *C. melanocarpa* is minimal, considering the area was previously bulldozed.



Figure 9. Track of vegetation survey



Figure 10. 2003 Aerial photo showing the proposed quarry site, and the associated remnant of native forest.

Two AudioMoth recorders were activated and deployed during the November 4, 2019 vegetation survey. Both recorders were configured to record for 1 minute every 10 minutes for a total of 144 recordings per each 24 hour period (6 per hour). Recorders were collected and deactivated

the night of Nov. 13 2019. The audio from recorder #1 revealed Puerto Rican nightjars calling both at dawn and at dusk on different days.



Figure 9. Location of recorders and survey call points

On the night of November 13, Service biologists José G. Martínez and Jan P. Zegarra retrieved the recorders, they detected 2 nightjars calling close to recorder #1 (Point A located within the native hilltop forest). Nightjars were first detected calling at 6:05PM and were heard calling throughout the rest of the site visit in the same general area close and around recorder #1. At Point B, another nightjar was heard calling far away (more than 200m) towards the north (330°) at 6:40PM. At 7:02PM, another nightjar was heard calling far away from recorder #2. One callback effort was made at this site following González (2010) in which a nightjar call is broadcast for 1 minute, followed by 2 minutes of listening for a calling response. At 7:09PM after the callback, we heard a nightjar calling far away more or less at 300° from the recorder #2 point.

5.2 Threatened and Endangered Species

The only listed species observed on the site is the Puerto Rican nightjar. The Puerto Rican nightjar or Puerto Rican Whip-poor-will is a bird in the nightjar family found in the coastal dry scrub forests in localized areas of southwestern Puerto Rico. It nests on the ground under closed canopies and needs an abundant leaf layer to hold the eggs. The peak months for nesting activity are April–June. Like many ground-nesting birds, the nightjar will try to divert the attention of potential predators away from the nest by conspicuously flying away and vibrating its wings.



Figure 10. PR nightjar. (USFWS)

In addition to the PR nightjar, the listed Puerto Rican boa may also be found in the area. This nonpoisonous snake lacks any bright coloration making it difficult to see in the vegetation or in the trees.



Figure 11. Puerto Rican boa. (USFWS)

The Service has developed conservation measures for construction projects for both species. These conservation measures are included in Appendix 1. These measures should be included as avoidance and minimization measures in the Corps' consultation under Section 7 of the Endangered Species Act.

5.3 Mitigation for Environmental Effects

If the proper design and precautions are taken to maintain bankfull flow through the natural river channel, mitigation would not be required for the proposed channel work and stilling basin. Several mitigation options can be considered for the El Faro Levee impacts to wetlands. Compensatory wetland mitigation in the form of onsite/in kind wetland enhancement and restoration can be accomplished in the existing mangrove forest between the Guayanilla River and Road 528. The mangrove area exhibits several “bare” areas that could represent previous fills, or area with hydrological impairment. These areas can be lowered and reconnected with the surrounding wetlands. There is also the possibility of expanding the previous mitigation site along the river mouth that was accomplished for the Phase 1 channel work carried out by PR DNER.



Figure 12. Possible compensatory mangrove mitigation site for proposed El Faro Levee.

Maintaining proper hydrology to the remaining mangroves in the area is also important. The Corps is proposing to allow a certain amount of overland flooding to keep the mangroves from becoming hypersaline. Irrigation drainage from the adjacent banana fields also needs to be taken into consideration and the existing ditches could be re-routed to discharge into the surrounding mangroves.

The Corps is currently working on a draft mitigation plan, and the Service is providing input and recommendations, as the plan is made available. We are also recommending that the mitigation plan contain a Monitoring and Corrective Action Plan to ensure that the proposed mitigation plan is successful. The Corrective Action Plan would provide a methodology to evaluate whether project effects exceed those already mitigated for in the base mitigation plan, and how any

additional compensatory mitigation will be determined and implemented. Monitoring data would be useful to evaluate whether the proposed mitigation sufficiently offsets the predicted effects. These plans should be closely coordinated with resource agencies and results of monitoring and analyses should be made available to agencies and stakeholders.

6.0 No Action Alternative

Based on the Corps documentation, if no action is taken, the town of Guayanilla would remain subject to frequent flooding and associated damage, increased life safety risk and other social effects. The current natural and manmade resources of geology, soils, hydrology, river, karst forest, secondary growth shrub/grasslands, and agricultural fields would remain in their current state.

7.0 Summary of Fish and Wildlife Service Position and Recommendations

During 2019, the Service carried out various site visits to different areas within the project footprint. During the proposed channel site visit, the Service found native aquatic species, which need natural flow due to the species life cycle. The Corps has addressed the presence of native aquatic species throughout its proposal to maintain normal to bankfull flow in the natural river channel, which minimizes impact to the species found. During the site visit of the preferred quarry zone, no federally listed plants were found. However, the endangered Puerto Rican nightjar was confirmed within and adjacent to the proposed quarry area. Also, suitable for the Puerto Rican boa was identified within and adjacent the project site.

The Corps has proposed the El Faro levee to prevent damage to the community due to overbank flooding. The construction of this levee can cause permanent impact to an estimated 5.8 acres of mangrove forest, with additional temporary impacts during the construction. The Corps has developed a draft compensatory mitigation plan for mangrove wetland impacts which is under review and it requires further refining.

Based on the information provided and the results of the site visits, the Service has the following recommendations:

1. Conservation measures outlined in this DCAR for the Puerto Rican boa and Puerto Rican nightjar should be included as avoidance and minimization measures in the Corps' consultation under Section 7 of the Endangered Species Act. These measures should be implemented during work at the proposed quarry.
2. Engineering details regarding construction techniques, maintenance of flows in the original channel, and disposal of excess materials, should be provided to the Service and other natural resource agencies in a timely manner to ensure conservation measures are fully developed and incorporated into our final report.

3. The Service recommends that compensatory mangrove mitigation be conducted adjacent or close to the previous Phase 1 mitigation area or in other areas near the river as follows:
 - a) A detailed mitigation plan should be developed prior to construction and implemented during construction.
 - b) As part of the mitigation plan, a comprehensive Environmental Monitoring and Corrective Action Plan should also be developed. This plan should include mitigation monitoring and success criteria, report requirements, and an adaptive management plan for such mitigation.
 - c) The Corps should coordinate the implementation plan and required corrective measures in coordination with the Service and the Puerto Rico DNER.
 - d) The Corps should consider the beneficial reuse of materials into the plan for wetland and ecosystem restoration.
4. To access the selected quarry for needed material to build the levees, the Service recommends minimizing impacts to native vegetation by re-establishing the existing access road as the least impacting alternative.
5. To minimize riverbed alterations and maintain the natural flow of the existing river channel, the Service recommends a bottomless culvert design to maintain natural riverbed continuity. The proposed stilling basin should be designed to maintain a natural riverbed during periods of normal flows; this would provide the continuity of flow and cues needed by native river fauna for their upstream migration.

This Report is presented as a Draft; this draft report does not constitute the official report of the Secretary of the Interior as required by Section 2(b) of the Act, since the Corps has not yet determined certain aspects of its TSP. Further coordination with the Service to review project specifics will be required prior to the completion of the final CAR. At this stage of planning, the Service concurs with the project as proposed provided that the above conservation recommendations are addressed during the continued planning process and incorporated into the Corps Final Report.

8.0 Coastal Barrier Resource Act

The Coastal Barrier Resources Act (CBRA), first enacted in 1982 (16 U.S.C. 3502 et seq.), was reauthorized and amended by the Coastal Barrier Improvement Act (CD3A) of 1990 (16 U.S.C. 3501). Its purpose, as stated in section 2(b), is "...to minimize the loss of human life, wasteful expenditure of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with coastal barriers..." CBRA established the Coastal Barrier Resources System, (CBRS) a mapped series of undeveloped coastal barriers on the Atlantic and Gulf coasts, including the Great Lakes Region, Virgin Islands, and Puerto Rico. Areas within the system are designated as either "units" or "otherwise protected areas" (OPA's). Section 5(a) prohibits all

new Federal expenditures and financial assistance within unit boundaries, with some exceptions as determined through a process of consultation.

There are no designated CBRA units within the project area. The closest CBRA units are PR-58-P, Bahia Tallaboa to the east and PR-59, Punta Ballena to the west.

9.0 References

Kwak, T. J., P. B. Cooney, and C. H. Brown. 2007. Fishery population and habitat assessment in Puerto Rico streams: phase 1 final report. Federal Aid in Sport Fish Restoration Project F-50 Final Report, Submitted to Marine Resources Division, Puerto Rico Department of Natural and Environmental Resources, San Juan.

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United States Army Corps of Engineers (Corps). 2019. Rio Guayanilla Flood Risk Management Study Draft Integrated Feasibility Report & Environmental Assessment.

Appendix A

Species Conservation Measures



U.S. FISH AND WILDLIFE SERVICE CARIBBEAN ECOLOGICAL SERVICES FIELD OFFICE

Conservation Measures for the Endangered Puerto Rican nightjar

Section 7 (a)(1) of the Endangered Species Act (ESA) charges Federal agencies to aid in the conservation of listed species, and section 7 (a)(2) requires the agencies, through consultation with the U.S. Fish and Wildlife Service (Service), to ensure their activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats. Section 7 applies to the management of Federal lands as well as Federal actions that may affect listed species, such as Federal approval of private activities through the issuance of Federal funding, permits, licenses, or other actions. Any person that injures, captures, or kills a Puerto Rican nightjar, destroys a nest, eggs, or hatchlings, are subject to penalties under the ESA. If Federal funds or permits are needed, the funding or permitting agency should initiate Section 7 consultation with the Service. To initiate a consultation under the Section 7 of the ESA, you must submit a project package with the established minimum requirements. These conservation measures should be incorporated into the project plans to minimize possible impacts to the species. Download the [project evaluations fact sheet](#) to learn more about the requirements or visit our [project evaluations webpage](#).

The Endangered Puerto Rican nightjar or guabairo de Puerto Rico (*Antrostomus noctitherus*), previously known as (*Caprimulgus noctitherus*) is an insectivore bird endemic to coastal dry and lower montane forest of south-western Puerto Rico. The species is known to occur in the municipality of Guayama, Salinas, Ponce, Guayanilla, Peñuelas, Guánica, Yauco, Sabana Grande, Maricao, Lajas and Cabo Rojo. It has nocturnal habits and its cryptic plumage makes them difficult to be detected and studied.



The endangered Puerto Rican nightjar is threatened by habitat destruction and degradation, and predation by exotic species such as mongoose, cats, and rats. Removal of vegetation for construction of residential complexes or agricultural practices may result in both short and long-term adverse effects to this species. The species reproductive behavior, including its territoriality, cryptic behavior, and nocturnal behavior can be altered by habitat removal and may result in mortality of eggs, chicks and/or adults. Habitat removal and degradation may also alter the spatial arrangement of nightjar's territories, and result in losing suitable nesting habitat in the future. In addition, habitat alteration creates open corridors for predators and other invasive species.

The Service has developed the following conservation measures with the purpose of assisting others to avoid or minimize adverse effects on Puerto Rican nightjar and its habitat. These recommendations may be incorporated into new project plans and under certain circumstances into existing projects. Depending on the project, additional recommendations can be made besides the ones presented in this document.

1. Conduct a meeting with all personnel involved in the construction and operational activities to discuss the potential presence of the Puerto Rican nightjar in the area, the characteristics of the species and its habitat, and the importance of its protection.
2. Clearly mark the project's footprint on a map and in the field (e.g., with flagging tape) to avoid affecting additional habitat. Maintain all activities within the marked area.
3. The breeding season of the nightjar occurs from February to August. Vegetation clearing should occur outside of the breeding season to minimize possible impacts to eggs, chicks and/or adults.
4. During nesting season, clearing of vegetation may occur only if no suitable habitat for the species will be affected. In this situation, experienced and qualified biologists should search for nightjar nests prior to vegetation removal. If nests are found, contact the Service immediately for further guidance.
5. If construction activities occur during September to January which is outside the nesting season, in suitable habitat or forested areas, surveys of the areas to be impacted should be conducted. If nightjars are found, do not begin any type of work in that area and contact the Service for technical assistance.
6. If a dead, injured, or sick Puerto Rican nightjar is found, the Service should be contacted.

If you have any questions regarding the above conservation measures, please contact the Service:

- Marelisa Rivera, Deputy Field Supervisor
 - Email: marelisa_rivera@fws.gov
 - Office phone 787-851-7297 ext. 206 or mobile 787-510-5219
- José Cruz-Burgos, Endangered Species Coordinator
 - Email: jose_cruz-burgos@fws.gov
 - Office phone 787-851-7297 ext. 218 or mobile 787-510-5206



**U.S. FISH AND WILDLIFE SERVICE
CARIBBEAN ECOLOGICAL SERVICES FIELD OFFICE
MARCH 2019**

Conservation Measures for the Puerto Rican boa (*Chilabothrus inornatus*)

Section 7 (a)(1) of the Endangered Species Act (ESA) charges federal agencies to aid in the conservation of listed species, and section 7 (a)(2) requires the agencies, through consultation with the U.S. Fish and Wildlife Service (Service), to ensure their activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats. Section 7 applies to the management of federal lands as well as federal actions that may affect listed species, such as federal approval of private activities through the issuance of federal funding, permits, licenses, or other actions. Any person that injures, captures, or kills a Puerto Rico boa, destroy eggs is subject to penalties under federal law. If federal funds or permits are needed, the funding or permitting agency should initiate Section 7 consultation with the Service. To initiate a consultation under the Section 7 of the ESA, you must submit a project package with the established minimum requirements. These conservation measures should be incorporated into the project plans to minimize possible effects to the species. Download the [project evaluations fact sheet](#) to learn more about the requirements or visit our [project evaluations webpage](#).

The endangered Puerto Rican (PR) boa (*Chilabothrus inornatus*, formerly *Epicrates inornatus*) is an endemic species and it is the largest snake that inhabits Puerto Rico. The PR boa is a non-venomous snake that does not pose any life threatening danger to humans, but be aware that some individuals may try to bite if disturbed or during capture or handling. The PR boa body color ranges from tan to dark brown with irregular diffuse marking on the dorsum but some individuals lack marking and are uniformly dark. Juveniles may have a reddish color with more pronounced markings. In general, as they mature, their body color tends to darken.



The PR boa has an island-wide distribution and occurs in a wide variety of habitat types ranging from wet montane to subtropical dry forest and can be found from virgin forest to areas that exhibit various degrees of human disturbance like roadsides or houses, especially if near their habitat. The PR boa is considered mostly nocturnal, remaining less active concealed or basking in the sun during the day.

The U.S. Fish and Wildlife Service (Service) has developed the following conservation measures with the purpose of assisting others to avoid or minimize adverse effects to the species and its habitat. These recommendations may be incorporated into new project plans and under certain circumstances into existing projects. Depending on the project, additional recommendations can be made besides the ones presented in this document.

Conservation Measures:

1. Inform all project personnel about the potential presence of the PR boa in areas where the proposed work will be conducted. A pre-construction meeting should be conducted to inform all project personnel about the need to avoid harming this species as well as penalties for harassing or harming boas. An educational poster or sign with photo or illustration should be displayed at the project site.
2. Prior to any construction activity, including removal of vegetation and earth movements, the boundaries of the project area and areas to be excluded and protected should be clearly marked in the project plan and in the field in order to avoid further habitat degradation into forested and conservation areas.
3. Once areas are clearly marked and prior to use of heavy machinery and any construction activity (including removal of vegetation and earth movement), a biologist or experienced personnel should survey the areas to be cleared to verify the presence of any PR boa within the work area. This should be done daily for the duration of the entire project.
4. The PR boa is considered more active at night. Thus, in order to maximize PR boa detection, the species can be searched for the night(s) prior to any vegetation clearing starts according to the construction plan and if snakes are found, they can be relocated accordingly (see #7).
5. Once the area has been searched for PR boas, vegetation should first be cleared by hand to the maximum extent possible. Vegetation should first be cut about one meter above the ground, prior to the use of heavy machinery for land clearing. Once land is cleared by hand, this will allow boas present on site to potentially move away on their own to adjacent available habitat. If there is no suitable habitat adjacent to the project site, any PR boas found need to be relocated accordingly (see #7).
6. For all boa sightings (dead or alive), record the time and date of the sighting and the specific location where it was found. PR boa data should also include a photo of the

animal (dead or alive), relocation site GPS coordinates, the time and date of the relocation, and comments on how the PR was detected and its behavior.

7. If a PR boa is found within any of the working or construction areas, activities should stop at the area where the PR boa is found and information recorded (see #6). Boas should be safely captured and relocated at least 1 km within suitable habitat (forested) and away from construction areas. Potential boa relocation sites should be pre-determined before the project starts and sites shared with the Service for review. Relocation of boas should be done by trained and designated personnel, and shall not harm or injure the captured boa. Activities at other work sites, where no boas have been found after surveying the area, may continue.
8. If immediate relocation is not an option, project related activities at this area should stop until the boa moves out of harm's way on its own or call the Puerto Rico Department of Natural and Environmental Resources (PRDNER) Rangers for safe capture and relocation (phone #'s: 787-724-5700, 787-230-5550, 787-771-1124). The potential use of the PRDNER staff for these purposes should be coordinated with them at least 30 days before the project starts. If a PR boa is captured by the PRDNER, record the name of the PRDNER staff and information on where the PR boa will be taken.
9. Measures should be taken to avoid and minimize PR boa casualties by heavy machinery or motor vehicles being used on site. Any heavy machinery left on site (in staging) or near potential PR boa habitat (within 50 meters of potential boa habitat), needs to be thoroughly inspected each morning before work starts to ensure that no boas have sheltered within engine compartments or other areas of the equipment. If PR boas are found within vehicles or equipment, boas need to be safely captured and relocated accordingly (see #7).
10. PR boas may also enter or occur within debris piles. Measures should be taken to avoid and minimize boa casualties associated with sheltering in debris piles as a result of project activities. Debris piles should be placed in areas farthest away from forested areas. Prior to moving, disposing or shredding, debris piles should be carefully inspected for the presence of boas. If debris piles will be left on site, we recommend they be placed in an undisturbed area.
11. If the event a dead PR boa is found, immediately cease all work in that area and record the information accordingly (see #6). If the PR boa was killed as part of the project actions, please include information on what conservation measures had been implemented and recommendations on what will be done to avoid further killing more individuals. A dead boa report should be sent by email (see contacts below) to the Service within 48 hours of the event.
12. Projects must comply with all state laws. Please contact the PRDNER for further guidance.

If you have any questions regarding the comments above, please contact the USFWS Monday to Friday 8am-430pm:

- Marelisa Rivera, Deputy Field Supervisor
 - Email: marelisa_rivera@fws.gov
 - Office phone 787-851-7297 ext. 206 or mobile 787-510-5219
- José Cruz-Burgos, Endangered Species Coordinator
 - Email: jose_cruz-burgos@fws.gov
 - Office phone 787-851-7297 ext. 218 or mobile 787-510-5206

Mr. Edwin Muñiz
US Fish & Wildlife Service
Caribbean Ecological Service Field Office
P.O. Box 491
Boquerón, PR 00622

Dear Mr. Muñiz:

This is a follow up to the Draft Fish & Wildlife Coordination Action Report (DCAR) dated 22 January 2020 (FWS/R4/CESFO/72-FC-011) regarding the Rio Guayanilla Flood Risk Management Study at the town of Guayanilla. Technical assistance was provided in accordance with the US Fish and Wildlife Act (16 U.S.C. 661, et seq.) and the Endangered Species Act (16 U.S.C. 1531, et seq. as amended).

During 2019, the USFWS carried out various site visits to different areas within the project footprint. During the proposed channel site visit, the USFWS found native aquatic species, which need natural flow due to the species life cycle. The USACE has addressed the presence of native aquatic species throughout the September 2019 EA to maintain fish passage and normal to bankfull flow in the natural river channel, which minimizes impact to the species found. During the site visit of the preferred quarry zone, no federally listed plants were found. However, the endangered Puerto Rican nightjar was confirmed within and adjacent to the proposed quarry area. Also, suitable habitat for the Puerto Rican boa was identified within and adjacent to the project site.

The USACE has proposed the El Faro levee to prevent damage to the community due to overbank flooding. The construction of this levee would cause permanent impact to an estimated 5.8 acres of mangrove forest, with additional temporary impacts during the construction. The Corps has developed a draft compensatory mitigation plan for mangrove wetland impacts and is provided as Attachment 1.

Based on the information provided and the results of the site visits, the Service has the following recommendations:

1. Conservation measures outlined in this DCAR for the Puerto Rican boa (*Epicrates inornatus* aka *Chilabothrus inornatus* and Puerto Rican nightjar (*Caprimulgus noctitherus* aka *Antrostomus noctitherus*) should be included as avoidance and minimization measures in the Corps' consultation under Section 7 of the Endangered Species Act. These measures should be implemented during work at the proposed quarry.

USACE Response: The USACE concurs and has updated the discussion of conservation measures for the Puerto Rican Nightjar and Boa in the Final EA. These conservation measures would be further detailed in the plans and specifications contract set for implementation should this project move forward. USACE would continue to coordinate with the USFWS Caribbean Office during the design phase to ensure conservation measures are still valid and accurately conveyed in the contract for construction.

The USACE has therefore concluded that a "May affect, but not likely to adversely affect" determination for the Puerto Rican Boa and Puerto Rican Nightjar is appropriately based on the following efforts to avoid and/or discount effects associated with rock quarry activities:

- Specific investigation and planning to avoid over 100-acres of high quality karstic Dry Forest

- Specific planning efforts to minimize need for stone and reduce quarry size to about 7-acres
- The use of former quarry and access road that had been clear cut and mined in the past
- Implementation of conservation measures attached to DCAR provided by USFWS to ensure individual Boas or Nightjars would not be taken during construction activities

This determination is documented in the updated Final EA and FONSI.

2. Engineering details regarding construction techniques, maintenance of flows in the original channel, and disposal of excess materials, should be provided to the Service and other natural resource agencies in a timely manner to ensure conservation measures are fully developed and incorporated into our final report.

USACE Response: USACE concurs and has updated the Final EA with additional engineering details on the Recommended Plan and regarding how conservation measures would be implemented and operated for the diversion structure.

3. The Service recommends that compensatory mangrove mitigation be conducted adjacent or close to the previous Phase 1 mitigation area or in other areas near the river as follows, USACE Responses shown below:

- a) A detailed mitigation plan should be developed prior to construction and implemented during construction.

USACE concurs and has developed a draft Mitigation, Monitoring and Adaptive Management Plan (MMAP) for review and concurrence by the USFWS and PRDNER. This plan is provided as Attachment 1.

- b) As part of the mitigation plan, a comprehensive Environmental Monitoring and Corrective Action Plan should also be developed. This plan should include mitigation monitoring and success criteria, report requirements, and an adaptive management plan for such mitigation.

USACE concurs and has provided these components as part of the MMAP (Attachment 1).

- c) The Corps should coordinate the implementation plan and required corrective measures in coordination with the USFWS and the Puerto Rico DNER.

USACE concurs and has requested assistance from USFWS during design of the mitigation, which will be approached using ecosystem restoration methodologies of hydrogeomorphic manipulation and native plant establishment. Specific botany and plant community assistance from Omar A. Monsegur-Rivera for the design has preliminarily been coordinated and requested.

- d) The Corps should consider the beneficial reuse of materials into the plan for wetland and ecosystem restoration.

USACE concurs and will reuse as much material as possible for any aspect of the project, including the mitigation, where possible.

4. To access the selected quarry for needed material to build the levees, the Service recommends minimizing impacts to native vegetation by re-establishing the existing access road as the least impacting alternative.

USACE Response: USACE concurs and will clear vegetation along existing road and provide work limits to ensure vegetated areas not within the needed quarry footprint are protected. USFWS is invited to participate in preconstruction flagging to ensure sensitive areas are protected.

5. To minimize riverbed alterations and maintain the natural flow of the existing river channel, the Service recommends a bottomless culvert design to maintain natural riverbed continuity. The proposed stilling basin should be designed to maintain a natural riverbed during periods of normal flows; this would provide the continuity of flow and cues needed by native river fauna for their upstream migration.

USACE Response: USACE concurs. Open bottom culverts or features equivalent or better at allowing fish passage and water flows are considered as part of the Recommended Plan. Riverine geomorphology would be maintained to the extent possible in the stilling basin for low to bank full flow elevations, which would maintain continuity of habitats, substrates and water flows above and below the diversion structure.

The U.S. Army Corps of Engineers values your timely input to the Rio Guayanilla Feasibility Study. The intent of this correspondence and supporting mitigation plan is to finalize determinations and subsequent actions that ensure their validity. The USACE requests separate correspondence/letters for final ESA Section 7 opinions and Final CAR / Mitigation Plan efforts. Correspondence may be sent to Frank Veraldi at U.S. Army Corps of Engineers, 231 South La Salle Street, Suite 1500, Chicago, Illinois 60604; or via email at Frank.M.Veraldi@usace.army.mil.

Sincerely,



Susanne J. Davis, P.E.
Chief, Planning Branch

Enclosure



DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
231 SOUTH LA SALLE STREET, SUITE 1500
CHICAGO IL 60604

CELRC-PMD-PB

12 February 2020

Mr. Edwin Muñiz
US Fish & Wildlife Service
Caribbean Ecological Service Field Office
P.O. Box 491
Boquerón, PR 00622

Dear Mr. Muñiz:

This letter is in reference to the Rio Guayanilla FRM Study (FWS/R4/CESFO/72-FC-011) - Section 7 Endangered Species Act Determination for the Puerto Rican Boa and Puerto Rican Nightjar. The proposed Rio Guayanilla Flood Risk Management recommended plan work limits are part of the southern Puerto Rican coastline and generally includes about 345 acres located in Guayanilla, Puerto Rico. The breakdown of acres includes 105-acres for the engineered diversion channel, levee and supporting features and 240-acres of coastal mangrove conservation area. The Draft Final Integrated Feasibility Report and Environmental Assessment (IFR/EA) were updated to reflect the determination provided in this memorandum.

As part of Section 7 of the Endangered Species Act, Federal agencies are directed to ensure that the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. An official species list for the study was finalized by the USFWS Caribbean Office and provided to the USACE along with conservation measures per species in the 22 January 2020 Draft Coordination Act Report (DCAR). The following two species were determined to be present within the footprint of the abandoned quarry scheduled for rock production use, which is considered secondary growth, subtropical, dry karstic forest:

Puerto Rican Nightjar (*Caprimulgus noctitherus* aka *Antrostomus noctitherus*) – This species was found to occur within the abandoned rock quarry identified for use under the Recommended Plan. The common name in English is the Puerto Rican Nightjar or Puerto Rican Whip-poor-Will, and in Spanish, the Guabairo. This species is a small member of the family Caprimuglidae (Nightjars & Nighthawks) that specifically occupy sparse understory habitats of the dry coastal and montane forests within the study area. This species was downgraded from Critically Endangered to Endangered (FE) based on discovery of a wider range breadth within the southwestern corner of the island. It nests on the ground under closed canopies and needs an abundant leaf layer to hold the eggs. The peak months for nesting activity are April–June. Like many ground-nesting birds, the nightjar will try to divert the attention of potential predators away from the nest by conspicuously flying away and vibrating its wings. As part of protection of this species, the USACE has incorporated the conservation measures into the Final EA.

Puerto Rican Boa (*Epicrates inornatus* aka *Chilabothrus inornatus*) – This species was not physically found, but is very likely to occur within the study area. The common name in English is the Puerto Rican Boa, and in Spanish, the Boa Puertorriqueña. This largest nonvenomous species of Puerto Rican snake is a member of the family Boidae (Boas & Pythons), which primarily occupy tree and cave habitats of the subtropical forest units within the study area; however, this species is well adapted and can be found in almost any habitat, including those induced by man. This species is Endangered (FE) primarily due to depredation by introduced mongoose species and man, but not necessarily habitat destruction given its adaptability. As part of protection of this species, plans during construction will include measures to

eliminate the risk of physically entraining or crushing mothers in parturition (in labor) and new born through adult life stages. As part of protection of this species, the USACE has incorporated the conservation measures into the Final EA.

USACE Determination

The specific area of the abandoned quarry that is under consideration for obtaining rock is considered secondary growth forest and somewhat degraded; however, this area still provides sufficient habitat for the Guabairo and Boa Puertorriqueña. Field work has confirmed that the borrow source for the project, an abandoned quarry, may provide habitat for the two species of concern. Activities associated with quarry operations could result in adverse effects to the two species of concern. To reduce possible adverse effects to less than significant, the following activities have been undertaken during the feasibility phase in conjunction with the USFWS Caribbean Office.

- Specific investigation and planning to avoid over 100-acres of high quality karstic Dry Forest
- Selection of an alternative site that had been bulldozed and quarried in the recent past
- Specific planning efforts to minimize need for stone and reduce quarry size to about 7-acres

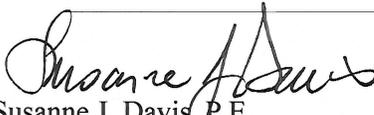
In addition, the following recommendations identified in the Draft Coordination Act Report will be incorporated into project detailed design and construction.

- Specific planning and design to ensure that all adjacent and surrounding high quality remnant areas will be avoided during quarrying operations
- Implementation of conservation measures, as attached, provided by USFWS to ensure individual Boas or Nightjars would not be taken during construction activities.

Based upon avoidance and minimization planning and the incorporation of conservation measures, the USACE has therefore concluded that a "May Affect, but not likely to Adversely Affect" determination for the Puerto Rican Boa and Puerto Rican Nightjar is appropriate. USACE requests concurrence with this determination from USFWS in writing for inclusion in the final feasibility study report.

USACE will continue coordination with the USFWS Caribbean Office during the detailed design phase, the development of plans and specification and project construction to ensure that the identified conservation measures and project features, including the quarry and access roads, are appropriately implemented. Please direct any requests for additional information to Mr. Frank Veraldi. Mr. Veraldi can be reached via email at frank.m.veraldi@usace.army.mil or via telephone at 312-846-5589.

Sincerely,



Susanne J. Davis, P.E.
Chief, Planning Branch

CC: DNER
Encl.



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Caribbean Ecological Services

Field Office

P.O. Box 491

Boqueron, PR 00622

FEB 24 2020

In Reply Please Refer To:
FWS/R4/CESFO/72-FC-011

Ms. Susanne J. Davis
Chief, Planning Branch
US Army Corps of Engineers, Chicago District
231 South La Salle St.
Suite 1500
Chicago, IL, 60604

Re: Rio Guayanilla Flood Control Endangered
Species Consultation

Dear Ms. Davis:

This is in reply to your February 12, 2020 letter, regarding the US Army Corps of Engineers (Corps) effects determination regarding federally listed threatened or endangered species and the proposed Rio Guayanilla Flood Control project. Our comments are provided under the Endangered Species Act (Act) (87 Stat. 884, as amended; 16 United States Code 1531 *et seq.*).

The proposed project consists of an engineered diversion channel, levee and supporting features, and 240-acres of coastal mangrove conservation in Guayanilla, Puerto Rico. The Service prepared a Fish and Wildlife Coordination Act report (CAR) that was incorporated by the Corps into the Draft Final Integrated Feasibility Report and Environmental Assessment (IFR/EA). The IFR/EA reflects the conservation recommendations and determinations provided in the CAR.

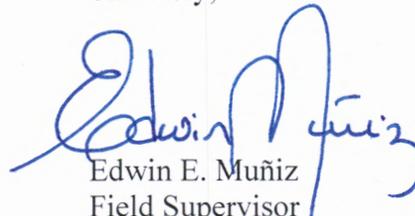
Two species were identified to be within the project site, the Puerto Rican nightjar (*Caprimulgus noctitherus* also known as *Antrostomus noctitherus*) and the Puerto Rican boa (*Epicrates inornatus* also known as *Chilabothrus inornatus*). The Service identified these species during site visits and field assessments, and conservation measures were provided to reduce impacts on the species during construction activities. The conservation measures were incorporated into the Corps Final Environmental Assessment of the project.

Based on the information above, the Corps has determined that the proposed flood control works for the Rio Guayanilla may affect, but are not likely to adversely affect these species. After reviewing the February 2020 Final Integrated Feasibility Report and Environmental Assessment for the Rio Guayanilla, we concur with the Corps determination that the project as currently proposed, is not likely to adversely affect the Puerto Rican nightjar or the Puerto Rican boa. This

concludes consultation at this time. However, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law, when the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence. Or the authorized actions may affect newly listed species or designated critical habitat.

Thank you for the opportunity to participate this flood control project. If you have any questions please contact Felix Lopez of our staff at (787) 851-7297 extension 210.

Sincerely,



Edwin E. Muñiz
Field Supervisor

fhl

cc:

DNER, San Juan

EPA, San Juan

Municipality of Guayanilla

Puerto Rico Planning Board



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Caribbean Ecological Services
Field Office
P.O. Box 491
Boqueron, PR 00622

FEB 28 2020

In Reply Please Refer To:
FWS/R4/CESFO/72-FC-011

Ms. Susanne J. Davis
Chief, Planning Branch
U.S. Army Corps of Engineers, Chicago District
231 South La Salle St., Suite 1500
Chicago, IL. 60604

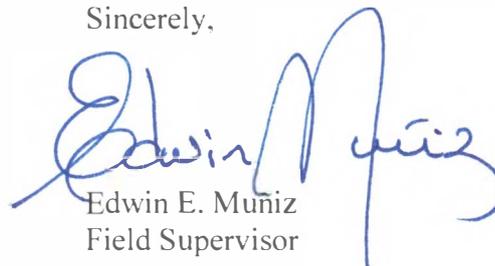
Re: Coordination Act Report Rio Guayanilla Flood
Control Project

Dear Ms. Davis:

Enclosed is the Final Fish and Wildlife Coordination Act Report (CAR) for the Guayanilla Flood Control project. On January 22, 2020, we requested comments from the Puerto Rico Department of Natural and Environmental Resources and the National Marine Fishery Service. No comments were received. This CAR constitutes the report of the Secretary of Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act. The CAR is issued as technical assistance in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

If you have any questions regarding the CAR, please feel free to contact Marelisa Rivera at 787 851-7297 x 206.

Sincerely,



Edwin E. Muniz
Field Supervisor

fhl

cc:

DNER, San Juan
EPA, San Juan
NMFS, San Juan
Municipality of Guayanilla
Puerto Rico Planning Board

FISH AND WILDLIFE COORDINATION ACT REPORT

For

Rio Guayanilla Flood Control Risk Management Study

Guayanilla, Puerto Rico



**U.S. Fish and Wildlife Service
Caribbean Ecological Services Field Office
February 2020**

Executive Summary

The U.S. Fish and Wildlife Service (Service) evaluated potential natural resource impacts resulting from the U.S. Army Corps of Engineers (Corps) February 2020, Final Integrated Feasibility Report (IFR) and Environmental Assessment for the Rio Guayanilla, Puerto Rico. This evaluation includes habitat within the study area, new channel, potential borrow area, floodwall or levee sites, review of the affected areas, proposed mitigation for expected impacts to jurisdictional wetlands and additional natural resource recommendations.

During 2018 and 2019, the Corps developed six (6) proposed alternatives to address the Rio Guayanilla flooding issues. Based on the planning concepts of life, safety, environmental effects, real estate, utilities and project sustainability, three out of the 6 action alternatives were chosen for further consideration: Alternative #1 Non-Structural Measures, Alternative #3 Diversion Channel South w/ Single Line Protection, and Alternative #6 Staged Greenway Terraces w/ Single Line Protection. The Tentatively Selected Plan (TSP) resulted in Alternative #3.

A Draft Coordination Act Report (DCAR) based on the TSP was provided to the Corps in January 2020. The information provided in the DCAR assisted in the Corps developing their IFR and Environmental Assessment for the Rio Guayanilla. The Corps IFR integrated the conservation recommendations made in the Service's DCAR presented in Section 7 – Summary of Fish and Wildlife Position and Recommendations.

Based on further analysis in the IFR, Alternative #3 Diversion Channel South w/ Single Line Protection is the Recommended Plan. The Recommended Plan includes an engineered diversion channel, a robust diversion structure, a levee along one side of the diversion channel, bridge modifications, berms, a rock quarry, haul roads, staging, and disposal areas. The levees will be constructed from local limestone that will be excavated from an abandoned quarry in the project area. A 2,750-foot long earthen levee will be constructed to protect the El Faro community from overbank flooding from the diversion channel. Other plan features include the development of a flood warning/response plan, and conservation measures for connectivity, flow and habitat. Due to impacts associated with the El Faro levee, wetland mitigation of 5.8 acres is also included in the final plan.

The project is located within the range of the following threatened and endangered species: the Puerto Rican boa (*Epicrates inornatus* aka *Chilabothrus inornatus*), the Puerto Rican nightjar (*Caprimulgus noctitherus* aka *Antrostomus noctitherus*) and the listed plants *Varronia rupicola*, *Eugenia woodburyana*, *Trichilia triacantha*, *Ottoschulzia rhodoxylon*, and *Catesbaea melanocarpa*. Other rare endemic plants such as *Randia portoricensis*, which are locally protected, may also be in the area. During surveys conducted by Service personnel, federally listed plants were not detected, but presence of the Puerto Rican nightjar and suitable habitat for the Puerto Rican boa were detected within the project site. Consultation under Section 7 of the Endangered Species Act was completed with the Corps on February 24, 2020.

Fish and Wildlife Coordination Act Report, Rio Guayanilla Flood Control Project

This Coordination Act Report report fulfills the requirements of section 2(b) of the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) and represents the Secretary of the Interior's report to Congress on the Rio Guayanilla flood control measures.

There are no designated units of the Coastal Barrier Resources System, as defined by the Coastal Barrier Resources Act of 1982, as amended (CBRA), within the project area.

While this constitutes a final report, the Corps will continue to coordinate and request comments on any changes during the design and construction phase of the project.

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Appendices

Appendix A Conservation Measures for Puerto Rican boa and Puerto Rican nightjar.

1.0 Introduction

The Rio Guayanilla basin is located within the Municipality of Guayanilla on the southwestern coast of Puerto Rico. The Rio Guayanilla originates at a point near the central mountain range at an elevation of about 1,000 meters (3,280 feet) above mean sea level near the municipality of Adjuntas. The river flows in a southerly direction through steep slopes in the upper part of the basin producing fast runoff velocities and allowing minimal infiltration. The total length of the river channel is approximately 23 kilometers (13.9 miles). The total drainage area of the Rio Guayanilla basin is approximately 96 square kilometers (37 square miles) (Corps 2019).

The study area starts in the town of Guayanilla just upstream of highway PR-2 and continues to where it intersects the existing channel work near the Caribbean Sea. Preliminary analysis shows that Rio Guayanilla flooding has a 0.5 Annual Chance of Exceedance (ACE) storm event (which corresponds to a 2-year storm). In the study area, there are approximately 8,800 residents and 1,665 public, commercial, and residential structures at risk of inundation. There are also approximately 400 acres of agricultural land at risk of inundation. Analysis shows the 500-year (0.002 ACE) storm event would cause an estimated \$270 million in structural and other damages. Study analyses completed by the Corps, to develop a sound alternative to prevent flooding, focused on various diversion channel types that would divert floodwaters greater than the 2-year ACE flow around the Town of Guayanilla to the west.

In September 2003, the Puerto Rico Department of Natural and Environmental Resources (PRDNER) began construction of a portion of what the Corps recommended in the 1990 Reconnaissance Report. The plan entailed the channelization of the lower Guayanilla River at the estuary mouth for better evacuation of floodwaters in the Guayanilla floodplain. Major activities included the excavation and dewatering for a diversion channel and main river channel. Phase I of that plan was completed in June 2006 with associated compensatory mitigation. The remaining elements of the Corps plan were never constructed.

This Coordination Act Report (CAR) is prepared following the guidance contained in “Policy and Guidance on Fulfillment of the Fish and Wildlife Coordination Act Responsibilities in the Corps of Engineers Water Resources Development Program” dated November 2004 and the information contained in the IFR, prepared by the Corps, as required by the Fish and Wildlife Coordination Act.

2.0 Authorization

As established by the Flood Control Act of 1936, flood risk management projects are in the Federal interest if the economic benefits over the period of analysis exceeds estimated costs, and if the lives and security of people would otherwise be adversely affected. The 1990 Reconnaissance Study for this project determined that Federal Interest was warranted. The study authority is the Water Resources Development Act of 1986 (P.L. 99-662), Sec 722, Guayanilla River Basin, Puerto Rico. This CAR presents updated evaluations of fish, wildlife, and habitat impacts from the proposed project, and discusses mitigation alternatives. The submission of this CAR is in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16

U.S.C. 661 et seq.) and constitutes the official report of the Secretary of the Interior as required by Section 2(b) of the Act.

3.0 Project Description

The current project as proposed by the Corps builds upon the 2003 Phase 1 project, which consisted of the channelization of the lower Guayanilla River from below the PR 3336 bridge to the mouth of the river. Recently, 2018 and 2019, the Corps in collaboration with the Non Federal Sponsor (NFS) (the PRDNER and Municipality of Guayanilla), added engineering, design, and constructions alternatives to the initial 2003 flood control project. There were 6 alternatives proposed and analyzed. After evaluation, Alternative #3 was selected as the Final Plan. (Figure 1).

The Final Plan Diversion Channel South w/ Single Line Protection would involve the construction of an engineered diversion channel below the PR-2 bridge. A diversion structure would be set in place across the river channel to split flows, sending all floodwaters to the diversion channel while largely retaining bank-full flows in the natural channel of the Rio Guayanilla, to maintain its ephemeral riverine ecology. The conceptual design of the diversion structure includes riverine connectivity for sediment transport and fish passage. The alignment for this alternative directs floodwaters away from the town and to the west along the confining mountain valley wall, through agriculture fields, where it bends east through banana fields to join up with constructed 2003 Phase I project.

The proposed diversion channel would be an engineered trapezoidal construction with a bottom width of 100-feet and 2:1 side slopes. This alternative only includes levees on the east side or town side of the new diversion channel. The west side of the channel would be graded/bermed to certain elevations to ensure waters stay within the designated flowage. Material from the excavated channel would be predominantly gravel and sand, which is not suitable for levee construction, but potentially suitable for concrete components; beneficial reuse of materials could be incorporated into the plan for wetland and ecosystem restoration. The disposal areas for the material to be excavated are shown in red in Figure 1.

The bottom of the new channel may have concrete, gabion, sheet-pile and/or riprap grade control structures embedded at selected locations where hydraulic models indicate that incision or meandering potential exists. The NFS will be responsible for the operation and maintenance of the project in perpetuity. This would include security, periodic inspections, vegetation control, debris removal, litter control, repair of the diversion channel, diversion structure, floodwalls levees and floodway would be kept free of woody vegetation via clearing or mowing, only allowing grasses and forbs to grow. The NFS will also be responsible for reaching out to communities, residents, and businesses in the leveed area about the project risks and the development of an emergency action/ response plan.

In addition to the diversion channel and levees, a floodwall or levee is being proposed along the eastern side of El Faro community to protect it from any residual flooding. This structure will permanently impact approximately 5.8 acres of basin mangrove wetlands and may temporarily impact additional acres during construction.

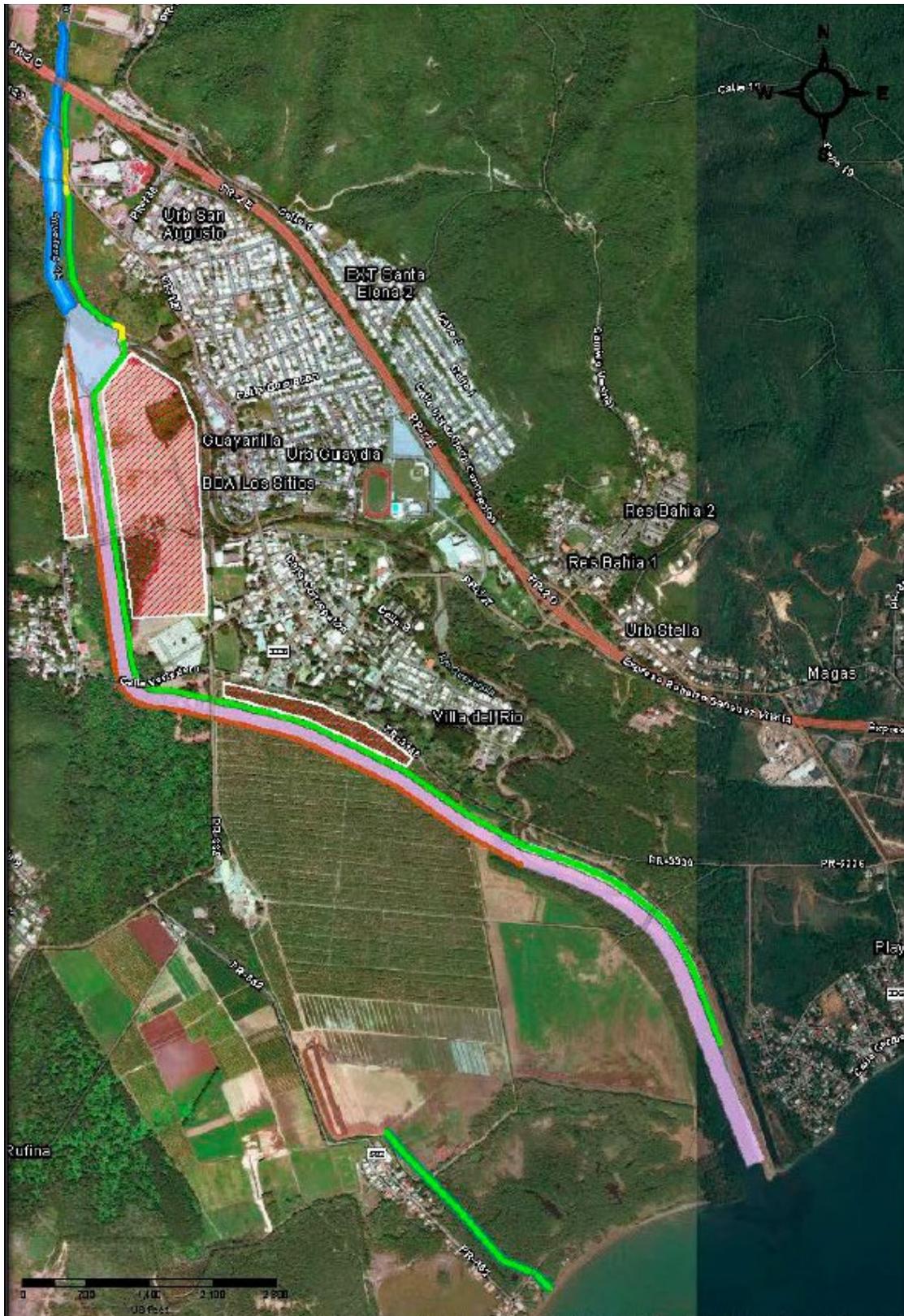


Figure 1. Final Plan Diversion Channel South w/ Single Levee Protection (Corps 2020)

In order to build the levees, the Corps needs material that will be extracted from a borrow site. The initial plan was to obtain the material for the levee from two possible borrow areas in relatively intact karst dry forest (Figure 2).

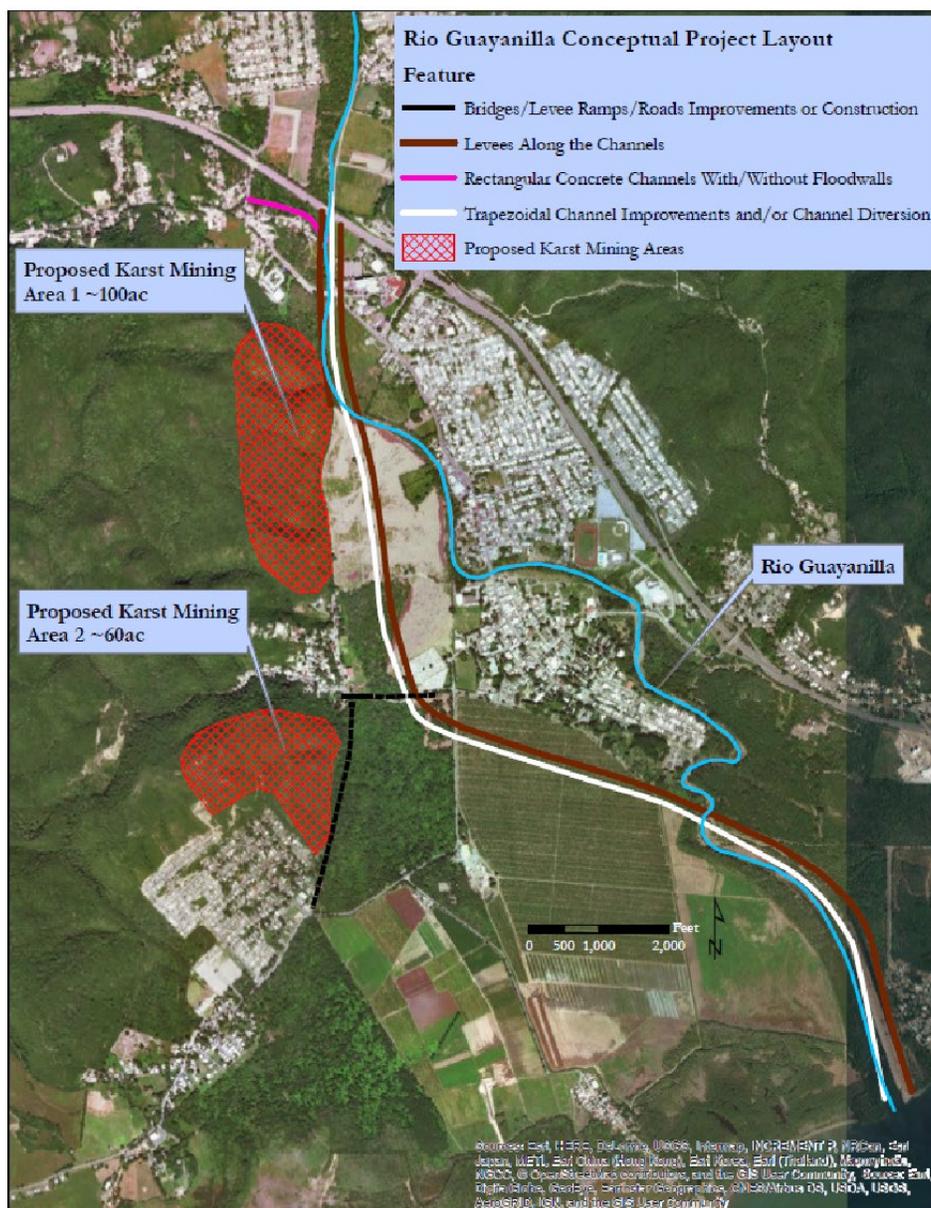


Figure 2. Initial Conceptual Plan (Corps 2019)

Based on Service’s Planning Aid Report, the borrow area was eventually reduced in size but still located in the karst hills. After several site visits and studying the area, the Service recommended an alternative borrow site, which was previously used for the construction of a residential development (Figure 3). Although this site is also forms part of the karst area, aerial photographs show that it was excavated and cleared of vegetation on more than one occasion. Currently, the area is undergoing slow ecological succession; however, the site provides less

habitat value than the previously proposed borrow sites. Therefore, this area has been selected by the Corps as the preferred Quarry Zone (Figure 3).

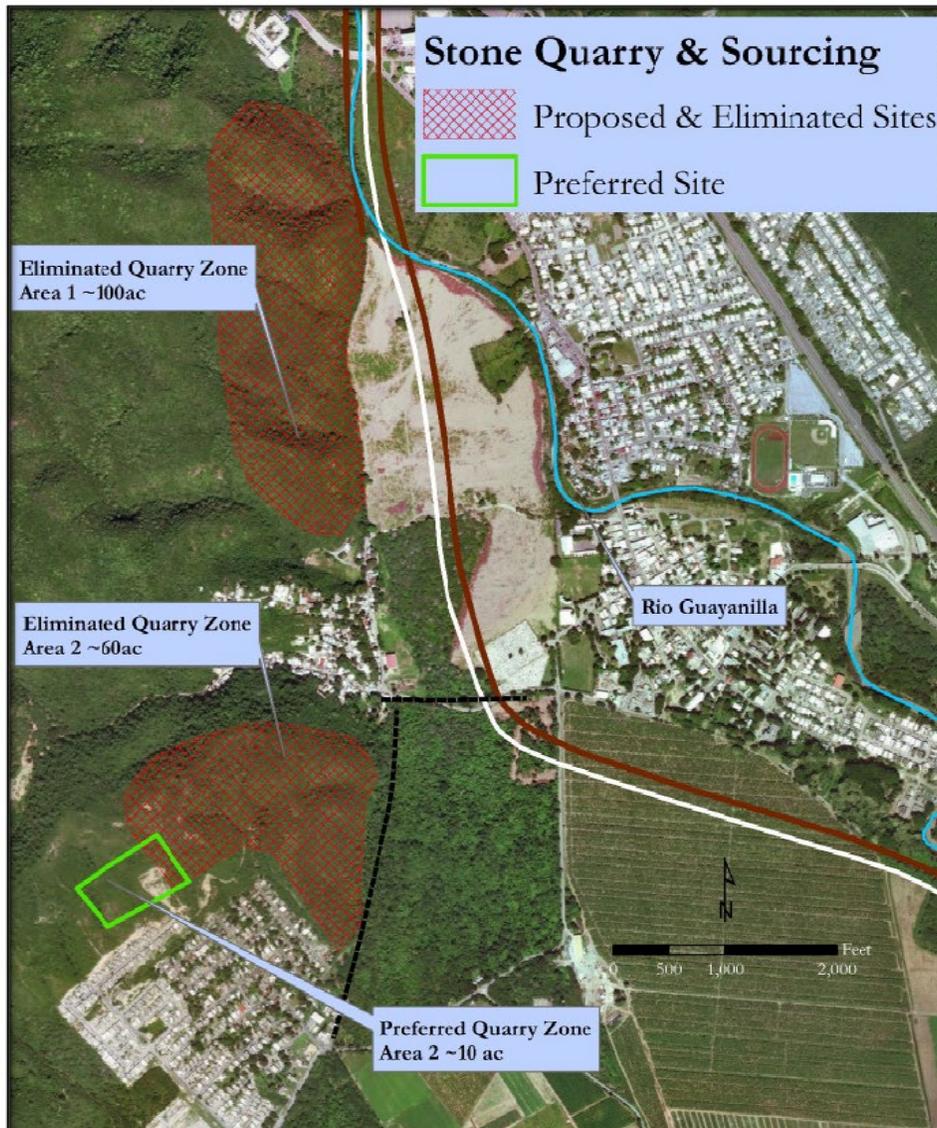


Figure 3. Proposed and Preferred quarry areas for the levee material. This area has been previously disturbed for the construction of a residential area. There are however small patches of remnant dry forest nearby and there exists the possibility of the area being used by native wildlife. (Corps 2019)

4.0 Description and Discussion of the Affected Environment

The Rio Guayanilla is naturally an ephemeral river typical of many of Puerto Rico's south coast rivers. The short coastal plain and sharp rise in elevation tends to cause flash flooding of short

duration but of high water volumes. The river valley and floodplain have been in agricultural production for over 100 years. Sugarcane agriculture has given way to banana farming in the lower floodplain. South of the Highway #2 bridge, karst hills on the west and the town on the east border the Guayanilla River. The town of Guayanilla established itself along the river and eventually the town expanded to encircle the river. The river's floodwaters enter the town creating a constant flood risk. The mouth of the Rio Guayanilla has been previously channelized up to the PR 3336 bridge. During periods of low flow, the mouth can close off with a sand berm forming a brackish water "lagoon" in the channel (Figure 4). This is typical of south coast rivers in Puerto Rico during the island's dry season. The river mouth has an associated mangrove wetland and salt flat area, hydrology for this wetland is via groundwater, overbank flooding and storm surge. Seasonal flooding of this area maintains the salt levels in the soils at a tolerable level for the mangroves. A wetland mitigation site for previous channel work also exists on the western banks of the river.

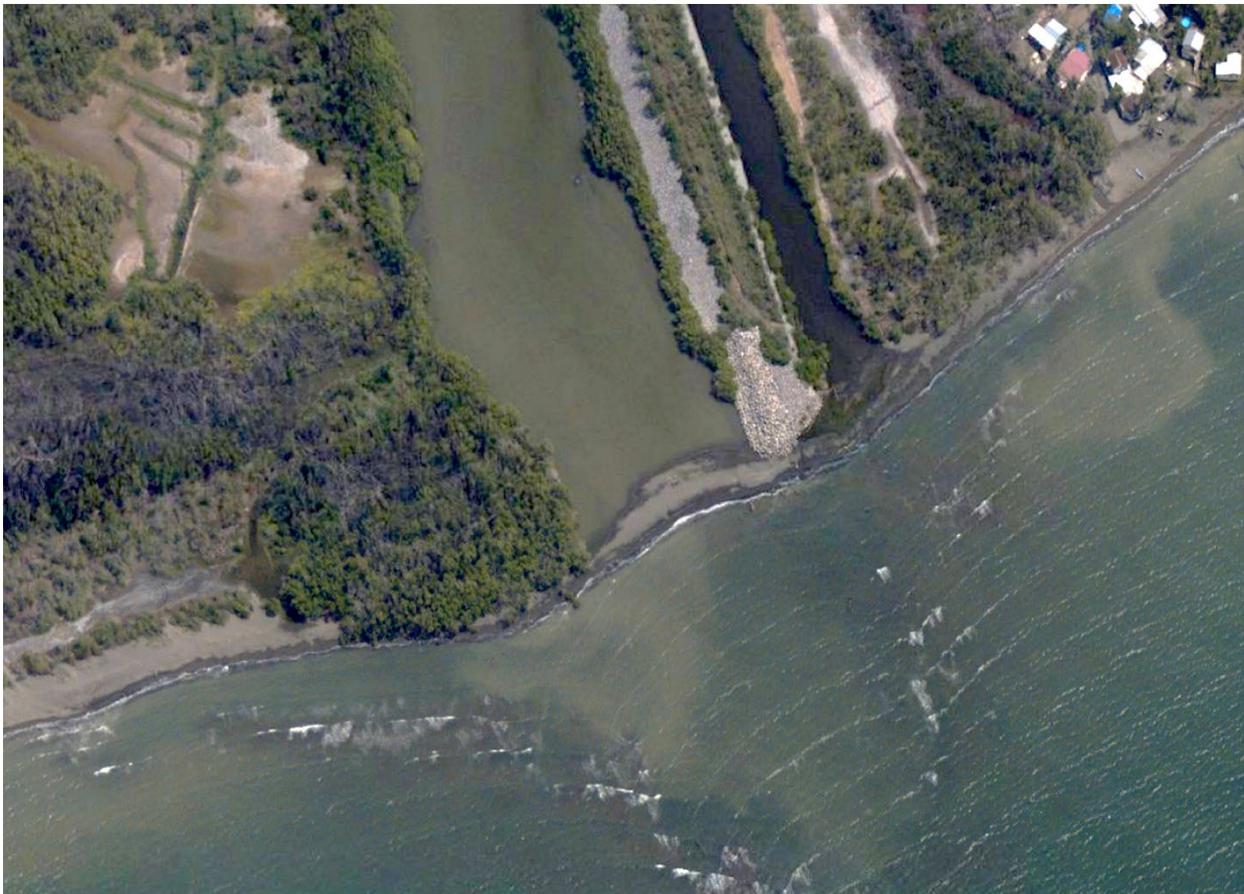


Figure 4. Satellite Photo showing Guayanilla River mouth cut off by sand berm during the dry season.

4.1 River Channel Sections

Natural channel improvements would begin just north of the Puerto Rico Highway #2 (PR 2) and continue to where the river starts turning towards the town. These improvements would involve

excavating back material and debris that has fallen into the river channel and re-defining bank slopes as necessary. The banks would be further stabilized with riprap to prevent further erosion. A road borders the eastern bank of the river; this road provides access to Jagua Tuna Ward. A trunk sewer also runs along this road. In this area, the river is incised between the road and the higher opposite bank. In some areas, the river has undercut the road fill and existing sidewalk. Channel improvements would most likely have to occur on the western bank since there is very little space on the eastern bank between the river and the roadbed. The river bottom in this area is composed of small cobbles, gravel and sand. We recommend disturbing the river bottom as little as possible while working on the riverbanks. The PR 2 bridge serves as a slight constriction in the river channel. Remains of gabion baskets, riprap and concrete are evidence of attempts at erosion protection. At this bridge, the western bank is also higher than the eastern bank, with the relatively unarmored roadbed receiving most of the erosion impacts. Evidence of flood levels is evident on the bridge, support piles and the bank erosion (Figure 5).



Figure 5. East bank of PR 2 bridge, note undercut concrete apron, and large cobbles in river. Downstream of the PR 2 marks the start of the levee and floodwall system. These structures will be located along the eastern bank of the river.

Below the PR 127 bridge there is some evidence of previous in channel work. Gabion drop structures are visible 100 meters downstream. The Corps should evaluate whether these structures need to be removed as part of the proposed channel improvements.



Figure 6. Rio Guayanilla south of PR 127 Bridge.

Beyond this point, a large stilling basin for sedimentation/debris will be constructed to allow normal and low flow storm events as well as maintain riverine connectivity for sediment transport and fish passage through an engineered culvert into the natural river channel, which will continue through the town. This area is composed of abandoned agricultural fields and scrub shrub vegetation.

Flood flows above bankfull, would spill into the diversion channel and bypass the town, connecting with the channelized portion below Road PR 3336. The engineered diversion channel is primarily a concrete-lined trapezoidal channel. The channel base is 100-foot wide with 2-to-1 side slopes extending to natural ground. This alternative would have a levee on the east

side of the diversion channel. The west side of the channel would remain at grade and allow certain magnitudes of flood to spread wider to the west, flooding undeveloped lands, agricultural lands and the mangroves wetlands associated with the river mouth. The diversion channel's side slope of the levee would be lined with riprap to prevent erosion. Upstream of the diversion channel, a combination of levees and floodwalls would be installed on the eastern side of the river channel.

The diversion channel will run in between the existing cemetery and the Piedras Blancas community. There are some woodlands in this area with large fruit trees such as mango, tamarind, and West Indian almond. Once the channel crosses PR 3336, it goes into the existing banana fields until it joins into the existing channel work.

Throughout the different sections of the project, Service biologists were able to identify both native and introduced fish and shrimp species indicating that local river fauna are using all sections of the river.

4.2 Mangrove Levee

In order to protect the El Faro community from any overbank flooding, a levee or floodwall is being proposed. The majority of this community is located within or adjacent to existing mangrove or salt flat wetlands. North of the community is an existing banana farm. The levee would start in the existing banana fields. Two drainage channels from the banana fields drain into the mangrove and run parallel behind the houses east of Road PR 582 (Figure 7).



Figure 7. El Faro area showing the approximate location of the existing agricultural drainage channels. Some of these channels may be impacted by the proposed flood levee.



Figure 8. Proposed levee alignment El Faro community (Corps 2019)

The levee is estimated to impact some 5.8 acres of mangrove wetlands permanently and some additional acreage during construction (Figure 8). The area to be impacted is part of a 240 acre basin type mangrove obtaining its hydrology from extreme high tides, coastal flooding and river flooding. Freshwater input provided by the agricultural drainage canals and overbank flooding by the Rio Guayanilla helps maintain salinity levels.

This mangrove basin includes leather fern (*Acrostichum* spp) and cattails (*Typha* spp) along the fringes of the drainage ditches with red mangroves (*Rhizophora mangle*), away from the drainage ditch as salinities increase, this may result into black (*Avicennia nitida*) and white mangroves (*Laguncularia racemosa*). It also contains areas of bare salt flat. The Corps has developed a mitigation plan to address wetland impacts.

4.3 Quarry

Based on aerial photography, the selected quarry site was previously used for the construction of the La Concepcion Urbanization. Most of the area was scraped of vegetation in 2003, but by 2006 some areas were starting to recover. Some small areas were not cleared and the vegetation found in these areas tends to be completely different in nature from the previously cleared areas.

Service and PRDNER biologists surveyed the site on November 4, 2019. During this survey, no federally listed plant species were found. However, the area has been recovering for the last 13 years and has reached a canopy height and cover that may support wildlife resources. During the

vegetation surveys two wildlife recorders were deployed to document any evidence of listed species using the area.. The recorders were recovered on November 13, 2019. The result from the recorders showed the presence of the federally endangered Puerto Rico nightjar. Furthermore, suitable habitat for the Puerto Rican boa was documented at the site.

4.3.1 Quarry Access Roads

Current access to the quarry is through the La Concepcion urbanization; however, there is a previously used road to the east, the Corps has proposed a road access to the north joining with the existing landfill access road. The Corps’ proposed quarry access road would require clearing additional relatively undisturbed vegetation and building a new road from the highpoint of the quarry to the landfill access road which runs through the Piedras Blanca Community. The landfill road access is a narrow asphalt road with residential structures on either side, thus, we believe that there is no room to widen or improve this road for heavy traffic.

The former quarry access road is visible in satellite photos up until 2010. This road is an unimproved dirt road running east, around the Sector Beldum community and eventually joining Road 335. This road can be re-established and allow quarry material to exit from a lower elevation. This area was previously surveyed by the Service and is still open in some areas; scrub shrub vegetation dominates the rest. The alternative that would be least impacting would be to re-establishing the old access road. The Corps has accepted to use the old quarry access road as the least impacting alternative.

4.4 Disposal Areas

There are three proposed disposal areas for excavated material; the amount of material to be disposed of depends on the quantity and quality of the material found during channel excavation and bank restoration. Two of the disposal areas are located between the proposed basin and the town cemetery on either side of the diversion channel. This area is composed of unimproved pasture which has little wildlife value and some woodlands composed mainly of fruit trees (mango and tamarind) and fast growing colonizing species. The third disposal area is located between the channel and Road 3336; this disposal area may impact existing banana fields.

5.0 Natural Resource Impacts

With the exception of the previous channel work done in the lower part of the river, and the section that runs through the town of Guayanilla, the Guayanilla River and its associated riverine habitat is relatively intact north of the PR-2 bridge. Puerto Rico’s stream fauna is mostly amphidromous with many of the species having to release eggs or larvae to be carried out into Guayanilla Bay. Once in salt water these eventually migrate back upstream as juvenile of the species. Studies carried out by PRDNER identified the following 8 species of fish at the PR-127 bridge crossing (Kwak 2007):

Species	Common Name	Nativity
<i>Anguilla rostrate</i>	American Eel	Native

<i>Oreochromis mossambicus</i>	Mosambique Tilapia	Introduced
<i>Eleotris perniger</i>	Smallscaled Spinycheeked Sleeper	Native
<i>Gobiomorus dormitor</i>	Bigmouth Sleeper	Native
<i>Awaous banana</i>	River Goby	Native
<i>Sicydium plumeri</i>	Sirajo Goby	Native
<i>Pomadasys crocro</i>	Burro Grunt	Native
<i>Agonostromus monticola</i>	Mountain Mullet	Native

A site visit of the riverine sections of the project was carried out by Service biologists Alexandra Galindo, Jose Martínez and Félix López on November 1, 2019. The following aquatic species were visually identified:

Species	Common Name	Nativity
<i>Agonostromus monticola</i>	Mountain Mullet	Native
<i>Oreochromis mossambicus</i>	Mosambique Tilapia	Introduced
<i>Awaous banana</i>	River Goby	Native
<i>Xiphocaris elongate</i>	River shrimp	Native

Previous fieldwork has concentrated on the fish species found in the rivers of Puerto Rico, however, there is an entire suite of freshwater shrimp that make up a large part of the native river fauna. It is safe to assume that in addition to *Xiphocaris*, the following macroinvertebrates probably could be found in Rio Guayanilla:

Species	Common Name	Nativity
<i>Macrobrachium acanthurus</i>	River shrimp	Native
<i>Macrobrachium carcinus</i>	River shrimp	Native
<i>Macrobrachium faustinum</i>	River shrimp	Native
<i>Micratya poeyi</i>	River shrimp	Native
<i>Potimirim glabra</i>	River shrimp	Native

Maintaining continuity between the river mouth and the upper reaches of Rio Guayanilla is vital to maintaining the freshwater fauna biodiversity of the river. The Corps is proposing to maintain natural flow through the existing river channel via a culvert size to estimate bank full flows. We recommend a bottomless culvert design to maintain natural riverbed continuity in the DCAR, The Corps has incorporated the use of a bottomless culvert criteria in its IFR. The proposed stilling basin should be designed to maintain a natural riverbed during periods of normal flows, this would provide the continuity of flow and cues needed by native river fauna for their upstream migration.

Any non-structural bank stabilization and improvements should strive to maintain the existing river width and depth. Increase widening of the river channel can cause lower velocities and increase deposition of bed load, altering the riverbed characteristics.

5.1 Proposed Quarry Area

Although the currently proposed quarry area has been previously impacted and the vegetation for the most part composed of early successional and invasive vegetation, there is enough canopy and ground cover to provide habitat for wildlife species. On November 4, 2019, Service biologists Omar A. Monsegur-Rivera, Marielle Peschiera, José G. Martínez, and Félix López along with José Sustache-Sustache (Puerto Rico PRDNER) surveyed the proposed quarry area and its surroundings for listed plant species and sensitive habitats.

The site is located within the subtropical dry forest life zone overlying a limestone substrate (Ewel and Whitmore 1973), and is part of the geographical range known as Montes de Barinas (group of hills along the boundary of the municipalities of Yauco and Guayanilla). This site is just adjacent to the designated critical habitat of *Varronia rupicola* (threatened) (Montes de Barina Unit). However, the project site is adjacent to an urban area, and the site was used as a quarry in the past. An assessment of aerial images shows the project site was bulldozed by 2003.

With the exception of a small remnant forest associated with a hilltop immediately west of the proposed quarry, the area has had landscape alteration in the past. The best quality habitat is associated with the hilltop remnant of native forest. This area showed an open understory with little evidence of exotics, although we did not identify any federally listed species. Puerto Rico endemics identified were *Ipomoea steudelii*, *Thouinia striata* var. *portoricensis* and *Machaonia portoricensis*, all of which are considered common in dry forest habitat. The quarry boundary curves around this hilltop following a natural drainage, the vegetation structure of the quarry area is an early successional forest dominated by species such as *Bourreria succulenta*, *Leucaena leucocephala*, *Croton* spp. and *Lantana involucrata*. In fact, the majority of the site is dominated by stands of *Leucaena leucocephala* and *Megathyrsus maximus*. The only federally listed plants that may occur under such disturbed site may be *Varronia rupicola* and *Catesbaea melanocarpa*. However, no federally listed plants were identified within the proposed project area. The likelihood for the presence of *V. rupicola* and *C. melanocarpa* is minimal, considering the area was previously bulldozed.



Figure 9. Track of vegetation survey



Figure 10. 2003 Aerial photo showing the proposed quarry site, and the associated remnant of native forest.

Two AudioMoth recorders were activated and deployed during the November 4, 2019 vegetation survey. Both recorders were configured to record for 1 minute every 10 minutes for a total of 144 recordings per each 24 hour period (6 per hour). Recorders were collected and deactivated the night of Nov. 13 2019. The audio from recorder #1 revealed Puerto Rican nightjars calling both at dawn and at dusk on different days.

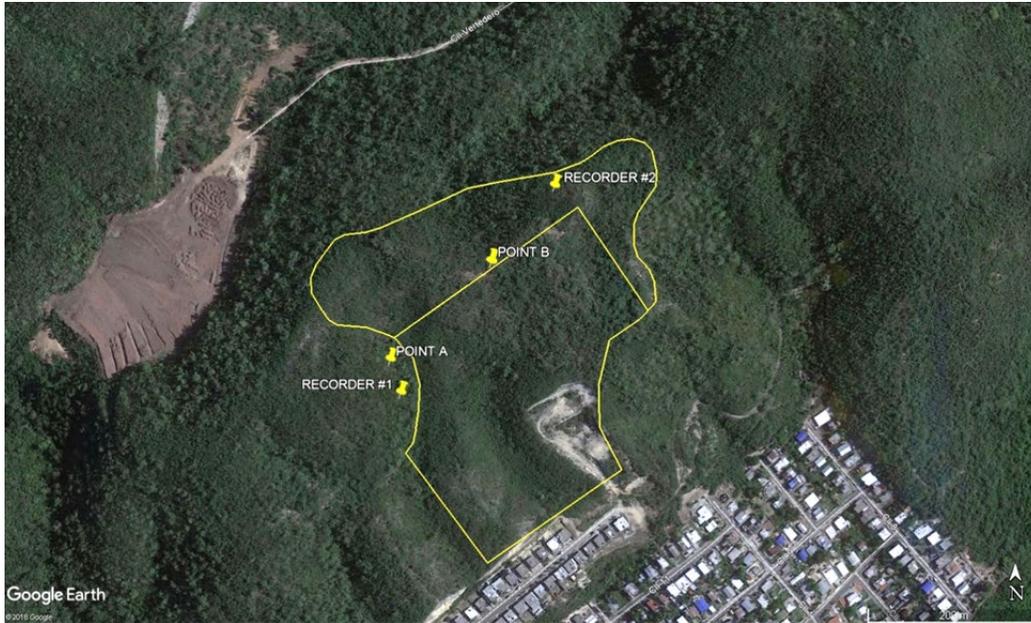


Figure 9. Location of recorders and survey call points

On the night of November 13, Service biologists José G. Martínez and Jan P. Zegarra retrieved the recorders, they detected 2 nightjars calling close to recorder #1 (Point A located within the native hilltop forest). Nightjars were first detected calling at 6:05PM and were heard calling throughout the rest of the site visit in the same general area close and around recorder #1. At Point B, another nightjar was heard calling far away (more than 200m) towards the north (330°) at 6:40PM. At 7:02PM, another nightjar was heard calling far away from recorder #2. One callback effort was made at this site following González (2010) in which a nightjar call is broadcast for 1 minute, followed by 2 minutes of listening for a calling response. At 7:09PM after the callback, we heard a nightjar calling far away more or less at 300° from the recorder #2 point.

5.2 Threatened and Endangered Species

The only listed species observed on the site is the Puerto Rican nightjar. The Puerto Rican nightjar or Puerto Rican Whip-poor-will is a bird in the nightjar family found in the coastal dry scrub forests in localized areas of southwestern Puerto Rico. It nests on the ground under closed canopies and needs an abundant leaf layer to hold the eggs. The peak months for nesting activity are April–June. Like many ground-nesting birds, the nightjar will try to divert the attention of potential predators away from the nest by conspicuously flying away and vibrating its wings.



Figure 10. PR nightjar. (USFWS)

In addition to the PR nightjar, the listed Puerto Rican boa may also be found in the area. This nonpoisonous snake lacks any bright coloration making it difficult to see in the vegetation or in the trees.



Figure 11. Puerto Rican boa. (USFWS)

The Service has developed conservation measures for construction projects for both species. These conservation measures are included in Appendix 1. These measures were included in the IFR and Corps ESA consultation.

5.3 Mitigation for Environmental Effects

If the proper design and precautions are taken to maintain bankfull flow through the natural river channel, mitigation would not be required for the proposed channel work and stilling basin. It was determined that compensatory mitigation (40 C.F.R. § 230.93) would be implemented for the loss of 5.8 acres of perennial estuarine interior basin mangrove wetland/habitat and associated fauna as described for Clean Water Act compliance in the Corps 404(b)(1) Analysis (Corps 2020 Appendix A2). The effects under NEPA are considered to be lowered to less than significant by the application of the conservation measure for flow, habitat and connectivity as well as 6 acres of compensatory mitigation. Planning analyses were completed to identify the least environmentally damaging alternative. These elements of the Recommended Plan are described in the Corps 2020 Appendix A3 Mitigation, Monitoring and Adaptive Management Plan.

The Service and the Corps have been collaborating in the development of the mitigation plan, Appendix A3 describes the proposed mitigation which will comprise 1:1 ratio. The recommended mitigation alternatives plan (MAP) is the enhancement/restoration of a bare salt flat area near the river (Figure 12). This area was previously recommended by the Service is the DCAR.



Figure 12. Possible compensatory mangrove mitigation site for proposed El Faro Levee.

Maintaining proper hydrology to the remaining mangroves in the area is also important. The Corps is proposing to allow a certain amount of overland flooding to keep the mangroves from becoming hypersaline. Irrigation drainage from the adjacent banana fields also needs to be taken into consideration and the existing ditches could be re-routed to discharge into the surrounding mangroves.

The Corps and the Service will continue to work on the design of this mitigation plan. The Corps has developed a Monitoring and Adaptive Management Plan with projected funding for a 5-year period once the mitigation is complete. Mitigation measures will generally be scheduled for accomplishment concurrently with other project features in the most efficient way.

The final plan should be closely coordinated with Puerto Rico resource agencies and results of monitoring and analyses should be made available to all interested agencies and stakeholders.

6.0 No Action Alternative

Based on the Corps documentation, if no action is taken, the town of Guayanilla would remain subject to frequent flooding and associated damage, increased life safety risk and other social effects. The current natural and manmade resources of geology, soils, hydrology, river, karst forest, secondary growth shrub/grasslands, and agricultural fields would remain in their current state.

7.0 Summary of Fish and Wildlife Service Position and Recommendations

In 2019, the Service carried out various site visits to different areas within the project footprint. During the site visit, the Service found native aquatic species, which need natural flow due to the species life cycle. The Corps addressed the presence of native aquatic species through its proposal to maintain normal to bankfull flow in the natural river channel, which minimizes impact to the species found. During the site visit of the preferred quarry zone, no federally listed plants were found. However, the endangered Puerto Rican nightjar was confirmed within an adjacent area to the proposed quarry area. Also, suitable for the Puerto Rican boa was identified within and adjacent the project site.

The Corps has proposed the El Faro levee to prevent damage to the community due to overbank flooding. The construction of this levee can cause permanent impact to an estimated 5.8 acres of mangrove forest, with additional temporary impacts during the construction. The Corps has developed a compensatory mitigation plan for mangrove wetland impacts.

Based on the information provided in the IFR and EA and the results of the site visits, the Service has the following comments and recommendations:

1. The conservation measures outlined in the DCAR for the Puerto Rican boa and Puerto Rican nightjar have been included in the IFR/EA, the Corps will continue to work with the Service during the design and construction phases of the project to ensure these measures are implemented properly during work at the proposed quarry.
2. Engineering details regarding construction techniques, maintenance of flows in the original channel, and disposal of excess materials, should be provided to the Service and

other natural resource agencies in a timely manner to ensure conservation measures are fully developed.

3. The Corps has developed a compensatory mangrove mitigation plan for the project, based on our review, we recommend the following:
 - a) A detailed mitigation plan showing design and construction plan showing projected elevation and mangrove planting schemes. The Service will continue to collaborate with the Corps in the design and implementation of this mitigation plan.
 - b) During implementation of the mitigation plan, the Environmental Monitoring and Corrective Action Plan should also be implemented.
 - c) The Corps will coordinate the implementation plan and any required corrective measures with the Service and the Puerto Rico DNER.
 - d) The Corps should consider the beneficial reuse of materials into the plan for wetland and ecosystem restoration.
4. To access the selected quarry for needed material to build the levees, the Corps will minimize impacts to native vegetation by re-establishing the existing access road as the least impacting alternative.
5. To minimize riverbed alterations and maintain the natural flow of the existing river channel, the Corps will use a bottomless culvert design to maintain natural riverbed continuity and upstream migration of the river fauna.

This Report is presented as the official report of the Secretary of the Interior as required by Section 2(b) of the Act. Further coordination with the Service to refine project specifics will continue. At this stage of planning, the Service does not object to the project as proposed, provided that the conservation recommendations and mitigation plan outlined in the IFR are implemented.

8.0 Coastal Barrier Resource Act

The Coastal Barrier Resources Act (CBRA), first enacted in 1982 (16 U.S.C. 3502 et seq.), was reauthorized and amended by the Coastal Barrier Improvement Act (CD3A) of 1990 (16 U.S.C. 3501). Its purpose, as stated in section 2(b), is "...to minimize the loss of human life, wasteful expenditure of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with coastal barriers..." CBRA established the Coastal Barrier Resources System, (CBRS) a mapped series of undeveloped coastal barriers on the Atlantic and Gulf coasts, including the Great Lakes Region, Virgin Islands, and Puerto Rico. Areas within the system are designated as either "units" or "otherwise protected areas" (OPA's). Section 5(a) prohibits all new Federal expenditures and financial assistance within unit boundaries, with some exceptions as determined through a process of consultation.

There are no designated CBRA units within the project area. The closest CBRA units are PR-58-P, Bahia Tallaboa to the east and PR-59, Punta Ballena to the west.

9.0 References

Kwak, T. J., P. B. Cooney, and C. H. Brown. 2007. Fishery population and habitat assessment in Puerto Rico streams: phase 1 final report. Federal Aid in Sport Fish Restoration Project F-50 Final Report, Submitted to Marine Resources Division, Puerto Rico Department of Natural and Environmental Resources, San Juan.

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Appendix A

Species Conservation Measures



U.S. FISH AND WILDLIFE SERVICE CARIBBEAN ECOLOGICAL SERVICES FIELD OFFICE

Conservation Measures for the Endangered Puerto Rican nightjar

Section 7 (a)(1) of the Endangered Species Act (ESA) charges Federal agencies to aid in the conservation of listed species, and section 7 (a)(2) requires the agencies, through consultation with the U.S. Fish and Wildlife Service (Service), to ensure their activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats. Section 7 applies to the management of Federal lands as well as Federal actions that may affect listed species, such as Federal approval of private activities through the issuance of Federal funding, permits, licenses, or other actions. Any person that injures, captures, or kills a Puerto Rican nightjar, destroys a nest, eggs, or hatchlings, are subject to penalties under the ESA. If Federal funds or permits are needed, the funding or permitting agency should initiate Section 7 consultation with the Service. To initiate a consultation under the Section 7 of the ESA, you must submit a project package with the established minimum requirements. These conservation measures should be incorporated into the project plans to minimize possible impacts to the species. Download the [project evaluations fact sheet](#) to learn more about the requirements or visit our [project evaluations webpage](#).

The Endangered Puerto Rican nightjar or guabairo de Puerto Rico (*Antrostomus noctitherus*), previously known as (*Caprimulgus noctitherus*) is an insectivore bird endemic to coastal dry and lower montane forest of south-western Puerto Rico. The species is known to occur in the municipality of Guayama, Salinas, Ponce, Guayanilla, Peñuelas, Guánica, Yauco, Sabana Grande, Maricao, Lajas and Cabo Rojo. It has nocturnal habits and its cryptic plumage makes them difficult to be detected and studied.



The endangered Puerto Rican nightjar is threatened by habitat destruction and degradation, and predation by exotic species such as mongoose, cats, and rats. Removal of vegetation for construction of residential complexes or agricultural practices may result in both short and long-term adverse effects to this species. The species reproductive behavior, including its territoriality, cryptic behavior, and nocturnal behavior can be altered by habitat removal and may result in mortality of eggs, chicks and/or adults. Habitat removal and degradation may also alter the spatial arrangement of nightjar's territories, and result in losing suitable nesting habitat in the future. In addition, habitat alteration creates open corridors for predators and other invasive species.

The Service has developed the following conservation measures with the purpose of assisting others to avoid or minimize adverse effects on Puerto Rican nightjar and its habitat. These recommendations may be incorporated into new project plans and under certain circumstances into existing projects. Depending on the project, additional recommendations can be made besides the ones presented in this document.

1. Conduct a meeting with all personnel involved in the construction and operational activities to discuss the potential presence of the Puerto Rican nightjar in the area, the characteristics of the species and its habitat, and the importance of its protection.
2. Clearly mark the project's footprint on a map and in the field (e.g., with flagging tape) to avoid affecting additional habitat. Maintain all activities within the marked area.
3. The breeding season of the nightjar occurs from February to August. Vegetation clearing should occur outside of the breeding season to minimize possible impacts to eggs, chicks and/or adults.
4. During nesting season, clearing of vegetation may occur only if no suitable habitat for the species will be affected. In this situation, experienced and qualified biologists should search for nightjar nests prior to vegetation removal. If nests are found, contact the Service immediately for further guidance.
5. If construction activities occur during September to January which is outside the nesting season, in suitable habitat or forested areas, surveys of the areas to be impacted should be conducted. If nightjars are found, do not begin any type of work in that area and contact the Service for technical assistance.
6. If a dead, injured, or sick Puerto Rican nightjar is found, the Service should be contacted.

If you have any questions regarding the above conservation measures, please contact the Service:

- Marelisa Rivera, Deputy Field Supervisor
 - Email: marelisa_rivera@fws.gov
 - Office phone 787-851-7297 ext. 206 or mobile 787-510-5219
- José Cruz-Burgos, Endangered Species Coordinator
 - Email: jose_cruz-burgos@fws.gov
 - Office phone 787-851-7297 ext. 218 or mobile 787-510-5206



**U.S. FISH AND WILDLIFE SERVICE
CARIBBEAN ECOLOGICAL SERVICES FIELD OFFICE
MARCH 2019**

Conservation Measures for the Puerto Rican boa (*Chilabothrus inornatus*)

Section 7 (a)(1) of the Endangered Species Act (ESA) charges federal agencies to aid in the conservation of listed species, and section 7 (a)(2) requires the agencies, through consultation with the U.S. Fish and Wildlife Service (Service), to ensure their activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats. Section 7 applies to the management of federal lands as well as federal actions that may affect listed species, such as federal approval of private activities through the issuance of federal funding, permits, licenses, or other actions. Any person that injures, captures, or kills a Puerto Rico boa, destroy eggs is subject to penalties under federal law. If federal funds or permits are needed, the funding or permitting agency should initiate Section 7 consultation with the Service. To initiate a consultation under the Section 7 of the ESA, you must submit a project package with the established minimum requirements. These conservation measures should be incorporated into the project plans to minimize possible effects to the species. Download the [project evaluations fact sheet](#) to learn more about the requirements or visit our [project evaluations webpage](#).

The endangered Puerto Rican (PR) boa (*Chilabothrus inornatus*, formerly *Epicrates inornatus*) is an endemic species and it is the largest snake that inhabits Puerto Rico. The PR boa is a non-venomous snake that does not pose any life threatening danger to humans, but be aware that some individuals may try to bite if disturbed or during capture or handling. The PR boa body color ranges from tan to dark brown with irregular diffuse marking on the dorsum but some individuals lack marking and are uniformly dark. Juveniles may have a reddish color with more pronounced markings. In general, as they mature, their body color tends to darken.



The PR boa has an island-wide distribution and occurs in a wide variety of habitat types ranging from wet montane to subtropical dry forest and can be found from virgin forest to areas that exhibit various degrees of human disturbance like roadsides or houses, especially if near their habitat. The PR boa is considered mostly nocturnal, remaining less active concealed or basking in the sun during the day.

The U.S. Fish and Wildlife Service (Service) has developed the following conservation measures with the purpose of assisting others to avoid or minimize adverse effects to the species and its habitat. These recommendations may be incorporated into new project plans and under certain circumstances into existing projects. Depending on the project, additional recommendations can be made besides the ones presented in this document.

Conservation Measures:

1. Inform all project personnel about the potential presence of the PR boa in areas where the proposed work will be conducted. A pre-construction meeting should be conducted to inform all project personnel about the need to avoid harming this species as well as penalties for harassing or harming boas. An educational poster or sign with photo or illustration should be displayed at the project site.
2. Prior to any construction activity, including removal of vegetation and earth movements, the boundaries of the project area and areas to be excluded and protected should be clearly marked in the project plan and in the field in order to avoid further habitat degradation into forested and conservation areas.
3. Once areas are clearly marked and prior to use of heavy machinery and any construction activity (including removal of vegetation and earth movement), a biologist or experienced personnel should survey the areas to be cleared to verify the presence of any PR boa within the work area. This should be done daily for the duration of the entire project.
4. The PR boa is considered more active at night. Thus, in order to maximize PR boa detection, the species can be searched for the night(s) prior to any vegetation clearing starts according to the construction plan and if snakes are found, they can be relocated accordingly (see #7).
5. Once the area has been searched for PR boas, vegetation should first be cleared by hand to the maximum extent possible. Vegetation should first be cut about one meter above the ground, prior to the use of heavy machinery for land clearing. Once land is cleared by hand, this will allow boas present on site to potentially move away on their own to adjacent available habitat. If there is no suitable habitat adjacent to the project site, any PR boas found need to be relocated accordingly (see #7).
6. For all boa sightings (dead or alive), record the time and date of the sighting and the specific location where it was found. PR boa data should also include a photo of the

animal (dead or alive), relocation site GPS coordinates, the time and date of the relocation, and comments on how the PR was detected and its behavior.

7. If a PR boa is found within any of the working or construction areas, activities should stop at the area where the PR boa is found and information recorded (see #6). Boas should be safely captured and relocated at least 1 km within suitable habitat (forested) and away from construction areas. Potential boa relocation sites should be pre-determined before the project starts and sites shared with the Service for review. Relocation of boas should be done by trained and designated personnel, and shall not harm or injure the captured boa. Activities at other work sites, where no boas have been found after surveying the area, may continue.
8. If immediate relocation is not an option, project related activities at this area should stop until the boa moves out of harm's way on its own or call the Puerto Rico Department of Natural and Environmental Resources (PRDNER) Rangers for safe capture and relocation (phone #'s: 787-724-5700, 787-230-5550, 787-771-1124). The potential use of the PRDNER staff for these purposes should be coordinated with them at least 30 days before the project starts. If a PR boa is captured by the PRDNER, record the name of the PRDNER staff and information on where the PR boa will be taken.
9. Measures should be taken to avoid and minimize PR boa casualties by heavy machinery or motor vehicles being used on site. Any heavy machinery left on site (in staging) or near potential PR boa habitat (within 50 meters of potential boa habitat), needs to be thoroughly inspected each morning before work starts to ensure that no boas have sheltered within engine compartments or other areas of the equipment. If PR boas are found within vehicles or equipment, boas need to be safely captured and relocated accordingly (see #7).
10. PR boas may also enter or occur within debris piles. Measures should be taken to avoid and minimize boa casualties associated with sheltering in debris piles as a result of project activities. Debris piles should be placed in areas farthest away from forested areas. Prior to moving, disposing or shredding, debris piles should be carefully inspected for the presence of boas. If debris piles will be left on site, we recommend they be placed in an undisturbed area.
11. If the event a dead PR boa is found, immediately cease all work in that area and record the information accordingly (see #6). If the PR boa was killed as part of the project actions, please include information on what conservation measures had been implemented and recommendations on what will be done to avoid further killing more individuals. A dead boa report should be sent by email (see contacts below) to the Service within 48 hours of the event.
12. Projects must comply with all state laws. Please contact the PRDNER for further guidance.

If you have any questions regarding the comments above, please contact the USFWS Monday to Friday 8am-430pm:

- Marelisa Rivera, Deputy Field Supervisor
 - Email: marelisa_rivera@fws.gov
 - Office phone 787-851-7297 ext. 206 or mobile 787-510-5219
- José Cruz-Burgos, Endangered Species Coordinator
 - Email: jose_cruz-burgos@fws.gov
 - Office phone 787-851-7297 ext. 218 or mobile 787-510-5206