SUPPORTING STATEMENT – PART A

Benefits of Puerto Rico Beaches – 0710-CBRS

1.   Need for the Information Collection

Abstract and Authorities
The purpose of this study, *Estimating Recreation Value and Recreation National Economic Development Benefits for Federal Shore Protection Projects: An Application of Travel Cost and Stated Preference Methods*, is to employ necessary methods of welfare economics for analyzing the net economic value of beach re-nourishment. USACE Principle and Guidelines stipulates that when beach visitation exceeds the 750,000 annual visitation threshold, contingent valuation (CV) or travel cost method (TCM) are the required metrics for measuring benefits accruing from recreation. This study will produce empirical estimates of economic value of beach replenishment, focusing on recreation value, how recreation value varies with programmatic attributes, and economic impacts stemming from changes in recreation and recreation value. This study will employ utility-theoretic micro-econometric models with revealed and stated preference data, and focus on San Juan, Puerto Rico. This project is being conducted as part of the Puerto Rico Coastal Study and the San Juan Metro Area, Puerto Rico Study. Section 204 of the Flood Control Act of 1970 (Title II of Public Law 91-611) authorizes the Secretary of the Army, acting through the Chief of Engineers, to prepare plans for the development, utilization and conservation of water and related land resources of drainage basins and coastal areas in the Commonwealth of Puerto Rico. The initial project scope also included data collection in Dade County FL, Pinellas County FL, Collier County FL, and Folly Beach SC. However, the COVID-19 pandemic prohibited the collection of necessary information onsite. An alternative data source was found for those counties, but these data do not provide information on Puerto Rico beaches. Thus, the project scope has been modified to assess beach visitation and erosion management preferences for Puerto Rico residents and international beach visitors. To this end, the study includes the "Puerto Rico Beaches" survey version for Puerto Rican residents and the "Caribbean Visitor Survey" version for international visitors.

Expanded Justification
Federal beach nourishment projects are a primary means of protecting infrastructure and property along the oceanfront. In addition, these projects enhance recreation opportunities and provide essential services for citizens and visitors. Beach nourishment can improve the quality of life in the beach community by fostering economic development, strengthening the sense of community, increasing property values, and preserving the environment.

Policy makers spend a significant amount of money to maintain beaches and are interested in the economic value and impact of beaches on their economies. The specific economic benefits and tax revenues accruing to local government from beach tourism are of great interest to municipal officials. Economic impact numbers estimate how much people spend on a particular activity including complementary spending (lodging at beach hotels, gas,

etc.). This study will provide policy makers with information on how much the public will benefit in return for the cost of beach nourishment.

Benefits from beach nourishment for project sites will accrue to those who live near the beach, visit for recreation, or participate in the local economy. Benefits can include use and non-use values. Non-use values include existence (individual economic values stemming from knowing that a resource exists and is preserved), bequest (economic values related to future generations use and non-use values), and vicarious use (economic values engendered by others' use of a resource) motivations. While use benefits can be measured using hedonic property value methods, recreational demand methods, and other revealed preference approaches, only stated preference methods can capture non-use. There are limited stated preference studies on Caribbean locations and none specifically on Puerto Rico sites; there are no studies specifically estimating willingness to pay (WTP) for beach improvements that can be used to assess recreation value and national economic development (NED) benefits. This study will provide policy makers with information on how much the public will benefit in return for the cost of the programs. USACE plans to use the WTP estimates from the survey in conjunction with the storm damage reduction benefits to develop a benefit-cost analysis to calculate expected net benefits of the beach nourishment projects.

USACE plans to use the results of the travel cost models and stated preference (SP) questions to estimate the WTP for beach improvements that will be used to assess the NED benefits and economic welfare impacts of beach nourishment in Puerto Rico. The information collected will provide vital data on NED benefits and economic impacts for both existing water resource projects and proposed water resource development. Estimating marginal benefits from nourishment projects requires assessment of current economic values attributable to the beach, how values and behavior might change if the beach is not nourished, and how values and behavior changes if the beach is nourished to create a wider beach and other services are provided (access points, parking, etc.). In this project, the TCM will be combined with the stated preference methods to estimate economic values of environmental services (e.g. Whitehead et al 2008, 2010) and how these services may change in the future.

USACE plans to use the willingness to pay estimates from the survey in conjunction with the storm damage reduction benefits to develop a benefit-cost analysis to calculate expected net benefits of the beach nourishment projects. The Federal Water Project Recreation Act of 1965 (Pub. L. 89-72) requires that full consideration be given to the opportunities that Federal multiple-purpose and other water projects afford for outdoor recreation. The Corps implementation of the Principles and Guidelines, and the total of the laws and policies governing water resources development policy for the agency, is outlined in Engineering Regulation (ER) 1105-2-100, which also allows for the inclusion of recreation benefits to produce benefits in excess of costs as long as at least fifty percent of the benefits needed to do so come from the primary project purpose unless the recommendation is for nonstructural acquisition within a floodplain. In the case of a coastal project, recreation benefits are purely incidental. The benefits inform the

identification of the National Economic Development plan, as identified in the Principles and Guidelines.

Literature Review

The coastal zone is one of the most dynamic natural systems on earth, with unremitting wind and waves, occasional storms, and sea level change playing key roles in process and evolution. Various patterns of sediment erosion and accretion can rise, with an overwhelming majority (80 to 90 percent) of coastline in the eastern U.S. exhibiting net erosion in recent decades (Galgano and Douglas 2000). Climate change threatens to increase the intensity of coastal storms (Hoyos, et al. 2006) and accelerate sea level rise (IPCC 2007). Analysis conducted by the Heinz Center (2000) suggests that one in four homes within 500 feet of the U.S. east coast could be directly or indirectly lost to erosion in the next 60 years, at a potential cost of $530 million each year. Beach replenishment – the addition of primarily dredged sand – has been a widespread policy response in the U.S., with about $60 million (2011 dollars) spent annually by the USACE between 1950 and 2002.

The USACE Principles & Guidelines (P&G) require that beach nourishment projects be justified on the basis of storm damage reduction benefits (i.e., foregone storm damages) and incidental recreation enhancement benefits. In practice, storm damage benefits are assessed by estimating the present value of expected storm damage with and without additional beach sediments to elevate dunes and widen the beach. Accounting for recreation benefits can be satisfied through application of unit-day value estimates, but this approach is only permitted when visitation is below 750,000 visits per annum. For highly visited beach recreation sites, the P&G require primary assessment of recreation benefits.

This project will address the need for original valuation work utilizing survey data for residents of and visitors to Puerto Rico; estimating current and future recreation demand for project beaches; collecting stated preference information that will assist USACE in planning and assessment of beach protection projects; and assessing internal and external validity. This research project will provide for assessment NED Benefits associated with beach erosion control, including estimates of individual and aggregate economic value associated with beach recreation, potential changes in recreation value associated with improvements in beach width (or other management parameters like parking or access points) and how these changes translate into hotel occupancy rates, tax revenues, and economic impacts.

There have been a number of studies that utilize the recreation demand framework to value beach recreation. Recreation demand theory uses travel costs as an exogenous variation in price of beach recreation to identify preferences and WTP. Applications of the single-site model include Bell and Leeworthy (1990) [Florida beaches], Bin, et al. (2005) [North Carolina beaches], Whitehead, et al. (2008) [North Carolina beaches], and Oh, et al. (2010) [South Carolina beaches]. Others have used the random utility models (RUMs) to analyze discrete choice of beach recreation or beach site selection: Parsons, Massey, and Tomasi (1999) use a RUM to model beach visitation decisions in the Northeast U.S. and welfare effects of lost beach width. Lew and Larson (2008) employ RUM analysis to

estimate the value of a San Diego County beach day including erosion factors that affect sand quality. Pendleton, et al. (2012) estimate a RUM for Southern California beaches and find that beach visits increase with beach width nonlinearly, and values differ across individual activity categories.

RUMs can also be used within stated preference analysis to provide evidence of WTP for beach recreation or changes in beach quality. Using this approach, Smith, Zhang, and Palmquist (1997) estimate WTP to cleanup marine debris on beaches in North Carolina. Landry, Keeler, and Kriesel (2003) and Kriesel, Keeler, and Landry (2004) estimate WTP for improved beach width at Tybee Island, and Jekyll Island, Georgia, respectively. Shivlani, Letson and Theis (2003) estimate mean WTP for increases in beach width in Florida. Huang, et al. (2007) consider the RUM framework to evaluate trade-offs associated with beach nourishment in New Hampshire and Maine using a choice experiment. Oh et al. (2008) estimate South Carolina beach visitors' WTP for additional beach access points and parking spaces.

The bulk of recent studies on beach valuation have employed combined revealed and stated preference approaches. Whitehead et al. (2010) and Landry and Liu (2009, 2011) explore parametric and non-parametric models for stacking observed and contingent behavior recreation demand data; they use these models to assess changes in beach width and parking in North Carolina. Similarly, Parsons et al. (2013) combine observed and contingent behavior data to value losses and gains in beach width along the Delaware Bay. Most relevant to our research design, Landry, Shonkwiler, and Whitehead (2020) combine travel cost and contingent valuation data to estimate the value of beach recreation, marginal values for beach width, and non-use values associated with beach renourishment. Their econometric model builds on Eom and Larson (2006) and Huang, et al. (2015), which we describe in the methods section below.

Also relevant to USACE analysis of beach erosion management is the increasing use of dynamic optimization models designed to identify optimal rotation times for beach replenishment. Recent studies have identified efficient sand quantities and scheduling of sediment restoration activities (Landry 2008, 2011; Smith et al. 2009), explored spatial externalities among communities engaging in beach replenishment (Slott, Smith, and Murray 2008; McNamara, Murray and Smith 2011; Lazarus et al. 2011; Williams et al. 2013; Gopalakrishnan et al. 2016, 2017), and examined political economy models of coastal development, risk mitigation, and abandonment (McNamara and Keeler 2013; Mullins, Smith, and McNamara 2018). A recent paper by McNamara et al. (2015) examines the effects of stochastic coastal storms, replenishment costs, erosion rates, and federal replenishment subsidies on optimal beach rotation and the resulting property values.

Our analysis will provide information on household preferences for beach recreation, changes in beach width, improvements in parking and access, and changes in site congestion (which, in turn, depends upon beach width and total visitation). We explore the influence of variability in beach width, site amenities, environmental impacts, and individual characteristics (e.g., environmental attitudes, political ideology, education, income, etc.) on beach recreation values and willingness-to-pay for beach replenishment.

Employing a utility-theoretic valuation framework, we will use revealed preference demand data and stated preference contingent valuation data to estimate total value of coastal erosion management for USACE project beaches, while testing for the presence of non-use value.

2.   Use of the Information

USACE is seeking approval to conduct a revealed and stated preference survey to collect data on beach visitors in San Juan, Puerto Rico. Eligible respondents for this survey are individuals 18 years of age or older that are visiting a beach site in Puerto Rico during the study period (approximately one year following OMB approval); this includes both Puerto Rico residents and international visitors to Puerto Rico (including US citizens). Our mode of data collection will be onsite samples at the study beaches. Onsite sampling assures that we obtain sufficient data from actual beach users, but entails a number of inference problems, which we address below. We will employ an access-point-based sampling strategy, a common approach for recreation and tourism sites where there are multiple entry and exit points (Bowker, Bergstrom, & Gil 2007). For each site, we will catalog access points, classify them along a spectrum of high to low use, and obtain a stratified random sample across those access points, with sampling intensity corresponding to level of usage. Classification will also involve recording potential heterogeneous beach visitor types at each site (e.g. some sites may be more popular with surfers, anglers, etc.). In addition to sampling units being broken down by frequency of use, there will also be a time-of-day component to account for different types of beachgoers who visit in the morning compared to the afternoon.

Morning sampling will run from 8 AM to 12 PM and afternoon sampling will run from 1 PM to 5 PM. Using these two criteria of frequency of use and time of day, sampling units will be developed for each beach season at each study site. The onsite survey will be administered using a pen-and-paper survey instrument. Surveyors will walk in approximate 1-mile increments to the right and left of the beach access site surveying every 3rd beach user group they encounter on busy days (> 70 beach user groups) and all visitors that they encounter on slow days (< 70 beach user groups). If there are multiple people within a party, the beach goer with the most recent birthday will be surveyed to ensure respondents are randomly selected. Surveyors will briefly explain the study and then ask the beach goers to voluntarily participate. If the subjects do not consent to participate, we will employ the following non-response bias protocol.

In order to assess non-response bias, before completing the survey or after refusal to complete the survey, we will attempt to ask non-respondent two questions:
- City/postal code (for domestic Puerto Ricans) and Country of residence (for visitors)
- Number of beach trips [or days onsite]

If we are able to obtain responses to these two questions, it will permit us to estimate the potential magnitude of non-response bias. We will employ Chi-square and Wilcoxson-Mann-Whitney tests to assess differences across respondents and non-respondents.

For subjects that consent to participate, the surveyor will leave a clipboard, survey, and pen with the beachgoer and come back 15-20 minutes later, giving the beachgoer time and privacy to fill out the survey. This also provides the ability for the surveyor to administer other surveys down the beach before doubling back to pick up completed surveys. We plan to provide each surveyor 5-10 clipboards at a time so that he/she can efficiently administer other surveys while other respondents are completing surveys. This type of survey loop will be completed until the end of the sampling time frame.

Data collected from intercepted beach visitors will focus on trips to the intercept site. RP and SP (contingent behavior) data will be centered primarily on the intercept site, as will CV and CE data. In addition to collecting information from beach-goers, our surveyors will obtain a count of beach visitors within a standardized unit of area to get a measure of functional density (AKA congestion). Following Parsons, et al. (2015) we will use the data on counts combined with survey data on length of stay to estimate the total number of daily users and congestion measures during the morning and afternoon sampling periods. This information can also be used to correct for potential endogenous stratification across sites.

The information from the surveys is used to estimate recreation value and recreation NED benefits and economic impacts for both existing water resource projects and proposed water resource development. Estimating marginal benefits from nourishment projects requires assessment of current economic values attributable to the beach, and how values might change if the beach is not nourished or if the beach is nourished to create a wider beach. In this project, the travel cost method (TCM) should be combined with stated preference methods to estimate economic values of environmental services (e.g. Whitehead, et al. 2008, 2010) and how these services may change in the future.

The findings from this study will be used by the USACE to estimate recreation benefits in accordance with Economic and Environmental Principles and Guidelines for Water and Related Land Resources (1983). Specifically, the survey will be used to estimate the public's WTP for changes in environmental attributes of beaches in San Juan, Puerto Rico. The survey is being developed, conducted, and analyzed by contract support provided by Dr. Craig Landry, Professor of Agricultural and Applied Economics, University of Georgia Athens.

3.   Use of Information Technology
No information technology will be used in direct collection of data. Paper surveys with clipboards provide a convenient way for subjects to complete the survey.

4.   Non-duplication
The information obtained through this collection is unique and is not already available for use or adaptation from another cleared source.

5.   Burden on Small Businesses
This information collection does not impose a significant economic impact on a substantial number of small businesses or entities.

6.   Less Frequent Collection

The survey is a one-time survey and is therefore the most infrequent collection interval possible.

7.   Paperwork Reduction Act Guidelines
This collection of information does not require collection to be conducted in a manner inconsistent the guidelines described in 5 CFR 1320.5(d)(2).

8.   Consultation and Public Comments

Part A: PUBLIC NOTICE

A 60-Day Federal Register Notice (FRN) for the collection published on Thursday, April 29, 2021. The 60-Day FRN citation is 86 FR 22639.

No comments were received during the 60-Day Comment Period.

A 30-Day Federal Register Notice for the collection published on Friday, February 11, 2022. The 30-Day FRN citation is 87 FR 8004.

Part B: CONSULTATION

Individuals were consulted on statistical aspects of the designs. This information can be found in Supporting Statement Part B.

9.   Gifts or Payment
No payments or gifts are being offered to respondents as an incentive to participate in the collection.

10.   Confidentiality
A Privacy Act Statement is not required for this collection because we are not requesting individuals to furnish personal information for a system of records.

A System of Record Notice (SORN) is not required for this collection because records are not retrievable by PII.

A Privacy Impact Assessment (PIA) is not required for this collection because PII is not being collected electronically.

The survey instruments and results will be retained in current filing area (CFA) until for 30 years after the event, then transfer to National Archives and Records Administration (NARA). Event is the completion, de-authorization, or unfavorable report of project.

11.   Sensitive Questions
The surveys include race and ethnicity questions. Research in the field of recreation has shown differences in recreation preferences, activity participation, and expenditures among socio-economic groups. Respondents will be asked which of the following

categories best describes their household's total annual income before taxes in the last calendar year and employment status. Income and employment information is used to estimate the opportunity cost of travel time in the travel cost model, which is necessary to estimate recreation benefits. Income measures are also used as independent variables in recreation demand and contingent valuation/choice experiment models; results provide support for internal validity and assessment of income effects on preferences. Race and employment information is meant to construct demographic distribution of visitors and will not be used further.

12.   Respondent Burden and its Labor Costs

Part A: ESTIMATION OF RESPONDENT BURDEN

1) Collection Instrument(s)
   Puerto Rico Beaches Survey (Domestic)
      a) Number of Respondents: 540
      b) Number of Responses Per Respondent: 1
      c) Number of Total Annual Responses: 540
      d) Response Time: 20 minutes
      e) Respondent Burden Hours: 180 hours

   Caribbean Visitors Survey
      a) Number of Respondents: 400
      b) Number of Responses Per Respondent: 1
      c) Number of Total Annual Responses: 400
      d) Response Time: 20 minutes
      e) Respondent Burden Hours: 133.33 hours

2) Total Submission Burden
      a) Total Number of Respondents: 940
      b) Total Number of Annual Responses: 940
      c) Total Respondent Burden Hours: 313 hours

Part B: LABOR COST OF RESPONDENT BURDEN

1) Collection Instrument(s)
   Puerto Rico Beaches Survey (Domestic)
      a) Number of Total Annual Responses: 540
      b) Response Time: 20 minutes
      c) Respondent Hourly Wage: $8.50
      d) Labor Burden per Response: $2.83
      e) Total Labor Burden: $1,530.00

   Caribbean Visitors Survey
      a) Number of Total Annual Responses: 400
      b) Response Time: 20 minutes

      c) Respondent Hourly Wage: $20.17

      d) Labor Burden per Response: $6.72

      e) Total Labor Burden: $2,689.33

2) Overall Labor Burden

      a) Total Number of Annual Responses: 940

      b) Total Labor Burden: $4,219

For the Domestic Puerto Rico Survey an updated minimum wage of $8.50 was used in anticipation of a 2022 fielding. Median hourly wage ($20.17) was considered a better indicator of hourly wage for Caribbean Visitor Survey because more than half of the US states (where 90% of Puerto Rico international visitors originate) have a minimum wage greater than federal minimum wage and because the "travel" market has some level of disposable income.

13. <u>Respondent Costs Other Than Burden Hour Costs</u>

There are no annualized costs to respondents other than the labor burden costs addressed in section above of this document to complete this collection.

14. <u>Cost to the Federal Government</u>

Part A: LABOR COST TO THE FEDERAL GOVERNMENT

1) Overall Labor Burden to the Federal Government: None

Part B: OPERATIONAL AND MAINTENANCE COSTS

1) Cost Categories

      a) Equipment: $0

      b) Printing: $0

      c) Postage: $0

      d) Software Purchases: $0

      e) Licensing Costs: $0

      f) Other: $24,922 for Contracts with University of Puerto Rico - Carolina

2) Total Operational and Maintenance Cost: $24,922

Part C: TOTAL COST TO THE FEDERAL GOVERNMENT

1) Total Labor Cost to the Federal Government: $0

2) Total Operational and Maintenance Costs: $24,922

3) Total Cost to the Federal Government: $24,922

15. <u>Reasons for Change in Burden</u>

This is a new collection with a new associated burden.

16.   Publication of Results

Results of the study will be submitted to USACE personnel for analysis of beach erosion management projects. In addition, statistical analysis of recreation demand and stated preference analysis for Puerto Rico beaches derived from the Puerto Rico Domestic survey will be submitted to an archival, social science/economics journal within 1 to 2 years of project completion. No individual identifiable information will be published only summary regression results of count data demand models (Poisson, Negative Binomial regressions) and discrete choice models (Mixed Logit regression) will be presented (in addition to summary statistics). Similarly, results from the visitor survey will also be submitted to an archival, social science/economics journal along a similar (but staggered) time frame. The visitor data will focus primarily on mode (air v. cruse) and site choice, as well as the influence of beach quality and erosion management efforts of recreation value and willingness to pay. Publication of results will permit further meta-analysis and benefits transfer for assessment of other coastal erosion efforts.

17.   Non-Display of OMB Expiration Date

We are not seeking approval to omit the display of the expiration date of the OMB approval on the collection instrument.

18.   Exceptions to "Certification for Paperwork Reduction Submissions"

We are not requesting any exemptions to the provisions stated in 5 CFR 1320.9.

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