

National Park Service  
U.S. Department of the Interior

Fort Pulaski National Monument  
Georgia



# Fort Pulaski Bridge Environmental Assessment

March 2015



# ENVIRONMENTAL ASSESSMENT for the FORT PULASKI BRIDGE

## at

## FORT PULASKI NATIONAL MONUMENT

### Georgia

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#### SUMMARY

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Fort Pulaski Bridge provides the only access to Cockspur Island and Fort Pulaski. Since its construction in 1938, several repair and rehabilitation projects have been completed to extend the life of the bridge; however, the bridge continues to show signs of deterioration. An Environmental Assessment (EA) was prepared by the National Park Service (NPS), in cooperation with the Federal Highway Administration (FHWA) for the repair and/or replacement of the Fort Pulaski Bridge in January 2013. In the January 2013 EA, several rehabilitation and replacement alternatives were analyzed, and Alternative D, rehabilitation of the existing bridge, was identified as the preferred alternative. Further review of the cost estimates of the proposed alternatives and investigation of the use of alternative bridge types changed the analysis regarding whether replacement of the existing bridge on a new alignment was cost-prohibitive. This EA was prepared to provide the updated analysis regarding the reasonable and feasible alternatives and their impacts and reevaluate alternatives that were previously determined to be unreasonable due to cost.

In this EA, the NPS and FHWA considered a range of alternatives for the proposed rehabilitation or replacement of the Fort Pulaski Bridge that would meet the project objectives. The range of alternatives considered includes eight alternatives: a no action alternative (Alternative A) and seven action alternatives (Alternative B, C, D, E, F, G, and H). Alternative H, replacement of the existing bridge with a new, two-lane bridge on a new alignment has been identified as the preferred alternative. Under Alternative H, a new two-lane bridge would be constructed upstream of the existing bridge. The bridge would have two travel lanes and a shoulder on one side. The bridge would have 13 spans, and eight of the 12 bents would have six concrete piles. Four of the bents at the main span would have 12 concrete piles. Riprap would be placed at each of the bridge abutments to protect the abutments from scour. After the new bridge is open to traffic, the existing bridge would be removed.

Alternative H would have adverse impacts to the cultural landscape, species of special concern, wetlands and wildlife and wildlife habitat; however, measures would be taken to mitigate the adverse impacts. Removal of the existing bridge would remove a feature that contributes to the cultural landscape. Documentation of the bridge would be done prior to its demolition. Construction of the bridge on a new alignment would require in-water work which would disrupt aquatic species, and would permanently fill tidal marsh wetlands located adjacent to the bridge. Wetland mitigation would restore tidal marsh in the project area to restore impacted wetland functions. The project would have long-term beneficial impacts to visitor use and experience, park operations and health and safety. The existing structurally deficient bridge would be replaced with a new bridge that meets current design and safety standards.

## PUBLIC COMMENT

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This Environmental Assessment (EA) will be on public review from March 4, 2015 through April 2, 2015. During this 30-day period, hardcopies of the EA will be available for review at the Fort Pulaski National Monument Visitor Center, and the Tybee Island Branch of the Chatham County Library located at 405 Butler Avenue, Tybee Island, Georgia 31328. An electronic version of this document can be found on the NPS's Planning Environment and Public Comment (PEPC) website at <http://parkplanning.nps.gov/fopu>. This site provides access to current plans, environmental impact analyses, and related documents on public review. An electronic version may also be found at the Federal Highway Administration, Eastern Federal Lands Highway Division's website at <http://efl.fhwa.dot.gov/projects/environment.aspx>.

If you wish to comment on the EA, you may submit comments through the PEPC website or mail comments to the name and address below. Please note that the names and addresses of people who comment become part of public record. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

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## CHAPTER 1: PURPOSE AND NEED

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### INTRODUCTION

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This EA presents alternatives for repair or replacement of the Fort Pulaski Bridge which provides access to Cockspur Island and the Fort Pulaski National Monument. It discloses the potential impacts of the implementation of those alternatives. In this EA, Chapter 1 presents the purpose and need for the action, discusses the location and background of the project, identifies related plans and planning, and provides information regarding the scoping completed as a part of the project development process. Chapter 2 presents the alternatives proposed to meet the purpose and need of the action, and discusses alternatives that were dismissed from further consideration. Chapter 3 provides information regarding the resources present in the study area that would be impacted by the proposed action, and also discloses the impacts of each alternative to the resources. Chapter 4 documents the public involvement process throughout this project. Chapter 5 presents the list of references.

The preparation of an EA by a Federal agency taking an action, and the contents of an EA are the result of legislation and implementing regulations issued to date. In 1969, the United States Congress passed the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.) to establish a national policy,

“...which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; ...”

NEPA also established the Council on Environmental Quality (CEQ) as an agency of the Executive Office of the President. In enacting NEPA, Congress recognized that nearly all Federal activities affect the environment in some way. Section 102 of NEPA mandates that before Federal agencies make decisions, they must consider the effects of their actions on the quality of the human and natural environment. NEPA assigns CEQ the task of ensuring that Federal agencies meet their obligations under the Act.

The CEQ regulations (40 CFR 1500-1508) describe the means for Federal agencies to develop the Environmental Impact Statements (EIS's) mandated by NEPA in Section 102. The CEQ regulations developed the EA to be used when there is not enough information to decide whether a proposed action may have significant impacts. If an EA concludes that a Federal action will result in significant impacts, the Agency is required to prepare an EIS or alter the action proposed. Otherwise, the Agency is directed to issue a Finding of No Significant Impact (FONSI).

Section 1508.09 of the CEQ regulations states that the purposes of an EA are to:

- Briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a FONSI.
- Aid an Agency's compliance with the Act when no environmental impact statement is necessary.

- Facilitate preparation of a statement when one is necessary.

Preparation of an EA is also used to aid in an Agency's compliance with Section 102(2)E of NEPA, which requires an Agency to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."

This EA was prepared to meet the NEPA requirements of both the National Park Service (NPS) and Federal Highway Administration (FHWA). The National Park Service is an agency within the Department of Interior. The Department of the Interior issued its NEPA regulations as Part 516 of its Departmental Manual (516 DM), last revised in March 2004. The NPS has issued several NEPA handbooks. In January 2001, the NPS released the Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision Making. The FHWA's NEPA regulations are codified at 23 CFR Part 771. FHWA Tech Advisory T6640.8A was issued in 1987 to provide guidance on environmental documents.

The United States Coast Guard was designated as a Cooperating Agency for the EA because the proposed action may impact navigation in the South Channel in the Savannah River. The information made available in this EA may be needed by the United States Coast Guard in order to discharge their NEPA responsibilities and any other requirements regarding jurisdictional approvals, permits, licenses, and/or clearances.

### Applicable Laws and Regulations

Applicable Federal policies, executive orders, and regulations are listed in Table 1. below by each resource for which they apply.

<b>Table 1. Relevant Laws and Regulations</b>	
<b>Resource</b>	<b>Relevant Laws and Regulations</b>
Aesthetics	NPS Organic Act
Air Quality	Clean Air Act NPS Organic Act
Aquatic Resources	Magnuson-Stevens Fishery Conservation and Management Act Marine Mammal Protection Act Fish and Wildlife Coordination Act
Coastal Barriers	Coastal Barrier Resources Act
Coastal Zone Management	Coastal Zone Management Act
Cultural, Historic, and Archeological Resources	National Historic Preservation Act Archeological Resources Protection Act Director's Order #28 NPS Organic Act
Ecologically Critical Areas	Endangered Species Act
Energy Requirements and Conservation	Energy Policy Act Executive Orders 13031, 13123, 13149
Environmental Justice	Executive Order 12898
Floodplains	Executive Order 11988 Director's Order #77-2
Indian Sacred Sites and Indian Trust Resources	Department of the Interior (DOI) Secretarial Orders 3206 and 3175 Director's Orders #66 and #71B Executive Orders 13007 and 13175
Noise	Director's Order #47

	Noise Control Act
Park Operations	NPS Organic Act
Prime and Unique Farmlands	Farmland Protection Policy Act Memorandum on Prime and Unique Agricultural Lands and NEPA (CEQ 1980)
Public Health and Safety	Architectural Barriers Act Americans with Disabilities Act Director's Orders #42 and #83 Executive Order 13045
Socioeconomic Resources	Director's Orders #2 and #12
Soils, Geology, Topography	National Cooperative Soil Survey Standards Erosion and Sedimentation Control Act
Terrestrial Resources	Migratory Bird Treaty Act Wilderness Act Executive Order 13112
Threatened and Endangered Species	Endangered Species Act NPS Organic Act
Visitor Use and Experience	NPS Organic Act Director's Order #12
Water Quality, Hydrology	Clean Water Act Rivers and Harbors Appropriation Act Executive Order 12088 Estuary Protection Act
Wetlands	Executive Order 11990 Clean Water Act Executive Order 12088 Director's Order #77-1 Rivers and Harbors Appropriation Act
Wildlife	Migratory Bird Conservation Act Migratory Bird Treaty Act

Regulations specific to the NPS include the NPS Organic Act and the various Director's Orders listed in the table above. NPS Management Policies 2006 was also used for guidance regarding the resources listed above.

*NPS Management Policies 2006, Section 1.4: The Prohibition on Impairment of Park Resources and Values*

By enacting the NPS Organic Act of 1916 (Organic Act), Congress directed the U.S. Department of Interior and the NPS to manage units “to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations” (16 USC § 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that NPS must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress” (16 USC 1a-1).

NPS Management Policies 2006, Section 1.4.4, explains the prohibition on impairment of park resources and values:

While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirements (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

The NPS has discretion to allow impacts on Park resources and values when necessary and appropriate to fulfill the purposes of a Park (NPS 2006 sec. 1.4.3). However, the NPS cannot allow an adverse impact that would constitute impairment of the affected resources and values (NPS 2006 sec.1.4.3). An action constitutes an impairment when its impacts “harm the integrity of Park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS 2006 sec.1.4.5). To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS 2006 sec 1.4.5). A determination of impairment will be made only for the selected alternative, and will be appended to the decision document.

## PROJECT LOCATION

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Fort Pulaski National Monument is located in Chatham County, Georgia. The Fort Pulaski Bridge is located along the entrance road to Fort Pulaski from U.S. Highway 80 and spans the South Channel of the Savannah River (Figure 1).

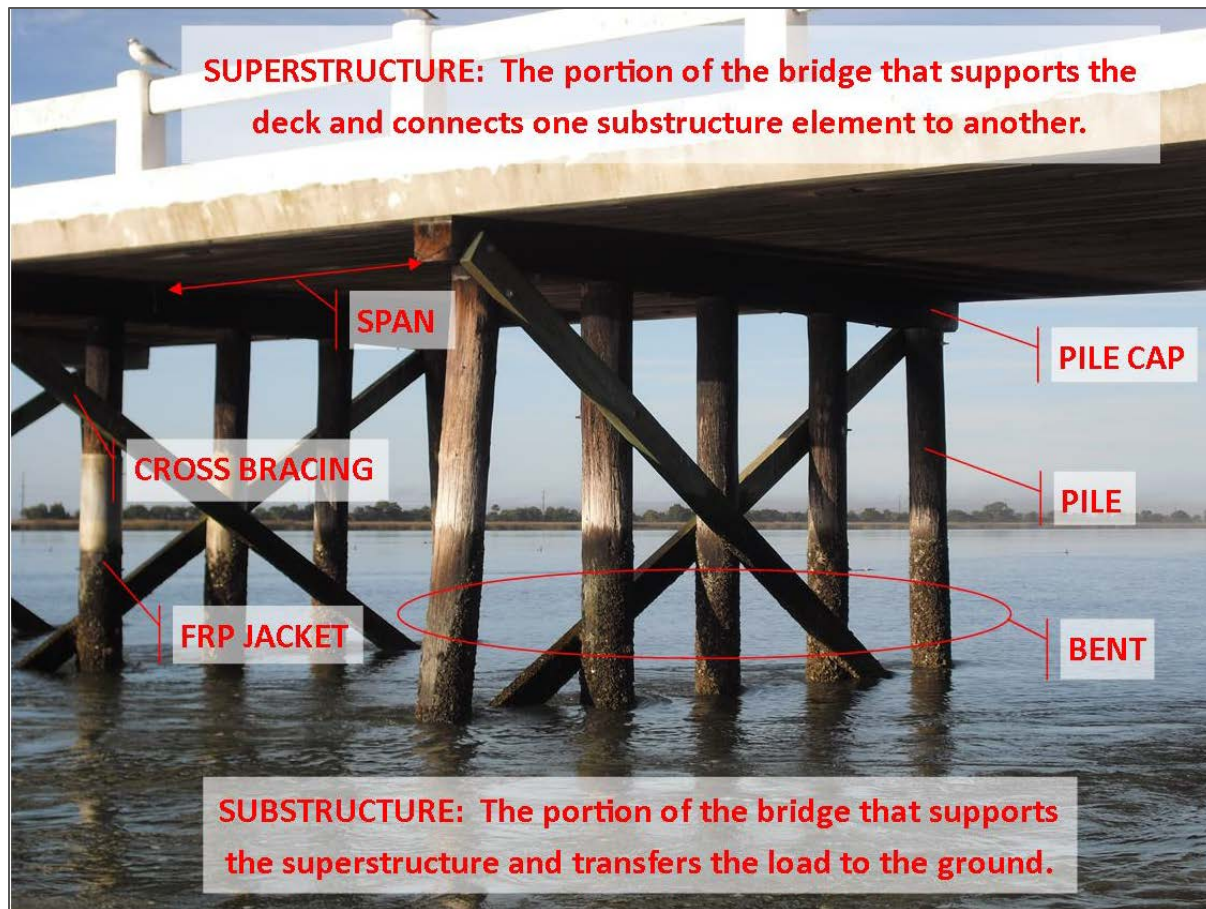


**Figure 1. Location Map.**

## PURPOSE AND NEED

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The entrance road to Fort Pulaski is the only route connecting Cockspur Island and Fort Pulaski to McQueens Island from US 80. Along the entrance road, the Fort Pulaski Bridge carries two travel lanes across the South Channel of the Savannah River (river). The bridge is approximately 1,300 feet long and 25 feet wide. Materials present in the components of the bridge include timber, concrete and steel. The bridge has 62 composite timber/concrete spans that are 20 feet long and one steel main channel span that is 40 feet long. The 64 substructure units (bents) are each comprised of five timber piles and a timber pile cap. There are a total of 330 timber piles supporting the structure, 310 of which are located in the river. The components of the bridge are identified in Figure 2.



**Figure 2. Elements of the existing bridge.**

The bridge was constructed in 1938 to replace the ferry service to Cockspur Island. Several repair projects have been completed to extend the life of the bridge. The bridge was rehabilitated in 1965. More recently, repair projects in 1996 and 2008 have been completed to extend the life of the bridge. These repair projects included the installation of fiber-reinforced polymer (FRP) jackets filled with epoxy grout to encapsulate the timber and protect it from further deterioration, replacing deteriorated pile bent timber bracing, and expansion joint and deck repairs. However, the bridge has continued to deteriorate. The timber piles, steel beams and bearings, and composite timber/concrete spans all exhibit signs of deterioration. In addition, the embankment no longer provides adequate protection to the bridge abutments from the flow of the River. The bridge is inspected every two years, and was last inspected in May of 2014. Additional detail regarding the deterioration is provided below.

- The original preservative treatment leaches out over time, which in combination with holes in the timber makes the timber piles vulnerable to marine borers that cause extensive damage to wood piles and speed up the deterioration rate.
- The steel beams and bearings in the main span are exhibiting widespread corrosion. In some locations corrosion has advanced to substantial section loss where portions of the original steel are no longer present.
- The main structural problem is the deterioration of the timber decking adjacent to the concrete bent caps, which causes section loss and a reduced load bearing capacity. The loss of bearing means that the bridge can no longer carry the weight of heavy vehicles.



The bridge currently has an 18-ton live load restriction. The average weight for a car is approximately one to two tons. The concrete spans have also deteriorated over time, as shown by spalling. Spalling is the chipping or flaking of the concrete.

- The abutment protection on each end of the bridge, comprised of concrete and riprap, is undermined and gradually eroding.

In 2013 the bridge was struck by a fishing boat, damaging a section of the bridge railing. Steel guardrail was installed as a temporary repair.



**Figure 3. An existing FRP jacket is shown.**

The bridge also does not meet current American Association of State Highway and Transportation Officials (AASHTO) standards. AASHTO standards are developed based on current safety research.

**The purpose of this project is to maintain the Park's ability to safely serve visitors by providing safe vehicular access to the Fort Pulaski National Monument while minimizing impacts to natural, cultural, and aesthetic resources.**

### **Purpose and Significance of the Park**

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Park purpose statements are based on the specific legislation for each park. The purposes of Fort Pulaski National Monument include:

- Preserve and protect the 19<sup>th</sup> century masonry fort and its associated structures and interpret its roles in coastal fortifications, military technology and the Civil War;
- Preserve and protect other military structures, other government structures, and archeological resources associated with various military developments and fortifications on Cockspur Island;

- And, preserve and protect approximately 5,000 acres of nearly pristine salt marsh on McQueens and Cockspur Islands that constitute the largest portion of the national monument and interpret this important coastal ecology for the education, inspiration, and enjoyment of the visitor.

Park significance statements identify the resources and values that the NPS is entrusting with managing and protecting. The significance of the Fort Pulaski National Monument includes:

- It is the site where rifled cannons first successfully breached masonry fortifications, forcing a hasty surrender of the fort and the closure of the port of Savannah, and signaled the end of such fortifications for coastal defenses.
- Fort Pulaski is the site of Robert E. Lee's first assignment following his commission for the U.S. Military Academy at West Point.
- It is the site of John Wesley's (the founder of Methodism) first sermon in the New World.
- It is the site where General David Hunter, commander of the Department of the South, captured Fort Pulaski and within less than one month issued two General Orders freeing slaves first on Cockspur Island and later throughout Georgia, Florida, and South Carolina. President Lincoln later rescinded these orders.
- The National Monument contains one of the largest federally protected salt marsh environments in the United States.
- Fort Pulaski National Monument is one of the most well preserved examples of "third system" masonry coastal fortifications on the Southeast coast (National Park Service, 2012).

### **Project Site Description**

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The Fort Pulaski Bridge provides an important connection for vehicular, bicycle, and pedestrian access between U.S. Highway 80 and McQueens Island Trail and the features located on Cockspur Island. In addition to providing NPS personnel and visitor access, the bridge also provides access to the following agencies. On the western edge of Cockspur Island, the U.S. Coast Guard uses facilities on park land under an inter-agency agreement. The U.S. Coast Guard Station is a 24-hour operation, for which continuous access is critical. The Savannah Bar Pilots Association also carries out piloting operations off the island's west end. The Savannah Pilots Association safely guides vessels on the 25.5 mile journey from the sea into the port of Savannah (Savannah Pilots Association). Every commercial vessel entering or leaving the Savannah River must have a pilot on board. The Bar Pilots facilities include living quarters, a dock, fuel supply system, and a parking area (National Park Service - Southeastern Regional Office, 2003).

At the entrance station, located south of the bridge near U.S. Highway 80, parking and access is provided to the McQueens Island Trail. The trail runs from Bull River (on the western boundary) through Fort Pulaski National Monument to the Lazaretto Creek (on the eastern boundary). Trail users park their vehicles at the informal parking areas on either side of the entrance station.

There are two small pull-off parking areas (Figure 4) located south and north of the bridge on each side of the road (Federal Highway Administration - Eastern Federal Lands Highway



Division, 2005). Each pull-off provides parallel parking for approximately three to four vehicles. These parking areas provide access for fishing adjacent to the bridge, and are frequently used. An interpretive sign is located next to the northwest pull-off.



**Figure 4. Two pull-offs are located on each side of the road approaching the bridge.**

## **Project Background**

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Prior to the construction of the Fort Pulaski Bridge, access to Cockspur Island was via passenger ferry service. The construction of the South Channel Bridge was one of the most significant Public Works Administration projects at Cockspur Island. In the mid-1800s the South Channel was no longer used for shipping. Marshland was acquired on McQueen's Island in 1935 for a bridge approach. Workers finished the composite wood and concrete bridge in April 1938, and it opened to the public in May (National Park Service - Southeastern Regional Office, 2003).

The bridge was rehabilitated in 1965 and repaired in 1996 and 2008 to extend the life of the bridge. The repair projects addressed all serious structural deficiencies noted at the time, but primarily repaired the deteriorated piles. The piles were jacketed with a fiber-reinforced polymer (FRP) jacket that was then filled with epoxy grout to encapsulate the timber and thus protect it from further deterioration.

## **Related Plans and Previous Planning Efforts**

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### *General Management Plan*

The Draft General Management Plan (GMP) for the Fort Pulaski National Monument was released for public review on May 11, 2012. The draft GMP provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, and providing opportunities for quality visitor experiences at Fort Pulaski National Monument. The document examines three

alternatives for managing the park for the next 20 or more years and analyzes the impacts of implementing each of the alternatives. Under the preferred alternative, Fort Pulaski would be managed to focus on the April 1862 period of significance in terms of landscape and interpretive programs (National Park Service, 2012).

### *Total Mobility Plan*

The Coastal Regional Metropolitan Planning Organization is the designated Metropolitan Planning Organization (MPO) for the Savannah urbanized area. Total Mobility Plan – 2040 Metropolitan Transportation Plan is the five-year update of the Chatham County – Savannah region’s previous long range transportation plan, adopted September 22, 2004 (Coastal Region MPO, 2014). Although neither Cockspur nor McQueen’s Island is included within the CORE MPO Planning Area, U.S. Highway 80 connects the included areas of Tybee Island and Savannah.

### *U.S. Highway 80 Bridges Replacement Study*

The U.S. Highway 80 Bridges Replacement Study was conducted to evaluate the existing deficiencies along the portion of US 80 in Chatham County, GA, which connects Savannah to Tybee Island, and to identify alternatives to correct these deficiencies. Recommendations in the study include widening the existing road to accommodate ten-foot paved, bikeable shoulders and restriping the roadway near Fort Pulaski to allow for a left hand and right hand turn lane. McQueen’s Island Trail would be extended east from its intersection with the Fort Pulaski Entrance Road to reach the new Lazaretto Creek Bridge (Chatham County - Savannah MPC, 2012).

## **Scoping**

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The CEQ guidelines (1978) for implementing the National Environmental Policy Act and the NPS’s National Environmental Policy Act guidelines contained in Director’s Order # 12: *Conservation Planning, Environmental Impact Analysis and Decision Making Handbook* (NPS 2001a) provide the framework for scoping. Scoping is an early and open process to: determine important issues, eliminate issues that are not important or relevant, identify relationships to other planning efforts or documents, define a time schedule or document preparation and decision-making, and define purpose and need, agency objectives and constraints, and the range of alternatives. For further scoping and public participation information, see Chapter 4: Public Involvement and Coordination and Appendix A: Agency Coordination Letters.

### *Public Scoping*

Information about the proposed project was made available to the public on the NPS’s Planning, Environment, and Public Comment website during the public scoping comment period, from January 28, 2011 through February 28, 2011. Flyers providing details of the proposed project and contact information for comments was sent to a mailing list comprised of Federal, State, and local agencies, elected officials, organizations, and advocacy groups. A legal notice was run in the Savannah Morning News on January 28, 2011 announcing the public scoping comment period. No comments were provided by the public.

### *Agency Scoping*

Scoping letters were also sent to the Georgia Department of Natural Resources – Historic Preservation Division, the Wildlife & Natural Heritage Section, the Savannah District of the United States Army Corps of Engineers, the Seventh District of the United States Coast Guard, the Southeast Regional Office of the National Marine Fisheries Service and the United States Fish and Wildlife Service. Comments were received from each of the agencies. Copies of the agency responses are located in Appendix A: Agency Coordination Letters.

## **ISSUES AND IMPACT TOPICS**

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Issues as discussed in NEPA describe the relationships between the action being proposed and the environmental (natural, cultural and socioeconomic) resources. Issues describe an association or a link between the action and the resource. Issues are not the same as impacts, which include the intensity or results of those relationships. Internal and external scoping (defining the range of potential issues) was conducted for this EA to identify what relationships exist between the proposed action and environmental resources. Issues identified through the scoping process were:

- The Fort Pulaski Bridge is the only access to Fort Pulaski and Cockspur Island.
- Pedestrians and bicyclist must travel in the vehicular travel lane because there are no shoulders on the bridge.
- The Fort Pulaski Bridge approaches are surrounded by tidal marsh wetlands.
- Fishing on the bridge is not permitted while the Park is open to the public, but is permitted after the gate is closed.
- A bridge of this length is expensive to repair or replace.
- The Fort Pulaski Bridge provides vehicular access for employees staffing the U.S. Coast Guard Station and the Savannah Bar Pilots.

## **Derivation of Impact Topics**

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Specific impact topics were developed to address potential natural, cultural, and social impacts that might result from the proposed construction work. These topics were derived from the issues identified above and address Federal laws, regulations and orders, Park management documents, and Park knowledge of limited or easily impacted resources. Issues are not the same as impacts, which include the intensity or results of those relationships. Each impact topic relates to a specific aspect of the Park and its surrounding community, which are essential to protect.

## **Impact Topics Included in This Document**

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### *Cultural Landscapes*

As outlined in 36 CFR 800, regulations issued by the Advisory Council on Historic Preservation implementing section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470 et seq.), the potential impacts on cultural resources must be addressed. Under the “Criteria of Effect” (36 CFR 800.9 [a]), federal undertakings are considered to have an effect when they alter the character, integrity or use of a cultural resource, or qualities that qualify a property for listing on the NRHP.

As described in DO #28, a cultural landscape is “a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values” (DO #28, 87). Cultural landscapes are expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The Fort Pulaski Bridge is listed on the Cultural Landscape Inventory for Fort Pulaski National Monument and contributes to the cultural landscape. The removal of the existing bridge and construction of a new bridge would impact the cultural landscape. Therefore, this impact topic was retained for further analysis in this EA.

### *Floodplains*

Executive Order 11988, “Floodplain Management,” and NPS Director’s Order #77-2: Floodplain Management, require an examination of impacts to floodplains and potential risk involved in placing facilities within floodplains (National Park Service, 2003). A Statement of Findings for Floodplains was prepared and is included in this EA as Appendix C. The project area is also located within Georgia’s designated coastal area. Chatham County is one of the 11 counties under the Coastal Management Program Service Area. The proposed project should be consistent to the maximum extent practicable with the enforceable policies of Georgia’s approved coastal management program per the Federal Coastal Zone Management Act of 1972, as amended (Georgia Department of Natural Resources, 2003). A Federal Consistency Determination was prepared and is included in this EA as Appendix B. The proposed action would require construction within the floodplain. Therefore, this impact topic was retained for further analysis in this EA.

### *Wetlands*

Executive Order 11990, “Protection of Wetlands,” and NPS Director’s Order #77-1: Wetland Protection defines the NPS goal to maintain and preserve wetland areas (National Park Service, 2008). Approximately 90% of Fort Pulaski National Monument is classified as wetland (National Park Service, 2006). Wetlands surround the bridge and are abundant in the study area. The proposed action has the potential to have an adverse impact on wetlands as defined in Section 4.1.1 of NPS Procedural Manual #77-1: Wetland Protection. The proposed action would also involve placing fill material in wetlands and “waters of the U.S.” as defined in 33 CFR 320-330. Therefore the proposed action must also comply with Section 404 of the Clean Water Act. Therefore, this impact topic was retained for further analysis in this EA.

### *Wildlife and Wildlife Habitat*

The NPS policy is to protect the natural abundance and diversity of all naturally occurring communities. The 2006 NPS Management Policies (National Park Service, 2006), NPS DO #77: Natural Resources Management, and other NPS and Park policies provide general direction for the protection of wildlife and wildlife habitat. Wildlife and wildlife habitat at the Park encompasses an abundance of species. The project area includes terrestrial and aquatic habitat. The proposed action would alter habitat and displace wildlife species that are commonly encountered in the vicinity of the project area. Therefore, this impact topic was retained for further analysis in this EA.

### *Species of Special Concern*

In addition to NPS policies and management guidelines, the Endangered Species Act of 1973, as amended provides for the protection of rare, threatened, and endangered species (floral and faunal). Federally-listed species, regulated by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), and State-listed species, regulated by Georgia Department of Natural Resources (GADNR) may be present in the study area. Also, the project area lies within waters designated as Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The proposed action may impact species of concern. Correspondence from the USFWS, NMFS, and GADNR can be found in Appendix A. Therefore, this impact topic was retained for further analysis in this EA.

### *Visitor Use and Experience of the Park*

Enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks (National Park Service, 2006). The NPS strives to provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the natural and cultural resources found in parks. Rehabilitation or replacement of the bridge would impact the ability for visitors to access Fort Pulaski. Delays associated with construction and a rehabilitated or new bridge structure would change the experience of visitors at the Park. The entrance road is the only transportation route from the mainland to Cockspur Island and Fort Pulaski. The bridge carries visitors from U.S. Highway 80 East on McQueen’s Island across the South Channel of the Savannah River to Cockspur Island and Fort Pulaski National Monument. Traffic patterns would change during construction. Impacts to employees of the U.S. Coast Guard and Savannah Bar Pilots Association, also located on Cockspur Island will be analyzed under visitor use and experience. Therefore, this impact topic was retained for further analysis in this EA.

### *Park Operations*

The existing bridge structure currently requires regular inspections to identify deterioration and repair projects to repair these areas. The monitoring and maintenance would increase as the bridge continues to deteriorate. Therefore, this impact topic was retained for further analysis in this EA.

### *Health and Safety*

The NPS Management Policies 2006 state that while recognizing that there are limitations on its capability to totally eliminate all hazards, the NPS and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The continued deterioration of the bridge is a potential safety hazard to visitors and Park employees. Therefore, this impact topic was retained for further analysis in this EA.

### **Impact Topics Dismissed From Further Consideration**

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The following impact topics were initially considered but were dismissed from further analysis because the resource is not present in the project site or because the proposed action would have no impact, have a negligible impact, or have a minor impact. A brief rationale for the dismissal of each impact topic is provided below.

### *Vegetation*

The NPS policy is to protect the natural abundance and diversity of all naturally occurring communities. The 2006 NPS Management Policies (National Park Service, 2006), NPS DO #77: Natural Resources Management, and other NPS and Park policies, provides general direction for the protection of vegetation. Construction of a new bridge structure would require the clearing of vegetation. The study area is comprised of two vegetation communities, the mowed-grass vegetation community and the wetland vegetation community. Mowed-turf grass road shoulders are found adjacent to the paved road and between the trail and US 80. This shoulder area is comprised of multiple species of *Paspalum* and *Panicum*. Several cabbage palms (*Sabal palmetto*) are also present in the maintained grass area. The wetland vegetation community is dominated by cordgrass; however other species present include bushy seaside tansy (*Borrchia frutescens*), saltgrass (*Distichlis spicata*), and eastern baccharis (*Baccharis halimifolia*). The bridge repairs or a replacement of the bridge on the same alignment would be done within the footprint of the existing bridge, and would have a negligible impact to vegetation. Replacement of the bridge on a new alignment would be located adjacent to the existing bridge, and would impact a portion of the existing bridge approaches and tidal marsh. Impacts to wetland vegetation are discussed under the wetlands impact topic. Therefore, vegetation was dismissed as an impact topic for further analysis in this EA.

### *Surface Water and Groundwater Quality*

The 2006 NPS Management Policies (National Park Service, 2006), NPS Director's Order #77: Natural Resources Management, along with the Clean Water Act and other Federal, State, and local regulations, provide general direction for the protection of surface and groundwaters. The Atlantic Ocean bounds Cockspur Island to the east, while the north, south, and west of the Island are bound by the North and South Channel of the Savannah River. The pollution of surface waters and groundwaters by both point and nonpoint sources can impair the natural functioning of aquatic and terrestrial ecosystems and diminish the utility of Park waters for visitor use and enjoyment. The NPS Management Policies 2006 state that the Service will determine the quality of park surface and groundwater resources and avoid, whenever possible, the pollution of park waters by human activities occurring within and outside the parks. The proposed action would have a negligible increase of impervious surface and ground disturbance during construction. Therefore, this impact topic was dismissed as an impact topic for further analysis in this EA.

### *Gateway Communities*

Gateway communities are cities or towns located in close proximity to national parks, and serve as a portal to these Federal lands. They contain amenities that are often not available in the national parks, such as food, lodging, and transportation. There are no gateway communities in the vicinity of the project. Therefore, this impact topic was dismissed as an impact topic for further analysis in this EA.

### *Historic Structures, Districts, and Landmarks*

A historic structure is defined by the NPS as "a constructed work, usually immovable by nature or design, consciously created to serve some human act" (DO #28, 113). For a structure, building to be listed on or eligible for listing on the National Register, it must possess historic integrity of those features necessary to convey its significance, particularly with respect to location, setting, design, feeling, association, workmanship, and materials. The Fort Pulaski

Bridge connecting McQueens Island and Cockspur Island was built by the Civilian Conservation Corps in 1938. The Fort Pulaski Bridge is eligible for listing in the NRHP as a contributing resource to the Fort Pulaski National Monuments' cultural landscape. Impacts to the cultural landscape resulting from the demolition of the existing bridge and construction of a new bridge are discussed under cultural landscapes. Therefore, historic structures, districts, and landmarks was dismissed as an impact topic for further analysis in this EA.

#### *Museum Collections*

The NPS defines a museum object as “a material thing possessing functional, aesthetic, cultural, symbolic, and/or scientific value, usually movable by nature or design. Museum objects include prehistoric and historic objects, artifacts, works of art, archival material, and natural history specimens that are part of a museum collection” (DO #28, 137). No museum objects are located within the study area, and no museum objects would be impacted by the proposed action. Therefore, museum collections was dismissed as an impact topic for further analysis in this EA.

#### *Archeological Resources*

The NPS defines an archeological resource as any material remains or physical evidence of past human life or activities that are of archeological interest, including the record of the effects of human activities on the environment. Archeological resources are capable of revealing scientific or humanistic information through archeological research (DO #28, 67). A Phase I Archeological Investigation was completed by the NPS Southeast Archeological Center for the areas of new ground disturbance on both the upstream and downstream sides of the existing bridge abutments in December 2013. No cultural materials or features were encountered in any of the shovel tests. Therefore, archeological resources was dismissed as an impact topic for further analysis in this EA.

#### *Ethnographic Resources*

An ethnographic resource is defined as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (DO #28, 157). Fort Pulaski National Monument has no ethnographic resources. Therefore, ethnographic resources was dismissed as an impact topic for further analysis in this EA.

#### *Indian Trust Resources*

Secretarial Order 3175 requires that any anticipated impacts to Indian Trust resources from a proposed action by U.S. Department of the Interior agencies be explicitly addressed in environmental documents. The Federal Indian Trust responsibility is a legally enforceable obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of Federal laws with respect to American Indian tribes. There are no known Indian Trust resources in the study area. Therefore, Indian trust resources was dismissed as an impact topic for further analysis in this EA.

#### *Geologic Resources*

The NPS Management Policies (National Park Service, 2006) states that the NPS will “...preserve and protect geologic resources as integral components of park natural systems. As

used here, the term “geologic resources” includes both geologic features and geologic processes.” The existing bridge approaches are constructed on fill material. No geologic resources will be impacted by the project. Therefore, geologic resources was dismissed as an impact topic for further analysis in this EA.

### *Soils*

The NPS policy is to protect the abundance and diversity of all naturally occurring soils. The 2006 NPS Management Policies (National Park Service, 2006), NPS DO #77: Natural Resources Protection and other NPS and Fort Pulaski National Monument policies provide general direction for the protection of soils. Two soil types are found in the study area, manmade land and salty tidal marsh (Natural Resources Conservation Service). Impacts to wetland soils will be discussed under the wetlands impact topic. Impacts of installing new fill materials are discussed in the floodplains and wetlands impact topics. The proposed action would be constructed in an area comprised of disturbed soils and fill material from the construction of the existing Fort Pulaski Road. Therefore, soils was dismissed as an impact topic for further analysis in this EA.

### *Prime and Unique Farmlands*

In August 1980, the Council on Environmental Quality (CEQ) directed that Federal agencies must assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) as prime or unique. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed. Unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to NRCS, none of the soils in the project area are classified as prime and unique farmlands. Therefore, prime and unique farmlands was dismissed as an impact topic for further analysis in this EA.

### *Lightscape*

In accordance with NPS 2006 Management Policies (National Park Service, 2006), the NPS strives to preserve natural, ambient lightscapes, which are natural resources and values that exist in the absence of human-caused light. The proposed action would not change the location of lighting fixtures or alter the lightscape in the study area. No nighttime construction or artificial lighting would be necessary to construct the project. Therefore, lightscape was dismissed as an impact topic for further analysis in this EA.

### *Air Quality*

The 1963 Clean Air Act (CAA), as amended, requires land managers to protect air quality. Section 118 of the CAA further requires parks to meet all Federal, State, and local air pollution standards, and NPS 2006 Management Policies (National Park Service, 2006) addresses the need to analyze potential impacts to air quality during park planning. Although construction and demolition activities proposed would have some impacts to air quality, they would be short-term and negligible. Therefore, air quality was dismissed as an impact topic for further analysis in this EA.

### *Soundscape*

The NPS Management Policies 2006 state that the NPS will preserve, to the greatest extent possible, the natural soundscapes of parks. Park natural soundscape resources encompass all



the natural sounds that occur in parks, including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes. This is the basis for determining the "affected environment" and impacts on a Park soundscape. Traffic capacity would not increase as a result of this project, but there would be short-term minor impact to the soundscape from the presence of heavy equipment during construction. Therefore, soundscape was dismissed as an impact topic for further analysis in this EA.

### *Visual Resources*

The NPS 2006 Management Policies (National Park Service, 2006) notes that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks. The Organic Act also states that units of the National Park System are charged with conserving park scenery, along with all the natural and cultural resources which contribute to important views. In the evaluation of visual resources, both the visual character of the site and the quality of the viewshed are analyzed. A viewshed comprises the limits of the visual environment associated with the proposed action including the viewsheds within, into, and out of the site. Changes to the appearance of the bridge and surrounding landscape are discussed under the cultural landscape impact topic. Therefore, visual resources was dismissed as an impact topic for further analysis in this EA.

### *Sea Level Rise*

Sea level is rising at an approximate rate of 2 mm/year and is expected to accelerate over the next 100 years. The impacts of sea level rise include beach erosion, loss of salt marshes, inundation of low lying areas, salt water intrusion into aquifers, and increased flooding. According to the National Oceanic and Atmospheric Administration (NOAA), at Fort Pulaski, Georgia, the mean sea level trend is 2.98 millimeters/year with a 95% confidence interval of +/- 0.33 millimeters/year on monthly sea level data from 1935 to 2006 which is equivalent to a change of 0.98 feet in 100 years (National Oceanic and Atmospheric Administration). This predicted rise in sea level would have no effect on implementation of the proposed action nor would the proposed action have an impact on sea level rise. Furthermore, no reasonably foreseeable actions would alter overwash occurrences or shoreline change. Therefore, sea level rise was dismissed as an impact topic for further analysis in this EA.

### *Socioeconomic Environment*

The study area is located within the Fort Pulaski National Monument. The proposed rehabilitation or replacement of the bridge would neither change local and regional land use nor impact local businesses or other agencies. Therefore, socioeconomic environment was dismissed as an impact topic for further analysis in this EA.

### *Environmental Justice*

Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities (President of the United States, 1994).

Within a five mile radius of the project, 87.7% of the persons were white based on the data from the 2010 US Census of Population and Housing compared to 52.8% for Chatham County and 59.7% for Georgia (U.S. Environmental Protection Agency). Per EPA/CEQ Guidance (Final Guidance for Incorporating Environmental Justice Concerns in the EPA's NEPA Compliance Analysis and the CEQ's Environment Justice: Guidance under NEPA), a community minority population is greater than 50% or "meaningfully greater" than minority population percentage in the general population or other appropriate geographic area. The study area is therefore not a minority community.

Within a five mile radius of the project, the persons below poverty level was 5.4% (U.S. Environmental Protection Agency). The persons below the 2009 poverty level in Chatham County was 16.3% and in Georgia was 16.6% (U.S. Census Bureau). Per EPA/CEQ Guidance, a low-income community has a greater percentage of persons below poverty level in the general population or other appropriate geographic area. The study area is therefore not a low-income community. The proposed project would not have any disproportionate or adverse impacts on minority or low income populations. Therefore, environmental justice was dismissed as an impact topic for further analysis in this EA.

#### *Energy Requirements and Conservation Potential*

The CEQ guidelines for implementing NEPA require examination of energy requirements and conservation potential as a possible impact topic in environmental documents. Fort Pulaski National Monument strives to incorporate the principles of sustainable design and development into all facilities and Park operations. The objectives of sustainability are: to design structures to minimize adverse impacts on natural and cultural values, to reflect their environmental setting, to maintain and encourage biodiversity, to construct and retrofit facilities using energy efficient materials and building techniques, to operate and maintain facilities to promote their sustainability, and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The proposed rehabilitation or replacement of the bridge would minimize adverse impacts on natural and cultural values to the extent possible, and would upgrade the bridge to promote sustainability. Therefore, energy requirements and conservation potential was dismissed as an impact topic for further analysis in this EA.

## CHAPTER 2: DESCRIPTION OF ALTERNATIVES

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This chapter describes alternatives for the rehabilitation or replacement of the Fort Pulaski Bridge. Alternatives for the proposed action are intended to improve the safety of motorists, bicyclists, and pedestrians using the bridge. The NPS and FHWA considered a range of alternatives for the proposed rehabilitation or replacement of the Fort Pulaski Bridge.

Alternatives were developed that would meet the project objectives. The range of alternatives considered includes eight alternatives described below: a no action alternative (Alternative A) and seven action alternatives (Alternative B, C, D, E, F, G, and H). The range of alternatives considered also includes those discussed in the Alternatives Considered but Dismissed section.

The CEQ has provided guidance on the development and analysis of alternatives under NEPA. A full range of alternatives, framed by the purpose and need, must be developed for analysis for any Federal action. The alternatives should meet the project/proposal purpose and need, at least to a large degree. They should also be developed to minimize impacts to environmental resources. Alternatives should also be “reasonable,” which CEQ has defined as those that are economically and technically feasible, and show evidence of common sense. Alternatives that could not be implemented if they were chosen (for economic or technical reasons), or do not resolve the need for action and fulfill the stated purpose in taking action to a large degree, are therefore not considered reasonable.

### ALTERNATIVE A: NO ACTION

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Under Alternative A, the No Action Alternative, no substantial improvements would be performed other than in accordance with routine maintenance operations. Emergency repairs would likely be necessary. Analysis of the No Action Alternative is required as part of the NEPA process in order to provide a basis for the comparison of other feasible alternatives.

### ALTERNATIVE B: EMERGENCY REPAIRS

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The bridge would continue to be monitored every two years and a cursory inspection would be completed every year to monitor the deterioration. Emergency repairs would be made to address all serious structural deficiencies on an as needed basis depending on the results of the most recent inspection. It is anticipated that the needed repairs would be similar to the repairs made in 2008, which included jacketing the piles with a fiber-reinforced polymer (FRP) jacket that was then filled with epoxy grout to encapsulate the timber and thus reducing the rate of deterioration.

### ALTERNATIVE C: FRP JACKETING OF ALL PILES

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All of the timber piles would be jacketed with a fiber-reinforced polymer (FRP) that would then be filled with epoxy grout to encapsulate the timber and thus protect it from further deterioration. The wrapping would extend approximately two feet below the mud line and approximately two feet above high water level. Additional substructure (elements of the bridge that support the deck) repairs would include replacing timber cross bracing and bent caps, installing timber corbels, and repairing concrete bent caps. Superstructure repairs would also be completed, and would likely consist of cleaning and painting all of the structural steel in the

main span, cleaning exposed rebar in the bridge deck and diaphragms in the main span and coating them with protective sealant, and replacing timber deck shims.

#### ALTERNATIVE D: REHABILITATION OF EXISTING BRIDGE

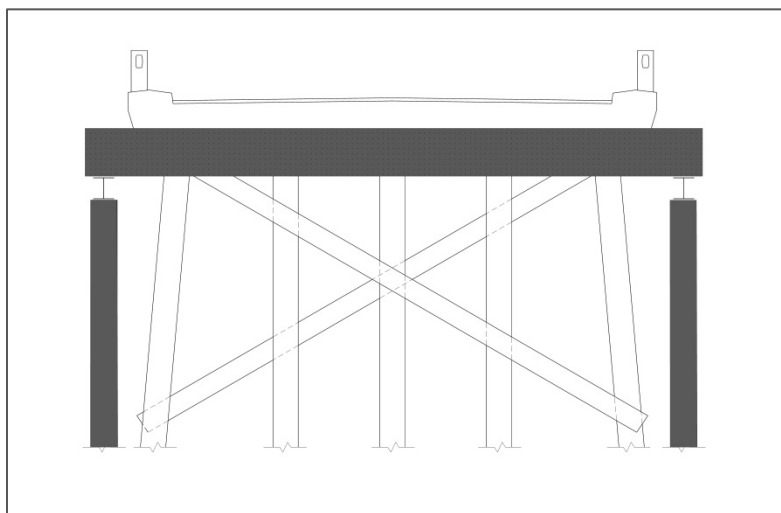
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Alternative D is a modification of Alternative C. FRP jackets would be installed on the most deteriorated timber piles as identified by previous bridge inspections. The jacket would be filled with epoxy grout to encapsulate the timber and protect it from further deterioration. The wrapping would extend from the mud line (but not below) to above the high water level. Sections of severely deteriorated timber piles may be replaced, if needed. It is estimated that 40 piles would have new FRP jackets installed, 30 piles would have their existing FRP jackets replaced, and that ten piles would have sections replaced and FRP jackets installed. Additional substructure repairs would include replacing timber cross bracing and bent caps, installing timber corbels, and repairing concrete bent caps. Superstructure repairs would also be completed, and would likely consist of cleaning and painting all of the structural steel in the main span, cleaning exposed rebar in the bridge deck and diaphragms in the main span and coating them with protective sealant, and replacing timber deck shims. Riprap would also be replaced around the bridge abutments. It is estimated that 18,500 cubic feet of riprap would be placed at the north abutment and 29,000 cubic feet would be placed at the south abutment. Dewatering may be necessary in order to install the riprap and may also be necessary to replace sections of deteriorated timber piles. It is anticipated that the access for the repairs would be from a barge located alongside the pile bents. The barge would likely be moored.

#### ALTERNATIVE E: INSTALL ADDITIONAL SUPPORT ON EXISTING BRIDGE

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Two new steel piles and one new floorbeam would be installed on each side of the existing pile bent. The new piles and floorbeams would support the existing superstructure (Figure 5). The existing substructure would not carry any loads. The steel piles would be driven into the river bottom with an impact hammer on a barge. Although concrete piles perform better than steel piles in a corrosive environment, the use of driven concrete piles is not feasible because driving concrete piles would cause settlement to the existing substructure.



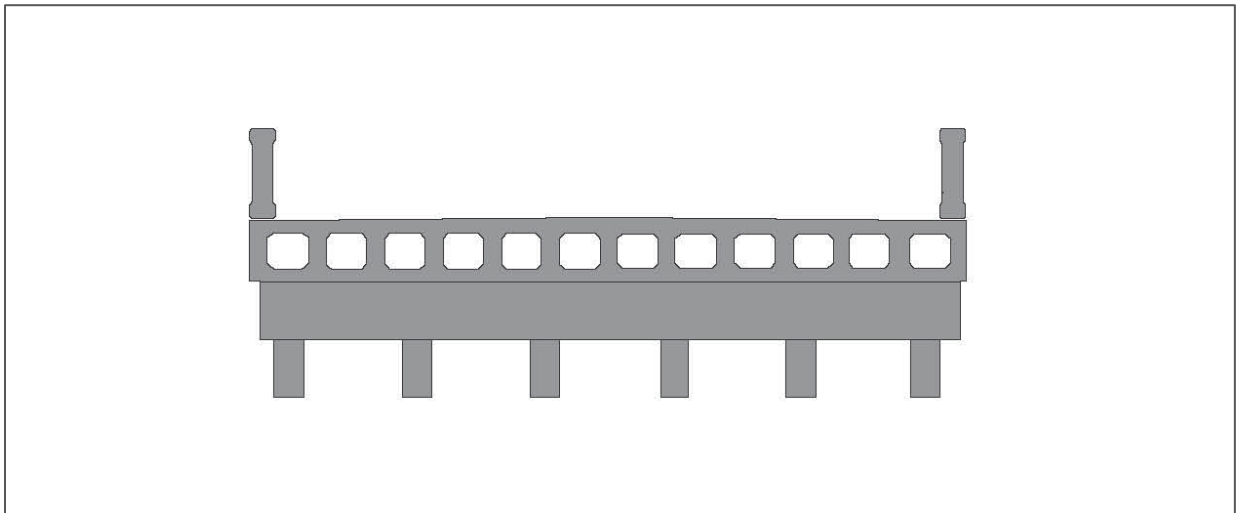
**Figure 5. Cross-section showing new floorbeam and piles.**

## ALTERNATIVE F: REPLACE ON EXISTING ALIGNMENT

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The existing bridge would be replaced with a new bridge that would be built in sections on the same alignment. The most deteriorated bridge spans would be replaced first and repairs would be made as they are needed to maintain the remaining sections until they can be replaced. In order to replace a section of the existing bridge, a section of the existing bridge would be demolished. Barriers would be installed to route traffic around the section under construction. Concrete piles would be driven into the river bottom. There would be six piles supporting each bent of the bridge. The pile caps would be constructed, upon which a concrete slab or beam would be placed (Figure 6). The bridge deck would be cast offsite and then set in place with a crane positioned on a barge in the River. The new bridge would have two 11-foot travel lanes and one five-foot shoulder, and would be approximately 29 feet wide including the railing width. The bridge railing would be 42 inches high, meeting the minimum requirements for use by vehicles, bicyclists, and pedestrians; however, there would be no railing to separate the pedestrians and bicyclists using the shoulder from the vehicles in the travel lanes.

The length and number of bridge deck segments would be dependent on the type of deck. A concrete slab bridge deck would be built to a length of 40 feet, and a concrete beam bridge deck would be built to a span length of 80 feet. A concrete slab bridge deck would require 33 spans (deck segments) and 32 bents. A concrete box beam deck would require 17 spans and 16 bents. One lane of traffic would be maintained throughout construction.



**Figure 6. Cross-section of the new bridge.**

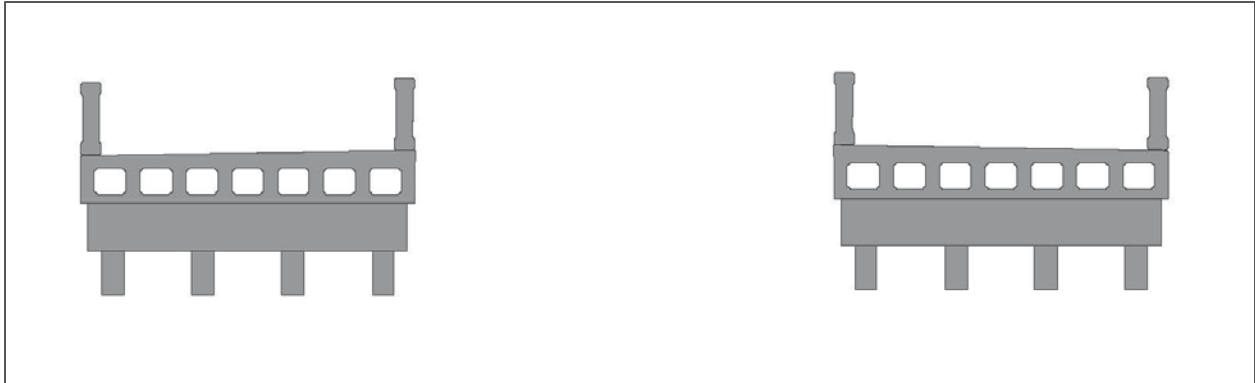
Riprap would be placed at each of the bridge abutments in order to protect the abutments from scour. It is estimated that 52,500 cubic feet of riprap would be placed at each end of the bridge.

The bridge would be replaced in multiple construction phases as funding is available. At least four phases would be necessary given the current funding levels and projected cost of the project. The duration of each construction phase would be approximately one year.

## ALTERNATIVE G: REPLACE ON A NEW ALIGNMENT (ONE-LANE BRIDGES)

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The existing bridge would be replaced with two new one-lane bridges that meet current AASHTO specifications with regards to lane width, shoulder width, live load capacity, and crash worthy railing system. Two one-lane bridges would be built (Figure 7). Each one-lane bridge would be approximately 22 feet wide (including railing width) with a 12-foot wide travel lane and two three-foot wide shoulders. The bridge railing would be 42 inches high, meeting the minimum requirements for use by vehicles, bicyclists, and pedestrians; however, there would be no railing to separate the pedestrians and bicyclists using the shoulder from the vehicles in the travel lanes.



**Figure 7. Cross-section of the one lane bridges.**

Concrete piles would be driven into the river bottom. There would be four piles per bent on each lane of the bridge. The pile caps would be constructed, upon which a concrete slab or beam would be placed. The bridge deck would be cast offsite and then set in place with a crane positioned on a barge in the River. The length and number of bridge deck segments would be dependent on the type of deck. A concrete slab bridge deck would be built to a length of 40 feet, and a concrete beam bridge deck would be built to a span length of 80 feet. A concrete slab bridge deck would require 33 spans (deck segments) and 32 bents. A concrete box beam deck would require 17 spans and 16 bents. One lane of traffic would be maintained throughout construction.

Riprap would be placed at each of the bridge abutments in order to protect the abutments from scour. It is estimated that 52,500 cubic feet of riprap would be placed at each end of the bridge.

The bridge would be replaced in construction phases as funding is available. Two phases would likely be necessary given the current funding levels and projected cost of the project. The duration of each construction phase would be approximately one year. The first one-lane bridge would be built. Once constructed, the new one-lane bridge would carry all truck loading with a signal system. The existing bridge would then only serve cars and other light vehicles until the second one-lane bridge is built. The second one-lane bridge would be built in a second construction phase. The existing bridge would be removed.

## ALTERNATIVE H: REPLACE ON A NEW ALIGNMENT (TWO LANE BRIDGE)

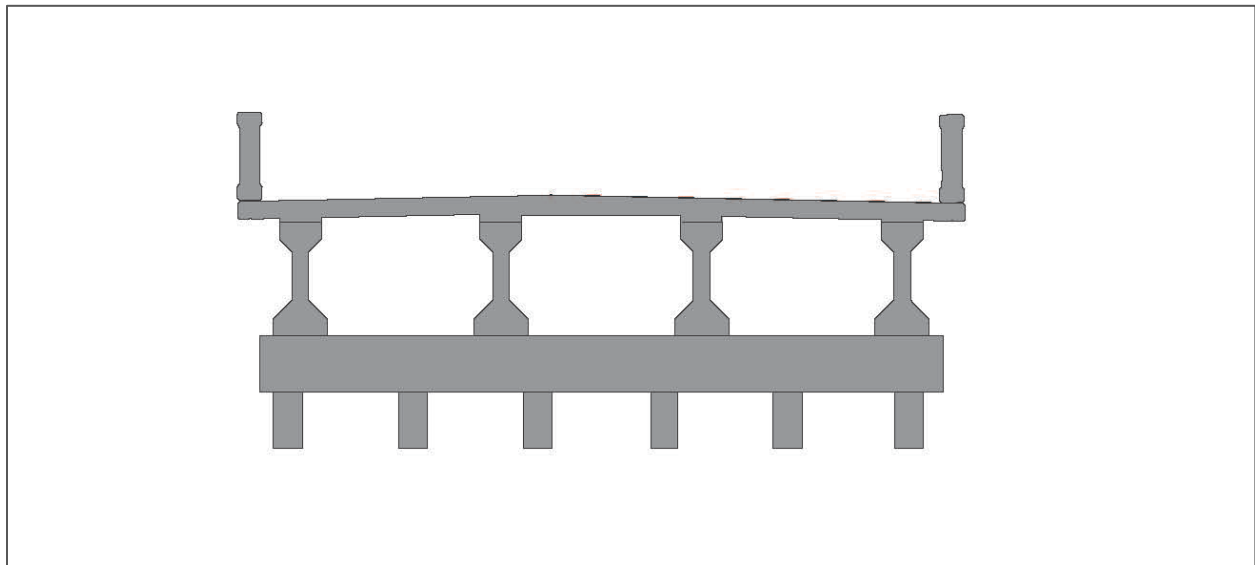
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The existing bridge would be replaced with a new bridge that meets current AASHTO specifications with regards to lane width, shoulder width, live load capacity, and crash worthy railing system. A new bridge with two travel lanes would be built upstream of the existing bridge. The bridge would be approximately 29 feet wide (including the width of the railings) with two 11-foot wide travel lanes and a five-foot shoulder on the downstream side. The bridge railing would be 42 inches high, meeting the minimum requirements for use by vehicles, bicyclists, and pedestrians; however, there would be no railing to separate the pedestrians and bicyclists using the shoulder from the vehicles in the travel lanes.

There would be a total of 114 concrete piles installed to construct the bridge. Eighteen piles would be installed in the banks of the River for the abutments and wingwalls. There would be six piles driven per bent, except for bents 3, 6, 7 and 10, which would have 12 piles per bent. The pile caps would be constructed, upon which a concrete beam would be placed. The bridge deck would be cast offsite and then set in place on top of the beams. The beams and deck would be installed using a crane positioned on a barge in the River. A cast-in-place concrete overlay would be constructed over the precast bridge deck panels. The intermediate spans of the bridge would be built to a length of 105 feet, and the length of the end spans would be 70 feet. There would be 13 spans and 12 bents. The existing bridge would remain open to traffic during construction.

Riprap would be placed at each of the bridge abutments in order to protect the abutments from scour. It is estimated that 45,000 cubic feet of riprap would be placed at the north abutment and 63,000 cubic feet of riprap would be placed at the south abutment.

The bridge would be constructed in one construction phase. After construction is completed and the new bridge is open, the existing bridge would be removed, and the area would be restored to natural tidal marsh conditions.



**Figure 8. Cross section of new bridge on a new alignment.**

## MITIGATION MEASURES

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Avoidance, minimization, and mitigation measures and Best Management Practices (BMPs) would prevent or minimize potential adverse effects associated with the implementation of the build alternatives. These measures and practices would be incorporated into the project design and construction plans, as appropriate.

### Measures Associated with Bridge Repair (Alternatives B, C, D and E)

- Before any bridge work is completed, the bridge would be surveyed for roosting birds and bats. If any are present, bridge work would be delayed until the birds and/or bats are no longer using the site.
- Debris shields would be installed to capture any debris released due to repairs completed above the surface of the water.

### Measures Associated with Removal of the Existing Bridge (Alternatives F, G and H)

- A Memorandum of Agreement with the State Historic Preservation Office (SHPO) would be necessary to document the resolution of adverse effects to the cultural landscape. Prior to demolition Historic American Engineering Record documentation of the bridge would be completed. The construction drawings for the new bridge would be reviewed by the SHPO.

### Measures Associated with Ground Disturbance (Alternatives D, F, G and H)

- Temporary BMPs would be utilized to minimize erosion and sedimentation from ground disturbing activities to exposed bare soil. The BMPs may include the use of silt-fence, sediment logs, erosion matting, or check dams. These BMPs would be used only during construction and would be removed once the disturbed area has been permanently stabilized.
- Disturbed soil would be re-vegetated using specific native seed mixes that do not include invasive or exotic species.
- Any soil excavated during construction would be stockpiled and reused as fill in needed. Should additional soil be needed, the soils would be clean, native soils.
- Should construction unearth previously undiscovered archeological resources, work would be stopped in the area of any discovery, and the Park would consult with the State Historic Preservation Officer/Tribal Historic Preservation Officer and the Advisory Council on Historic Preservation (ACHP), as necessary, according to §36 CFR 800.13, Post Review Discoveries. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed as appropriate.

### Measures Associated with In-Water Work (Alternatives B, C, D, E, F, G and H)

- Localized turbidity curtains would be installed where the River floor may be disturbed in order to not increase the turbidity of the River.
- The Standard Manatee Conditions for Boating Facilities would be implemented.
- No in-water work would be done from April 15<sup>th</sup> through May 31<sup>st</sup> and from September 1<sup>st</sup> through November 30<sup>th</sup> in order to avoid disruption of the Atlantic sturgeon spawning migration.
- Any dewatering activities would include the filtering of the water prior to reintroducing it to the River. Pumping water directly into the channels would be prohibited.



- Underwater noise attenuation, possibly in the form of a bubble screen, may be implemented to reduce noise levels from driving steel piles for Alternative E.
- The pile-driving hammer would be “ramped-up” to allow animals to leave the area. The minimum energy level required to drive the piles would be utilized to minimize noise levels and micarta cushion blocks would be used to dampen noise. A vibratory hammer would be utilized to install the sheet pile cofferdams for Alternatives F, G and H.

#### Measures Associated with Wetland Impacts (Alternatives F, G and H)

- Compensatory mitigation of tidal marsh wetlands would be required by the U.S. Army Corps of Engineers (Corps) under Section 404 of the Clean Water Act for Alternatives G and H. Wetland mitigation would include the restoration of a portion of the existing bridge approach areas and the installation of living shorelines, if feasible. Coordination with the Corps would continue throughout the project development process to ensure the proposed wetland mitigation meets their requirements.
- Mitigation of tidal marsh wetlands in relation to EFH impacts would be required by the NMFS under the Magnuson Stevens Act for Alternative G and H. Coordination with NMFS would continue throughout the project development process to ensure that the proposed wetland mitigation meets their requirements.

### ENVIRONMENTALLY PREFERABLE ALTERNATIVE

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The Environmentally Preferred Alternative is the alternative that would best promote the national environmental policy expressed in the National Environmental Policy Act. The environmentally preferred alternative would cause the least damage to the biological and physical environment, and would best protect, preserve, and enhance historical, cultural, and natural resources.

Section 101(b) of the National Environmental Policy Act identifies six criteria to help determine the Environmentally Preferred Alternative. The act directs that Federal plans should:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
2. Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The identification of the Environmentally Preferred Alternative was based on an analysis that balances factors such as physical impacts on various aspects of the environment, mitigation of impacts, and other factors including the statutory mission of the NPS and the purposes of the project. Alternative H, Two-Lane Bridge on New Alignment, is the Environmentally Preferred

Alternative because it best meets all six of the criteria. This alternative was identified based on the following criteria:

- Alternative H would improve pedestrian and bicycle access to the Fort Pulaski National Monument, and would replace the structurally deficient existing bridge, which would improve safety (criteria 1, 2, and 3). Alternative A would not allow for continued access to the Fort Pulaski Monument. Alternatives B and E would make repairs, but would extend the life of the bridge for a shorter duration of time in comparison with Alternatives C, D, F, G and H. Alternative C would provide for a long-term repair of the bridge; however, it would not address the scour at the bridge abutments. Alternative D would make long-term repairs to the existing bridge which would allow for continued safe pedestrian and vehicular access; however, it would not improve safety and access to the extent of Alternative H.
- Alternative D would minimize impacts to the surrounding River and tidal marsh (criteria 4) in comparison with Alternatives F, G and H. Although Alternatives F, G and H replace the existing bridge, making a long-term reduction in the need for repairs, they impact a greater amount of the River and surrounding tidal marsh (criteria 5).
- Alternative H enhances the quality of renewable resources and recycles depletable resources to the same extent as Alternatives A, B, C, D, E, F, and G (criteria 6).

#### PREFERRED ALTERNATIVE

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The seven action alternatives are comprised of four alternatives that would make repairs to the existing structure. Three of the action alternatives would construct a new bridge. The alternatives were evaluated based on their advantages in relation to their life cycle cost. Alternative H is the Preferred Alternative because it would provide long-term, safe, multi-modal access to the Fort Pulaski National Monument while minimizing and mitigating impacts to natural, cultural, and aesthetic resources.

#### ALTERNATIVES CONSIDERED BUT DISMISSED

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As mentioned previously, alternatives should be “reasonable.” Unreasonable alternatives may be those that are unreasonably expensive; that cannot be implemented for technical or logistic reasons; that do not meet park mandates; that are inconsistent with carefully considered, up-to-date park statements of purpose and significance or management objectives; or that have severe environmental impacts (NPS 2001a).

#### ALTERNATIVE I: CONVERT EXISTING BRIDGE TO ONE VEHICLE LANE

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In order to reduce the load on the structure, the existing bridge would be converted so that one lane would become a reversible vehicle lane, and the other lane would be used for pedestrian and bicycle access. The condition of the existing bridge would continue to deteriorate, even with minor repairs as necessary, and would need to be replaced in 20 years. Alternative I would be inconsistent with management objectives because long-term access to the Island would be reduced due to the elimination of one travel lane.

#### ALTERNATIVE J: ONE LANE SIGNALIZED BRIDGE

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A new bridge would be constructed adjacent to the existing bridge with one reversible lane for vehicle traffic, and one lane for pedestrian and bicycle use. The existing bridge would be demolished in approximately five years. Alternative J would be inconsistent with management objectives because long-term access to Cockspur Island would be reduced due to the elimination of one travel lane. Therefore, it was considered, but dismissed from further consideration in this EA.

#### ALTERNATIVE K: PASSENGER FERRY

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Two ferry docks, one of the south-side of the South Channel of the Savannah River on McQueens Island, and one on the north-side of the River on Cockspur Island would be constructed. A passenger ferry program would be implemented, with shuttle service from the ferry dock on Cockspur Island to the Fort Pulaski National Monument. The existing bridge would be demolished once the two ferry docks are completed and the ferry service is operational. Alternative K would be inconsistent with management objectives because access to the Island would be reduced. Access for the U.S. Coast Guard Station and Savannah Bar Pilots, in particular, would be reduced. Therefore, it was considered, but dismissed from further consideration in this EA.

#### ALTERNATIVE L: PRESERVE HISTORIC STRUCTURE

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The existing bridge would be preserved according to Secretary of Interior Standards for Historic Preservation. Fort Pulaski Bridge is considered a contributing element of Fort Pulaski National Monument in the National Register of Historic Places. The bridge is one of the more significant resources of the Civilian Conservation Corps era on Cockspur Island. Alternative L would be unreasonably expensive; therefore, it was considered, but dismissed from further consideration in this EA.

#### ALTERNATIVE M: REPLACE SUPERSTRUCTURE

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The most severely deteriorated components of the substructure would be rehabilitated through the placement of FRP jackets. The superstructure of the bridge would be replaced. The bridge deck would be replaced with either a FRP deck system or precast deck beams. The expansion joints, bearings, and pile bent bracing would also be replaced. Alternative M would be unreasonably expensive because although the superstructure would be replaced, minimizing the need for future repairs, the substructure would require continuous extensive repair. Therefore, it was considered, but dismissed from further consideration in this EA.

<b>Table 2. Impact Summary</b>		
	<b>Alternative A</b>	<b>Alternative B</b>
<b>Cultural Landscape</b>	<ul style="list-style-type: none"> <li>• Overall impact: None</li> <li>• Cumulative impact: None</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Floodplains</b>	<ul style="list-style-type: none"> <li>• Overall impact: None</li> <li>• Cumulative impact: None</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Species of Special Concern</b>	<ul style="list-style-type: none"> <li>• Overall impact: None</li> <li>• Cumulative impact: None</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Wetlands</b>	<ul style="list-style-type: none"> <li>• Overall impact: None</li> <li>• Cumulative impact: None</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact</li> </ul>
<b>Wildlife and Wildlife Habitat</b>	<ul style="list-style-type: none"> <li>• Overall impact: None</li> <li>• Cumulative impact: None</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term minor, and long-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact</li> </ul>
<b>Visitor Use and Experience</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, minor, and beneficial cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short and long-term, minor adverse impact.</li> <li>• Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, minor, and beneficial cumulative impact.</li> </ul>
<b>Park Operations</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, negligible, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, negligible and adverse cumulative impact.</li> </ul>
<b>Health and Safety</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, negligible, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible, and adverse cumulative impact.</li> </ul>

<b>Table 2. Impact Summary Continued</b>		
	<b>Alternative C</b>	<b>Alternative D</b>
<b>Cultural Landscape</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Floodplains</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Species of Special Concern</b>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short- and long-term, minor, adverse impact from installation of FRP jackets and riprap.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Wetlands</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</li> </ul>
<b>Wildlife and Wildlife Habitat</b>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, minor and long-term, negligible, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short- and long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor and adverse cumulative impact.</li> </ul>
<b>Visitor Use and Experience</b>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, moderate, adverse impact and long-term, minor, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and beneficial cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, moderate, adverse impact and long-term, minor, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and beneficial cumulative impact.</li> </ul>
<b>Park Operations</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible and adverse cumulative impact.</li> </ul>
<b>Health and Safety</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor to moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor to moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible and adverse cumulative impact.</li> </ul>

<b>Table 2. Impact Summary Continued</b>		
	<b>Alternative E</b>	<b>Alternative F</b>
<b>Cultural Landscape</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Floodplains</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Species of Special Concern</b>	<ul style="list-style-type: none"> <li>• Overall impact: Short- and long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short- and long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Wetlands</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor and adverse cumulative impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, adverse impact from addition of riprap and replacement of piles.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact</li> </ul>
<b>Wildlife and Wildlife Habitat</b>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, minor, and long-term negligible adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, and long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</li> </ul>
<b>Visitor Use and Experience</b>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, moderate, adverse impact and long-term, minor, and beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, minor, and beneficial cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, moderate, adverse impact and long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.</li> </ul>
<b>Park Operations</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible, and beneficial cumulative impact.</li> </ul>
<b>Health and Safety</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the cumulative long-term, negligible and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible, and adverse cumulative impact.</li> </ul>

<b>Table 2. Impact Summary Continued</b>		
	<b>Alternative G</b>	<b>Alternative H (Preferred Alternative)</b>
<b>Cultural Landscape</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Floodplains</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor to moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, minor to moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Species of Special Concern</b>	<ul style="list-style-type: none"> <li>• Overall impact: Short- and long-term, minor to moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short- and long-term, minor to moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.</li> </ul>
<b>Wetlands</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</li> </ul>
<b>Wildlife and Wildlife Habitat</b>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term and long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term and long-term, minor, adverse impact.</li> <li>• Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</li> </ul>
<b>Visitor Use and Experience</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and beneficial cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Short-term, moderate, adverse impact and long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and beneficial cumulative impact.</li> </ul>
<b>Park Operations</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, negligible and adverse cumulative impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, negligible and adverse cumulative impacts.</li> </ul>
<b>Health and Safety</b>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible, and adverse cumulative impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall impact: Long-term, moderate, beneficial impact.</li> <li>• Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, negligible, and adverse cumulative impact.</li> </ul>

## CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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This chapter describes the existing environmental conditions in and around the project area and the environmental consequences associated with the alternatives presented in Chapter 2: Alternatives. Chapter 3 is organized by impact topic, and includes the impact topics presented in Chapter 1: Purpose and Need that required further analysis: floodplains, wetlands, wildlife and wildlife habitat, species of special concern, visitor use and experience, Park operations, and health and safety.

For each impact topic identified in Chapter 2, a process for impact assessment was developed based on the directives of Sections 2.9 and 4.5(g) of the DO-12 Handbook. The NPS units are directed to assess the extent of impacts on Park resources as defined by the context, duration, and intensity of the effect. While measurement by quantitative means is useful, it is even more crucial for the public and decision-makers to understand the implications of those impacts in the short- and long-term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists. With that interpretation, one can ascertain whether a certain impact intensity to a park resource is “minor” compared to “major” and what criteria were used to base that conclusion.

### METHODOLOGY

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To determine impacts, methodologies were identified to measure the change in park resources that would occur with the implementation of each alternative. Thresholds were established for each impact topic to help understand the severity and magnitude of changes in resource conditions, both adverse and beneficial, of the various alternatives.

Potential impacts are described in terms of type (Are the effects beneficial or adverse?), context (Are the effects site-specific, local, or even regional?), duration (Are the effects short-term, lasting during construction, or long-term, lasting permanently?), and intensity (Are the effects negligible, minor, moderate, or major?). Because definitions of intensity (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document.

Each alternative is compared to a baseline to determine the context, duration, and intensity of resource impacts. For purposes of impact analysis, the baseline is the continuation of current management (the No Action Alternative) projected over the next 10 years. In the absence of quantitative data, best professional judgment was used to determine impacts. In general, the thresholds used come from existing literature, Federal and State standards, and consultation with subject matter experts and appropriate agencies.



## CUMULATIVE IMPACTS

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The CEQ regulations (40 CFR 1508.7) require the assessment of “cumulative impacts” which are defined as:

*The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.*

In January 1997, the CEQ published a handbook entitled Considering Cumulative Effects Under the National Environmental Policy Act (see <http://ceq.eh.doe.gov/nepa/ccenepa/ccenepa.htm> ). The introduction to the handbook opens with, “Evidence is increasing that the most devastating environmental effects may result not from the direct effects of a particular action, but from the combination of individually minor effects of multiple actions over time.”

Cumulative impacts are considered for all alternatives, including the no-action alternative. They were determined by looking at each resource (impact topic), determining which past, present, and future actions would impact the resource for the determined spatial and temporal boundaries, and then combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at the Park and, if applicable, the surrounding region.

These cumulative actions are evaluated in the cumulative impact analysis in conjunction with the impacts on particular resources. Because both of these cumulative actions are in the early stages, the evaluation of cumulative impacts was based on a general description of the action. Cumulative impacts are considered for all alternatives, and are presented at the end of each impact topic discussion. In defining the contribution of each alternative to cumulative impacts, the following terminology is used:

**Imperceptible:** The incremental effect contributed by the alternative to overall cumulative impacts is such a small increment that it is impossible or extremely difficult to discern.

**Noticeable:** The incremental effect contributed by the alternative, while evident and observable, is still relatively small in proportion to the overall cumulative impacts.

**Appreciable:** The incremental effect contributed by the alternative constitutes a large portion of the overall cumulative impact.

### Past Actions

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The War Department declared Fort Pulaski a National Monument on October 15, 1924. The monument was transferred to the National Park Service on August 10, 1933.

### Present and Future Actions

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Contamination of the Savannah River is ongoing. Numerous industrial sources in the vicinity of metropolitan Savannah include: wastewater treatment plants, chemical producers, a natural gas

processing facility and a paper mill. Further upstream is the Savannah River Site, a nuclear weapons production facility.

S.R. 26/U.S. Highway 80 from Bull River to Lazaretto Creek: The U.S. Highway 80 Bridges Replacement Study has been completed, and recommends widening the existing road to accommodate ten-foot paved, bikeable shoulders and restriping the roadway near Fort Pulaski to allow for a left hand and right hand turn lane. McQueen's Island Trail would be extended east from its intersection with the Fort Pulaski Entrance Road to reach the new Lazaretto Creek Bridge. This project would be completed after 2018 (Chatham County - Savannah MPO, 2014).

Savannah Harbor Expansion Project: The Army Corps of Engineers plans to dredge the Savannah Harbor federal shipping channel from a depth of -42 feet to -47 feet. The deepening would enable larger and more heavily-loaded vessels to enter the harbor. (US Army Corps of Engineers, 2010).

Continued Development of Chatham County: Chatham County's population is projected to increase by 18.5% from 232,048 people in 2000 to 275,057 in 2015. By 2030, the population is expected to reach 307,472, an increase of 32.5% over the 2000 population (Center for Quality Growth and Regional Development at the Georgia Institute of Technology (CRD), 2006).

## CULTURAL LANDSCAPE

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### Affected Environment

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The Fort Pulaski Bridge is listed on the Cultural Landscape Inventory for the Fort Pulaski National Monument and contributes to the cultural landscape. The history of the bridge dates back to 1936, when Congress passed an act that expanded Fort Pulaski Monument to nearly five hundred acres and permitted the construction of a bridge across the South Channel from McQueens Island to Cockspur Island. Ferry service, initiated in 1934, provided access to Cockspur Island at this time. The CCC filled in marshes to prepare for the construction of a bridge across the South Channel, and the construction of the bridge was completed as a Public Works Administration project. The CCC worked on the landscape of the approaches to the bridge and some of the rip-rap at its terminal abutments. The bridge was opened to the public in May 1938, increasing visitation to the park. In 1968 the park installed a fee collection station and entrance gate at the south end of the South Channel Bridge (National Park Service - Southeastern Regional Office, 2003).

As the bridge aged, several repair projects were completed. In 1964 a repair project was completed on the bridge. A U.S. Coast Guard tender replaced cross braces on the bridge in 1982 and again in 1984. In 1987, the bridge expansion joints and spalls were repaired and the structure was painted. In 1999, a project repaired deteriorated parts and resurfaced the asphalt decking. A Cultural Landscape Report was prepared in 2011. The treatment recommendation was to preserve the South Channel Bridge, one of the more significant resources of the CCC era on Cockspur Island. Although the bridge has been repaired multiple times, including the construction of a new deck and encapsulating some of the piles, it retains its integrity of location, feeling, association, workmanship, design and setting. The materials category is the only category that has been somewhat compromised because of the repair projects.

## Methodology

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The NPS Cultural Landscape Inventory for Fort Pulaski National Monument was obtained to evaluate the repaired or replaced bridge. Impact analysis was based on the on-site inspection of the study area, review of existing literature and studies, and professional judgment.

### *Definition of Intensity Levels:*

Negligible	Impacts would result in a change to the cultural landscape, but it would be at the lowest level of detection with no perceptible consequences.
Minor	Impacts would result in a detectable and measurable change to the cultural landscape, but the change would not diminish the integrity of the resources.
Moderate	Impacts would result in a loss of integrity that would consequently jeopardize a site's national register eligibility.
Major	Impacts would result in a change to the cultural landscape that would result in the loss of most or the entire site, to the extent that it would no longer be eligible for national register listing.

*Definition of Duration.* Short-term: Effects lasting the duration of construction or less (maximum of 15 months). Long-term: Effects extend after the construction of the project is completed (15 months) and could be permanent

## Environmental Consequences

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### Alternative A – No Action

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*Direct and Indirect Impacts.* Under Alternative A there would be no impact to the cultural landscape.

*Cumulative Impacts.* There can be no cumulative impacts because there are no direct impacts to the cultural landscape.

*Conclusions.* Under Alternative A, there would be no impact to the cultural landscape, and no cumulative impact to the cultural landscape.

### Alternative B – Emergency Repairs

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*Direct and Indirect Impacts.* FRP jackets would likely be installed to make repairs to the existing bridge. Although additional new materials would be added to the bridge and the cultural landscape, the repairs would be similar to repairs already made to the bridge. For the purposes of Section 106 of the NHPA, the determination of effect would be no adverse effect. Under Alternative B, there would be a long-term, negligible, adverse impact to the cultural landscape.

*Cumulative Impacts.* Past actions, such as the construction of the Fort, the construction of the bridge, and the transfer of Fort Pulaski to the NPS and management by the NPS established and protected the cultural landscape. The combined effects of past, present and reasonably foreseeable actions on the cultural landscape would be long-term, negligible, and adverse. The implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative B would have long-term, negligible, and adverse impacts to the cultural landscape. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative impacts to the cultural landscape.

#### Alternative C – FRP Jacketing of All Piles

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*Direct and Indirect Impacts.* FRP jackets would likely be installed to make repairs to the existing bridge. The repairs would be similar to repairs already made to the bridge, although more extensive. For the purposes of Section 106 of the NHPA, the determination of effect would be no adverse effect. Alternative C would have a long-term, negligible, and adverse impact to the cultural landscape.

*Cumulative Impacts.* Past actions, such as the construction of the Fort, the construction of the bridge, and the transfer of Fort Pulaski to the NPS and management by the NPS established and protected the cultural landscape. The combined past, present and reasonably foreseeable future action would have a long-term, negligible, and adverse cumulative impact to the cultural landscape. The implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative C would have long-term, negligible, and adverse impacts to the cultural landscape. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative impacts to the cultural landscape.

#### Alternative D – Rehabilitation of Existing Bridge

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*Direct and Indirect Impacts.* The repairs to rehabilitate the bridge would be similar to repairs already made to the bridge. FRP jacks would be installed and replaced and some of the timber components of the bridge would be replaced. Although additional components of the bridge would be impacted, the bridge would still retain its historic integrity. For the purposes of Section 106 of the NHPA, the determination of effect would be no adverse effect. Alternative D would have a long-term, minor, and adverse impact to the cultural landscape.

*Cumulative Impacts.* Past actions, such as the construction of the Fort, the construction of the bridge, and the transfer of Fort Pulaski to the NPS and management by the NPS established and protected the cultural landscape. The combined past, present and reasonably foreseeable future action would have a long-term, negligible, and adverse cumulative impact to the cultural landscape. The implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative D would have long-term, minor, and adverse impacts to the cultural landscape. Implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative impacts to the cultural landscape.

#### Alternative E – Install Additional Support on Existing Bridge

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*Direct and Indirect Impacts.* The steel piles and floorbeams would be installed on the existing bridge to provide additional support would not be similar in appearance to previous repairs made to the bridge, and would alter the appearance of the bridge. These repairs would

detract from the appearance of the existing bridge. For the purposes of Section 106 of the NHPA, the determination of effect would be an adverse effect to cultural resources. A Memorandum of Agreement (MOA) would be necessary to document the resolution of the adverse effects. Alternative E would have a long-term, minor, and adverse impact to the cultural landscape.

*Cumulative Impacts.* Past actions, such as the construction of the Fort, the construction of the bridge, and the transfer of Fort Pulaski to the NPS and management by the NPS established and protected the cultural landscape. The combined past, present and reasonably foreseeable future action would have a long-term, negligible, and adverse cumulative impact to the cultural landscape. The implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative E would have long-term, minor, and adverse impacts to the cultural landscape. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts to the cultural landscape.

#### Alternative F – Replace on Existing Alignment

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*Direct and Indirect Impacts.* Alternative G differs from the treatment recommendation provided in the 2011 Cultural Landscape Report. The removal of the existing bridge would remove an important CCC-era structure that contributes to the cultural landscape. The new bridge would be located on the same alignment, so the presence of a bridge within the cultural landscape would not be changed. However, the new bridge would be different in appearance. The new concrete bridge would be made of different materials than the existing bridge. For the purposes of Section 106 of the NHPA, the determination of effect would be an adverse effect to cultural resources. An MOA would be necessary to document the resolution of the adverse effects. Measures carried out to mitigate the adverse effect on the Fort Pulaski Bridge would include Historic American Engineering Record documentation of the bridge and review of the construction drawings for the new bridge by the State Historic Preservation Office. The implementation of Alternative F would have long-term, minor and adverse impacts to the cultural landscape.

*Cumulative Impacts.* Past actions, such as the construction of the Fort, the construction of the bridge, and the transfer of Fort Pulaski to the NPS and management by the NPS established and protected the cultural landscape. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to the cultural landscape. The implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative F would have long-term, minor, and adverse impacts to the cultural landscape. Implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative impacts to the cultural landscape.

#### Alternative G– Replace on a New Alignment (One-Lane Bridges)

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*Direct and Indirect Impacts.* Alternative G differs from the treatment recommendation provided in the 2011 Cultural Landscape Report. The two new one-lane bridges would introduce an

intrusion into a previously undisturbed area of the cultural landscape and the realignment of the entrance road at the bridge approaches would introduce a new circulation pattern for visitors that was never present historically. The concrete bridges would also be made out of different materials and dissimilar in appearance to the existing bridge. The removal of the existing bridge would remove an important CCC-era structure that contributes to the cultural landscape. For the purposes of Section 106 of the NHPA, the determination of effect would be an adverse effect to cultural resources. An MOA would be necessary to document the resolution of the adverse effects. Measures carried out to mitigate the adverse effect on the Fort Pulaski Bridge would include Historic American Engineering Record documentation of the bridge and review of the construction drawings for the new bridge by the State Historic Preservation Office. Alternative G would have long-term, moderate, and adverse impacts to the cultural landscape.

*Cumulative Impacts.* Past actions, such as the construction of the Fort, the construction of the bridge, and the transfer of Fort Pulaski to the NPS and management by the NPS established and protected the cultural landscape. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to the cultural landscape. The implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative G would have long-term, minor to moderate, and adverse impacts to the cultural landscape. Implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative impacts to the cultural landscape.

#### Alternative H– Replace on a New Alignment (Two Lane Bridge) – Preferred Alternative

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*Direct and Indirect Impacts.* Alternative H differs from the treatment recommendation provided in the 2011 Cultural Landscape Report. The removal of the existing bridge would remove an important CCC-era structure that contributes to the cultural landscape. The new bridge would introduce an intrusion into a previously undisturbed area of the cultural landscape and the realignment of the entrance road at the bridge approaches would introduce a new circulation pattern that was never present historically. The concrete bridge would also be made out of different materials and dissimilar in appearance to the existing bridge. For the purposes of Section 106 of the NHPA, the determination of effect would be an adverse effect to cultural resources. An MOA would be necessary to document the resolution of the adverse effects. Measures carried out to mitigate the adverse effect on the Fort Pulaski Bridge would include Historic American Engineering Record documentation of the bridge and review of the construction drawings for the new bridge by the State Historic Preservation Office. Alternative H would have long-term, moderate, and adverse impacts to the cultural landscape.

*Cumulative Impacts.* Past actions, such as the construction of the Fort, the construction of the bridge, and the transfer of Fort Pulaski to the NPS and management by the NPS established and protected the cultural landscape. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to the cultural landscape. The implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative H would have long-term, minor to moderate, and adverse impacts to the cultural landscape. Implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative impacts to the cultural landscape.

### Affected Environment

Floodplain functions include sediment storage, floodwater storage, groundwater recharge, channel stability, water quality, and habitat. Flooding is critical to maintaining vegetation because the flood waters and high tides transport sediment and nutrients from the river and ocean to the connecting floodplain. In this area, the Savannah River exhibits one of the highest tidal ranges on the U.S. East Coast. The differences between low tide and high tide can be more than seven feet (Seabrook, 2009).



A FEMA Flood Insurance Rate Map (13051C0194F) was obtained and evaluated for the study area. The area was surveyed to determine the ground elevations. Impact analysis was based on the on-site inspection of the study area, review of existing literature and studies, and professional judgment. The proposed action was found to be in an applicable regulatory

floodplain. There is no land outside of the floodplain upon which Fort Pulaski Road could be relocated in the study area. Therefore, flood conditions and associated hazards must be quantified as a basis for management decision making and a formal NPS Statement of Findings (SOF) for Floodplains has been prepared. The SOF can be found in Appendix C. The NPS and FHWA have determined that the proposed project is consistent to the maximum extent practicable with the enforceable policies of Georgia's approved coastal management program per the Federal Coastal Zone Management Act of 1972, as amended. A Federal Consistency Determination was prepared and is included in this EA as Appendix B.

*Definition of Intensity Levels:*

Negligible	Impacts would result in a change to floodplain functions and values, but the change would be so slight that it would not be of any measurable or perceptible consequence.
Minor	Impacts would result in a detectable change to floodplain functions and values, but the change would be expected to be small, of little consequence, and localized. There would be no appreciable increased risk to life or property. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Impacts would result in a change to floodplain functions and values that would be readily detectable and relatively localized. Location of operations in floodplains would increase risk to life or property. Mitigation measures, if needed to offset adverse effects, would be extensive, but would likely be successful.
Major	Impacts would result in a change to floodplain functions and values that would have substantial consequences on a regional scale. Location of operations would increase risk to life or property. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

*Definition of Duration.* Short-term: Effects lasting the duration of construction or less (maximum of 15 months). Long-term: Effects extend after the construction of the project is completed (15 months) and could be permanent

## Environmental Consequences

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### Alternative A – No Action

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*Direct and Indirect Impacts.* Under Alternative A there would be no impact to floodplains.

*Cumulative Impacts.* There can be no cumulative impacts because there are no direct impacts to floodplains.

*Conclusions.* Under Alternative A, there would be no impact to floodplains, and no cumulative impact to floodplains.

### Alternative B – Emergency Repairs

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*Direct and Indirect Impacts.* Under Alternative B, there would be a long-term, negligible, adverse impact to floodplains. The repairs would likely include the application of FRP jackets. The installation of these jackets would place additional material in the floodplain; however, the amount of new material would be negligible.



*Cumulative Impacts.* Past actions, such as the placement of fill material to construct Fort Pulaski, have impacted floodplains from the reduction in floodwater storage capacity. Continued development within the floodplain would result in additional structures constructed and further reduction of the storage capacity of the floodplain. Future actions, such as the dredging of the Savannah River, could result in the relabeling of floodplain zones and adversely affect nearby habitats by depleting dissolved oxygen levels and increasing salinity. The combined effects of past, present and reasonably foreseeable actions on floodplains would be long-term, moderate, and adverse. The implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative B would have long-term, negligible, and adverse impacts to floodplains. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative impacts to floodplains.

#### Alternative C – FRP Jacketing of All Piles

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*Direct and Indirect Impacts.* Jacketing all of the timber piles with FRP jackets would place additional material in the floodplain; however, the amount of new material would be negligible. Alternative C would have a long-term, negligible, and adverse impact to floodplains.

*Cumulative Impacts.* Past actions, such as the placement of fill material to construct Fort Pulaski, have impacted floodplains from the reduction in floodwater storage capacity. Continued development of Chatham County adds fill material to the floodplain and decreases the floodwater storage capacity. Future actions, such as the dredging of the Savannah River, could result in the relabeling of floodplain zones and adversely affect nearby habitats by depleting dissolved oxygen levels and increasing salinity. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to floodplains. The implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative C would have long-term, negligible, and adverse impacts to floodplains. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative impacts to floodplains.

#### Alternative D – Rehabilitation of Existing Bridge

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*Direct and Indirect Impacts.* Jacketing of a portion of the timber piles with FRP jackets would place additional material in the floodplain; however, the amount of new material would be negligible. Riprap would also be placed at each of the bridge abutments to protect them from scour, resulting in the addition of 47,500 cubic feet of material in the floodplain. The decrease in floodwater storage capacity of the floodplain would be negligible. Alternative D would have a long-term, minor, and adverse impact to floodplains.

*Cumulative Impacts.* Past actions, such as the placement of fill material to construct Fort Pulaski, have impacted floodplains from the reduction in floodwater storage capacity. Continued development of Chatham County adds fill material to the floodplain and decreases the floodwater storage capacity. Future actions, such as the dredging of the Savannah River, could result in the relabeling of floodplain zones and adversely affect nearby

habitats by depleting dissolved oxygen levels and increasing salinity. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to floodplains. The implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative D would have long-term, minor, and adverse impacts to floodplains. Implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative impacts to floodplains.

#### Alternative E – Install Additional Support on Existing Bridge

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*Direct and Indirect Impacts.* The installation of additional piles and a support beam in the floodplain would introduce additional structural components that would decrease the floodwater storage capacity of the floodplain. However, the decrease would be minimal in relation to the size of the floodplain. Alternative E would have a long-term, minor, and adverse impact to floodplains.

*Cumulative Impacts.* Past actions, such as the placement of fill material to construct Fort Pulaski, have impacted floodplains from the reduction in floodwater storage capacity. Continued development of Chatham County adds fill material to the floodplain and decreases the floodwater storage capacity. Future actions, such as the dredging of the Savannah River, could result in the relabeling of floodplain zones and adversely affect nearby habitats by depleting dissolved oxygen levels and increasing salinity. The combined past, present, and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to floodplains. The implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative E would have long-term, minor, and adverse impacts to floodplains. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts to floodplains.

#### Alternative F – Replace on Existing Alignment

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*Direct and Indirect Impacts.* The deck, bents, and piles of the new bridge would all be located within the floodplain and under the 100-year flood elevation. The volume of the structure would be approximately 480 cubic yards, and would displace an equal amount of floodwater storage capacity; however, the existing bridge would be removed, resulting in an overall negligible impact to floodplains. Construction of the new bridge would also include the placement of riprap at both of the bridge abutments to protect them from scour. Approximately 3,500 square feet of riprap would be placed. This would amount to a volume of approximately 105,000 cubic feet. The implementation of Alternative F would have long-term, minor and adverse impacts to floodplains.

*Cumulative Impacts.* Past actions, such as the placement of fill material to construct Fort Pulaski, have impacted floodplains from the reduction in floodwater storage capacity. Continued development of Chatham County adds fill material to the floodplain and decreases the floodwater storage capacity. Future actions, such as the dredging of the Savannah River, could result in the relabeling of floodplain zones and adversely affect nearby

habitats by depleting dissolved oxygen levels and increasing salinity. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to floodplains. The implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative F would have long-term, minor, and adverse impacts to floodplains. Implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative impacts to floodplains.

#### Alternative G– Replace on a New Alignment (One-Lane Bridges)

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*Direct and Indirect Impacts.* The deck, bents, and piles of the new bridge would all be located within the floodplain and under the 100-year flood elevation. The volume of the structure would be approximately 640 cubic yards, and would displace an equal amount of floodwater storage capacity. Construction of two one-lane bridges on new alignments would include the placement of riprap at both of the bridge abutments to protect them from scour. Approximately 3,500 square feet of riprap would be placed. This would amount to a volume of approximately 105,000 cubic feet. Alternative G would have long-term, minor to moderate, and adverse impacts to floodplains.

*Cumulative Impacts.* Past actions, such as the placement of fill material to construct Fort Pulaski, have impacted floodplains from the reduction in floodwater storage capacity. Continued development of Chatham County adds fill material to the floodplain and decreases the floodwater storage capacity. Future actions, such as the dredging of the Savannah River, could result in the relabeling of floodplain zones and adversely affect nearby habitats by depleting dissolved oxygen levels and increasing salinity. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to floodplains. The implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative G would have long-term, minor to moderate, and adverse impacts to floodplains. Implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative impacts to floodplains.

#### Alternative H– Replace on a New Alignment (Two Lane Bridge) – Preferred Alternative

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*Direct and Indirect Impacts.* The deck, bents, and piles of the new bridge would all be located within the floodplain and under the 100-year flood elevation. The volume of the structure would be approximately 3,200 cubic yards, and would displace an equal amount of floodwater storage capacity. Construction of a new two-lane bridge on a new alignment would include the placement of riprap at both of the bridge abutments to protect them from scour. Approximately 20,500 square feet of riprap would be placed. This would amount to a volume of approximately 4,000 cubic yards. The existing bridge would be demolished after the new bridge is open for use. Alternative H would have long-term, minor to moderate, and adverse impacts to floodplains.

*Cumulative Impacts.* Past actions, such as the placement of fill material to construct Fort Pulaski, have impacted floodplains from the reduction in floodwater storage capacity.

Continued development of Chatham County adds fill material to the floodplain and decreases the floodwater storage capacity. Future actions, such as the dredging of the Savannah River, could result in the relabeling of floodplain zones and adversely affect nearby habitats by depleting dissolved oxygen levels and increasing salinity. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to floodplains. The implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative impacts.

**Conclusions.** Alternative H would have long-term, minor to moderate, and adverse impacts to floodplains. Implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative impacts to floodplains.

## SPECIES OF SPECIAL CONCERN

### Affected Environment

Species of special concern, for the purposes of this EA, include those species that have been designated for additional Federal or State protection. Federally protected species are those species listed by the USFWS as endangered, threatened, or candidate; and by the NMFS as endangered or threatened per the Endangered Species Act. The terms “endangered” and “threatened” are classifications provided to an animal or plant in danger of extinction within the foreseeable future throughout all or significant portion of its range and any species which is likely to become an endangered, respectively. State protected species are those species identified by the state of Georgia as endangered, threatened, rare, or an unusual species. The following species of special concern have been identified as potentially occurring in the study area through coordination with USFWS, NMFS, and GADNR:

<b>Table 3. Species of Special Concern</b>		
<b>Species</b>	<b>Scientific Name</b>	<b>Status</b>
<b>Plants</b>		
Florida wild privet	<i>Forestiera segregate</i>	State - Rare
<b>Birds</b>		
American oystercatcher	<i>Haematopus palliates</i>	State - Rare
Bald eagle	<i>Haliaeetus leucocephalus</i>	State - Threatened
<b>Fish</b>		
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Federal - Endangered, State - Endangered
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	Federal - Endangered
<b>Reptiles</b>		
Loggerhead sea turtle	<i>Caretta caretta</i>	Federal - Threatened, State - Endangered
Green sea turtle	<i>Chelondia mydas</i>	Federal - Threatened, State - Threatened
Kemp’s ridley sea turtle	<i>Lepidochelys kempii</i>	Federal - Endangered, State - Endangered
Carolina diamondback terrapin	<i>Malaclemys terrapin</i>	State - Unusual
<b>Mammals</b>		
West Indian manatee	<i>Trichechus manatus</i>	Federal - Endangered, State - Endangered

Florida wild privet is a deciduous shrub or small tree up to 10 feet tall typically found in coastal/maritime forests and scrub-shrub areas over shell mounds on or near barrier islands or bordering salt marshes (Chafin, 2008). Florida wild privet is not located in the study area and would therefore not be impacted by the proposed project.

The remainder of the species listed in Table 3 have the potential to occur in the study area may be impacted by the proposed project.

The American oystercatcher is a large shorebird that reaches 16-17 inches in length. It has a dark brown back, black head and neck, red eye-ring, and yellow iris. The underside of the body is which, the legs are a pale flesh color, and the bill is deep orange to red with a yellowish tip. This species exists on the highly dynamic edge of estuarine and marine coastal environments. In Georgia, preferred nesting sites are areas of beach with broad sandy berms or terraced flats that are above the mean (average) high tide line (Harris, George, Schneider, & Winn, 1999).

The bald eagle is easily recognized by their dark brown body and contrasting white head and tail. The bill, eyes, legs, and feet are yellow. The length ranges from 30 to 43 inches. Nesting activity is concentrated mostly along the coast and near major rivers, wetlands and reservoirs in the southern and central parts of the state (Ozier & Schneider, 1999).

Atlantic sturgeon, like shortnose sturgeon, are long-lived, estuarine dependent, anadromous fish. Atlantic sturgeon can be distinguished by their larger size, smaller mouth and different snout shape. Atlantic sturgeon grow to approximately 14 feet long and are bluish-black or olive brown dorsally with paler sides and a white belly (National Marine Fisheries Service Office of Protected Resources, 2012). Atlantic sturgeon migrate up the Savannah River to spawn during the fall. Some Atlantic sturgeon come in from the Atlantic and go straight up the river in the fall; however, others do a pre-spawn migration in the spring and go part way up the river, then go the rest of the way to their spawning grounds in the fall.

Shortnose sturgeon are long-lived, estuarine dependent, anadromous fish. Anadromous fish live mainly in the slow moving riverine waters or near shore marine waters and migrate in faster moving fresh water areas to spawn. Shortnose sturgeon grow to approximately 4.7 feet long and are bluish-black or olive brown dorsally with paler sides and a white belly. Based on coordination with NMFS, shortnose sturgeon sometimes move from one river system to another river system and would traverse the project area in the process.

Sea turtles live most of their lives in the ocean; however, adult females must return to beaches on land to lay their eggs. Many sea turtle species employ an open ocean developmental stage because encounters with healthy neonate sea turtles are extremely rare near shore waters. Loggerhead turtles reach approximately three feet in length and occupy the coastal and oceanic zones. Loggerhead turtles are reddish-brown, with a slightly heart-shaped top shell with a pale yellowish bottom shell. Green turtles are the largest of all of the hard-shelled sea turtles, reaching a length of three feet. Green turtles have a smooth top shell with shades of black, gray, green, brown, and yellow, and their bottom shell is yellowish-white. Green turtles primarily eat sea grass and algae in coastal areas. Kemp's are the smallest sea turtle, reaching a length of 28 inches. Kemp's are grayish-green, with a nearly circular top shell and have a pale yellowish bottom shell. Kemp's primarily occupy coastal habitats with muddy or sandy bottoms. Sea turtles may be found year round in the project area (NOAA Fisheries, 2012).

The Carolina diamondback terrapin is a medium sized turtle characterized by concentric age rings or grooves on the scutes of the carapace. Terrapins reach a maximum carapace size of 9 3/8 inches. Diamondback terrapins inhabit brackish and saltwater estuarine habitats (Dodd, 2009).

West Indian manatees are marine mammals found in marine, estuarine, and freshwater environments. Manatees have large seal-shaped bodies with paired flippers and a round, paddle-shaped tail. They are typically grey in color, although color can range from black to light brown. Manatees are occasionally spotted with barnacles or colored by patches of green or red algae. Adult manatees, on average, are about nine feet long, and weigh about 1,000 pounds (U.S. Fish and Wildlife Service, 2011). Manatees migrate northward from Florida to Georgia and are found in the coastal waters during all but the coldest months of the year. The largest identified cause of manatee death is collisions with watercraft. To reduce the likelihood of collisions with manatees during construction activities, the USFWS, in cooperation with the U.S. Army Corps of Engineers, developed the 2007 Standard Manatee Conditions for Boating Facilities (Manatee Conditions). A copy of the Manatee Conditions can be found in Appendix A: Agency Coordination Letters.

### Essential Fish Habitat

The South Channel of the Savannah River is designated as essential fish habitat (EFH) for several species. EFH includes all types of aquatic habitat where fish spawn, breed, feed, or grow to maturity. EFH within the study area was identified for the following species:

<b>Table 4. Essential Fish Habitat Species</b>	
<b>Species</b>	<b>Lifestage(s) Found at Location</b>
Blacknose Shark	Neonate, Juvenile, Adult
Finetooth Shark	Neonate, Juvenile, Adult
Scalloped Hammerhead Shark	Neonate, Juvenile
Bonnethead Shark	Neonate, Juvenile, Adult
Tiger Shark	Neonate, Juvenile
Blacktip Shark	Neonate, Juvenile
Bull Shark	Juvenile
Sandbar Shark	Juvenile
Atlantic Sharpnose Shark	Neonate, Juvenile
White Shark	All
Great Hammerhead Shark	All
Snapper Grouper	All
Shrimp	All

### Methodology

Early coordination was completed with the USFWS, NMFS, and GADNR - Wildlife Resources Division. Impact analysis was based on the on-site inspection of the study area, review of existing literature and studies, and professional judgment. Endangered Species Act Section 7 consultation was completed with the USFWS and NMFS for Alternative H, the Preferred Alternative. Copies of the consultation correspondence can be found in Appendix A.

#### *Definition of Intensity Levels:*

- |            |  |
|------------|--|
| Negligible | The actions would result in a change to a population or individuals of a species, but the change would be of barely perceptible consequence and would be well within natural variability. In the case of federally-listed species, this impact intensity equates to a USFWS determination of “may affect, not likely to adversely affect”. |
| Minor      | The action would result in a change to a population or individuals of a species. The change would be measurable, but small and localized, and not outside the range of natural variability.  |

	Mitigation measures, if needed, would be simple and successful. In the case of federally-listed species, this impact intensity equates to a USFWS determination of “may affect, not likely to adversely affect.”
Moderate	Impacts on special status species, their habitats, or the natural processes sustaining them would be detectable and occur over a large area. Breeding animals of concern are present, and animals are present during particularly vulnerable life stages; mortality or interference with activities necessary for survival would be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit or conservation zone. Mitigation measures would be extensive and likely successful. In the case of federally-listed species, this impact intensity equates to a USFWS determination of “may affect, likely to adversely affect.”
Major	The action would result in noticeable effects to the viability of the population or individuals of a species. Impacts on special status species or the natural processes sustaining them would be detectable, both inside and outside of the park. Loss of habitat might affect the viability of at least some special status species. Extensive mitigation measures would be needed to offset any adverse effects and their success could not be guaranteed. In the case of federally-listed species, the impact intensity equates to a USFWS determination of “may affect, likely to jeopardize the continued existence” of the species.

*Definition of Duration.* Short-term: Effects lasting the duration of construction or less (maximum of 15 months). Long-term: Effects extend after the construction of the project is completed (15 months) and could be permanent

## Environmental Consequences

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### Alternative A – No Action

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*Direct and Indirect Impacts.* Alternative A would have no impact to species of special concern.

*Cumulative Impacts.* There can be no cumulative impacts because there are no direct impacts to species of special concern.

*Conclusions.* Under Alternative A, there would be no impact to species of special concern, and no cumulative impact to species of special concern.

### Alternative B – Emergency Repairs

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*Direct and Indirect Impacts.* Emergency repairs completed under Alternative B would most likely include the installation of FRP jackets only where needed. FRP jackets would be wrapped around the piles, and then epoxy grout would be poured inside of the jackets. No dewatering would be necessary.

Impacts to the American oystercatcher and bald eagle would be negligible. No vegetation clearing or earth disturbance would be necessary in order to complete the emergency repairs. The noise associated with making the repairs would be minor, and is similar in nature to the vehicular and motorized boat traffic in the project area.

Impacts to the Atlantic sturgeon, shortnose sturgeon and sea turtles would be negligible. In-water work would be prohibited during the Atlantic sturgeon spawning migration between April 15 and May 31 and between September 1 and November 30. The construction noise would be

below a harmful level. Equipment and materials would be lowered at the lowest speed possible and all vessels associated with the project would operate at a “no wake/idle” speed at all times while in the construction area.

No ground disturbance or clearing of vegetation would be necessary in order to construct the emergency repairs; therefore Alternative B would have no impact on the Carolina diamondback terrapin.

The Manatee Conditions would be implemented during any construction activities. Under these Conditions, construction activities would be managed to avoid and minimize impacts to the manatee. These conditions include measures such as lowering equipment at the lowest speed possible, and operating vessels at a “no wake/idle” speed. Impacts to the manatee would be negligible due to the limited nature of the repairs and short duration of in-water work.

No adverse impacts to EFH are expected from making emergency repairs to the Fort Pulaski Bridge.

Alternative B would have a short-term, negligible, and adverse impact to species of special concern.

*Cumulative Impacts.* Past actions, such as the development of Chatham County including the construction of roads and the construction of Fort Pulaski, have impacted species of special concern from the loss of habitat. Continued development of Chatham County continues to reduce available habitat for these species. Future actions, such as the dredging of the Savannah River, may adversely impact certain species, particularly the short nose sturgeon, by reducing dissolved oxygen levels and increasing salinity. The combined past, present and reasonably foreseeable future action would have a long-term, moderate, and adverse cumulative impact to species of special concern. The implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative impacts.

*Conclusions.* Alternative B would have short-term, negligible, adverse impacts to species of special concern. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative impacts to species of special concern.

#### Alternative C – FRP Jacketing of All Piles

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*Direct and Indirect Impacts.* Under Alternative C, FRP jackets would be installed around all of the existing timber piles. No dewatering would be necessary to install the FRP jackets. The impacts of Alternative C would be similar to Alternative B, only for a longer duration of time because more FRP jackets would be installed. Alternative C would have a short-term, negligible, and adverse impact to species of special concern.

*Cumulative Impacts.* The other past, present, and future actions would have a long-term, moderate, and adverse cumulative impact to species of special concern. Future actions, such as the dredging of the Savannah River, may adversely impact certain species, particularly the short nose sturgeon, by reducing dissolved oxygen levels and increasing salinity. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to species of special concern.



*Conclusions.* Alternative C would have short-term, negligible, adverse impacts to species of special concern. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative impacts to species of special concern.

#### Alternative D – Rehabilitation of Existing Bridge

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*Direct and Indirect Impacts.* Under the rehabilitation proposed under Alternative D, only the more deteriorated timber piles would be repaired. Riprap would be placed at the bridge abutments. It would be necessary to dewater around the bridge abutments in order to place the riprap.

Impacts to the American oystercatcher and bald eagle would be minor. The area surrounding the abutments would be dewatered, cleared of vegetation, and excavated in order to install the riprap. The noise associated with these activities would be louder than the noise associated with the vehicular and motorized boat traffic in the project area. The noise associated with the construction equipment and activities would cause the American oystercatcher and bald eagle to avoid the project area during the construction of the project; however, similar habitat is abundant in the area and they would return to the area after the project is completed.

Impacts to the Atlantic sturgeon, shortnose sturgeon and sea turtles would be minor. In-water work would be prohibited during the Atlantic sturgeon spawning migration between April 15 and May 31 and between September 1 and November 30. A vibratory hammer would be used to install the sheet piling necessary to dewater the areas around the bridge abutments. Equipment and materials would be lowered at the lowest speed possible and all vessels associated with the project would operate at a “no wake/idle” speed at all times while in the construction area. The area surrounding the abutments would be cleared and excavated in order to install the riprap. This area is comprised of mowed turf grass, riprap shoreline, and tidal marsh. There would be negligible impacts to the Carolina diamondback terrapin because 0.05 acres of tidal marsh would be impacted to install the riprap. Alternative D would have a minor impact on the Carolina diamondback terrapin.

The Manatee Conditions would be implemented during any construction activities. Under these Conditions, construction activities would be managed to avoid and minimize impacts to the manatee. These conditions include measures such as lowering equipment at the lowest speed possible, and operating vessels at a “no wake/idle” speed. Impacts to the manatee would be minor.

No adverse impacts to EFH are expected from rehabilitating the Fort Pulaski Bridge.

Alternative D would have a short-term and long-term, minor, and adverse impact to species of special concern.

*Cumulative Impacts.* The other past, present, and future actions would have a long-term, moderate, and adverse cumulative impact to species of special concern. Future actions, such as the dredging of the Savannah River, may adversely impact certain species, particularly the short nose sturgeon, by reducing dissolved oxygen levels and increasing salinity. Implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to species of special concern.

*Conclusions.* Alternative D would have short-term and long-term, minor, adverse impacts to species of special concern. Implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative impacts to species of special concern.

#### Alternative E – Install Additional Support on Existing Bridge

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*Direct and Indirect Impacts.* Sixty-four additional piles would be constructed within the floodplain under Alternative E. These piles would be steel piles driven into the substrate with a vibratory hammer.

Impacts to the American oystercatcher and bald eagle would be minor. The noise associated with driving piles with a vibratory hammer would be louder than the noise associated with the vehicular and motorized boat traffic in the project area. The American oystercatcher and bald eagle to avoid the project area during the construction of the project; however, similar habitat is abundant in the area and they would return to the area after the project is completed.

Impacts to the Atlantic sturgeon, shortnose sturgeon and sea turtles would be minor. In-water work would be prohibited during the Atlantic sturgeon spawning migration between April 15 and May 31 and between September 1 and November 30. A vibratory hammer would be used to install the steel piles. Equipment and materials would be lowered at the lowest speed possible and all vessels associated with the project would operate at a “no wake/idle” speed at all times while in the construction area. The piles would cause a minimal reduction of the aquatic habitat because the steel piles would be “I” shaped.

No ground disturbance or clearing of vegetation would be necessary in order to install the additional piles; therefore, Alternative E would have no impact on the Carolina diamondback terrapin.

The Manatee Conditions would be implemented during any construction activities. Under these Conditions, construction activities would be managed to avoid and minimize impacts to the manatee. These conditions include measures such as lowering equipment at the lowest speed possible, and operating vessels at a “no wake/idle” speed. Impacts to the manatee would be minor.

No adverse impacts to EFH are expected from rehabilitating the Fort Pulaski Bridge.

Alternative E would have a short-term and long-term, minor, adverse impact to species of special concern.

*Cumulative Impacts.* The other past, present, and future actions would have a long-term, moderate, and adverse cumulative impact to species of special concern. Future actions, such as the dredging of the Savannah River, may adversely impact certain species, particularly the short nose sturgeon, by reducing dissolved oxygen levels and increasing salinity. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to species of special concern.

*Conclusions.* Alternative E would have short-term and long-term, minor, adverse impacts to species of special concern. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts to species of special concern.

#### Alternative F – Replace on Existing Alignment

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*Direct and Indirect Impacts.* The construction of a new bridge on the same alignment as the existing bridge would result in a reduction in the overall number of piles in the River. The existing timber piles would likely be sawed off at the mud line.

Impacts to the American oystercatcher and bald eagle would be minor. The area surrounding the abutments would be dewatered, cleared of vegetation, and excavated in order to construct the new bridge abutments and place riprap around the abutments. The noise associated with the construction activities would be louder than the noise associated with the vehicular and motorized boat traffic in the project area. The noise associated with the construction equipment and activities would cause the American oystercatcher and bald eagle to avoid the project area during the construction of the project; however, similar habitat is abundant in the area and they would return to the area after the project is completed.

Impacts to the Atlantic sturgeon, shortnose sturgeon and sea turtles would be minor to moderate. In-water work would be prohibited during the Atlantic sturgeon spawning migration between April 15 and May 31 and between September 1 and November 30. A vibratory hammer would be used to install the sheet piling necessary to dewater the areas around the bridge abutments and to install the new concrete piles. Equipment and materials would be lowered at the lowest speed possible and all vessels associated with the project would operate at a “no wake/idle” speed at all times while in the construction area.

The area surrounding the abutments would be cleared and excavated in order to construct the new bridge abutments and place riprap around the bridge abutments. This area is comprised of mowed turf grass, riprap shoreline, and tidal marsh. There would be negligible impacts to the Carolina diamondback terrapin because 0.11 acres of tidal marsh would be impacted to install the riprap. Alternative F would have a minor impact on the Carolina diamondback terrapin.

The Manatee Conditions would be implemented during any construction activities. Under these Conditions, construction activities would be managed to avoid and minimize impacts to the manatee. These conditions include measures such as lowering equipment at the lowest speed possible, and operating vessels at a “no wake/idle” speed. Impacts to the manatee would be minor.

Alternative F would impact tidal marsh, an area potentially utilized for spawning, nursery area, and foraging of EFH species. The project would also cause a temporary impact to 0.40 acres of benthic invertebrates. Pile driving would cause underwater noise that may cause EFH species to avoid the project area. The EFH fish species that would be present in the project area would likely avoid the project area due to the increased noise, resulting in behavioral impacts. Species present in close proximity to the pile driving may be injured by the noise, resulting in physiological impacts. In order to minimize the potential for physiological impacts, the pile driving hammer would be “ramped-up” to allow animals to leave the area before harm occurs. Also, the minimum energy level required to drive piles would be utilized to minimize noise levels

and micarta cushion blocks would be used to dampen noise. A vibratory hammer would be utilized to install the sheet pile cofferdam to reduce noise.

Clearing, excavation, and the placement of fill material would be necessary to construct the approaches to the new bridge. Silt fence and other BMPs would be utilized to reduce erosion and control sediment from leaving the site and impacting the adjacent tidal marsh. The disturbed area would be re-vegetated using native species. Crane mats in the tidal marsh would not be necessary in order to construct the bridge.

The placement of piles for the new bridge would temporarily reduce the quantity of EFH until the existing timber piles are removed. After completion of the project, the overall number of piles in the river would be reduced. The construction of the new bridge and demolition of the old bridge would temporarily reduce the quality of EFH because of the increase in turbidity. Turbidity curtains would be used where the river floor may be disturbed by construction activities in order to minimize this impact.

The replacement of the Fort Pulaski Bridge would result in temporary adverse effects to EFH; however, the effect on EFH would not be substantial and the minimization and mitigation measures would appropriately mitigate for the adverse effects. The project would not result in any long-term adverse effects to EFH.

Alternative F would have a short-term and long-term, minor, and adverse impact to the species of special concern.

*Cumulative Impacts.* The other past, present, and future actions would have a long-term, moderate, and adverse cumulative impact to species of special concern. Future actions, such as the dredging of the Savannah River, may adversely impact certain species, particularly the short nose sturgeon, by reducing dissolved oxygen levels and increasing salinity. Implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to species of special concern.

*Conclusions.* Alternative F would have short-term and long-term, minor, and adverse impacts to species of special concern. Implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative impacts to species of special concern.

#### Alternative G – Replace on a New Alignment (One-Lane Bridges)

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*Direct and Indirect Impacts.* Alternative G would have impacts similar to those listed for Alternative F; however, the construction of a new bridge adjacent to the existing bridge would introduce between 128 and 256 new concrete piles (depending on the bridge span length) into the River in addition to the 330 timber piles. The overall increase in the number of piles in the River would have a negligible decrease in aquatic habitat. Alternative G would also require more piles in order to be constructed, which would increase the duration of noise impacts during construction. The area impacted by the placement of riprap would be more than Alternative F, resulting in additional impacts to EFH species; however, mitigation of tidal marsh would be done to compensate for the impacts to tidal marsh and EFH species. Alternative G would have a short-term and long-term, minor to moderate, and adverse impact to species of special concern.

*Cumulative Impacts.* The other past, present, and future actions would have a long-term, moderate, and adverse cumulative impact to species of special concern. Future actions, such as the dredging of the Savannah River, may adversely impact certain species, particularly the short nose sturgeon, by reducing dissolved oxygen levels and increasing salinity. Implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to species of special concern.

*Conclusions.* Alternative G would have short-term and long-term, minor to moderate, and adverse impacts to species of special concern. Implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative impacts to species of special concern.

#### Alternative H – Replace on a New Alignment (Two-Lane Bridge) – Preferred Alternative

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*Direct and Indirect Impacts.* Alternative H would have impacts similar to those listed for Alternative F; however, the construction of a new bridge adjacent to the existing bridge would introduce 96 new concrete piles into the River. The existing bridge would be demolished, removing the 330 timber piles. The overall decrease in the number of piles in the River would have a negligible increase in aquatic habitat. Alternative H would require impact hammering of the piles, which would have noise impacts during construction. The area impacted by the placement of riprap would be more than Alternative F, resulting in additional impacts to EFH species; however, mitigation of tidal marsh would be done to compensate for the impacts to tidal marsh and EFH species. Alternative H would have a short-term, minor, and adverse and long-term, minor beneficial impact to species of special concern.

*Cumulative Impacts.* The other past, present, and future actions would have a long-term, moderate, and adverse cumulative impact to species of special concern. Future actions, such as the dredging of the Savannah River, may adversely impact certain species, particularly the short nose sturgeon, by reducing dissolved oxygen levels and increasing salinity. Implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to species of special concern.

*Conclusions.* Alternative H would have short-term and long-term, minor to moderate, and adverse impacts to species of special concern. Implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative impacts to species of special concern.

## WETLANDS

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### Affected Environment

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Approximately 28 miles upstream from where the Savannah River enters the Atlantic Ocean, saltwater begins mixing with the River's freshwater to form an estuary. Below the city of Savannah, the River picks up more of the characteristics of a tidal river. These characteristics include dangerous currents, saltier water, and extensive expanses of tidal marsh dominated by the plant *Spartina alterniflora*, or smooth cordgrass (Seabrook, Savannah River, 2009). Within

Fort Pulaski National Monument, cordgrass covers about 90 percent of the marshes (Figure 10). Cordgrass grows in dense masses with heights ranging from a few inches to over ten feet.



**Figure 10. The tidal marsh is shown adjacent to the riprap protecting the bridge abutment.**

National Wetland Inventory Maps show the presence of one wetland type in the study area, E2EM1N. E2EM1N wetlands are estuarine, intertidal, emergent wetlands that are dominated by species that normally remain standing at least until the beginning of the next growing season. The tidal water alternately floods and exposes the land surface at least once daily (U.S. Fish and Wildlife Service, 2010). A delineation of the wetlands in the study area was completed. Wetlands in the study area are intertidal wetlands, and include estuarine, intertidal, emergent, persistent wetlands (E2EM1), estuarine, intertidal, unconsolidated shore, mud wetlands (E2US3), and estuarine, intertidal, rocky shore, rubble, artificial wetlands (E2RS2r). The limits of the intertidal zone are from the upland edge of the wetland to the extreme low water elevation of spring tides, or mean low low water (MLLW). The MLLW elevation in the study area is -4.05 feet (Figure 11). The E2EM1 (tidal marsh) primarily contains cordgrass (*Spartina alterniflora*). Other species present include bushy seaside tansy (*Borrchia frutescens*), saltgrass (*Distichlis spicata*), and eastern baccharis (*Baccharis halimifolia*). Both the E2US3 and E2RS2r wetlands are unvegetated.

Wetlands in the study area perform biotic and hydrologic functions. The E2EM1 tidal marsh wetlands provide important fish and wildlife habitat. The marsh provides foraging habitat, refuge from predation, and nursery habitat. Tidal marsh and E2RS2r (riprap shoreline) perform the hydrologic function of erosion and sediment control. E2US3 (tidal flats) may support worm and clam populations, and are often important to migratory birds.

The South Channel of the Savannah River below MLLW is a “water of the U.S.” Although this area is not a wetland, any placement of fill material in wetlands and “waters of the U.S. are regulated by the Corps of Engineers.

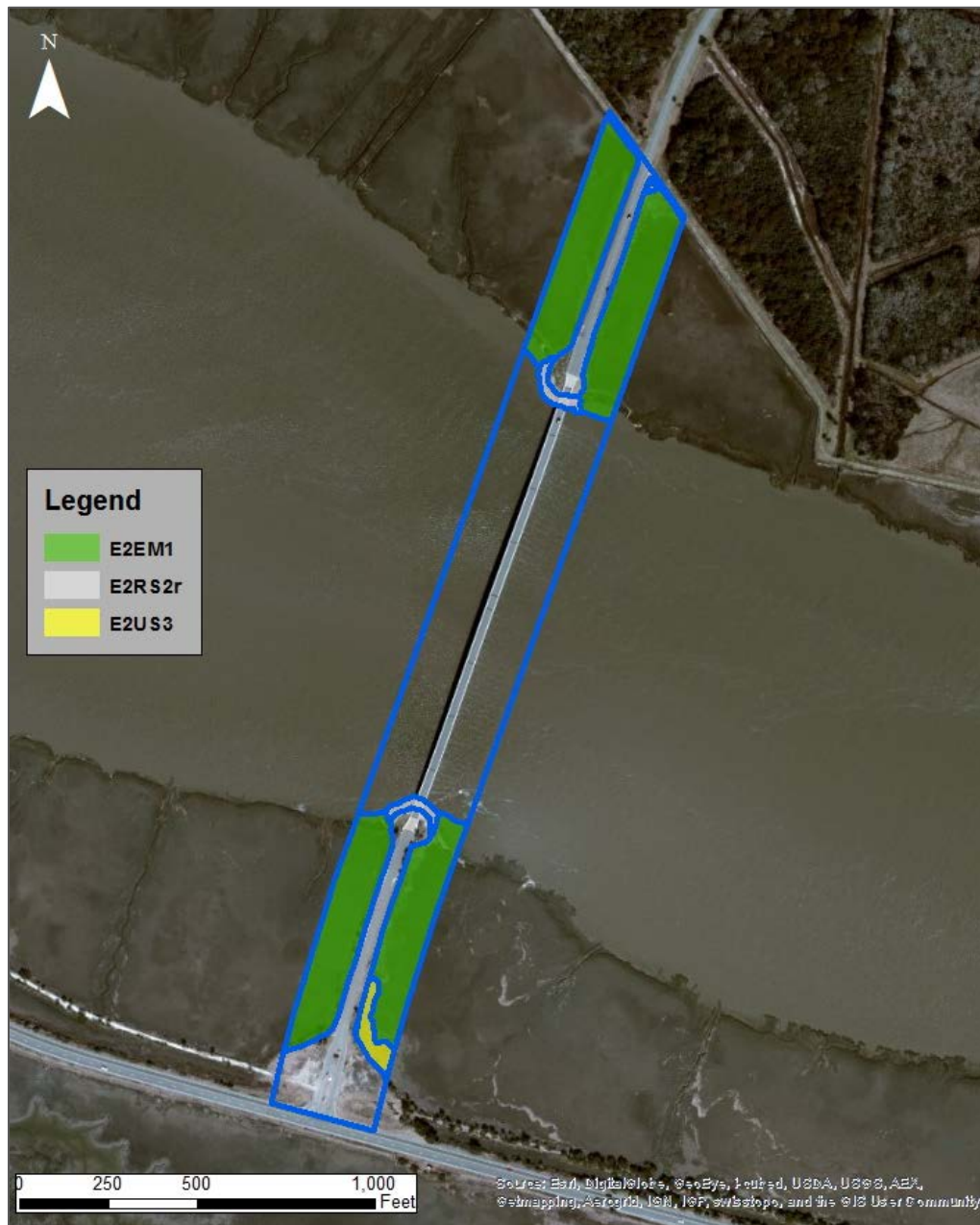


Figure 11. Wetlands in the study area.

## Methodology

Available information on wetlands potentially impacted by the proposed alternatives was compiled by viewing National Wetland Inventory maps. A wetland delineation was performed to gather site-specific data in accordance with the 1987 Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987) and NPS Procedural Manual #77-1 (Dial Cordy and



Associates Inc, 2011). In areas containing both vegetation and soil, the Corps manual was used. In unvegetated areas, such as stream channels, the “limits” of these systems were determined as described in Cowardin et al (1979) (L.M. Cowardin, 1979).

Predictions about short-term and long-term impacts to wetlands were based on previous experience with projects of similar scope and characteristics. Analyses of the potential intensity of impacts on wetlands were derived from the available information and the professional judgment of the resource specialists.

#### *Definition of Intensity Levels:*

Negligible	Wetlands would not be affected or the effects would be at or below the level of detection. There would be no measurable or perceptible effects on wetland plant and animal populations, soils, or hydrology. The effects would be below or at the lower levels of detection (0.0 to 0.01 acres).
Minor	Effects on wetland plant and animal populations, soils, or hydrology would be measurable or perceptible. Mortality of individual plants and animals might occur, but the viability of wetland populations and habitats would not be affected and the community, if left alone, would recover. Changes in wetland soils or hydrology might occur but if left alone, the wetland would recover in time. The effects to wetlands would be detectable and relatively small in terms of area (0.01 to 0.10 acres) and the nature of the change. The action would affect a limited number of individuals of plant or wildlife species within the wetland.
Moderate	A readily measurable change in abundance, distribution, quantity, or quality of populations of plants and animals would occur. Readily measurable changes in soils or hydrology would occur. The wetland would be slow to recover from these changes, or might not recover fully over time. Mitigation measures would be necessary to offset adverse effects, and would likely be successful. The effects to wetlands would be readily apparent over a relatively small area (0.10 acres to 1.0 acres) but the impact could be mitigated by restoring previously degraded wetlands. The action would have a measurable effect on plant or wildlife species within the wetland, but all species would remain indefinitely viable.
Major	Effects on wetland plant and animal populations, soils, or hydrology would be readily apparent, and measurable. Extensive mitigation would be needed to offset adverse effects, and the success of mitigation measures could not be assured. The effects to wetlands would be readily apparent over a relatively large area (1.0 acre or more). The action would have measurable consequences for the wetland area that could not be mitigated. Wetland species dynamics would be upset, and plant and/or animal species would be at risk of extirpation from the area.

*Definition of Duration.* Short-term: Effects lasting the duration of construction, plus the time it takes for wetland vegetation to establish or less (maximum of 18 months). Long-term: Effects extend after the construction of the project is completed (18 months) and could be permanent

### **Environmental Consequences**

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#### **Alternative A – No Action Alternative**

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*Direct and Indirect Impacts.* Alternative A would have no additional impact to wetlands.

*Cumulative Impacts.* There can be no cumulative impacts because there are no direct impacts to wetlands.



*Conclusions.* Under Alternative A, there would be no additional impact to wetlands, and no cumulative impact to wetlands.

#### Alternative B – Emergency Repairs

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*Direct and Indirect Impacts.* Under Alternative B, emergency repairs would be performed as needed. It is likely that these repairs would include the installation of FRP jackets. The installation of FRP jackets would place a negligible amount of fill material into the E2RS2 (riprap shoreline) and South Channel of the Savannah River, a “water of the U.S.” Wetland functions would not be impacted by the implementation of Alternative B. Alternative B would have a long-term, negligible, and adverse impact to wetlands.

*Cumulative Impacts.* Continued development of Chatham County would likely impact wetlands. Future projects, such as the dredging of the Savannah River, may impact wetlands by increasing the salinity of the water. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wetlands. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wetlands.

*Conclusions.* Alternative B would have long-term, negligible, and adverse impacts to wetlands. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative impacts to wetlands.

#### Alternative C – FRP Jacketing of All Piles

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*Direct and Indirect Impacts.* The installation of FRP jackets on all of the existing timber bridge would place a negligible amount of fill material into the E2RS2 (riprap shoreline) and South Channel of the Savannah River, a “water of the U.S.” Wetland functions would not be impacted by the implementation of Alternative C. Alternative C would have a long-term, negligible, and adverse impact to wetlands.

*Cumulative Impacts.* Continued development of Chatham County would likely impact wetlands. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wetlands. Future projects, such as the dredging of the Savannah River, may impact wetlands by increasing the salinity of the water. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wetlands.

*Conclusions.* Alternative C would have long-term, negligible, and adverse impacts to wetlands. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative impacts to wetlands.

#### Alternative D – Rehabilitation of Existing Bridge

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*Direct and Indirect Impacts.* The installation of FRP jackets on a portion of the existing timber piles would place a negligible amount of fill material into the E2RS2 (riprap shoreline) and South Channel of the Savannah River, a “water of the U.S.” The placement of riprap at the bridge abutments would impact approximately 2,200 square feet (0.05 acre) of tidal marsh (E2EM1).

Approximately 900 square feet (0.02 acre) of “waters of the U.S.” would be impacted by the placement of riprap. The wetland functions of fish and wildlife habitat would be minimally impacted by the implementation of Alternative D. Alternative D would have a long-term, minor, and adverse impact to wetlands.

Alternative D would maintain, repair, or renovate a currently serviceable structure and would impact less than 0.10 acres of wetlands; therefore, the proposed action would be excepted from the Statement of Findings and compensation requirements according to section 4.2.1 of Procedural Manual #77-1: Wetland Protection.

*Cumulative Impacts.* Continued development of Chatham County would likely impact wetlands. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wetlands. Future projects, such as the dredging of the Savannah River, may impact wetlands by increasing the salinity of the water. Implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wetlands.

*Conclusions.* Alternative D would have long-term, minor, and adverse impacts to wetlands. Implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative impacts to wetlands.

#### Alternative E – Install Additional Support on Existing Bridge

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*Direct and Indirect Impacts.* Under Alternative E, two new piles would be installed at each of the existing 64 pile bents, placing a minor amount of fill material in the E2RS2 (riprap shoreline) wetlands and in the South Channel of the Savannah River. It is anticipated that less than 0.10 acres of “waters of the U.S.” would be impacted by the “I” shaped steel piles. Alternative E would have a long-term, minor, and adverse impact to wetlands.

Alternative E would maintain, repair, or renovate a currently serviceable structure and would impact less than 0.10 acres of wetlands; therefore, the proposed action would be excepted from the Statement of Findings and compensation requirements according to section 4.2.1 of Procedural Manual #77-1: Wetland Protection.

*Cumulative Impacts.* Continued development of Chatham County would likely impact wetlands. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wetlands. Future projects, such as the dredging of the Savannah River, may impact wetlands by increasing the salinity of the water. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wetlands.

*Conclusions.* Alternative E would have long-term, minor, and adverse impacts to wetlands. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts to wetlands.

## Alternative F – Replace on Existing Alignment

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*Direct and Indirect Impacts.* Under Alternative F, the existing bridge would be replaced by a new bridge with fewer piles on the same alignment. Since the bridge would be replaced on the existing alignment, there would be no impact to the wetlands by the construction of the bridge approaches. The placement of riprap at the abutments would impact approximately 4,800 square feet (0.11 acre) of tidal marsh (E2EM1). There would be no temporary impacts to tidal marsh during construction because construction activities would be phased and the areas would be accessed from the existing bridge approaches. Approximately 10,200 square feet (0.23 acre) of riprap shoreline (E2RS2r) would be replaced in kind, causing no impact to riprap shoreline. The wetland functions of fish and wildlife habitat would be minimally impacted by the implementation of Alternative F. Under Alternative F, a total of 0.11 acres of intertidal wetlands would be impacted.

The existing timber piles would most be removed, most likely by being saw-cut at the mud line. The new bridge would have between 96 and 192 piles depending on the span length. The impact of placing new piles in the River would be offset by the removal of the existing timber piles. Approximately 7,400 square feet (0.17 acre) of “water of the U.S.” would be impacted by the placement of riprap around the bridge abutments. Temporary impacts during construction would be negligible because only the area around the abutments would be dewatered. Alternative F would have a long-term, moderate, and adverse impact to wetlands.

Alternative F would require compensatory mitigation per Procedural Manual #77-1: Wetland Protection. Compensation wetlands must, at a minimum, provide 1:1 wetland function replacement. Fill areas in the Park that were previously tidal marsh would be restored to tidal marsh.

*Cumulative Impacts.* Continued development of Chatham County would likely impact wetlands. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wetlands. Future projects, such as the dredging of the Savannah River, may impact wetlands by increasing the salinity of the water. Implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wetlands.

*Conclusions.* Alternative F would have long-term, moderate, and adverse impacts to wetlands. Implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative impacts to wetlands.

## Alternative G – Replace on a New Alignment (One-Lane Bridges)

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*Direct and Indirect Impacts.* Under Alternative G, two one-lane bridges would be constructed on both sides of the existing bridge. The construction of two new bridges would require the placement of fill material for the bridge approaches, the placement of riprap to protect the bridge abutments, and the installation of piles in the river. The bridge approaches would be constructed in upland and wetland areas. Approximately 11,700 square feet (0.27 acre) of tidal marsh (E2EM1) wetlands would be permanently impacted by the construction of the bridge approaches and the placement of riprap. Approximately 10,200 square feet (0.23 acre) of riprap shoreline (E2RS2r) would be replaced in kind, causing no impact to riprap shoreline. The new bridges would be constructed by equipment on a barge; therefore, there

would not be any short-term impacts to wetlands during construction. Under Alternative G, a total of 0.27 acres of intertidal wetlands would be impacted.

The new bridge piles would also be constructed in the river, a “water of the U.S.” Approximately 9,300 square feet (0.21 acres) of “waters of the U.S.” would be impacted by the new piles and riprap around the abutments. Temporary impacts during construction would be negligible because only the area around the abutments would be dewatered. The wetland functions of fish and wildlife habitat would be minimally impacted by the implementation of Alternative G. Alternative G would have a long-term, moderate, and adverse impact to wetlands.

Alternative G would require compensatory mitigation per Procedural Manual #77-1: Wetland Protection. Compensation wetlands must, at a minimum, provide 1:1 wetland function replacement. Fill areas in the Park that were previously tidal marsh would be restored to tidal marsh.

*Cumulative Impacts.* Continued development of Chatham County would likely impact wetlands. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wetlands. Future projects, such as the dredging of the Savannah River, may impact wetlands by increasing the salinity of the water. Implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wetlands.

*Conclusions.* Alternative G would have long-term, moderate, and adverse impacts to wetlands. Implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative impacts to wetlands.

#### Alternative H – Replace on a New Alignment (Two-Lane Bridge) – Preferred Alternative

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*Direct and Indirect Impacts.* Under Alternative H, a new two-lane bridge would be constructed on the upstream side of the existing bridge. The construction of a new bridge would require the placement of fill material for the bridge approaches, the placement of riprap to protect the bridge abutments, and the installation of piles in the river. The bridge approaches would be constructed in upland and wetland areas. Approximately 17,100 square feet (0.40 acre) of tidal marsh (E2EM1) wetlands would be permanently impacted by the construction of the bridge approaches and the placement of riprap. Approximately 10,200 square feet (0.23 acre) of riprap shoreline (E2RS2r) would be replaced in kind, causing no impact to riprap shoreline. The new bridges would be constructed by equipment on a barge and the approaches would be constructed from the existing road and new fill material; therefore, there would not be any short-term impacts to wetlands during construction. The wetland functions of fish and wildlife habitat would be minimally impacted by the implementation of Alternative H. Under Alternative H, a total of 0.40 acres of intertidal wetlands would be impacted.

The new bridge piles and riprap at the bridge abutments would impact approximately 9,300 square feet (0.25 acre) of “waters of the U.S.” Temporary impacts during construction would be negligible because only the area around the abutments would be dewatered. Alternative H would have a long-term, moderate, and adverse impact to wetlands.

Alternative H would require compensatory mitigation per Procedural Manual #77-1: Wetland Protection. Compensation wetlands must, at a minimum, provide 1:1 wetland function replacement. The roadway approaches for the existing bridge would be restored to tidal marsh in order to compensate for the loss of wetland function due to the placement of fill material to construct the new bridge. Additional mitigation for impacts to wetlands may include the installation of living shorelines to restore tidal marsh and minimize the existing rates of shoreline loss. Fill areas in the Park that were previously tidal marsh could also be restored to tidal marsh. A Statement of Findings has been prepared and can be found in Appendix C.

*Cumulative Impacts.* Continued development of Chatham County would likely impact wetlands. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wetlands. Future projects, such as the dredging of the Savannah River, may impact wetlands by increasing the salinity of the water. Implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wetlands.

*Conclusions.* Alternative H would have long-term, moderate, and adverse impacts to wetlands. Implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative impacts to wetlands.

## WILDLIFE AND WILDLIFE HABITAT

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### Affected Environment

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Several types of wildlife habitat are found in the project area; including mowed turf grass, tidal marsh, and open water aquatic habitat. Immediately adjacent to the road is the mowed turf grass corridor. The noise from the road and disruption by regular mowing make this marginal wildlife habitat.

Tidal marshes are salt-tolerant grasslands, dominated by cordgrass and rushes. Brackish marsh and salt marsh habitat is listed as a high priority habitat for the Southern Coastal Plain of Georgia in the State Wildlife Plan. These are extremely productive habitats. Brackish marshes occupy a transitional area zone in the vicinity of river mouths (Georgia Department of Natural Resources - Wildlife Resources Division, 2005). The tidal marshes provide food for a variety of crabs, shrimp, and other marine species. Migratory and water birds, sea turtles, mud snails, diamondback terrapins, various insects, alligators, mink, raccoons, marsh rabbits, and rice rats are common in the marshes. Great blue herons, snowy egrets, and willets are also common, and three bird species nest in the marshes: clapper rails (also called marsh hens), seaside sparrows, and long-billed marsh wrens (Kennington, 2010).

The South Channel of the Savannah River provides open water aquatic habitat which supports finfish, shellfish, benthic invertebrates, birds, and marine mammals. Observed finfish species include alewife (*Alosa pseudoharengus*), Atlantic croaker (*Micropogonias undulatus*), Atlantic needlefish (*Strongylura marina*), bay anchovy (*Anchoa mitchelli*), longnose gar (*Lepisosteus osseus*), mummichog (*Fundulus heteroclitus*), striped killifish (*Fundulus majalis*), and striped mullet (*Mugil cephalus*) (National Park Service, 2009). Shellfish include oysters, clams and mussels. Marine mammals found in the South Channel of the Savannah River include the West Indian manatee and the bottlenose dolphin (*Turrops truncatus*).

## Methodology

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Information regarding wildlife species was obtained from the Georgia Natural Heritage Program database and from previous studies conducted within the Park. Predictions about short-term and long-term impacts to wildlife and wildlife habitat were based on previous experience with projects of similar scope and characteristics. Analyses of the potential intensity of impacts on wildlife and wildlife habitat were derived from the available information and the professional judgment of the resource specialists. Impacts to Federal and State listed wildlife species are discussed under the Species of Special Concern section.

### *Definition of Intensity Levels:*

Negligible	There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them.
Minor	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Occasional responses by some individuals to disturbance would be expected, but without interference to feeding, reproduction, resting, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors might occur. However, some impacts might occur during critical reproduction periods for a species, but would not result in injury or mortality. Sufficient habitat in the Park would remain functional to maintain the viability of the species in the Park.
Moderate	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Frequent responses to disturbance by some individuals would be expected, with some adverse impacts to feeding, reproduction, resting or other factors affecting local population levels. Some impacts might occur during critical periods of reproduction or in key habitats in the Park and result in harassment, injury, or mortality to one or more individuals. However, sufficient population numbers or habitat in the Park would remain functional to maintain the viability of the species in the Park.
Major	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Frequent responses to disturbance by some individuals would be expected, with adverse impacts to feeding, reproduction, or other factors resulting in a decrease in Park population levels. Impacts would occur during critical periods of reproduction or in key habitats in the Park and result in direct mortality or loss of habitat that might affect the viability of a species in the Park. Local population numbers, population structure, and other demographic factors might experience large declines.

*Definition of Duration.* Short-term: Effects lasting the duration of construction, plus the time it takes for habitat to establish or less (maximum of 18 months). Long-term: Effects extend after the construction of the project is completed (18 months) and could be permanent

## Environmental Consequences

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### Alternative A – No Action Alternative

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*Direct and Indirect Impacts.* Alternative A would have no impact to wildlife or wildlife habitat.

*Cumulative Impacts.* There can be no cumulative impact because there is no direct impact to wildlife or wildlife habitat.

*Conclusions.* Alternative A would have no impact and no cumulative impact to wildlife or wildlife habitat.

#### Alternative B – Emergency Repairs

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*Direct and Indirect Impacts.* The installation of FRP jackets in order to complete the emergency repairs would impact a negligible amount of open water aquatic habitat. The presence of construction equipment and the installation of the jackets would cause wildlife to avoid the project area until the repairs are completed. Alternative B would have short-term, minor and long-term, negligible, and adverse impact to wildlife and wildlife habitat.

*Cumulative Impacts.* Future actions, such as the dredging of the Savannah River, may result in the destruction of certain habitats through decreasing dissolved oxygen levels, increasing salinity, and the erosion of beaches. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wildlife and wildlife habitat. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wildlife and wildlife habitat.

*Conclusions.* Alternative B would have short-term, minor, adverse and long-term, negligible, and adverse impacts to wildlife and wildlife habitat. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts to wildlife and wildlife habitat.

#### Alternative C – FRP Jacketing on All Piles

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*Direct and Indirect Impacts.* Alternative C would have impacts similar in nature to Alternative B, but for a longer duration. Slightly more open water habitat would be impacted because FRP jackets would be installed on all of the timber piles. Alternative C would have short-term, minor and long-term, negligible, and adverse impact to wildlife and wildlife habitat.

*Cumulative Impacts.* Future actions, such as the dredging of the Savannah River, may result in the destruction of certain habitats through decreasing dissolved oxygen levels, increasing salinity, and the erosion of beaches. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wildlife and wildlife habitat. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wildlife and wildlife habitat.

*Conclusions.* Alternative C would have short-term, minor, adverse and long-term, negligible, and adverse impacts to wildlife and wildlife habitat. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts to wildlife and wildlife habitat.

#### Alternative D – Rehabilitation of Existing Bridge

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*Direct and Indirect Impacts.* Alternative D would impact open water aquatic habitat through the installation of FRP jackets and the placement of riprap at the abutments. Clearing and excavation completed in order to install the riprap at the abutments would temporarily impact approximately 8,970 square feet (0.20 acres) of un-vegetated rock habitat. This habitat would be

replaced in-kind. Approximately 890 square feet (0.02 acres) of open water aquatic habitat and 2,200 square feet (0.11 acre) of tidal marsh habitat would be impacted by the placement of riprap. Similar habitat is available in the surrounding area; therefore, Alternative D would have long-term, negligible, adverse impacts to wildlife and wildlife habitat.

Dewatering in order to install the riprap and the increased noise from construction activities and equipment would also impact wildlife during construction. Alternative D would have short-term, minor, adverse impacts to wildlife and wildlife habitat.

*Cumulative Impacts.* Future actions, such as the dredging of the Savannah River, may result in the destruction of certain habitats through decreasing dissolved oxygen levels, increasing salinity, and the erosion of shoreline. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wildlife and wildlife habitat.

Implementation of Alternative D would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wildlife and wildlife habitat.

*Conclusions.* Alternative D would have short-term, minor, adverse and long-term, negligible, and adverse impacts to wildlife and wildlife habitat. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts to wildlife and wildlife habitat.

#### Alternative E – Install Additional Support on Existing Bridge

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*Direct and Indirect Impacts.* Under Alternative E, the construction activities would be completed primarily in the water. Alternative E would impact the open water aquatic habitat through the installation of additional piles in the River. The new piles would be steel piles installed by a vibratory hammer. Aquatic species, such as fish, would be disturbed by the increase in underwater noise levels. Temporary increases in suspended sediments may also result from in-water work. The piles would be installed by equipment on a barge. The barge would shade a small area of the River. These impacts would occur only during construction, and would cease after construction is completed. Alternative E would have a short-term, minor, and adverse impact to wildlife. The “I” shaped bridge piles would permanently impact a minimal amount of aquatic habitat. Alternative E would have a long-term, negligible, and adverse impact to wildlife habitat.

*Cumulative Impacts.* Future actions, such as the dredging of the Savannah River, may result in the destruction of certain habitats through decreasing dissolved oxygen levels, increasing salinity, and the erosion of shoreline. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wildlife and wildlife habitat.

Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wildlife and wildlife habitat.

*Conclusions.* Alternative E would have short-term, minor, adverse and long-term, negligible, and adverse impacts to wildlife and wildlife habitat. Implementation of Alternative E would contribute an imperceptible, adverse increment to the cumulative impacts to wildlife and wildlife habitat.



## Alternative F – Replace on Existing Alignment

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*Direct and Indirect Impacts.* The footprint of the new bridge would be slightly wider than the existing bridge; however, the number of piles in the water would be reduced. The placement of between 96 and 192 piles (depending on the span length) for the new bridge would impact up to 430 square feet of open water habitat; however, the removal of the 330 existing timber piles would create approximately 250 square feet of open water habitat. The wider bridge would shadow an additional area of approximately 15,250 square feet (0.35 acres). Approximately 4,800 square feet (0.11 acres) of tidal marsh habitat, 10,200 square feet (0.23 acres) of un-vegetated rock habitat, and 7,400 square feet (0.17 acres) of open water aquatic habitat would be impacted by the placement of riprap to protect the bridge abutments. Alternative F would have a long-term, minor, and adverse impact to wildlife habitat.

During construction, the increased noise associated with construction activities would disturb and displace terrestrial and aquatic wildlife. The bridge would be constructed using barges, which would temporarily shade and displace wildlife. Alternative F would have a short-term, minor, and adverse impact to wildlife.

*Cumulative Impact.* Future actions, such as the dredging of the Savannah River, may result in the destruction of certain habitats through decreasing dissolved oxygen levels, increasing salinity, and the erosion of shoreline. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wildlife and wildlife habitat. Implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wildlife and wildlife habitat.

*Conclusions.* Alternative F would have short- and long-term, minor, adverse impacts to wildlife and wildlife habitat. Implementation of Alternative F would contribute an imperceptible, adverse increment to the cumulative impacts to wildlife and wildlife habitat.

## Alternative G – Replace on New Alignment (One-Lane Bridges)

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*Direct and Indirect Impacts.* Alternative G would impact the terrestrial and aquatic wildlife and wildlife habitat. The construction of the bridge approaches would impact approximately 6,900 square feet (0.16 acres) of the salt marsh habitat. The placement of riprap to protect the bridge abutments would impact approximately 4,800 square feet (0.11 acre) of the tidal marsh and 7,400 square feet (0.17 acres) of the open water aquatic habitat. The placement of new bridge piles and bents would impact approximately 580 square feet (0.01 acre) of open water aquatic habitat. The new bridge spans would shadow an area of approximately 58,000 square feet (1.33 acres). Shadowing of the water reduced the amount of sunlight that reaches algae and reduces productivity. Alternative G would have a long-term, minor, and adverse impact to wildlife habitat.

During construction, the increased noise associated with construction activities would disturb and displace terrestrial and aquatic wildlife. The piles associated with the new bridges would be driven concrete piles. The bridge would be constructed using barges, which would temporarily shade and displace wildlife. Alternative G would have a short-term, minor, and adverse impact to wildlife.

*Cumulative Impacts.* Future actions, such as the dredging of the Savannah River, may result in the destruction of certain habitats through decreasing dissolved oxygen levels, increasing salinity, and the erosion of shoreline. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wildlife and wildlife habitat. Implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wildlife and wildlife habitat.

*Conclusion.* Alternative G would have short- and long-term, minor, adverse impacts to wildlife and wildlife habitat. Implementation of Alternative G would contribute an imperceptible, adverse increment to the cumulative impacts to wildlife and wildlife habitat.

#### Alternative H – Replace on New Alignment (Two-Lane Bridge) – Preferred Alternative

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*Direct and Indirect Impacts.* Alternative H would impact the terrestrial and aquatic wildlife and wildlife habitat. The construction of the bridge approaches would impact approximately 14,600 square feet (0.34 acres) of the tidal marsh habitat. The placement of riprap to protect the bridge abutments would impact approximately 2,500 square feet (0.06 acre) of the tidal marsh and 3,100 square feet (0.07 acres) of the open water aquatic habitat. The placement of new bridge piles and bents would impact approximately 220 square feet (0.005 acre) of open water aquatic habitat. The new bridge spans would shadow an area of approximately 39,000 square feet (0.90 acres). Shadowing of the water reduced the amount of sunlight that reaches algae and reduces productivity. Alternative H would have a long-term, minor, and adverse impact to wildlife habitat.

During construction, the increased noise associated with construction activities would disturb and displace terrestrial and aquatic wildlife. The piles associated with the new bridges would be driven concrete piles. The bridge would be constructed using barges, which would temporarily shade and displace wildlife. Alternative H would have a short-term, minor, and adverse impact to wildlife.

*Cumulative Impacts.* Future actions, such as the dredging of the Savannah River, may result in the destruction of certain habitats through decreasing dissolved oxygen levels, increasing salinity, and the erosion of shoreline. The other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to wildlife and wildlife habitat. Implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to wildlife and wildlife habitat.

*Conclusion.* Alternative H would have short- and long-term, minor, adverse impacts to wildlife and wildlife habitat. Implementation of Alternative H would contribute an imperceptible, adverse increment to the cumulative impacts to wildlife and wildlife habitat.

#### VISITOR USE AND EXPERIENCE

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##### Affected Environment

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Approximately 416,000 people visited Fort Pulaski National Monument in 2010. Visitation is spread throughout the year, although visitation is reduced in the winter months (National Park Service). A \$10/year local pass is available for entrance fees, otherwise the entrance fee is \$5 per

person for those 16 years of age and older. An interpretive sign located adjacent to the pulloff on the south end of the bridge provides visitors with information regarding things to do while visiting Fort Pulaski. A second interpretive sign located at the north end of the bridge provides visitors with information about the salt marshes located in the park. Both Fort Pulaski and the Cockspur Lighthouse are visible from the bridge.

Numerous recreational opportunities are available for park visitors in the project area. Near the bridge, visitors can fish, exercise or use the picnic area (National Park Service - Southeastern Regional Office, 2003). The existing bridge has two travel lanes and no shoulders. Pedestrians and bicyclists have to cross the bridge in the vehicular travel lane.

Fishing is a popular activity at the approaches of the bridge. Most saltwater finfish seasons are open all year. Bluefish, cobia, Spanish mackerel, and tarpon are all open from March 16<sup>th</sup> through November 30<sup>th</sup>. Amberjack is open March 16<sup>th</sup> through December 31<sup>st</sup> (Georgia Department of Natural Resources, 2003). A public boat ramp, the Lazaretto Creek Boat Ramp, is located in the vicinity of the Fort Pulaski Bridge and is accessible from U.S. Highway 80.

The McQueens Island Historic Trail runs from Bull River to the Fort Pulaski National Monument entrance road (Figure 12). This six-mile trail makes use of the old abandoned Savannah/Tybee Railroad bed. The trail parallels the South Channel of the Savannah River. Birders, hikers, cyclists and kayakers all make use of the trail, the fort, and its facilities (Mobley, 2007). Parking for trail use is available at Fort Pulaski. Chatham County plans to extend the trail system and widen the Lazaretto Creek Bull Creek bridges in order to connect the trail to Tybee Island. Connecting the trail to Tybee Island would increase the number of bicyclist and pedestrians using the trail.



**Figure 12. McQueens Island Historic Trail**

## **Methodology**

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Available information regarding visitor use was compiled by talking to Park staff. Predictions about short-term and long-term impacts to visitor use and experience were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of

impacts to visitor use and experience were derived from the available information, best professional judgment, and previous project investigations.

*Definition of Intensity Levels:*

Negligible	Changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
Minor	Changes in visitor use and/or experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
Moderate	Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.
Major	Changes in visitor use and/or experience would be readily apparent and severely adverse or exceptionally beneficial. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

*Definition of Duration.* Short-term: Effects lasting the duration of construction or less (maximum of 15 months). Long-term: Effects extend after the construction of the project is completed (15 months) and could be permanent

## **Environmental Consequences**

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### **Alternative A – No Action Alternative**

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*Direct and Indirect Impacts.* The Fort Pulaski Bridge would continue to deteriorate over time. Load restrictions would likely be placed on the bridge as the deterioration worsens over time. Pedestrians would continue to be unable to use the bridge without walking in the travel lane. Bicyclists would continue to have to ride with vehicular traffic across the bridge. Alternative A would have a long-term, moderate, and adverse impact to visitor use and experience.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument and the establishment of the park unit, preserved a historic structure for the appreciation of the public. Future actions, such as the S.R. 26/U.S. Highway 80 improvements, would make the National Monument more easily accessible. The combined past, present and reasonably foreseeable future actions would have a long-term, minor, and beneficial cumulative impact to visitor use and experience. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and beneficial impacts to visitor use and experience.

*Conclusions.* Alternative A would have long-term, moderate, adverse impacts to visitor use and experience. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative impacts to visitor use and experience.

### **Alternative B – Emergency Repairs**

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*Direct and Indirect Impacts.* The Fort Pulaski Bridge would continue to deteriorate over time requiring more emergency repairs over time. The emergency repair project would require lane closures or total closure of the bridge. Lane closures would require traffic to alternate on a

single travel lane across the bridge. The travel delays would be noticeable to visitors to Fort Pulaski National Monument. Total bridge closures, if required, would keep visitors from being able to access Fort Pulaski National Monument, because the Fort Pulaski Bridge is the only access to Cockspur Island and Fort Pulaski National Monument. Pedestrians would continue to be unable to use the bridge without walking in the travel lane. Bicyclists would continue to have to ride with vehicular traffic across the bridge. Alternative B would have a short- and long-term, minor, adverse impact to visitor use and experience. Although repairs would be made improve the conditions of the bridge for visitor use, further extensive repairs would necessary.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, preserved a historic structure for the appreciation of the public. Future actions, such as the S.R. 26/U.S. Highway 80 improvements, would make the National Monument more easily accessible. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to visitor use and experience. Implementation of Alternative B would contribute a noticeable, adverse increment to the cumulative long-term, minor, and beneficial impacts to visitor use and experience.

*Conclusions.* Alternative B would have short- and long-term, minor, and adverse impacts to visitor use and experience. Implementation of Alternative B would contribute a noticeable, adverse increment to the cumulative impacts to visitor use and experience.

#### Alternative C – FRP Jacketing of All Piles

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*Direct and Indirect Impacts.* The FRP jackets would be installed by accessing the piles from the bridge deck. The placement of equipment on the bridge deck would require the closure of one of the travel lanes across the bridge. Traffic would alternate in each direction. Travel delays may impact visitors entering and leaving Cockspur Island. Alternative C would have short-term, moderate, and adverse impacts to visitor use and experience. Placing FRP jackets on all of the piles would likely defer the need for additional maintenance on the bridge piles, and reduce the possible future inconveniencing of visitors. Pedestrians would continue to be unable to use the bridge without walking in the travel lane. Bicyclists would continue to have to ride with vehicular traffic across the bridge. Alternative C would have long-term, minor, and beneficial impacts to visitor use and experience as less emergency repair projects would be required in the future.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, preserved a historic structure for the appreciation of the public. Future actions, such as the S.R. 26/U.S. Highway 80 improvements, would make the National Monument more easily accessible. The combined past, present and reasonably foreseeable future actions would have a long-term, minor, and beneficial cumulative impact to visitor use and experience. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and beneficial impacts to visitor use and experience.

*Conclusions.* Alternative C would have short-term, moderate, and adverse and long-term, minor, and beneficial impacts to visitor use and experience. Implementation of Alternative C

would contribute a noticeable, beneficial increment to the cumulative impacts to visitor use and experience.

#### Alternative D – Rehabilitation of Existing Bridge

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*Direct and Indirect Impacts.* The elements of the bridge that would be rehabilitated would be accessed both from a work barge and from the bridge deck. The placement of equipment on the bridge deck would require the closure of one of the travel lanes on the bridge. Traffic would alternate in each direction. Travel delays may impact visitors entering and leaving Cockspur Island. Alternative D would have short-term, moderate, and adverse impacts to visitor use and experience. Rehabilitation of the bridge would likely defer the need for additional maintenance on the bridge, and reduce the possible future inconveniencing of visitors. Pedestrians would continue to be unable to use the bridge without walking in the travel lane. Bicyclists would continue to have to ride with vehicular traffic across the bridge. Alternative D would have long-term, minor, and beneficial impacts to visitor use and experience as less intensive repair projects would be required in the future.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, preserved a historic structure for the appreciation of the public. Future actions, such as the S.R. 26/U.S. Highway 80 improvements, would make the National Monument more easily accessible. The combined past, present and reasonably foreseeable future actions would have a long-term, minor, and beneficial cumulative impact to visitor use and experience. Implementation of Alternative D would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and beneficial impacts to visitor use and experience.

*Conclusions.* Alternative D would have short-term, moderate, and adverse and long-term, minor, and beneficial impacts to visitor use and experience. Implementation of Alternative D would contribute a noticeable, beneficial increment to the cumulative impacts to visitor use and experience.

#### Alternative E – Install Additional Support on Existing Bridge

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*Direct and Indirect Impacts.* Lane closures and closures of the bridge to all traffic would be necessary in order to install the new piles, support beams and floorbeams. Lane and bridge closures would result in travel delays to visitors accessing Cockspur Island and the Fort Pulaski National Monument. Alternative E would have short-term, moderate, and adverse impacts to visitor use and experience. The installation of additional support on the bridge would reduce the need for additional maintenance projects. Pedestrians would continue to be unable to use the bridge without walking in the travel lane. Bicyclists would continue to have to ride with vehicular traffic across the bridge. Alternative E would have long-term, minor, and beneficial impacts to visitor use and experience as less emergency repair projects would be required in the future.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, preserved a historic structure for the appreciation of the public. Future actions, such as the S.R. 26/U.S. Highway 80 improvements, would make the National Monument more easily accessible. The combined past, present and

reasonably foreseeable future actions would have a long-term, minor, and beneficial cumulative impact to visitor use and experience. Implementation of Alternative E would contribute a noticeable increment to the cumulative long-term, minor, and beneficial impacts to visitor use and experience.

*Conclusions.* Alternative E would have short-term, moderate, and adverse and long-term, minor, and beneficial impacts to visitor use and experience. Implementation of Alternative E would contribute a noticeable, adverse increment to the cumulative impacts to visitor use and experience.

#### Alternative F – Replace on Existing Alignment

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*Direct and Indirect Impacts.* Under Alternative F, the bridge would be replaced on the existing alignment. This would require that sections of the bridge are closed to traffic so that they can be demolished, and a new structure constructed in its place. Minor repair projects would also be necessary under Alternative F in order to keep the bridge safe for vehicular traffic until the bridge is completely replaced. Lane closures would be in place for the duration of the construction phase and traffic would alternate directions on the single open travel lane. During construction, pedestrians and bicyclists would be required to use the bridge and intermix with vehicular traffic. Alternative F would have repeated short-term, moderate, and adverse impacts to visitor use and experience.

The new bridge would include a five-foot shoulder on the downstream side of the bridge. The shoulder area would allow pedestrians and bicyclists to cross the bridge without the conflicts with vehicular traffic. Visitors would also be able to utilize the shoulder to view the Fort and the Lighthouse. After the bridge is completely replaced the need for maintenance and inconvenience to visitors would be reduced. Alternative F would have a long-term, moderate, and beneficial impact to visitor use and experience.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, preserved a historic structure for the appreciation of the public. Future actions, such as the S.R. 26/U.S. Highway 80 improvements, would make the National Monument more easily accessible. The combined past, present and reasonably foreseeable future actions would have a long-term, minor, and beneficial cumulative impact to visitor use and experience. Implementation of Alternative F would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and beneficial impacts to visitor use and experience.

*Conclusions.* Alternative F would have short-term, moderate, and adverse and long-term, moderate, and beneficial impacts to visitor use and experience. Implementation of Alternative F would contribute a noticeable, beneficial increment to the cumulative impacts to visitor use and experience.

#### Alternative G – Replace on New Alignment (One-Lane Bridges)

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*Direct and Indirect Impacts.* The two one-lane bridges would be constructed on a new alignment; therefore, closures of travel lanes would not be necessary. Vehicular traffic, bicycles, and pedestrians would continue to be able to utilize the existing bridge until the new

bridges are opened. Minor repair projects would be necessary to keep the existing bridge safe for vehicular traffic until the new bridges are completed. After the two one-lane bridges are open to vehicular traffic, the existing bridge would be demolished.

The new bridge would include three-foot shoulders on each side of the travel lane. The shoulders would allow pedestrians and bicyclists to cross the bridge without the conflicts with vehicular traffic. Visitors would also be able to utilize the shoulder to view the Fort and the Lighthouse. Alternative G would have a long-term, moderate, and beneficial impact to visitor use and experience.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, preserved a historic structure for the appreciation of the public. Future actions, such as the S.R. 26/U.S. Highway 80 improvements, would make the National Monument more easily accessible. The combined past, present and reasonably foreseeable future actions would have a long-term, minor, and beneficial cumulative impact to visitor use and experience. Implementation of Alternative G would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and beneficial impacts to visitor use and experience.

*Conclusions.* Alternative G would have long-term, moderate, and beneficial impacts to visitor use and experience. Implementation of Alternative G would contribute an imperceptible, beneficial increment to the cumulative impacts to visitor use and experience.

#### Alternative H – Replace on New Alignment (Two-Lane Bridge) – Preferred Alternative

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*Direct and Indirect Impacts.* The two-lane bridge would be constructed on a new alignment. A one-lane signalized closure would be implemented during the pile driving, and may be necessary for the duration of construction. Vehicular traffic, bicycles, and pedestrians would continue to be able to utilize the existing bridge until the new bridge is opened. After the new bridge is open to vehicular traffic, the existing bridge would be demolished. Alternative H would have a short-term, moderate, and adverse impact to visitor use and experience.

The new bridge would include a five-foot shoulder on the downstream side of the bridge. The shoulder area would allow pedestrians and bicyclists to cross the bridge without the conflicts with vehicular traffic. Visitors would also be able to utilize the shoulder to view the Fort and the Lighthouse. Alternative H would have a long-term, moderate, and beneficial impact to visitor use and experience.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, preserved a historic structure for the appreciation of the public. Future actions, such as the S.R. 26/U.S. Highway 80 improvements, would make the National Monument more easily accessible. The combined past, present and reasonably foreseeable future actions would have a long-term, minor, and beneficial cumulative impact to visitor use and experience. Implementation of Alternative H would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and beneficial impacts to visitor use and experience.



*Conclusions.* Alternative H would have long-term, moderate, and beneficial impacts to visitor use and experience. Implementation of Alternative H would contribute an imperceptible, beneficial increment to the cumulative impacts to visitor use and experience.

## PARK OPERATIONS

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### Affected Environment

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The Fort Pulaski National Monument currently has 17 permanent employees. A concessionaire, Eastern National, runs the bookstore located within the Fort Pulaski National Monument. Park maintenance and operations include daily activities required to ensure the proper functioning, repair, and rehabilitation of the Park's assets and infrastructure. The Fort Pulaski Bridge is maintained by the NPS. The existing bridge contains lead paint and is painted annually. Phone and water lines run through the bridge structure to Cockspur Island. Park operations also includes protection and visitor services and interpretation activities related to providing visitors a safe experience, emergency services, and law enforcement, and providing visitors with the desired educational experience.

### Methodology

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Available information regarding Park operations was compiled by talking to Park staff. Predictions about short-term and long-term impacts to Park operations were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of impacts to operation were derived from the available information and best professional judgment.

#### *Definition of Intensity Levels:*

Negligible	Park operations would not be impacted or the impact would not have a noticeable or measurable impact on Park or agency operations.
Minor	Impacts would be noticeable and would result in a measurable, but small, change in Park operations. Any required changes in Park staffing and funding would be accommodated within normal budget cycles and expected annual funding without appreciably affecting other operations within the Park. Current levels of funding and staffing would not be reduced or increased, but priorities would need to be changed.
Moderate	Impacts would be readily apparent and would result in a substantial change in Park operations that would be noticeable to staff and the public. Required changes in Park staffing and/or funding would not be accommodated within expected annual funding and would measurably affect other operations within the Park by shifting staff and funding levels between operational divisions. Increases or decreases in staff and funding would be needed or other Park operations would have to be reduced and/or priorities changed.
Major	Impacts would be readily apparent and would result in a substantial change in Park operations that would be noticeable to staff and the public and would be markedly different from existing operations. These changes in Park staffing and/or funding would not be accommodated by expected annual funding and would require the Park to readdress its ability to sustain current Park operations. Increases or decreases in staff and funding would be needed and/or other Park programs would have to be substantially changed or eliminated.

*Definition of Duration.* Short-term: Effects lasting the duration of construction or less (maximum of 15 months). Long-term: Effects extend after the construction of the project is completed (15 months) and could be permanent.

## **Environmental Consequences**

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### **Alternative A – No Action Alternative**

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*Direct and Indirect Impacts.* Under Alternative A, the Fort Pulaski Bridge would continue to deteriorate. Emergency repair projects would be completed as critically needed, and it is possible that additional load restrictions would be placed on the bridge. Funds would not be programmed for these repairs, and funding for these repairs could take away from other maintenance needs in the Park. Alternative A would have a long-term, moderate, and adverse impact to park operations.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, created a facility that requires routine maintenance and repair as it continues to deteriorate over time. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, negligible, and adverse impacts to park operations.

*Conclusions.* Alternative A would have long-term, moderate, and adverse impacts to park operations. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative impacts to park operations.

### **Alternative B – Emergency Repairs**

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*Direct and Indirect Impacts.* Under Alternative B, emergency repairs would be completed as needed, similar to Alternative A; however, the funding for these repairs would be planned for and programmed. It is estimated that emergency repair projects would total \$4 million. Alternative B would have a long-term, minor, and adverse impact to park operations because although repair projects would be minor for the near future, the bridge would still require replacement within the next 20 years.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, created a facility that requires routine maintenance and repair as it continues to deteriorate over time. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative B would contribute a noticeable, adverse increment to the cumulative long-term, negligible, and adverse impacts to park operations.

*Conclusions.* Alternative B would have long-term, minor, and adverse impacts to park operations. Implementation of Alternative B would contribute a noticeable, adverse increment to the cumulative impacts to park operations.

## Alternative C – FRP Jacketing of All Piles

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*Direct and Indirect Impacts.* Under Alternative C, all of the timber piles would be wrapped in FRP jackets. It is estimated that the cost of this work would be approximately \$10 million. Alternative C would extend the life of the bridge for about 20 years and reduce the need for maintenance and repair of the bridge structure in the near future. Alternative C would have a long-term, minor, and beneficial impact to park operations.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, created a facility that requires routine maintenance and repair as it continues to deteriorate over time. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to park operations.

*Conclusions.* Alternative C would have long-term, minor, and beneficial impacts to park operations. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative impacts to park operations.

## Alternative D – Rehabilitation of Existing Bridge

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*Direct and Indirect Impacts.* Under Alternative D, the most deteriorated timber piles would be wrapped in FRP jackets. Severely deteriorated sections of the timber piles would be replaced. Riprap would also be installed to protect the abutments from scour. It is estimated that the cost of this work would be approximately \$6 million. Alternative D would extend the life of the bridge for about 40 years and reduce the need for maintenance and repair of the bridge structure in the near future. Alternative D would have a long-term, minor, and beneficial impact to park operations.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, created a facility that requires routine maintenance and repair as it continues to deteriorate over time. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative D would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to park operations.

*Conclusions.* Alternative D would have long-term, minor, and beneficial impacts to park operations. Implementation of Alternative D would contribute a noticeable, beneficial increment to the cumulative impacts to park operations.

## Alternative E – Install Additional Support on Existing Bridge

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*Direct and Indirect Impacts.* Under Alternative E, new steel piles, support beams, and floor beams would be installed. The steel piles would corrode relatively quickly in the saline environment; therefore the bridge would need to be replaced in 20 years. It is estimated that the cost of this work would be \$11 million. Alternative E would have a long-term, minor, and beneficial impact to park operations.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, created a facility that requires routine maintenance and repair as it continues to deteriorate over time. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative E would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to park operations.

*Conclusions.* Alternative E would have long-term, minor, and beneficial impacts to park operations. Implementation of Alternative E would contribute an imperceptible, beneficial increment to the cumulative impacts to park operations.

#### Alternative F – Replace on Existing Alignment

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*Direct and Indirect Impacts.* Under Alternative F, the existing bridge would be replaced in several sections over time as funding is available. It is estimated that this would cost \$8.5 million. The new bridge would have a lifespan of 75 years. Maintenance would be necessary for the bridge to reach its maximum useful life. Maintenance activities may include cleaning and sealing of the concrete, repairing or replacing deteriorated sections of the joints and repairs to any deteriorated or damaged concrete. Corrective maintenance may be required every 20 years and would be estimated to cost approximately \$250,000 for each cycle. Alternative F would have a long-term, moderate, and beneficial impact to park operations.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, created a facility that requires routine maintenance and repair as it continues to deteriorate over time. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative F would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to park operations.

*Conclusions.* Alternative F would have long-term, moderate, and beneficial impacts to park operations. Implementation of Alternative F would contribute an imperceptible, beneficial increment to the cumulative impacts to park operations.

#### Alternative G – Replace on New Alignment (One-Lane Bridges)

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*Direct and Indirect Impacts.* Under Alternative G, two new one-lane bridges would be constructed. It is estimated that the construction of these two new bridges would cost \$8.7 million. The project would be constructed in two phases. The new bridges would have a life of 75 years. Maintenance would be necessary for the bridge to reach its maximum useful life. Maintenance for Alternative G would be similar to Alternative F. Alternative G would have a long-term, moderate, and beneficial impact to park operations.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, created a facility that requires routine maintenance and repair as it continues to deteriorate over time. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse

cumulative impact to park operations. Implementation of Alternative G would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts to park operations.

*Conclusions.* Alternative G would have long-term, moderate, and beneficial impacts to park operations. Implementation of Alternative G would contribute a noticeable, beneficial increment to the cumulative impacts to park operations.

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#### Alternative H – Replace on New Alignment (Two-Lane Bridge) – Preferred Alternative

*Direct and Indirect Impacts.* Under Alternative H, a new two-lane bridge would be constructed. It is estimated that the construction of this new bridge would cost \$7 million. The project would be constructed in one phase. The new bridge would have a life of 75 years. Maintenance would be necessary for the bridge to reach its maximum useful life. Maintenance for Alternative H would be similar to Alternative F. Alternative H would have a long-term, moderate, and beneficial impact to park operations.

*Cumulative Impacts.* Past actions, such as the declaration of Fort Pulaski as a National Monument, and the establishment of the park unit, created a facility that requires routine maintenance and repair as it continues to deteriorate over time. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative H would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts to park operations.

*Conclusions.* Alternative H would have long-term, moderate, and beneficial impacts to park operations. Implementation of Alternative H would contribute a noticeable, beneficial increment to the cumulative impacts to park operations.

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## HEALTH AND SAFETY

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### Affected Environment

The NPS Management Policies 2006 state that while recognizing that there are limitations on its capability to totally eliminate all hazards, the NPS and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The existing bridge was originally constructed in 1938, and has been deteriorating over time. The main structural problem is the extensive decay of the timber decking adjacent to the concrete pile caps. The beams and bearings in the main span of the bridge are made of steel, and are exhibiting widespread rusting with substantial section loss. As the timber and steel components of the bridge structure continue to deteriorate, the bridge will be unable to support heavy vehicles and load restrictions would be placed on the bridge (Federal Highway Administration, 2010). The bridge is currently posted at 18 tons.

The existing bridge is structurally deficient and its current configuration poses a safety hazard to pedestrians and bikers who must share the narrow bridge with vehicular traffic. The bridge has two 10-foot travel lanes and no shoulders. The railing on the bridge is a 36-inch high concrete railing (height above bridge deck), which includes a seven-inch curb. Bridge railings are

designed to redirect an impacting vehicle; i.e. to be crashworthy. Current standards for vehicle and pedestrian/bicycle bridge rail recommend a height of 32 inches and 42 inches respectively.

## Methodology

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Available information regarding health and safety was compiled. Predictions about short-term and long-term impacts to health and safety were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of impacts to health and safety were derived from the available information on the Park and best professional judgment.

### *Definition of Intensity Levels:*

Negligible	Changes in health and safety would be below or at the level of detection.
Minor	Changes in health and safety would be detectable, although the changes would be slight.
Moderate	Changes in health and safety would be readily apparent.
Major	Changes in health and safety would be readily apparent and severely adverse or exceptionally beneficial.

*Definition of Duration.* Short-term: Effects lasting the duration of construction or less (maximum of 15 months). Long-term: Effects extend after the construction of the project is completed (15 months) and could be permanent.

## Environmental Consequences

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### Alternative A – No Action

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*Direct and Indirect Impacts.* Under Alternative A, the Fort Pulaski Bridge would continue to deteriorate. Emergency repair projects would be completed as needed, and it is possible that additional load restrictions would be placed on the bridge. The existing bridge would continue to pose a safety hazard to pedestrians and bikers who have to share the narrow bridge with vehicular traffic. Alternative A would have a long-term, moderate, and adverse impact to health and safety.

*Cumulative Impacts.* Past actions, such as the construction of the Fort Pulaski Bridge, maintenance activities, and repair and rehabilitation projects could create potential conflicts between motor vehicles, bicyclists and pedestrians and maintenance and construction equipment. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to health and safety. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, negligible, and adverse impacts to health and safety.

*Conclusions.* Alternative A would have long-term, moderate, and adverse impacts to health and safety. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative impacts to health and safety.

### Alternative B – Emergency Repairs

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*Direct and Indirect Impacts.* Under Alternative B, emergency repair projects would be completed as needed. The bridge would need to be replaced in 20 years. The existing bridge

would continue to pose a safety hazard to pedestrians and bikers who have to share the narrow bridge with vehicular traffic. Alternative B would have a long-term, minor, and beneficial impact to health and safety.

*Cumulative Impacts.* Past actions, such as the construction of the Fort Pulaski Bridge, maintenance activities, and repair and rehabilitation projects could create potential conflicts between motor vehicles, bicyclists and pedestrians and maintenance and construction equipment. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to health and safety. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to health and safety.

*Conclusions.* Alternative B would have long-term, minor, and beneficial impacts to health and safety. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative impacts to health and safety.

#### Alternative C - FRP Jacketing of All Piles

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*Direct and Indirect Impacts.* Under Alternative C, all of the timber piles would be wrapped in FRP jackets. This would extend the life of the bridge for about 40 years and reduce the need for maintenance and repair of the bridge structure in the near future. The existing bridge would continue to pose a safety hazard to pedestrians and bikers who have to share the narrow bridge with vehicular traffic. Alternative C would have a long-term, minor to moderate, and beneficial impact to health and safety.

*Cumulative Impacts.* Past actions, such as the construction of the Fort Pulaski Bridge, maintenance activities, and repair and rehabilitation projects could create potential conflicts between motor vehicles, bicyclists and pedestrians and maintenance and construction equipment. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to health and safety.

*Conclusions.* Alternative C would have long-term, minor to moderate, and beneficial impacts to health and safety. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative impacts to health and safety.

#### Alternative D - Rehabilitation of Existing Bridge

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*Direct and Indirect Impacts.* Under Alternative D, the existing bridge would be rehabilitated. Included with the rehabilitation would be the installation of FRP jackets on the more deteriorated timber piles and additional substructure and superstructure repairs. This would extend the life of the bridge for about 40 years and reduce the need for maintenance and repair of the bridge structure in the near future. The existing bridge would continue to pose a safety hazard to pedestrians and bikers who have to share the narrow bridge with vehicular traffic. Alternative D would have a long-term minor to moderate, and beneficial impact to health and safety.

*Cumulative Impacts.* Past actions, such as the construction of the Fort Pulaski Bridge, maintenance activities, and repair and rehabilitation projects could create potential conflicts between motor vehicles, bicyclists and pedestrians and maintenance and construction equipment. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to park operations. Implementation of Alternative D would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to health and safety.

*Conclusions.* Alternative D would have long-term, minor to moderate, and beneficial impacts to health and safety. Implementation of Alternative D would contribute a noticeable, beneficial increment to the cumulative impacts to health and safety.

#### Alternative E – Install Additional Support on Existing Bridge

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*Direct and Indirect Impacts.* Under Alternative E, additional support structures would be installed to improve the safety of the bridge and extend the life of the bridge by 20 years. The existing bridge would continue to pose a safety hazard to pedestrians and bikers who have to share the narrow bridge with vehicular traffic. Alternative E would have a long-term, minor, and beneficial impact to health and safety.

*Cumulative Impacts.* Past actions, such as the construction of the Fort Pulaski Bridge, maintenance activities, and repair and rehabilitation projects, could create potential conflicts between motor vehicles, bicyclists and pedestrians and maintenance and construction equipment. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to health and safety. Implementation of Alternative E would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to health and safety.

*Conclusions.* Alternative E would have long-term, minor, and beneficial impacts to health and safety. Implementation of Alternative E would contribute a noticeable, beneficial increment to the cumulative impacts to health and safety.

#### Alternative F – Replace on Existing Alignment

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*Direct and Indirect Impacts.* Under Alternative F, the existing Fort Pulaski Bridge would be replaced with a new two-lane bridge constructed to meet current safety standards with regards to lane width, shoulder width, live load capacity, and crash worthy railing system. Once completed, the new bridge would have a life span of approximately 75 years. The bridge would provide 4.5-foot shoulders to allow for separation of the vehicular traffic from the pedestrian and bicyclists. The bridge would also provide higher railing to improve pedestrian and bicycle safety. Alternative F would have a long-term, moderate, and beneficial impact to health and safety.

*Cumulative Impacts.* Past actions, such as the construction of the Fort Pulaski Bridge, maintenance activities, and repair and rehabilitation projects could create potential conflicts between motor vehicles, bicyclists and pedestrians and maintenance and construction equipment. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to health and safety. Implementation of



Alternative F would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to health and safety.

*Conclusions.* Alternative F would have long-term, moderate, and beneficial impacts to health and safety. Implementation of Alternative F would contribute a noticeable, beneficial increment to the cumulative impacts to health and safety.

#### Alternative G – Replace on New Alignment (One-Lane Bridges)

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*Direct and Indirect Impacts.* Under Alternative G, two one-lane bridges would be constructed. These bridges would be constructed to meet current safety standards with regards to lane width, shoulder width, live load capacity, and crash worthy railing system. The new bridges would have a life span of approximately 75 years. The bridges would provide three-foot shoulders to allow for separation of the vehicular traffic from the pedestrian and bicyclists. The bridge would also provide higher railing to improve pedestrian and bicycle safety. Alternative G would have a long-term, moderate, and beneficial impact to health and safety.

*Cumulative Impacts.* Past actions, such as the construction of the Fort Pulaski Bridge, maintenance activities, and repair and rehabilitation projects could create potential conflicts between motor vehicles, bicyclists and pedestrians, who use the bridge, and maintenance and construction equipment. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to health and safety. Implementation of Alternative G would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to health and safety.

*Conclusions.* Alternative G would have long-term, moderate, and beneficial impacts to health and safety. Implementation of Alternative G would contribute a noticeable, beneficial increment to the cumulative impacts to health and safety.

#### Alternative H – Replace on New Alignment (Two-Lane Bridge) – Preferred Alternative

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*Direct and Indirect Impacts.* Under Alternative H, a two-lane bridge would be constructed. This bridge would be constructed to meet current safety standards with regards to lane width, shoulder width, live load capacity, and crash worthy railing system. The new bridge would have a life span of approximately 75 years. The bridge would provide a five-foot shoulder on one side of the bridge to allow for separation of the vehicular traffic from the pedestrian and bicyclists. The bridge would also provide higher railing to improve pedestrian and bicycle safety. Alternative H would have a long-term, moderate, and beneficial impact to health and safety.

*Cumulative Impacts.* Past actions, such as the construction of the Fort Pulaski Bridge, maintenance activities, and repair and rehabilitation projects could create potential conflicts between motor vehicles, bicyclists and pedestrians, who use the bridge, and maintenance and construction equipment. The combined past, present and reasonably foreseeable future actions would have a long-term, negligible, and adverse cumulative impact to health and safety. Implementation of Alternative H would contribute a noticeable, beneficial increment to the cumulative long-term, negligible, and adverse impacts to health and safety.

*Conclusions.* Alternative H would have long-term, moderate, and beneficial impacts to health and safety. Implementation of Alternative H would contribute a noticeable, beneficial increment to the cumulative impacts to health and safety.

## CONCLUSIONS

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### Alternative A (No-Action)

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Implementation of Alternative A (No-Action) would have no impact on the cultural landscape, floodplains, species of special concern, wetlands, or wildlife and wildlife habitat. There would be long-term, moderate, adverse impacts to visitor use and experience, park operations, and health and safety as the Fort Pulaski Bridge continues to deteriorate and require emergency repairs. The cumulative impacts would be noticeable and adverse.

### Alternative B (Emergency Repairs)

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Implementation of Alternative B would have short-term, negligible, and adverse impacts to species of special concern and long-term, negligible, adverse impacts to the cultural landscape, floodplains and wetlands from installation of FRP jackets around deteriorating bridge piles as needed. Alternative B would contribute an imperceptible, adverse increment to the cumulative impacts on those resources.

Impacts to wildlife and wildlife habitat would be minor and adverse in the short-term from construction activity and negligible and adverse in the long-term. The cumulative impacts would be imperceptible and adverse.

There would be short-term, minor, and adverse impacts to visitor use and experience to visitor use due to lane closures during construction. Alternative B would have long-term minor adverse impacts to visitor use and experience and park operations because even with these repairs, the Fort Pulaski Bridge would need to be replaced in 20 years. Impacts to health and safety would be long-term, minor and beneficial because the bridge would be made safer by the repairs. Cumulative impacts to these resources would be noticeable and adverse.

### Alternative C (FRP Jacketing of All Piles)

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Alternative C would have long-term, negligible, adverse impacts to the cultural landscape, floodplains, wetlands, and wildlife and wildlife habitat from installation of FRP jackets around the bridge piles. Impacts to species of special concern would be short-term, negligible, and adverse. Cumulative impacts to these resources would be imperceptible and adverse.

Impacts to wildlife and wildlife habitat would be minor and adverse in the short-term from construction activity and negligible and adverse in the long-term. The cumulative impacts would be imperceptible and adverse.

Unlike Alternative B, under Alternative C all 330 bridge piles would be jacketed at once. There would be short-term, moderate, adverse impacts to visitor use and experience from lane closures during installation of the FRP jackets. However, there would be long-term, minor, beneficial impacts to visitor use and experience and park operations, because the entire Fort Pulaski Bridge would be rehabilitated.

Impacts to health and safety would be long-term, minor to moderate, and beneficial. The Fort Pulaski Bridge would still need to be replaced in approximately 40 years. Cumulative impacts to visitor use and experience, park operations and health and safety would be noticeable and beneficial.

#### **Alternative D (Rehabilitation of Existing Bridge)**

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Alternative D would have long-term, negligible, adverse impacts to species of special concern, and long-term, minor, adverse impacts to floodplains and wildlife and wildlife habitat from the placement of riprap at the bridge abutments. Species of special concern, as well as wildlife and wildlife habitat, would also experience short-term minor adverse impacts during construction from the increased noise. Alternative D would also have long-term, minor, adverse impacts to the cultural landscape from changes to materials and wetlands from the riprap installation. Cumulative impacts to floodplains, species of special concern, wetlands, and wildlife and wildlife habitat would be imperceptible and adverse.

Visitor use and experience and park operations would experience long-term, minor, beneficial impacts; however visitor use would also experience short-term, moderate, adverse impacts during construction. Health and safety would experience a long-term, minor to moderate, beneficial impact. The Fort Pulaski Bridge would still need to be replaced in approximately 40 years. Cumulative impacts to visitor use and experience, park operations, and health and safety would be noticeable and beneficial.

#### **Alternative E (Install Additional Support on Existing Bridge)**

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Implementation of Alternative E would have long-term, minor, adverse impacts on the cultural landscape, floodplains, species of special concern, and wetlands from the installation of new bridge piles. Species of special concern would also experience short-term, minor, adverse impacts during construction from pile driving activity. Cumulative impacts to these resources would be imperceptible and adverse.

There would be short-term, minor, adverse impacts to wildlife from construction activity associated with the installation of steel piles, and long-term, negligible, adverse impacts to wildlife habitat because the additional steel piles would remain within the aquatic habitat. Cumulative impacts to wildlife and wildlife habitat would be imperceptible and adverse.

Impacts to visitor use and experience and park operations would be short-term, moderate, and adverse from lane and bridge closures, and the cost of installing additional bridge support. There would be long-term, minor, beneficial impacts to health and safety because the bridge would be rehabilitated. There would also be a long-term, minor, beneficial impact to visitor use and experience and park operations. Cumulative impacts would be noticeable and beneficial.

#### **Alternative F (Replace on Existing Alignment)**

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Implementation of Alternative F would have short- and long-term, minor, adverse impacts on wildlife and wildlife habitat. The cultural landscape would have a long-term, minor, adverse impact from the removal of the existing bridge. Floodplains would experience long-term, minor, adverse impacts resulting from the placement of riprap. Species of special concern would experience short-term and long-term minor adverse impacts. Wetlands would

experience long-term, moderate, adverse impacts because of the placement of riprap. Cumulative impacts would be imperceptible and adverse.

Impacts to visitor use and experience, park operations, and health and safety would be long-term, moderate, and beneficial. However, visitor use and experience would also experience short-term moderate adverse impacts during construction because of lane closures. Cumulative impacts to visitor use and experience, health and safety, and park operations would be noticeable and beneficial.

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#### **Alternative G (Replace on New Alignment – One-Lane Bridges)**

Implementation of Alternative G would result in long-term, minor, adverse impacts to species of special concern, as well as wildlife and wildlife habitat. The cultural landscape would experience a long-term, moderate, adverse impact from the removal of the existing bridge and change in circulation pattern. Floodplains would experience long-term, minor to moderate, adverse impacts. Species of special concern would also experience short-term, minor to moderate, adverse impacts during construction. Construction activities would also cause a short-term, minor, adverse impact to wildlife and wildlife habitat. Wetlands would experience long-term, moderate, adverse impacts because of the placement of riprap. Cumulative impacts would be imperceptible and adverse.

Impacts to visitor use and experience, park operations, and health and safety would be long-term, moderate, and beneficial because the bridge would be replaced with a new bridge without disrupting access during construction. Cumulative impacts would be noticeable and beneficial.

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#### **Alternative H (Replace on New Alignment – Two-Lane Bridge) – Preferred Alternative**

Implementation of Alternative H would result in long-term, minor to moderate, adverse impacts to species of special concern, as well as long-term minor adverse impacts to wildlife and wildlife habitat. The cultural landscape would experience a long-term, moderate, adverse impact from the removal of the existing bridge and change in circulation pattern. Floodplains would experience long-term, minor to moderate, adverse impacts. Species of special concern would also experience short-term, minor to moderate, adverse impacts during construction. Construction activities would also cause a short-term, minor, adverse impact to wildlife and wildlife habitat. Wetlands would experience long-term, moderate, adverse impacts because of the new alignment and the placement of riprap. Cumulative impacts would be imperceptible and adverse.

Impacts to visitor use and experience, park operations, and health and safety would be long-term, moderate, and beneficial because the bridge would be replaced with a new bridge without disrupting access during construction. Cumulative impacts would be noticeable and beneficial.

## CHAPTER 4: PUBLIC INVOLVEMENT AND COORDINATION

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This chapter documents the public involvement process for this project and includes the official list of recipients for the document. As required by NPS policies and planning documents, it is the Park's objective to work with State, Federal, and local governmental and private organizations to ensure that the Park and its programs are coordinated with theirs, and are supportive of their objectives, as far as proper management of the Park permits, and that their programs are similarly supportive of Park programs.

An EA was prepared for the repair and/or replacement of the Fort Pulaski Bridge in January 2013. In this EA, the replacement of the existing bridge with a new, two-lane bridge on the existing alignment was analyzed in detail; however, this alternative was not identified as the preferred alternative. The replacement of the existing bridge with a new, two-lane bridge on a new alignment adjacent to the existing bridge was dismissed from further analysis in the EA due to unreasonable cost. After further review of the cost estimates of the proposed alternatives, and investigation of the use of alternative bridge types, the FHWA and NPS are analyzing the replacement of the existing bridge with a new, two-lane bridge on a new alignment as the preferred alternative. Public involvement and agency coordination was re-initiated in order to inform the public, resource agencies, and regulatory agencies and complete the necessary consultations.

### PUBLIC INVOLVEMENT

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Comments from the public are solicited at two stages in the project planning process, public scoping and the public comment period. Information about the proposed project was made available to the public on the NPS's Planning, Environment, and Public Comment website during the public scoping comment period, from January 28, 2011 through February 28, 2011. Flyers providing details of the proposed project and contact information for comments was sent to a mailing list comprised of Federal, State, and local agencies, elected officials, organizations, and advocacy groups. A legal notice was run in the Savannah Morning News on January 28, 2011 announcing the public scoping comment period. No comments were provided by the public.

The January 2013 EA was made available for public review from January 4, 2013 through February 2, 2013. During this 30-day period, hardcopies of the EA were available for review at the Fort Pulaski National Monument Visitor Center, and the Tybee Island Branch of the Chatham County Library located at 405 Butler Avenue, Tybee Island, Georgia 31328. An electronic version of this document can be found on the NPS's PEPC website at <http://parkplanning.nps.gov/fopu>. This site provides access to current plans, environmental impact analyses, and related documents on public review. An electronic version may also be found at the FHWA, Eastern Federal Lands Highway Division's website at <http://efl.fhwa.dot.gov/projects/environment.aspx>. No comments were received from the public.

This EA will be made available for public review from March 4, 2015 through April 2, 2015. During this 30-day period, hardcopies of the EA will be available for review at the Fort Pulaski National Monument Visitor Center, and the Tybee Island Branch of the Chatham County Library located at 405 Butler Avenue, Tybee Island, Georgia 31328. An electronic version of this document can be found on the NPS's PEPC website at <http://parkplanning.nps.gov/fopu>. This site provides access to current plans, environmental impact analyses, and related documents on public review. An electronic version may also be found at the FHWA - Eastern Federal Lands Highway Division's website at <http://efl.fhwa.dot.gov/projects/environment.aspx>. Comments on this EA will be summarized and responded to in an appendix to the decision document.

## AGENCY COORDINATION AND PERMITS

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### Agency Coordination

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Other Federal, State, and local governments were contacted during the planning process. Appendix A contains copies of written correspondence with those agencies.

#### Early Coordination

Early coordination letters were sent to the USFWS, GADNR – Wildlife and Natural Heritage Section and Historic Preservation Divisions, National Marine Fisheries Service, U.S. Army Corps of Engineers, and U.S. Coast Guard in December of 2010 to solicit input regarding the proposed bridge repair or replacement. Comments were received from the USFWS and the U.S. Coast Guard. Copies of the agency responses are located in Appendix A: Agency Coordination Letters.

The Georgia Department of Natural Resource, Historic Preservation Division was contacted via phone on March 21, 2011. The Division stated that the bridge had been modified substantially from the original 1930's structure, and that they would provide additional comment during the Section 106 consultation process.

#### Section 7 Consultation under the Endangered Species Act, as amended

Consultation per Section 7 of the Endangered Species Act was completed with the USFWS and NMFS. In a letter dated August 29, 2012 to the USFWS, the FHWA determined that Alternative D (Rehabilitation of Existing Bridge) may affect, but is not likely to adversely affect the West Indian manatee. In a letter dated October 25, 2012 the USFWS concurred with FHWA's determination of "not likely to adversely affect" for West Indian manatee. In a letter dated March 26, 2014, the FHWA re-initiated consultation with the USFWS. The FHWA determined that Alternative H (Replacement on New Alignment – Two-Lane Bridge) may affect, but is not likely to adversely affect the West Indian manatee. In a letter dated May 5, 2014, the USFWS concurred with this determination.

In a letter dated August 29, 2012 to the NMFS and subsequent coordination, the FHWA determined that Alternative D (Rehabilitation of Existing Bridge) may affect, but is not likely to adversely affect the Atlantic Sturgeon, shortnose sturgeon, and green turtle, Kemp's ridley turtle, and loggerhead turtle. Turbidity curtains would be used in the areas where the river floor may be disturbed. In-water work would be restricted from April 15 through May 31 and September 1 through November 30 to avoid impacts to the Atlantic sturgeon during the migration season. A vibratory hammer would be used to install the sheet-pile cofferdams instead of an impact hammer in order to reduce noise impacts to the Atlantic sturgeon and sea

turtles. The NMFS stated in a letter dated November 27, 2012 that, “We believe the project may affect, but is not likely to adversely affect shortnose sturgeon, Atlantic sturgeon, and sea turtles.” In a letter dated March 26, 2014, the FHWA re-initiated consultation with the NMFS. The FHWA determined that Alternative H (Replacement on a New Alignment – Two-Lane Bridge) including mitigation measures may affect, but is not likely to adversely affect the Atlantic Sturgeon, green, Kemp’s ridley, and loggerhead sea turtles. The FHWA determined that Alternative H would have no effect on the shortnose sturgeon; however, further coordination with NMFS indicated that a recent study has shown that they may be present in the project area. In a letter dated October 10, 2014, the NMFS concurred that the proposed actions are unlikely to adversely affect Atlantic sturgeon, shortnose sturgeon and green, Kemp’s ridley and loggerhead sea turtles.

#### Section 106 Consultation under the National Historic Preservation Act

Consultation per Section 106 of the National Historic Preservation Act was completed with the GA-DNR Historic Preservation Division. In a letter dated August 29, 2012, the FHWA determined that Alternative D (Rehabilitation of Existing Bridge) would have no adverse effect to any historic structures or cultural resources. In a letter dated October 1, 2012, the Historic Preservation Division concurred that the project, as proposed, will have no adverse effect to historic properties within its area of potential effects. In a letter dated April 9, 2014, the FHWA re-initiated consultation, stating that Alternative H (Replacement on New Alignment – Two-Lane Bridge) would have an adverse effect to the historic structure and cultural landscape. GA-DNR Historic Preservation Division concurred that the project would have an adverse effect. An MOA was developed to resolve the adverse effect and executed on September 8, 2014. The MOA is included in this EA as Appendix D.

#### Essential Fish Habitat

Consultation per Section 305(b)(2) of the Magnuson-Stevens Act was completed with the NMFS. The bridge repair action area has been designated as Essential Fish Habitat. The bridge repair action area has been designated as Essential Fish Habitat (EFH) by the South Atlantic Fishery Management Council. The action could potentially harm the EFH by release of debris and chemicals into the water during the repair of the bridge. A FRP shell will be used to encapsulate the piles. The FRP shell will be fully sealed and the injected grout will be contained to prevent it from entering the surrounding waters. Localized turbidity curtains and debris shields will be used to capture any debris released due to construction. The turbidity curtains will also be used in the few locations of shallow water where the river floor maybe disturbed by the pile encapsulation in order to not increase the turbidity of the river. Based on the type of construction proposed and the mitigation measures to be employed, the FHWA has determined that the action will not result in any adverse effects to the EFH by letter dated August 29, 2012. In an email dated November 1, 2012, NMFS agreed with this determination and offered no EFH conservation recommendations pursuant to the Magnuson-Stevens Fishery Conservation and Management Act. In a letter dated March 26, 2014, the FHWA re-initiated consultation. Alternative H (Replacement on New Alignment – Two-Lane Bridge) would temporarily adversely affect EFH, but the effect on EFH would not be substantial. In a letter dated December 11, 2014, the NMFS found that the proposed project would adversely affect EFH by filling salt marsh, and as a conservation recommendation required that FHWA complete a compensatory mitigation and monitoring plan to NMFS for approval. The mitigation and monitoring plan would be provided to NMFS during the permitting process.

## Permits

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If the action alternatives were implemented, several permits would be required in order to construct the project. These permits include:

### Coastal Management Program Federal Consistency Review

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The proposed project requires a Federal consistency determination or certification from the State of Georgia before it is allowed to proceed. A Federal consistency certification is a statement certifying that the Federally-funded project has been designed to meet all State and local laws and that all necessary State permits have been obtained. A Federal consistency determination is a report that addresses the effects of a Federal activity on enforceable policies of the state (Georgia Department of Natural Resources, 2003). This EA will serve as the Federal consistency determination report.

### Coastal Marshlands Protection Permit Application

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A Coastal Marshlands Protection Act (OCGA 12-5-280, et seq.) Permit is required for any project which involves removing, filling, dredging, draining, or otherwise altering any marshlands. Marshland is defined as areas below the ordinary high water mark (Georgia Department of Natural Resources, 2003). Tidewaters are State-owned property.

### Clean Water Act Section 404 Permit/ Section 10 of the Rivers and Harbors Act

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The Rivers and Harbors Appropriation Act of 1899 prohibits the creation of any obstruction to the navigable capacity of any of the waters of the United States. The Federal Water Pollution Control Act, more commonly known as the "Clean Water Act," under Section 404, directs the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into waters of the United States at specified disposal sites. This project would discharge dredged or fill material into the waters of the United States, including special aquatic sites such as wetlands. The proposed project would most likely require a standard permit. There is no associated fee, and the review period is typically 6 months to a year for standard permits.

### Coast Guard Section 9 of the Rivers and Harbors Act

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Federal law prohibits the construction of any bridge across navigable waters of the United States unless first authorized by the Coast Guard. The Coast Guard approves the location and clearances of bridges through the issuance of bridge permits or permit amendments, under the authority of Section 9 of the Rivers and Harbors Act of 1899, the General Bridge Act of 1946, and other statutes. There is a mandatory 30-day public comment period.

### NPDES (National Pollutant Discharge Elimination System) Permit

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This project would likely disturb greater than one acre of bare soil, and therefore would need an NPDES General Permit To Discharge Storm Water Associated With Construction Activity. The NPDES permit would be GAR 100002, Infrastructure. Erosion and Sediment Control plans aim to protect adjoining properties, streams, and other water resources of the State. Chatham



County is also a Local Issuing Authority. The permit requires a fee, and requires the submission of a Notice of Intent to both the Georgia EPD and Chatham County.

#### Variance Application for a 25-Foot Vegetative Buffer Encroachment

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The Georgia Erosion and Sedimentation Act of 1975 (O.C.G.A. 12-7) and its subsequent amendments require that primary and secondary trout streams maintain an undisturbed riparian buffer of 50 feet, and all other streams maintain a minimum buffer of 25 feet. The buffer distance is measured from where vegetation is removed by normal stream flow (England, 2001). The South Channel of the Savannah River is protected by the 25 foot buffer. An Application for a 25 Foot Vegetative Buffer Encroachment is required. The Environmental Protection Division has a review period of 60 days, after which there is a 30-day public comment period.

#### 401 Water Quality Certification

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The 401 Water Quality Certification is a “certification,” needed for any Federal permit involving impacts to water quality. Most 401 Certifications are triggered by Section 404 Permits issued by the U.S. Army Corps of Engineers. Typical types of projects involve filling in surface waters or wetlands. Section 401 of the Clean Water Act delegates authority to the States to issue a 401 Water Quality Certification for all projects that require a Federal permit (such as a Section 404 Permit). The “401” is essentially verification by the State that a given project will not remove or degrade existing, designated uses of “Waters of the State,” or otherwise violate water quality standards. Mitigation of unavoidable impacts and inclusion of stormwater management features are two of the most important aspects of water quality review. This certification is issued by the Georgia Environmental Protection Division. Georgia EPD normally issues 401 Certification within 120 days of receipt of a complete application

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