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**ENVIRONMENTAL
CONSEQUENCES**

CHAPTER 4 — ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The National Environmental Policy Act requires that federal agencies discuss the environmental impacts of a proposed federal action, feasible alternatives to that action, and any adverse environmental effects that cannot be avoided if the proposed action is implemented. In this case the proposed federal action would be the adoption of a general management plan for Fort Pulaski National Monument. The following portion of this document analyzes the environmental impacts of implementing each of the three alternatives on natural resources, cultural resources, transportation, the visitor experience, the socioeconomic environment, and monument operations. The analysis is the basis for comparing the beneficial and adverse effects of implementing the three alternatives. By examining the environmental consequences of all alternatives on an equivalent basis, decision makers can evaluate which approach would provide the greatest beneficial results with the fewest adverse effects on the park.

Because of the general, conceptual nature of the actions described in the alternatives, the impacts of these actions are analyzed in general qualitative terms. Thus, this environmental impact statement should be considered a programmatic analysis. If and when site-specific developments or other actions are proposed for implementation subsequent to this general management plan, appropriate detailed environmental and cultural compliance documentation will be prepared in accordance with requirements of the National Environmental Policy Act and the National Historic Preservation Act.

This chapter begins with a description of the methods and assumptions used for analyzing impacts. The impact analyses follow next, organized by alternative and then by impact topic under each alternative. All of the impact topics are assessed for each alternative. The existing conditions for each impact topic are

described in chapter 3 (“Affected Environment”). For each impact topic, there is an analysis of the beneficial and adverse effects of implementing the alternative, a description of cumulative impacts (in which this plan is considered in conjunction with other actions occurring in the region), and a conclusion. At the end of each alternative there is also a brief discussion of unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and the relationship of short-term uses of the environment and the maintenance and enhancement of long-term productivity. The impacts of each alternative are briefly summarized in table 7, near the end of chapter 2 (“Alternatives, Including the Preferred Alternative”).

METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

The planning team based the impact analysis and the conclusions in this chapter largely on a review of existing literature and studies, information provided by experts in the National Park Service and other agencies, and monument staff insights and professional judgment. It is important to remember that all the impacts have been assessed assuming mitigation measures have been implemented to minimize or avoid impacts (under the National Environmental Policy Act only, not for impacts on cultural resources governed by Section 106 of the Historic Preservation Act—see the discussion under Cultural Resources below). If mitigation measures described in chapter 2 were not applied, the potential for resource impacts and the magnitude of those impacts would increase.

Identification of Impacts

Director’s Order 12 and Handbook: *Conservation Planning, Environmental Impact Analysis, and Decision Making* presents an approach to identifying the impacts of a

particular alternative. The analysis considers the duration (short-or long-term), type (adverse or beneficial), context (the setting within which an effect would occur), and intensity or magnitude (e.g., negligible, minor, moderate, or major) of impacts. This is the approach that has been used in this document. Where quantitative data were not available, best professional judgment was used to identify impacts.

Unless otherwise described under a specific impact topic, the duration of an impact is defined as follows:

Short-Term — Impacts that would last less than one year and could be *temporary* in nature.

Long-Term — Impacts that would last one year or longer and could be *permanent*.

Impacts are evaluated by type, i.e. whether the impacts would be *beneficial* or *adverse*. Beneficial impacts would improve monument resources, the visitor experience, or monument operations. Adverse impacts would negatively affect monument resources, the visitor experience, or monument operations.

Direct and *indirect* impacts caused by an action are considered in the analysis. Direct impacts are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by the action and occur later in time or farther removed from the place, but are still reasonably foreseeable.

The analysis also considers the setting of impacts for each impact topic. Unless otherwise indicated, the setting for each impact topic is Cockspur and McQueens islands, together with surrounding waters.

In this document, the definition of impact intensity varies by impact topic. Individual intensity definitions can be found in table 13 below.

IMPACT TOPICS

The following impact topics are addressed in this environmental impact statement.

Cultural Resources

Method for Assessing Effects on Cultural Resources. This environmental impact assessment addresses the effects of the three plan alternatives on cultural resources — *archeological sites, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections* — that are proposed by actions in this general management plan. The method for assessing effects on cultural resources is designed to comply with the requirements of both the National Environmental Policy Act and Section 106 of the National Historic Preservation Act and with implementing regulations 40 CFR 1500 and 36 CFR 800, respectively, while considering the differences in language between the two acts and recognizing that compliance with one does not automatically mean compliance with the other. Accordingly, the assessment of effects discusses the following characteristics of effects:

- direct and indirect effects
- duration of the effect (short-term, long-term)
- context of the effect (site-specific, local, regional)
- intensity of the effect (negligible, minor, moderate, major, both adverse and beneficial)
- cumulative nature of the effect

In accordance with 36 CFR 800, the regulations implementing Section 106 of the National Historic Preservation Act, effects on cultural resources are identified and evaluated by

- Determining the area of potential effect (APE) [800.4(a)]
- Identifying historic properties in the APE that are listed in or eligible for listing in the National Register of

Historic Places [800.4(b)-(c)]. The results are either:

- *No historic properties affected* — either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them [800.4(d)(1)]; or
- *Historic properties affected* — there are historic properties that may be affected by the undertaking [800.4(d)(2)].
- Applying the criteria of adverse effect to affected historic properties in the area of APE [800.5.(a)(1)], as follows:
 - An *adverse effect* is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. Examples of adverse effects are provided in 800.5(a)(2).
 - A finding of *no adverse effect* is found when the undertaking's effects do not meet the criteria of 800.5(a)(1) [800.5.(b)].
- Considering ways to avoid, minimize, or mitigate or otherwise resolve adverse effects. The following are considered:
 - Consultation with the Georgia Historic Preservation Division / tribal historic preservation officer and others to develop and evaluate

strategies to mitigate adverse effects [800.6].

- CEQ regulations and Director's Order 12 call for the discussion of mitigating impacts and an analysis of how effective the mitigation would be in reducing the intensity of an impact, such as reducing it from moderate to minor intensity. Any resultant reduction in impact intensity is, however, an estimate of the effectiveness of mitigation under National Environmental Policy Act procedures only.
- Such reduction in impact intensity does not suggest that the level of effect as defined by Section 106 and 36 CFR 800 is similarly reduced. Cultural resources are nonrenewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss of integrity that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 and 36 CFR 800 may be mitigated, the effect remains adverse.

A Section 106 Summary is included in the impact analysis sections. The Section 106 summary provides an assessment of effect of the undertaking (implementation of the alternative), on historic properties, based on the Section 106 regulations cited previously.

Definitions for impact intensity for archeological resources, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections are provided in table 13 below.

Natural Resources

The natural resource impact topics analyzed in this document are *climate, soils and geologic resources, plant communities and vegetation, fish and wildlife, water quality, floodplains, and wetlands*. Information about known resources was compiled and compared with

the locations of proposed developments and other actions. The impact analysis was based on the knowledge and best professional judgment of planners and biologists; data from monument records; and studies of similar actions and effects, when applicable. The planning team qualitatively evaluated the intensities of effects on all the natural resource impact topics.

Definitions of impact intensity as regards climate, soils/geologic resources, plant communities/vegetation, fish and wildlife, water quality, floodplains, and wetlands are presented in table 13.

Wilderness Resources and Values

The National Park Service compared the management actions of each alternative with the wilderness eligibility criteria identified in the Wilderness Act to determine how those values might be affected. Impacts were classified as adverse if they would adversely affect wilderness values or integrity. Conversely, impacts were classified as beneficial if they would enhance wilderness values or integrity.

Definitions of impact intensity as regards wilderness resources and values are presented in table 13.

Visitor Use and Experience

This impact analysis considers various aspects of visitor use and experience at Fort Pulaski National Monument, including the effects on: the range of recreational opportunities; opportunities for solitude and getting in touch with nature; visitor access including access for visitors with disabilities; opportunities for orientation, education, and interpretation; and visitor safety. The analysis is primarily qualitative rather than quantitative due to the conceptual nature of the alternatives. Impacts on visitor use and experience were determined considering the best available information regarding visitor use and experience. Information on visitor use and visitor opinions was taken from data

in monument files. This information was supplemented by data gathered during the planning process for this management plan, including opinions from national monument visitors and neighbors and information provided by national monument staff.

Primarily, visitors expressed interest in preserving the natural and cultural resources of the park, continuing to provide high-quality interpretive activities, expanding the themes interpreted by monument staff, protecting and expanding recreational opportunities, especially along the bike path and at the boat-launch facility on Lazaretto Creek, and educating visitors and neighbors about the monument's unique resources and values.

Definitions of impact intensity as regards visitor use and experience are presented in table 13.

Socioeconomic Environment

Fort Pulaski National Monument primarily operates within the local social and economic environment of the surrounding communities and regionally within Chatham County. As a result, actions proposed in the alternatives could have a direct effect on some parts of the social and economic environment of the region. In the socioeconomic analysis, the duration of effects is considered to be either short-term (lasting less than one year), or long-term (lasting more than one year). Long-term effects could be considered as a permanent change in conditions.

Definition of impact intensity as regards the socioeconomic environment is presented in table 13.

Transportation

None of the alternatives addressed in this general management plan would change transportation patterns inside the monument to any significant degree. However, the proposed widening of U.S. Highway 80 could

adversely impact the monument's natural resources, as could the proposed deepening of the Savannah River to accommodate larger container ships. Thus, the primary intent of this impact topic is to analyze impacts on monument resources caused by transportation projects outside of monument boundaries. The analysis is based in large part on studies the monument has commissioned in recent years to identify the effects of past transportation projects on monument resources.

Definitions of impact intensity as regards transportation projects are presented in table 13.

Monument Operations and Management

The impacts of the alternatives on monument operations and facilities were determined by examining the effects and changes on staffing, infrastructure, visitor facilities, and services.

Definitions of impact intensity as regards monument operations and management are presented in table 13.



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FORT PULASKI MAINTENANCE BUILDING

TABLE 13. IMPACT THRESHOLD DEFINITIONS

Impact Topic	Negligible	Minor	Moderate	Major
Cultural Resources				
Archeological Resources	The effect would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resources. The Section 106 determination would be no adverse effect.	The effect is measurable or perceptible, but it is slight and affects a limited area of a site or group of sites. Slight alteration(s) to any of the characteristics that qualify the site(s) for inclusion in the National Register may diminish the integrity of the site(s). For purposes of Section 106, the determination of effect would be adverse effect.	The effect is measurable and perceptible. The effect changes one or more of the characteristics that qualify the site(s) for inclusion in the National Register and diminishes the integrity of the site(s), but does not jeopardize the National Register eligibility of the site(s). For purposes of Section 106, the determination of effect would be adverse effect.	The effect on the archeological site or group of sites is substantial, noticeable, and permanent. The action severely changes one or more characteristics that qualify the site(s) for inclusion in the National Register, diminishing the integrity of the site(s) to such an extent that it is no longer eligible for listing in the National Register. For purposes of Section 106, the determination of effect would be adverse effect.
Museum Collections	The effect would be at the lowest levels of detection, barely perceptible, with no measurable consequences, either adverse or beneficial, to the collections. The Section 106 determination would be no adverse effect.	The effect is measurable or perceptible, but it is slight and affects the integrity of a few items in the museum collection, but would not degrade the usefulness of the collection for future research and interpretation. Slight alteration to any of the characteristics of the collection that qualify its related resource for inclusion in the National Register may diminish the integrity of the resource and its related collection. For purposes of Section 106, the determination of effect would be adverse effect.	The effect is measurable and perceptible, and would affect the integrity of many items in the collection and diminish the usefulness of the collection for future research and interpretation. The effect changes one or more of the characteristics of the collection that qualify its related resource for inclusion in the National Register and diminishes the integrity of the resource and its related collection, but does not jeopardize the National Register eligibility of the resource related to the collection. For purposes of Section 106, the determination of effect would be adverse effect.	The effect on the collection is substantial, noticeable, and permanent, and would affect the integrity of most items in the collection and destroy the usefulness of the collection for future research and interpretation. The action severely changes one or more characteristics of the collection that qualify its related resource for inclusion in the National Register, diminishing the integrity of the resource and its related collection to such an extent that the resource is no longer eligible for listing in the National Register. For purposes of Section 106, the determination of effect would be adverse effect.

Impact Topic	Negligible	Minor	Moderate	Major
Historic Structures	The effect would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resources. The Section 106 determination would be no adverse effect.	The effect is measurable or perceptible, but it is slight and affects a limited area of a structure or group of structures. Slight alteration(s) to any of the characteristics that qualify the structure(s) for inclusion in the National Register may diminish the integrity of the structure(s). For purposes of Section 106, the determination of effect would be adverse effect.	The effect is measurable and perceptible. The effect changes one or more of the characteristics that qualify the structure(s) for inclusion in the National Register and diminishes the integrity of the structure(s), but does not jeopardize the National Register eligibility of the structure(s). For purposes of Section 106, the determination of effect would be adverse effect.	The effect on the structure or group of structures is substantial, noticeable, and permanent. The action severely changes one or more characteristics that qualify the structure(s) for inclusion in the National Register, diminishing the integrity of the structure(s) to such an extent that it is no longer eligible for listing in the national Register. For purposes of Section 106, the determination of effect would be adverse effect.
Cultural Landscapes	The effect would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resources. The Section 106 determination would be no adverse effect.	The effect is measurable or perceptible, but it is slight and affects a limited area of the landscape or few of its patterns or features. Slight alteration(s) to any of the characteristics that qualify the landscape for inclusion in the National Register may diminish the integrity of the landscape. For purposes of Section 106, the determination of effect would be adverse effect.	The effect on the patterns and features of the landscape is measurable and perceptible. The effect changes one or more of the characteristics that qualify the landscape for inclusion in the National Register and diminishes the integrity of the landscape, but does not jeopardize the landscape's National Register eligibility. For purposes of Section 106, the determination of effect would be adverse effect.	The effect on the cultural landscape, its patterns and features, is substantial, noticeable, and permanent. The action severely changes one or more characteristics that qualify the landscape for inclusion in the National Register, diminishing the landscape's integrity to such an extent that it is no longer eligible for listing in the national Register. For purposes of Section 106, the determination of effect would be adverse effect.

Impact Topic	Negligible	Minor	Moderate	Major
Ethnographic Resources	The effect would be at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial, to the resources. The Section 106 determination would be no adverse effect.	The effect is slight but noticeable, and it may result in limited changes in traditional resource access or use, or the relationship between the resource and the affiliated group's body of beliefs or practices. Slight alteration(s) to any of the characteristics that qualify the resource for inclusion in the National Register may diminish the integrity of the site. For purposes of Section 106, the determination of effect would be adverse effect.	The effect is readily apparent and would interfere with traditional resource access or use, or the relationship between the resource and the affiliated group's beliefs and practices, even though the group's beliefs and practices would survive. The effect changes one or more of the characteristics that qualify the resource for inclusion in the National Register and diminishes the resource's integrity, but does not jeopardize the resource's National Register eligibility. For purposes of Section 106, the determination of effect would be adverse effect.	The effect is substantial, noticeable, and permanent, and results in significant changes in traditional resource access or use, or in the relationship between the resource and the affiliated group's beliefs and practices, to such a degree that the survival of the group's beliefs and practices is jeopardized. The action severely changes one or more characteristics that qualify the resource for inclusion in the National Register, diminishing the resource's integrity to such an extent that it is no longer eligible for listing in the national Register. For purposes of Section 106, the determination of effect would be adverse effect.
Natural Resources				
Climate	The impact on climate would be barely perceptible, not measurable.	The impact on climate would be perceptible and measurable.	The impact on climate would be clearly detectable and could have an appreciable effect.	The impact on climate would have a substantial, highly noticeable influence on a regional scale.
Geology and Soils	The action would result in a change in soils or a geologic feature but the change would be at the lowest level of detection, or not measurable.	The action would result in a detectable change, but the change would be slight and local. Soils or geologic resources might be slightly altered in a way that would be noticeable. There could be changes in a soil's profile in a relatively small area, but the change would not appreciably increase the potential for erosion.	The action would result in a clearly detectable change in soils or geologic processes — soils would be obviously altered, or a few features would show changes. There could be a loss or alteration of the topsoil in a small area, or the potential for erosion to remove small quantities of additional soil would increase.	The action would result in the permanent loss of an important soil or geologic resource or there would be highly noticeable, widespread changes in many soils or features. There would be a permanent loss or alteration of soils or geologic resources in a relatively large area, or there would be a strong likelihood for erosion to remove large quantities of additional soil as a result of the action.

Impact Topic	Negligible	Minor	Moderate	Major
Plant Communities and Vegetation (including Exotic/Nonnative Plants)	The action might result in a change in vegetation, but the change would not be measurable or would be at the lowest level of detection.	The action might result in a detectable change, but the change would be slight. This could include changes in the abundance, distribution, or composition of individual species in a local area, but would not include changes that would affect the viability of vegetation communities. Changes to local ecological processes would be minimal.	The action would result in a clearly detectable change in a vegetation community and could have an appreciable effect. This could include changes in the abundance, distribution, or composition of nearby vegetation communities, but would not include changes that would affect the viability of plant populations in the park. Changes to local ecological processes would be of limited extent.	The action would be severely adverse to a vegetation community. The impacts would be substantial and highly noticeable, and they could result in widespread change. This could include changes in the abundance, distribution, or composition of a nearby vegetation community or plant populations in the monument to the extent that the population would not be likely to recover. Key ecological processes would be altered, and "landscape-level" (regional) changes would be expected.
Fish and Wildlife	The action might result in a change, but the change would not be measurable or would be at the lowest level of detection.	The action might result in a detectable change, but the change would be slight and have a local effect on population. This could include changes in the abundance or distribution of individual in a local area, but not changes that would affect the viability of local populations. Changes to local ecological processes would be minimal.	The action would result in a clearly detectable change in a population and could have an appreciable effect. This could include changes in the abundance or distribution of local populations, but not changes that would affect the viability of regional populations. Changes to local ecological processes would be of limited extent.	The action would be severely adverse to a population. The effects would be substantial and highly noticeable, and they could result in widespread change and be permanent. This could include changes in the abundance of or distribution of a local or regional population to the extent that the population would not be likely to recover. Important ecological processes would be altered, and "landscape-level" (regional) changes would be expected.
Water Quality	The action would have no measurable or detectable effect on water quality or the timing and intensity of flows.	The action would have measurable effects on water quality or the timing or intensity of flows. Water quality effects could include increased or decreased loads of sediment, debris, chemical or toxic substances, or pathogenic organisms.	The action would have clearly detectable effects on water quality or the timing or intensity of surface water flows and potentially would affect organisms or natural ecological processes. The impact would be visible to visitors.	The action would have substantial effects on water quality or the timing or intensity of surface water flows and potentially would affect organisms or natural ecological processes. The impact would be easily visible to visitors.

Impact Topic	Negligible	Minor	Moderate	Major
Floodplains	Impacts would occur outside the regulatory floodplain as defined by the Floodplain Management Guideline (100-year or 500-year floodplain, depending on the type of action), or no measurable or perceptible change in natural hydrologic processes or aquatic habitat would occur.	Actions in the regulatory floodplain would potentially interfere with or improve natural hydrologic processes or aquatic habitat in a limited way or in a local area. Levee maintenance that would protect development areas from flooding and road and trail construction that would alter natural sheet flow are example actions that would have minor adverse impacts.	Actions within the regulatory floodplain would interfere with or enhance river processes or aquatic habitat in a substantial way or in a large area. Examples of moderate adverse impacts would include modification of natural watercourses or canals in multiple locations or development of small-scale recreational facilities in the floodplain.	An action would greatly alter or improve a floodplain, natural hydrologic process, or aquatic habitat. Examples of major adverse impacts would include substantial modification of natural watercourses or canals in multiple locations or development of facilities in the floodplain.
Wetlands	No measurable or perceptible changes in wetland size, integrity, or continuity would occur.	The impact would be measurable or perceptible, but slight. A small change in size, integrity or continuity could occur due to indirect effects such as storm water related runoff. However, the overall viability of the resource would not be affected.	The impact would be sufficient to cause a measurable change in the size, integrity or continuity of the wetland or would result in a small, but permanent, loss or gain in wetland acreage.	The action would result in a measurable change in all three parameters (size, integrity, and continuity) or a permanent loss of large wetland areas. The impact would be substantial and highly noticeable.
Wilderness Resources and Values	An action would have no discernable effects on wilderness resources and values.	An action would have detectable effects on wilderness resources and values, affecting the ability for a small area to meet wilderness eligibility criteria or improving and protecting its wilderness characteristics.	An action would have clearly detectable effects on wilderness resources and values, affecting the ability of an area to meet wilderness eligibility criteria or improving and protecting its wilderness characteristics. The impact would be visible to visitors.	An action would have substantial effects on wilderness resources and values, eliminating the characteristics that make substantial areas eligible as wilderness or improving and protecting its wilderness characteristics. The impact would be easily visible to visitors.
Visitor Use and Experience				
Visitation of Historic Sites / Recreational Activities	Visitors would likely be unaware of any effects associated with implementation of the alternative. There would be no noticeable changes in visitor use and/or experience or	Changes in visitor use and/or experience would be slight but detectable, but would not appreciably diminish or enhance critical characteristics of the visitor experience. Visitor	Few critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be altered. The visitor would be	Multiple critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be greatly reduced or

Impact Topic	Negligible	Minor	Moderate	Major
	in any defined indicators of visitor satisfaction or behavior.	satisfaction would remain stable.	aware of the effects associated with implementation of the alternative and would likely be able to express an opinion on the changes. Visitor satisfaction would begin to either decline or increase as a direct result of the effect.	increased. The visitor would be aware of the effects associated with implementation of the alternative and would likely express a strong opinion about the change. Visitor satisfaction would markedly decline or increase.
Socioeconomic Environment				
Local Economy	The effect would be below detectable levels or detectable only through direct means, with no discernable effect on the character of the social and economic environment. Effects identified as neutral would be actions that do not produce any changes at all to the social and economic environment.	The effect would be detectable but limited in geographic extent or size of population affected and not expected to alter the character of the established social and economic environment.	The effect would be readily detectable across a broad geographic area or segment of the community and could have an appreciable effect on the social and economic environment.	The effect would be readily apparent, affect a large segment of the population across the entire community and region, and would have substantial effect on the social and economic environment.
NPS Operations and Management				
NPS Operations and Management	The effect would be at or below the level of detection, and would not have an appreciable effect on monument operations and management.	The effects would be detectable, but would be of a magnitude that would not have an appreciable effect on monument operations and management.	The effects would result in a change in monument operations and management in a manner readily apparent to staff and possibly to the public.	The effects would result in a substantial and widespread change in monument operations and management in a manner readily apparent to staff and the public.
Transportation	The impact on transportation patterns would be barely perceptible, not measurable.	The impact on transportation patterns would be perceptible and measurable.	The impact on transportation patterns would be clearly detectable and could have an appreciable effect.	The impact on transportation patterns would have a substantial, highly noticeable influence on a regional scale.

CUMULATIVE IMPACT ANALYSIS

A cumulative impact is described in the Council on Environmental Quality's regulation 1508.7 as follows: *Cumulative impacts* are incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Likewise, 36 CFR 800.5(a)(1) similarly defines (and requires consideration of) cumulative effects: Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be *cumulative*.

To determine potential cumulative impacts, other projects within and surrounding Fort Pulaski National Monument were identified. The area included Chatham County and the city of Savannah. Projects were identified via discussions with monument staff and representatives of county and city governments. Potential projects identified as cumulative actions included any past activities and any planning or development activity that was currently being implemented, or that would be implemented in the reasonably foreseeable future.

These past, current, and reasonably foreseeable actions are evaluated in conjunction with the impacts of each alternative to determine if they have any cumulative effects on a particular natural, cultural, or socioeconomic resource or visitor use. Because most of these cumulative actions are in the early planning stages, the qualitative evaluation of cumulative impacts was based on a general description of the project.

Past Actions That Could Contribute to Cumulative Effects

As detailed in Alexander (2008), Cockspur Island was originally a series of small upland islands, or hammocks, surrounded by salt marsh. Fort George, the first fort on Cockspur Island, was constructed along the southeastern portion of the island during 1761. In 1829, construction of Fort Pulaski began under the direction of engineer Robert E. Lee for the purpose of guarding the river approaches to Savannah. Throughout the Civil War, the military kept island vegetation closely cut to maintain a clear field of view.

The first known maintenance harbor dredging around Fort Pulaski occurred in 1867. Additional dredging occurred as the harbor and port developed. At present, maintenance dredging occurs annually. Major channel deepening events and depths of the river channel are

- In 1929–1930, deepened from 26 feet to 30 feet (4-foot increase)
- In 1950–1951, deepened from 30 feet to 36 feet (6-foot increase)
- In 1955–1966, deepened from 36 feet to 40 feet (4-foot increase)
- In 1993–1994, deepened from 40 feet to 44 feet (4-foot increase)

Cockspur Island is a dynamic habitat and has undergone many physical changes throughout its history. At first frequently inundated by storms, the island has been physically altered over time by the accumulation of upland habitat. This habitat has developed primarily as a result of dredge spoil deposition, structural modifications associated with the construction of fortifications, and natural processes, including storm events.

Deposition of dredge spoil material along the island edge has increased the area of upland habitat, providing protection from storm wash-over and allowing for the establishment of forests. The island is approximately 45% dry land today, with 260 acres of upland

1 supporting successional phases of maritime
2 forest habitat.

3 Beacons, lighthouses, and quarantine stations
4 have existed on Cockspur since the 18th
5 century. The North Pier was constructed
6 round 1828 to facilitate the unloading of
7 building supplies, and channel ditches and
8 embankments were constructed to control
9 flooding. Cockspur Island Lighthouse was
10 originally completed in 1848, damaged
11 during an 1854 storm, and rebuilt in 1856.
12 The lighthouse remained in continuous
13 operation until June 1909, after which it
14 served as a harbor beacon. From 1869 to
15 1872, the Corps of Engineers remodeled the
16 demilune, a work constructed beyond the
17 main ditch of the fort. It also installed
18 underground magazines and passageways.
19 Much of the land mass along the north and
20 west shores was built up with dredge spoil
21 during the 1880s. A series of jetties were
22 constructed around the mouth of the
23 Savannah River from 1884 to 1896,
24 establishing a channel depth of 19 feet below
25 mean low water. A quarantine station was
26 built atop sand and ballast deposits along the
27 North Channel Savannah River during 1891.
28 Multiple requests for additional dredge
29 material around the station followed due to
30 its position one foot above spring tides.
31 Additionally, hydraulic fill was placed
32 between Jones and Oyster Bed Island
33 between 1929 and 1930.

34 The Act of June 26, 1936, (49 Stat. 1979)
35 reserved for the Corps of Engineers a strip of
36 land along the north shore of Cockspur
37 Island extending shoreward 200 feet from the
38 then existing high water line for the
39 deposition of dredge materials and for “other
40 purposes.” This authority was last exercised
41 in 1943, and resulted in obliteration of the
42 marsh vegetation and drainage system. After
43 dredging west of the quarantine station in
44 1939, the Corps reconstructed the shoreline
45 adjacent to the station with dredge spoil. The
46 Corps also rebuilt a small dock and placed
47 riprap along the new shoreline to prevent
48 erosion. Additionally, the wharf was removed
49 to mitigate obstruction to the channel’s
50 current.

51 Workers for the National Park Service
52 resided on Cockspur Island from 1960 to
53 1963, their efforts directed toward renovating
54 the nonfunctional island-wide drainage
55 system. During this same time period, the
56 Chatham County Mosquito Control
57 Commission excavated canals and filled low
58 areas on the island for mosquito control. In
59 1972, the Corps constructed revetments and
60 restraining walls to reduce shoaling in the
61 North Channel Savannah River and to
62 protect the facilities of the Savannah Bar
63 Pilots.

Current and Future Actions That Could Contribute to Cumulative Effects

64 It can be anticipated that Fort Pulaski
65 National Monument will continue to be
66 affected by regional population growth, with
67 attendant impacts from increased visitation,
68 continued development of adjacent lands,
69 increased storm water runoff, increased
70 upstream discharges of air and water
71 pollutants, and the like. In addition the
72 following future projects outside the
73 monument could contribute to cumulative
74 impacts:

- 75 • Proposed widening of U.S. Highway
76 80 —This project would widen U.S.
77 Highway 80 from two lanes to four
78 lanes along its entire route through
79 the monument.
- 80 • Savannah Harbor Deepening Project
81 — The Georgia Ports Authority
82 proposes to deepen the main channel
83 of the Savannah River all the way
84 from the river’s mouth to the Garden
85 City terminal. The channel would be
86 deepened from 42 to 48 feet in order
87 to accommodate larger vessels
88 coming through the Panama Canal.
- 89 • Georgia-South Carolina Joint
90 Terminal Project —This proposed
91 port facility would be built in addition
92 to, or in lieu of, the Savannah Harbor
93 deepening project. It would be
94 located in Jasper County South

Carolina, just upstream from the monument.

DECISION MAKING TO AVOID IMPAIRMENT OR UNACCEPTABLE IMPACTS ON RESOURCES OF FORT PULASKI NATIONAL MONUMENT

Impairment

In addition to determining the environmental consequences of implementing the preferred and other alternatives, the 2006 NPS *Management Policies* (section 1.4) requires analysis of potential effects to determine whether or not proposed actions would impair park resources and values.

The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given National Park Service management discretion to allow certain impacts within a national park, that discretion is limited by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources and values, including opportunities that otherwise would be present for the enjoyment of those resources or values. (NPS *Management Policies 2006* 1.4.5) An impact on any park resource or value may, but does

not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

Impairment may result from NPS activities in managing the park; visitor activities; or activities undertaken by concessioners, contractors, and others operating in the park. A written impairment determination will be made for alternative B, the preferred alternative; the draft version is found in appendix E of this document.

Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the National Park Service applies a standard that offers a greater assurance that impairment will not occur. The National Park Service does this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Guidelines for the identification of unacceptable impacts are provided in section 1.4.7.1 of *Management Policies 2006* (NPS, 2006).

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. Therefore, for the purposes of these policies, unacceptable impacts at Fort Pulaski National Monument are impacts that, individually or cumulatively, would

- be inconsistent with the park’s purposes or values, or
- impede the attainment of the park’s desired future conditions for natural and cultural resources as identified through the park’s planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with
 - park programs or activities, or
 - an appropriate use, or
 - the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park, or
 - NPS concessioner or contractor operations or services

In accordance with *Management Policies 2006* (NPS, 2006), park managers must not allow uses that would cause unacceptable impacts on park resources. To determine if unacceptable impacts could occur to the resources and values of Fort Pulaski National Monument, the impacts of both existing and proposed actions in this general management plan have been evaluated, based on the preceding criteria.

Comparison of Alternatives

Once impacts are identified, each alternative is compared to a baseline, represented by future conditions that would occur under the no-action/continue current management alternative (alternative A). For the no-action alternative, the impact analysis compares future resource conditions in 2024 to existing conditions in 2009, assuming continuation of current management direction.

The impact analysis for the action alternatives (alternatives B and C) compares the action alternatives in the year 2024 to the no-action alternative in the year 2024. Said differently, the description of the impacts of the action alternatives sets forth the *difference between* implementing the no-action alternative and implementing the action alternatives. To understand a complete “picture” of the impacts of implementing any of the action alternatives, the reader must take into consideration the impacts that would occur under the no-action alternative.

IMPACTS COMMON TO ALL ALTERNATIVES

Transportation

Under all of the alternatives, existing transportation flows within the Monument would be maintained in essentially their current form. Visitation levels may increase under all of the alternatives, due primarily to rising population in the local area, with impacts on monument roads, U.S. Highway 80, and roads in adjacent communities that would be minor to moderate, long term and adverse. Impacts to monument natural resources (particularly geologic resources and soils, vegetation, and wildlife) from the monument road and parking system would be negligible to minor, long term, and adverse. No impacts are anticipated to cultural resources.

Cumulative Effects. The proposed widening of U.S. Highway 80 through the monument could affect both transportation patterns and monument resources. The Georgia Department of Transportation has proposed to widen U.S. Highway 80 from 2-3 to 4 lanes, and elevate the 5.77-mile long portion of roadway that runs through McQueens Island from the Bull River Bridge to the Lazaretto Creek Bridge. The project start-date has been pushed back several times, and no projected start date is currently available. Widening the highway might potentially affect the adjacent

1 salt marsh by altering the natural hydrology
2 and/or increasing runoff of nutrients and
3 hydrocarbons (by increasing the amount of
4 impervious surface). In addition, the
5 widening could have adverse impacts on
6 animal migrations, especially those of
7 diamondback terrapins. Land from within
8 the current monument boundary would be
9 required to accommodate future widening of
10 U.S. Highway 80, and this land could
11 conceivably contain cultural resources on it.
12 Impacts could possibly be mitigated by the
13 donation of state land that has important
14 natural and cultural resources.

15 Two proposed harbor projects could likewise
16 affect transportation patterns and monument
17 resources. The Savannah Harbor Expansion
18 Project would involve deepening 36 miles of
19 the navigation channel an additional 6 to 8
20 feet and widening bends at 12 locations.
21 Specifically, the Georgia Ports Authority has
22 proposed to deepen the 36-mile portion of
23 the Savannah River from Fort Pulaski (at
24 river mile 0) to above the Kings Island
25 Turning Basin from its current 42-foot depth
26 to a depth of 48 feet. Possible adverse effects
27 associated with the proposed deepening
28 include its effects on water conditions (i.e.
29 surface water salinity, groundwater intrusion,
30 dissolved oxygen, water clarity, contaminant
31 concentrations), and how those in turn might
32 affect freshwater wetlands and aquatic
33 resources (e.g., striped bass, shortnose
34 sturgeon). Additional impacts include a
35 possible increase in the rate of erosion to the
36 north shore of Cockspur Island. There are
37 significant cultural resources in the northeast
38 section of Cockspur near the river's mouth,
39 and this area has been exclusively erosional
40 for the past 40 years, and continues to be so
41 today (Alexander, 2008). Although a recent
42 study was unable to draw a clear link between
43 shoreline erosion and river channel
44 deepening, it noted that the historic
45 placement of dredge spoil and other
46 anthropogenic activities on the north shore
47 of Cockspur has impeded erosion along the
48 river bank. Based on data obtained after these
49 activities ceased, it appears that the northeast
50 portion of Cockspur Island would likely have
51 been erosional throughout the last century

52 had it not been for these activities. This area
53 bears the full brunt of energy from both
54 weather systems and shipping activity in the
55 river. Harbor traffic has been increasing
56 steadily with time, and so harbor-related
57 impacts on the shoreline must be increasing
58 as well.

59 The second project is a proposed bi-state
60 container port on the Savannah River at
61 Hardeeville, South Carolina (Jasper County).
62 If built, the port would be 10 miles closer to
63 the ocean than the Port of Savannah's
64 Garden City terminal. Possible effects include
65 adverse impacts on water quality and physical
66 effects associated with port development
67 (e.g., dredging, channel maintenance,
68 deepening, etc). Additional impacts could
69 include exacerbation of erosive forces on the
70 north shore of Cockspur Island.

71 When the long-term, negligible to minor, and
72 adverse effects of implementing any of the
73 action alternatives are added to the moderate
74 to major effects of other past, present, and
75 reasonably foreseeable actions as described
76 previously, there would be long-term,
77 moderate to major, adverse cumulative
78 impacts on monument geological resources,
79 soils, vegetation, fish, and wildlife as a result
80 of transportation projects. Any one of the
81 action alternatives would contribute a
82 negligible increment to this cumulative
83 impact.

84 **Conclusion.** Impacts to transportation under
85 all alternatives would be negligible to minor,
86 long term, direct, and adverse. Moderate to
87 major impacts on a number of the
88 monument's natural resources could ensue
89 from deepening the Savannah River ship
90 channel and constructing the proposed
91 Jasper Port, both of which would take place
92 outside the monument boundary.

CLIMATE CHANGE

93 Under all of the alternatives, existing
94 emissions of greenhouse gases would initially
95 continue more or less in their current form.

No major new development or increase in the alternatives. Over time, however, the monument will implement the “Climate Friendly Parks” program developed jointly by the National Park Service and the U.S. Environmental Protection Agency. This program may lower emissions and reduce the monument’s overall carbon footprint. Possible elements of the program at Fort Pulaski could include greater use of energy-efficient vehicles, less frequent mowing of open areas, and more effective recycling and re-use strategies. In themselves, impacts from these activities would be negligible, direct and indirect, long term, and beneficial. When combined with similar efforts elsewhere, beneficial impacts would be greater, albeit difficult to quantify.

Cumulative Effects. Because it is a coastal park, Fort Pulaski National Monument is more vulnerable than inland areas to the projected consequences of global climate change, including sea level rise and more violent and frequent storm events. The National Park Service and the United States Geological Survey have developed Coastal Vulnerability Index maps for a number of coastal parks. These maps identify coastal areas sensitive to sea-level rise, and will allow managers to take precautions necessary for their protection. Records show that sea levels at Fort Pulaski are rising at a rate of 13 inches per century. Levels could rise another 25 inches by 2100 if the current rate of climate change continues. These changes in sea level could disrupt ecological services (nutrient recycling, sedimentation, primary/secondary productivity) provided by wetlands due to changes in hydrology and physical structure, biogeochemistry, vegetation, and animal populations (Michener et al., 1997). In addition, Georgia is expected to experience a predicted increase in temperatures by as much as 4 F (~2 C; fall) and in precipitation by as much as 40% (summer/fall) (U.S. EPA, 1997). Together, all of these changes have major implications for Fort Pulaski’s salt marsh and shoreline areas because they could lead to loss of wetlands and serious erosion (McFarlin and Alber, 2005). Rising sea levels

vehicle usage is contemplated under any of could also affect the structural integrity of the fort.

The monument would have extreme difficulty adapting to such changes, because they would entail outright loss or significant damage to the resources the monument was established to protect. Impacts would be major, direct, long term, and adverse. The alternatives in this plan would contribute a negligible increment to this adverse impact.

Conclusion. Direct impacts on climate under all alternatives would be negligible, long term, direct and indirect, and adverse. Major, long-term, and adverse impacts on monument resources could ensue from global climate change. The alternatives in this plan would contribute a negligible increment to this adverse impact.

IMPACTS OF IMPLEMENTING ALTERNATIVE A (CONTINUE CURRENT MANAGEMENT)

Cultural Resources

Archeological Resources. Under alternative A, impacts on archeological resources could result from visitor activities such as hiking, picnicking, cycling, and exploring. Trampling or disturbance could result in a loss of surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence. Additional impacts on archeological resources could occur due to soil erosion from existing roads and trails, soil disturbance due to the construction of new or expanded trails, shoreline erosion from ongoing shipping activities in the Savannah River, soil compaction at trailheads and parking areas, and soil disturbance resulting from miscellaneous facility maintenance activities. Apart from shoreline erosion, the impacts of which are difficult to predict, the impacts related to these activities would for the most part be confined to surface soil layers and take place in previously disturbed areas. Impacts would thus be permanent, adverse, and of negligible to minor intensity. Archeological resources

adjacent to or easily accessible from roads or trails could be vulnerable to looting and vandalism. Continued ranger patrol and emphasis on visitor education would minimize adverse effects and any adverse effects would be anticipated to range in intensity from negligible to minor and be permanent. There is no potential for impacts on archeological sites resulting from facility development.

Cumulative Impacts — Ongoing monument management and visitor use activities have resulted in relatively little disturbance of archeological resources in the monument. Large-scale projects such as deepening the Savannah River ship channel could pose some impacts on archeological resources in the vicinity of the monument. The number and extent of these archeological resources is unknown so the potential impact cannot be assessed with any degree of accuracy. However, the impacts of the federal channel project will be assessed in separate environmental compliance documents being prepared by the U.S. Army Corps of Engineers. When the permanent, negligible to minor adverse effects of implementing the actions under alternative A are added to the minor effects of other past, present, and reasonably foreseeable actions as described previously, there would be a permanent, negligible to minor, adverse cumulative impact on archeological resources. The actions under alternative A would contribute a negligible increment to this cumulative impact.

Conclusion — Under alternative A, impacts on archeological resources would be permanent, negligible, and adverse. Cumulative impacts would be permanent, minor, and adverse. The actions under alternative A would contribute a negligible increment to this cumulative impact.

Section 106 Summary — After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation

of alternative A would have no adverse effect on archeological resources.

Museum Collections. Museum collections would be co-located with the collections of Fort Frederica and Ocmulgee national monuments in Macon, thereby eliminating their vulnerability to storm surge and wind damage. Impacts to museum collections would be permanent and beneficial.

Cumulative Impacts — The National Park Service is currently endeavoring to move vulnerable museum collections in the Southeast away from coastal locations to more secure inland facilities. Impacts to museum collections would be permanent and beneficial. The actions under alternative A would contribute a significant increment to this cumulative impact.

Conclusion — Under alternative A, impacts on museum collections would be permanent and beneficial. Cumulative impacts would likewise be permanent and beneficial. The actions under alternative A would contribute a significant increment to this cumulative impact.

Section 106 Summary — After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative A would have no adverse effect on museum collections.

Historic Structures. Under alternative A, impacts on historic structures would continue to occur due to aging of the historic fabric, normal wear and tear, and vandalism. Impacts for the most part would be temporary, adverse, and of negligible intensity. Continued ranger patrols and cyclic maintenance activities would minimize damage to historic structures. Negative impacts would be anticipated to be short-term, negligible, and adverse. No historic structures would be modified or removed under this alternative.

Cumulative Impacts — No historic structures associated with Fort Pulaski survive in the

immediate area surrounding the monument. However, in the local metropolitan and regional area, a number of historic structures survive, and losses to these resources continue to occur due to development projects and structural modification. Therefore, when the short-term, negligible to minor, and adverse effects of implementing alternative A are added to the moderate to major adverse effects of other past, present, and reasonably foreseeable actions as described previously, there would be long-term, moderate to major adverse cumulative impacts on historic structures. Alternative A would contribute a negligible increment to this cumulative impact.

Conclusion — Under alternative A, impacts on historic structures would be short term, negligible, and adverse, mostly due to normal wear and tear. Cumulative impacts would be moderate to major and adverse due to continued development in the local and regional area. The actions under alternative A would constitute a negligible increment to this cumulative impact.

Section 106 Summary — After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative A would have no adverse effect on historic structures.

Cultural Landscapes. Under alternative A, the cultural landscape of the monument would continue to differ from its historic appearance. Areas on Cockspur Island that were open fields or otherwise cleared during the Civil War would continue to be covered by invasive, nonnative vegetation. Sight lines between the fort and Union batteries would continue to be obscured. As a result, existing adverse impacts on the cultural landscape would continue. Some removal of nonnative vegetation could occur under this alternative through periodic employment of NPS exotic plant management teams. Resulting impacts on the cultural landscape would be long term and beneficial. No impacts would occur from facility development because no new

development is planned under this alternative.

Cumulative Impacts — Development continues on nearby Tybee Island, including areas where Union batteries were located during the war. On the other hand, efforts are ongoing to preserve the sites of historic batteries on Tybee and Long islands. On balance, impacts on the cultural landscape of the area surrounding the monument are long term, minor to moderate, and both beneficial and adverse. When the long-term and beneficial effects of implementing alternative A are added to the minor to moderate effects of other past, present, and reasonably foreseeable actions as described previously, there would be long-term, minor to moderate, beneficial and adverse cumulative impacts on the cultural landscape. Alternative A would contribute a negligible to minor increment to this cumulative impact.

Conclusion — Under alternative A, there would be long-term beneficial impacts on the cultural landscape due to a gradual reduction in nonnative vegetation. Cumulative impacts would be long term, minor to moderate, and both beneficial and adverse. Alternative A would contribute a negligible to minor increment to this cumulative impact.

Section 106 Summary — After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative A would have no adverse effect on the cultural landscape.

Ethnographic Resources. Fort Pulaski National Monument has not yet been the subject of an ethnographic assessment and therefore the existence (or nonexistence) of ethnographic resources is undocumented. However, research by Dr. Charles J. Elmore (*General David Hunter's Proclamation: The Quest for African-American Freedom Before and During the Civil War*) and other records demonstrate that there are traditional attachments and connections between the African American community in the Savannah area and Fort Pulaski National

Monument. These connections include the use of slaves in the construction of the fort, General David Hunter's emancipation proclamation, the use of the fort as a stop on the Underground Railroad, and the use of the fort as a haven for freed and escaped slaves subsequent to the capture of Fort Pulaski by Union forces in April of 1862. In addition to these African American connections, the story of the "Immortal 600" resonates today among those whose ancestors fought on the side of the Confederacy and those who continue to do research on the subject of prisoners of war. Alternative A would have few if any impacts on the foregoing attachments because it would continue to provide long-term protection to the fort and its historic context. Impacts to ethnographic resources would therefore likely be negligible, long term, and neutral.

Cumulative Impacts — Development continues on nearby Tybee Island, including in areas that may have ethnographic resources similar to those within the monument. Actual impacts on ethnographic resources are not known. However, given the long-term protection of the fort and its historic context, alternative A would contribute a negligible increment to any cumulative impact that might occur.

Conclusion — Under alternative A, there would likely be negligible, long-term, and neutral impacts on ethnographic resources. Cumulative impacts are unknown. Alternative A would contribute a negligible increment to this cumulative impact.

Section 106 Summary — After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of alternative A would have no adverse effect on ethnographic resources.

Natural Resources

Geology and Soils. Under alternative A, geological, physiological, and soil

resources would continue to be subject to current management practices and policies. Impacts to these resources would be due to soil erosion from existing roads and trails, shoreline erosion from ongoing shipping activities in the Savannah River, soil compaction at trailheads and parking areas, and soil disturbance resulting from miscellaneous facility maintenance activities. Impacts to soils and geologic resources would be negligible to minor, local, short and long term, direct, and adverse.

Cumulative Impacts — Permanent soil loss resulting from regional growth and development would adversely impact soils. The impact of these efforts on soils is expected to be long term, moderate to major, and adverse. When the likely effects of implementing the actions under alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described previously, there would be a long-term, moderate to major, adverse cumulative impact on soils. The actions under alternative A would contribute a negligible increment to this cumulative impact.

Conclusion — Under alternative A, impacts on soils and geologic resources would be long term, negligible to minor, adverse, and local. There would be a long-term, moderate to major, adverse cumulative impact on soils and geologic resources. The actions under alternative A would contribute a negligible increment to this cumulative impact.

Plant Communities and Vegetation.

Vegetation resources would continue to be subject to current management practices and policies. Impacts would be due primarily to removal of dead, diseased, or hazardous trees, as well as fuel removal in accordance with an approved fire management plan. Additional impacts would occur from the possible continued spread of nonnative vegetation, as well as from trampling and other visitor use of existing facilities. Collectively, impacts from implementing alternative A would continue to be negligible to minor, adverse, long term, and local.

Cumulative Impacts — Regional growth and development is expected to result in an increase in the disturbance or destruction of plant communities and vegetation. The impact of these activities on vegetation and vegetative communities is expected to be long term, moderate to major, and adverse. When the likely effects of implementing the actions under alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described previously, there would be a long-term, moderate to major, and adverse cumulative impact on plant communities and vegetation. The actions under alternative A would contribute a negligible increment to this cumulative impact.

Conclusion — Under alternative A, impacts on plant communities and vegetation would be long term, adverse, negligible to minor, and local. There could be long-term, moderate to major, and adverse cumulative impacts on vegetation and plant communities in the surrounding region. The actions under alternative A would contribute a negligible increment to this cumulative impact.

Exotic/Nonnative Plants. Exotic plants can have severe effects on the integrity of native systems and habitats. Visitors can be agents for seed dispersal, increasing the threat to native plant communities. Under alternative A, impacts on monument resources from the growth and spread of exotic/nonnative plants would continue to occur. Some limited removal of exotics would take place as funding became available, but large scale restoration would not be likely to take place in the near term. Nonnative vegetation would therefore continue to displace native vegetation in large portions of Cockspur Island, with corresponding impacts on natural processes and native wildlife. Impacts from exotic/nonnative species would be long term, adverse, and moderate to major, and would be concentrated on Cockspur Island.

Cumulative Impacts — Regional growth and development is expected to result in an increase in the conversion of natural lands to developed areas and thereby increase the

amount of disturbed land available for colonization by exotic species. The impact of these activities on native plants and plant communities is expected to be long term, moderate to major, and adverse. When the likely effects of implementing the actions under alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described previously, there would be a long-term, moderate to major, adverse cumulative impact on native natural processes resulting from the loss of vegetative cover and the spread of exotic plants. The actions under alternative A would contribute a very small increment to this cumulative impact.

Conclusion — Under alternative A, impacts from exotic plants and nonnative vegetation would be long term, adverse, and moderate to major, and would be concentrated on Cockspur Island. There could be long-term, moderate to major, adverse cumulative impacts on native natural processes. The actions under alternative A would contribute a very small increment to this cumulative impact.

Fish and Wildlife. Under alternative A, minor adverse impacts on fish and wildlife would continue to occur, primarily from disturbance to soils and vegetation caused by ongoing visitor use and NPS management activities. Some limited vegetation management efforts, including hazardous vegetation removal and limited management of exotic vegetation, would improve habitat by decreasing competition from exotic plants and increasing the availability of native plants as food sources. Impacts from these management activities would be long term and beneficial. Overall, impacts on fish and wildlife from the continuation of current management (alternative A) would be long term, minor, and both beneficial and adverse.

Cumulative Impacts — Regional growth and development is expected to continue and result in an increase in the conversion of natural lands to development in the general area. The loss of natural areas and the increasing urbanization of the region have led

to a loss of wildlife habitat. Continued urbanization will fragment remaining natural areas and increase the risks and threats to wildlife, including automobile collisions, exotic species, and pathogens. Rainwater runoff and industrial discharges from urban areas may lead to a deterioration of water quality, with corresponding impacts on fish species. Overall, the effects of the activities described previously would likely be long term, moderate, and adverse on fish and wildlife in the region. When the likely effects of implementing the actions under alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described previously, there would be a long-term, moderate, adverse cumulative impact on fish and wildlife. The actions under alternative A would contribute a very small increment to this cumulative impact.

Conclusion — Under alternative A, impacts on fish and wildlife from the continuation of current management would be long term, minor, and both beneficial and adverse. Impacts would be concentrated at Cockspur Island. Minor adverse impacts on soil, water quality, and vegetation would result in minor adverse effects on some fish and wildlife species. In contrast, the removal of exotics would result in beneficial effects on some wildlife species. There would be long-term, moderate, adverse cumulative impacts on fish and wildlife. The actions under alternative A would contribute a very small increment to this cumulative impact.

Water Quality. Alternative A would result in impacts on hydrology and water quality that are negligible to minor, long term, indirect, and adverse. Impacts would be due to sedimentation from existing roads and trails, as well as from oil and grease discharges at parking areas and road crossings over waterways. Additional impacts could occur from the use of herbicides to control nonnative vegetation. To mitigate impacts from herbicide, the National Park Service would use the appropriate class of herbicide for the vegetation setting in question, would strictly adhere to application directions, and

would use appropriate best management practices.

Cumulative Impacts — Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Water quality would be affected by inputs from urban and suburban development, including increases in organic compounds and chemical concentrations. Inputs would derive both from point sources (e.g., sewer outfalls) and nonpoint sources (e.g., storm water runoff). The impact on water quality within the watershed is expected to be adverse, but the intensity is unknown. When the likely effects of implementing the actions under alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described previously, there would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions under alternative A would contribute a very small increment to this cumulative impact.

Conclusion — Under alternative A, impacts on water quality would be long term, negligible to minor, adverse, and local. There would be a long-term, adverse cumulative impact on water quality in the watershed. The intensity of the impact is unknown. The actions under alternative A would contribute a very small adverse increment to this cumulative impact.

Floodplains. Under alternative A, existing structures in the 100-year floodplain would remain in place. Such structures include the historic fort, the visitor center, administrative structures, access roads and trails, visitor parking area, sidewalks and trails, etc. Impacts to floodplain functions would be negligible to minor. These structures will remain in place because they either constitute the resource that the monument was designated to protect, or they provide administrative or visitor services in the only practical locations available.

Cumulative Impacts — Regional growth and development is expected to affect floodplains in the region. Floodplains could be physically altered, changing their capacity and altering the natural course of floodwater flow.

Natural flood patterns would be adversely affected, but any adverse impacts on property and life should be mitigated through proper permitting. The impact of the floodplain modification and structures in floodplains could be long term, minor to major (depending on the location and the nature of the impact), and adverse. When the likely effects of implementing the actions under alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described previously, there would be a long-term, minor to major, adverse cumulative impact on floodplains. The actions under alternative A would contribute a very small increment to this cumulative impact.

Conclusion — Given that Cockspur Island rarely floods, impacts on floodplain functions under alternative A would be local, direct and indirect, negligible to minor, and adverse. Impacts to infrastructure in the event of flooding would be short and long term, moderate to major, and adverse.

Wetlands. No filling of wetlands or other reduction in wetland function or values would occur as a result of alternative A. Therefore, no new impacts on wetlands would occur under this alternative. Impacts on wetlands would be attributed primarily to the retention and maintenance of existing facilities, such as roads, grades, and trails. Impacts would include those from past vegetation loss and alteration of soils, which have resulted in permanent effects on wetland size and integrity that are long term, minor, adverse, and local. Indirect impacts, such as increased runoff and sedimentation, are and will continue to be long term, minor, adverse, and local. Collectively, impacts on wetlands under alternative A would continue to be long term, minor, adverse, and local.

Cumulative Impacts — Some reduction in wetland function or values inside the

monument could take place as a result of actions occurring outside the monument boundary, e.g., expansion of U.S. Highway 80, and alteration of the Savannah River channel to accommodate more, and larger, ships. Short-term impacts on wetlands would be adverse, moderate, and local; long-term residual impacts would be adverse, minor, and local. Regional growth and development is expected to result in an increase in the conversion of natural lands to development and alter the hydrology of the general area. Changes in sheet flow and water quality would affect the size, integrity, and function of wetlands in the watershed. The impact of these activities on wetlands would be long term, moderate to major, and adverse. The adverse impacts would be at least partially offset by wetlands mitigation required by permitting agencies. Overall, the effects of the projects discussed previously would be adverse on wetlands. When the likely effects of implementing the actions under alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described previously, there would be a long-term, minor to major, adverse cumulative impact on wetlands. The actions under alternative A would not contribute any new impacts to this cumulative impact.

Conclusion — Under alternative A, past impacts on wetlands would continue and would be long term, minor, adverse, and local. There would be a long-term, minor to major, adverse cumulative impact on wetlands. The actions under alternative A would not contribute any new impacts on this cumulative impact.

Wilderness Resources and Values

In accordance with NPS *Management Policies 2006*, eligible land in the monument would continue to be managed to preserve its wilderness character and maintain its potential eligibility for wilderness designation; however, lands within the monument would not be proposed for wilderness designation and hence would not receive the special status and protection that

derives from wilderness designation. Because of limited public use of the salt marsh portion of the monument, fragmentation of habitats would be minimized, and the current condition of the natural soundscape would continue to be preserved. Opportunities for solitude and primitive and unconfined recreation would continue to be preserved and available. Continuation of current management would result in long-term beneficial impacts on wilderness character. Fishing would be allowed but would be accommodated by boat-in access only. The minimal public use in the salt marsh portion of the monument would cause only negligible to minor adverse impacts on wilderness resources and values. Ongoing NPS resource management activities would continue to preserve the long-term naturalness and untrammelled quality of the eligible lands, but development outside the monument boundary could cause some short- and long-term adverse impacts on wilderness character, including degradation of the natural soundscape and diminished opportunities for solitude. Overall, the impacts on wilderness resources and values would continue to be long term, beneficial, and local.

Cumulative Impacts. Regional growth and development is expected to continue and result in an increase in the conversion of natural lands in the general area. Increasing urbanization, fragmentation of habitat, and the loss of natural areas have led to the degradation of natural resources, ecosystem function, and natural soundscapes in the region. The impact of these activities on wilderness resources and values is expected to be long term, moderate, and adverse. Overall, the effects of the projects discussed previously would likely be adverse to wilderness resources and values in the region. When the likely effects of implementing the actions under alternative A are added to the effects of other past, present, and reasonably foreseeable actions as described previously, there would be a long-term, minor to moderate, adverse cumulative impact on wilderness resources and values in the region.

The actions under alternative A would not contribute to this cumulative impact.

Conclusion. Under alternative A, impacts on wilderness resources and values from the continuation of current management would be long term, beneficial, and local. There would be a long-term, minor to moderate, adverse cumulative impact on wilderness resources and values in the region. The actions under alternative A would not contribute to this cumulative impact.

Visitor Use and Experience

The no-action alternative would not change the current management of the park. Visitors would continue to have access to the historic fort and lighthouse, and monument staff would continue to offer a variety of interpretive programs. Opportunities for hiking, biking, and picnicking would continue to be available. Overall, access to historic resources and the availability of varied recreational opportunities would result in long-term, beneficial impacts on visitor use and experience.

Cumulative Impacts. Regional growth is expected to result in increased development in the vicinity of the monument. As a result, opportunities for cultural tourism and recreational activities may expand at Tybee Island and in the Savannah metropolitan area. Because the monument is well-buffered by thousands of acres of salt marsh, these opportunities would expand the choices available to monument visitors without affecting the actual visitor experience of most people using the park. Combining the likely effects of implementing the no-action alternative with the effects of other past, present, and reasonably foreseeable actions described previously, the cumulative impact on visitor use and experience in the monument would be long term and beneficial. The actions under the no-action alternative would not contribute an appreciable increment to this cumulative impact.