National Park Service
U.S. Department of the Interior

Padre Island National Seashore
Region 6

Draft Management Plan for Feral Exotic Invasive Species at Padre Island National Seashore

Environmental Assessment

October 2024

NOTE TO REVIEWERS

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RE: Feral Exotic Invasive Management Plan EA

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ON THE COVER

Sunrise view of a beach entrance through the dunes in Padre Island National Seashore

Photo NPS

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List of Acronyms and Initialisms

APE – Area of Potential Effect

APHIS – Animal and Plant Health Inspection Service

ASF – American Swine Fever

BCC – Bird of Conservation Concern

BMP – Best Management Practice

CE – Categorical Exclusion

CEQ – Council on Environmental Quality

CFR – Code of Federal Regulations

DEA – Drug Enforcement Administration

EA – Environmental Assessment

EDRR – Early Detection and Rapid Response

EIS – Environmental Impact Statement

EPA – Environmental Protection Agency

ESA – Endangered Species Act of 1973

FC – Candidate for Federal Listing [species status]

FE – Federally Listed Endangered [species status]

FP – Fully Protected [species status]

FSIS – Food Safety and Inspection Services

FT – Federally Listed Threatened [species status]

IPaC – Information for Planning and Consultation

JHA – Jobs Hazard Analysis

MB – Migratory Bird

NAGPRA – Native American Graves Protection and Repatriation Act

NEPA – National Environmental Policy Act of 1969

NHPA – National Historic Preservation Act

NPS – National Park Service

NRHP – National Register of Historic Places

PAIS – Padre Island National Seashore

PEA – Programmatic Environmental Assessment

PEPC – Planning, Environment, and Public Comment [website]

SE – State Endangered [species status]

SHPO – State Historic Preservation Office

SSC – Species of Special Concern [species status]

ST – State Threatened [species status]

THC – Texas Historical Commission

UAS – Uncrewed Aircraft Systems

USDA – United States Department of Agriculture

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

UTV – Utility Task Vehicle

WS – Wildlife Services

Chapter 1: Purpose and Need

Chapter 1 includes an introductory description of the project area, summary of impacts posed by feral species, resources potentially impacted by the alternatives, and the project's purpose and need.

Introduction

The National Park Service (NPS) has developed this programmatic environmental assessment (PEA) for a proposed plan at Padre Island National Seashore (PAIS, Seashore) for the management of feral exotic invasive wildlife, including feral swine (*Sus scrofa*) and other feral exotic invasives that are present, like nilgai antelope (*Boselaphus tragocamelus*), as well as any species that may be discovered in PAIS in the future where implementation of the proposed plan would protect resources. The management tools and methods evaluated in this PEA were developed based on depredation issues at several similar coastal areas in Texas, as well as those in the southeast (North Carolina, South Carolina, Georgia, Florida, and Mississippi).

Texas, including coastal Texas, suffers from feral swine invasion with devastating resource and economic impacts. Many coastal NPS units in the southeast with coastal and dune habitats similar to PAIS also have feral swine decimating these habitats and other natural and cultural resources. Figure 1 shows the breadth of feral swine presence in the United States from United States Department of Agriculture (USDA) data from 2023.

Feral swine, also known as feral pigs, wild boar, and feral hogs, include a mix of feral domestic stock, Eurasian wild boar, and hybrids between the two (Wood and Lynn 1977, Rary et al. 1968, Jones 1959). Feral swine are an ungulate, or hooved, species that have few natural predators. They are omnivorous and consume almost anything organic, including fruit, vegetables, wild plants, fish, fowl, carrion, mushrooms, snails, crayfish, bird eggs, turtle eggs, snakes, and small mammals. Feral swine will root up soils in search of mast (nuts of trees on the ground), roots, bulbs, and grubs. In the process, they can destroy wildlife habitat by damaging native plant communities, increasing the opportunity for non-native plants to become established, and fouling freshwater areas, resulting in an increased likelihood of erosion by wind and water. Feral swine populations have the potential to double and triple in size within 4 and 12 months respectively (Barrett and Birmingham 1994, Waithman 2001). Hone and Robards (1980) calculated that it would take nine years to eliminate a population of 1,000 individuals with a sustained population reduction of 70% per year. While a 70% reduction each year may not be achievable in the seashore given the nature of the terrain and limited staff and resources, these facts highlight the importance of maintaining a comprehensive and sustained feral swine management program.

Feral swine were first confirmed present at PAIS in June 2021 and park staff made efforts to remove the sounder with bait trapping, shooting, and removal to an incineration facility. However, a new population was discovered in April 2022 of approximately 20 individuals, including piglets. In May 2024, a sow with 20 piglets was confirmed. To prevent a widespread invasion, the same operations were taken in July and August 2024 with assistance from the USDA.

The occupancy of feral swine is in the early stages at PAIS, so enhancing capacity for early detection and rapid response (EDRR), prevention of re-introduction, control, and restoration through a comprehensive management plan is currently achievable and sustainable. Concern is high about their impact on listed species in the park. While the Seashore has not had any known predation on listed species to date, feral swine have predated sea turtle nests at other NPS units. The two largest nesting

programs in the NPS Southeast Region, Canaveral and Cumberland Island National Seashores, have experienced losses of varying levels for several decades despite ongoing predation management efforts. Additionally, Canaveral has documented feral swine impacts to cultural resources in addition to their sea turtle impacts.

PAIS has long been concerned about the effect of feral swine on coastal resources throughout the NPS system. Congaree National Park funded work to gather information on the feral swine population, including their movements, diseases, and impacts on park lands (Nix and Barry 1992, Gaddy et al. 2000, Friebel 2007, NPS 1988, NPS 2004, Zengle 2008). This has helped gain insight into the increasing population at PAIS. The NPS Southeast Region included feral pigs as a species analyzed for predator management activities as part of its Coastal Species of Concern Predator Management Plan Programmatic Environmental Assessment (PEA; 2018) and PAIS staff have closely monitored the implementation in those parks, particularly Canaveral National Seashore where resources, including turtle nesting, are similar to PAIS.

The coastal and dune habitats in the Seashore support several species of concern, unique natural resources, and many archeological, historic, and ethnographic resources. Examples of coastal species of concern found in PAIS are piping plover (*C. melodus*), eastern black rail (*Laterallus jamaicensis jamaicensis*), rufa red knot (*Calidris canutus*), green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), and Kemp's ridley sea turtle (*Lepidochelys kempii*).

The USDA Animal and Plant Health Inspection Service (APHIS) has a Wildlife Services Program which is the primary federal agency tasked with conducting wildlife damage management and is recognized as the most appropriate agency to conduct management efforts to reduce or prevent wildlife damage to property and natural resources. As of 2024, PAIS and APHIS have entered into an interagency agreement to remove feral swine to protect PAIS resources.

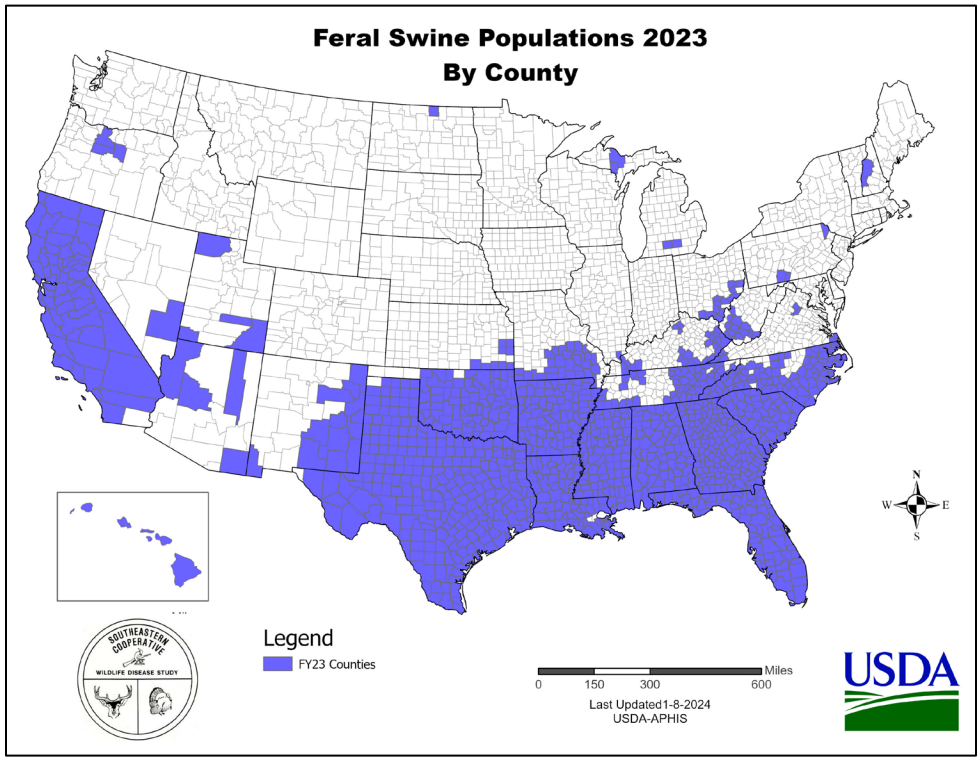

FIGURE 1: FERAL SWINE PRESENCE BY COUNTY (USDA 2023)

PAIS was established under Public Law 87-712 on September 28, 1962, with the primary purpose of preserving a portion of the diminishing undeveloped seashore of the United States (Figure 2). This unique area represents a primarily intact ecosystem and has received multiple designations that highlight its outstanding qualities. In addition to its almost 65.5 miles of protected coastline, the park includes important ecosystems, such as rare coastal prairie, a complex and dynamic dune system, and two natural islands in the Laguna Madre, one of the few hypersaline lagoon environments left in the world. The Laguna Madre is also home to sensitive areas such as freshwater and marine wetlands and special aquatic sites such as wind-tidal flats and seagrass beds that sustain diverse fish and wildlife resources that support our local economies. Notably, PAIS is recognized as a Globally Important Bird Area by the American Bird Conservancy (2001) and was the first NPS site designated as a Site of International Importance by the Western Hemisphere Shorebird Reserve Network. PAIS is a designated stop on the Great Texas Coastal Birding Trail, and nearly half of the adjacent city of Corpus Christi's tourism revenue results from nature tourism (McCorkle, 2012). Nesting of five of the six threatened and endangered sea turtles that occur in U.S. waters have been documented at the Seashore with the Kemp's ridley sea turtle exhibiting the highest nesting numbers in the United States (Amberg, 2014).

Besides the important habitats and species described above that are negatively impacted by feral swine, other wildlife species that have concerning impacts include Endangered Species Act (ESA)-listed species such as five species of sea turtles, piping plover, and rufa red knot. The park also has confirmed observations of the ESA-listed eastern black rail, a ground-nesting bird the breeds in the same habitats occupied by feral swine in the park. Due to feral swine's potentially high reproduction rate, early action and quick response to known presence in the park is essential to protect park wildlife resources, visitors, and communities from negative economic impacts. PAIS aims to eradicate feral swine and nilgai antelope that damage various habitat types and predate on native species, while protecting cultural and natural resources.

This project would ensure that PAIS has an effective plan to manage feral exotic invasive species and protect natural and cultural resources, with a focus on threatened and endangered species. The plan crafts an action alternative which would be designed to enhance existing management strategies with the goal of eradication by a mixed use of exclusion fencing, baiting, trapping, ground shooting, and aerial gunning of feral swine as well as located nilgai antelope to ensure early eradication before potential decimation of the delicate coastal habitat or predation on sea turtle nests. While feral swine have not been seen predating on sea turtle nests to date in PAIS, they are believed to have predated on 456 sea turtle nests in Canaveral National Seashore in Florida from 2017 to August 2024. If feral swine populations are not managed, Padre Island anticipates that feral swine will predate sea turtle nests due to their opportunistic feeding behavior, which includes scavenging and foraging for easily accessible food sources, leading to significant threats to vulnerable turtle eggs and hatchlings once they invade the beach ecosystem. For example, Cumberland Island has experienced varying levels of feral swine predation to sea turtle nests on its 18-mile Atlantic beach since the 1990s (Allen et al., 2018).

Since feral swine are an exotic and invasive species to the Seashore, and are known predators of threatened and endangered species, their populations at PAIS could result in adverse impacts to the ESA-listed nesting eastern black rail and critically endangered Kemp's ridley sea turtle. Nilgai antelope were introduced several decades ago on nearby ranches for hunting and are known carriers of ticks that spread cattle fever which can affect native white-tailed deer. Feral swine and nilgai antelope are both destructive to the delicate barrier island habitat and their coexistence wreaks havoc on the ecosystem, has great potential to negatively impact cultural resources, and is a potential safety threat to visitors.

Protection of park resources vital to local communities is determined by ongoing monitoring of feral swine ingress and activity, removal percentage, and acreage of habitat protected. The Seashore is currently operating under a 2021 categorical exclusion (CE) in collaboration with USDA APHIS which allows feral swine to be culled to protect native threatened and endangered species. However, these limited methods were determined to be ineffective for full eradication when game cameras captured images of feral swine within the seashore 10 months after the removal.

In consultation with APHIS, PAIS staff have found that complete eradication of feral swine can only be successfully achieved through a combination of strategies, which are outlined in the 2015 AHPIS Environmental Impact Statement (EIS) where NPS was a participating agency (USDA, 2015). The feral swine removal operations would potentially involve aerial gunning from USDA helicopters, which could also be used to directly reduce other invasive wildlife, if encountered, including nilgai antelope.

PAIS is the last stretch of public land along the Texas coastline that does not currently have a comprehensive management plan for feral swine removal with APHIS. Creation and implementation of an interagency plan would finally give consistent management along Texas coastal islands. Development of an eradication and monitoring plan for the Seashore, expanding partnerships and including local communities would enhance the effectiveness of efforts to manage feral swine populations and protect native species and habitats.

FIGURE 2: PROJECT AREA OVERVIEW

This PEA evaluates specific actions to manage non-native feral swine in the entire seashore boundaries It is also a programmatic EA in that it establishes a direction for overall pig management within the seashore. Additional compliance may be necessary for site-specific actions where the potential for sensitive resources exists, such as in an historic district. The public would be notified of any such proposals prior to implementation.

Purpose and Need

Purpose of the Action

The purpose of a proposed management plan for feral exotic invasive species at PAIS is to minimize natural and cultural resource impacts associated with feral swine and nilgai antelope and to reduce risks to human health and safety. Reduction in the number of feral swine related impacts on adjacent lands is also a purpose of the proposed plan.

Need for the Action

The need is to implement effective management strategies for invasive feral swine and other exotic species at PAIS to protect the park's ecosystem and its natural and cultural resources.

Feral swine pose significant threats to PAIS, disrupting the ecosystem through destructive behaviors like rooting and wallowing, which harm native species by promoting competition and predation (Lucas, 1977; Beach, 1993). They facilitate the spread of nonnative plants (Mungall, 2001) and degrade water quality by introducing silt and pathogens (Atwill et al., 1997). Additionally, they harbor diseases such as swine brucellosis and pseudorabies, which can affect human health (USDA, 2012).

Threatened are PAIS's unique coastal prairie ecosystems and habitats for endangered species like the Kemp’s ridley sea turtle (*Lepidochelys kempii*) and the eastern black rail (*Laterallus jamaicensis*). Cultural resources, including the historic Novillo Line Camp, also face disturbances from these invasive species, highlighting the urgent need for management action.

Issues and Impact Topics

Feral swine substantially degrade the physical and intangible resources PAIS and impact the visitor experience, as their trails and wallows disrupt vegetated areas. Their presence raises safety concerns for park visitors due to potentially aggressive behaviors and health risks associated with diseases such as swine brucellosis and pseudorabies, which can also threaten livestock and, in the case of brucellosis, even humans.

The dramatic surge in feral swine populations in Texas has started an invasion in PAIS. Issues and impact topics associate with their invasion are described in this section.

Issues Retained for Detailed Analysis

In the context of reviews under the National Environmental Policy Act of 1969, as amended (NEPA), "issues" encompass a range of factors including problems, concerns, conflicts, obstacles, or benefits that may arise if the Proposed Action or other alternatives are executed. Issues in this PEA have been identified through a comprehensive review of past planning efforts by the NPS at this and other parks, specifically including those that are actively managing feral swine. Contributions from environmental

groups, insights from state and federal agencies, and feedback gathered during civic engagement processes have further informed the issues. Certain issues have been retained for detailed analysis for several key reasons: (a) they are central to the proposal or of critical importance; (b) analyzing them is necessary to make a reasoned choice between alternatives; or (c) the environmental effects associated with them are contentious.

To facilitate a focused discussion of environmental consequences, specific impact topics have been developed. These topics allow for a systematic comparison of the impacts associated with each alternative. The identification of these topics is grounded in relevant federal laws, regulations, and Executive Orders, as well as in NPS Management Policies (2006) and recognized knowledge of resources that are either limited or particularly vulnerable.

Each impact topic selected includes a brief rationale elaborating on its importance. In instances where a particular issue or impact topic does not meet the aforementioned criteria, it has been excluded from detailed analysis (see Appendix C). Table 1 includes two columns. The pivotal issues are discussed briefly in the first column. The second column includes one or more impact topics, which are headings used to organize content in Chapter 3: Affected Environment & Environmental Consequences.

TABLE 1: ISSUES AND IMPACT TOPICS RETAINED FOR DETAILED ANALYSIS

Issue	Impact Topic(s)
Without feral swine management in place to control the population, sea turtle nests are at risk of predation by the pigs. Sea turtle nest predation is a substantia concern because it poses a serious threat to the already vulnerable populations of sea turtles. Feral swine are opportunistic feeders that can easily locate and consume turtle eggs, drastically reducing hatchling success rates and the future of the species. This issue is central to the proposal, and it is necessary to make a reasoned choice between alternatives. Therefore, this impact topic will be carried forward for detailed analysis.	Special Status Species–Sea Turtles
Without management of feral exotic invasive species, terrestrial megafauna like pigs and antelope in particular, the natural bird island and spoil islands rookeries, grasslands, wetlands, freshwater areas, and other habitat utilized by migratory, resident, and colonial birds are at risk of degradation. In addition, some actions within the proposed alternatives could have some short-term impacts to these species during implementation. These issues are central to the proposal and are necessary to make a reasoned choice between alternatives. Therefore, these impact topics are carried forward for detailed analysis.	Special Status Species–Birds, Wildlife (migratory birds, resident birds, colonial waterbirds)
Feral swine are not native to PAIS and disrupt the predator-prey dynamics of native predators in the ecosystem by predating on the limited prey in the seashore and wallowing in and fouling the limited freshwater sources in the park. Staff presence or other proposed actions in select areas could have short-term impacts to wildlife during implementation. These issues are central to the proposal for feral swine management. Therefore, this impact topic is carried forward for detailed analysis.	Wildlife (coyotes, small mammals, macroinvertebrates, reptiles)
Feral swine and nilgai are not native to the area and often foul the limited fresh water sources through defecation and trampling. These highly sensitive areas of the ecosystem are not equipped to handle the vast disturbances. Amphibians rely on these areas for survival and, without water sources, may go years without successful breeding events. Also, a few of the proposed actions may temporarily impact water quality. These issues are central to the proposal, and it is necessary to consider them in order to make a reasoned choice between alternatives. Therefore, these impact topics are carried forward for analysis.	Water Resources (water quality), Wildlife (amphibians)
Feral swine and nilgai can crush and decimate wildlife habitat, like delicate wetland and seashore vegetation, with short traffic duration. Additionally, some of the proposed actions may impact these resources in the short-term. These issues are central to the proposal, and it is necessary to make a reasoned choice between alternatives. Therefore, these impact topics are carried forward for detailed analysis.	Water Resources (wetlands, water quality), Wildlife (habitats: dune vegetation, seagrass communities, grasslands, coastal prairie), Soils (coastal dunes and beaches, mudflats)

Issue	Impact Topic(s)
Feral swine and nilgai antelope are commonly sighted near Bird Island Basin which is a popular destination for visitors since this is the only improved boat launch for Laguna Madre within PAIS and is the location of the concessionaire with a Commercial Use Authorization for windsurfing and other watersports. The park campgrounds are also in the northern areas of the grasslands. This issue is central to the proposal and is necessary to make a reasoned choice between alternatives.	Recreation and Visitor Use
Feral swine pose a threat to public health and safety due to their potentially aggressive behavior toward humans and through disease transmission. Certain aspects of the proposed feral swine management can also pose a threat to public safety. These issues are central to the proposal. Therefore, this impact topic is carried forward for detailed analysis.	Human Health and Safety
The presence of feral swine and nilgai potentially impacts the historical integrity of the Novillo Cultural Landscape due to behaviors which disturb vegetation and soils and the absence of these animals in this area in the past. This issue is central to the proposal. Therefore, this impact topic is carried forward for detailed analysis.	Cultural Resources (historic structures, cultural landscapes)
Feral swine wallows and trailing could substantially alter the grasslands that visitors see especially on Bird Island Basin Road which is a common area for recreation. Additionally, some proposed actions could impact viewsheds during operations. This issue is central to the proposal. Therefore, this impact topic is carried forward for detailed analysis.	Recreation and Visitor Use (viewsheds)

Issues and Impact Topics Dismissed from Detailed Analysis

Several potential issues and impacts were raised during internal scoping and civic engagement and not retained for detailed analysis. Using the same considerations noted previously, the interdisciplinary team analyzed these issues and determined they did not warrant detailed discussions in this PEA. Appendix C discusses impact topics that were dismissed from further analysis along with a brief explanation of the reasons for dismissal.

Chapter 2: Alternatives

This chapter describes actions that would take place under each alternative for feral exotic invasive species management at Padre Island National Seashore. This PEA carries forward two alternatives: the No Action Alternative and the Proposed Action/Preferred Alternative. Alternatives that were considered but dismissed from detailed analysis are described at the end of this chapter.

The impact of feral swine extends beyond National Park Service property to adjacent lands, where these animals can easily traverse. Evidence indicates that feral swine are present on neighboring private properties, complicating management efforts. One such landowner has engaged in regular communication with PAIS regarding sightings and culling of feral swine on their property. Therefore, responsible management must include collaboration with adjacent landowners, acknowledging the effects of feral swine on both private lands and the park ecosystem.

Actions Common to All Alternatives

Under both Alternative A and B, reductions in feral swine population would occur with a goal of zero feral swine in the seashore boundaries.

Trapping

Trapping is recognized as a flexible and cost-effective technique for managing feral swine populations, offering an economical approach to personnel and operational costs (Lukins, 1989). It is particularly effective for the removal of entire sounders, which are groups consisting of adult and sub-adult sows along with their offspring, generally numbering between four to forty individuals (Kurz and Marchington, 1972; Wood and Brenneman, 1980; Singer et al., 1981; Ilse and Hellgren, 1995; Sparklin et al., 2009). Within PAIS, the application of trapping would be strictly confined to live-capture traps; kill traps and snares will not be utilized.

The range of live-capture traps proposed includes corral traps composed of livestock panels, which are designed for easy disassembly, transport, and reassembly and can be remotely activated. Additionally, drop nets, similar to those that are effectively used at Great Smoky Mountains National Park, may be considered. Portable single-catch traps made of chain-link fencing, metal, or wood could also be implemented (NPS, 1993; Barrett and Birmingham, 1994). Increasing trapping success is feasible when wild food availability is limited, as feral swine may be more inclined to visit baited traps during these periods (Missouri Department of Conservation, n.d.); for PAIS food availability is more limited in the summer months when ground cherry is no longer an abundant food source.

Key strategies for effective trapping include remote triggers and the deployment of wildlife cameras at locations demonstrating feral swine damage. This allows for the identification of core use areas, the delineation of entire sounders, and insights into habituation patterns around traps. Trapping would be used in areas of PAIS where direct shooting would pose safety concerns or is otherwise impractical.

FIGURE 3: EXAMPLE OF A WILDLIFE CAMERA DEPLOYED IN PAIS. NPS PHOTO

Evidence strongly suggests that when trapping, targeting the removal of entire sounders is more efficient than focusing on individual feral swine (Holtfreter et al., 2010). Utilizing wildlife cameras (Figure 3) further assists in refining trapping strategies by helping to establish the presence, number, and distribution of sounders within the seashore.

The logistics of trap placement would include the use of boats and heavy machinery, such as front-end loaders, where conventional access via trucks or on foot is not feasible. Care would be taken to minimize disturbances to vegetation and soil during trap deployment, by either emphasizing the placement of traps in areas previously impacted by feral swine activity or flagging of any sensitive areas. Importantly, traps would be located away from main visitor areas to ensure public safety and preserve cultural sites. If a trap is not actively used and there are no plans for future use at that location, it would be dismantled.

NPS personnel or authorized representatives, such as agents from USDA Wildlife Services, would oversee trapping operations. NPS-approved training and certification for wildlife control and firearms usage will be mandated for all personnel involved in trapping operations to ensure adherence to safety and management standards. Traps would be strategically placed in areas exhibiting recent feral swine activity to maximize capture likelihood, with the bait—commonly shelled corn—carefully selected to attract feral swine. Inspection of traps would occur at least every 24 hours, ensuring timely release of any non-target species that could potentially be caught. Cellular trap cameras may be used, when service is available, to remotely monitor traps.

Captured feral swine would be humanely euthanized through direct headshots, utilizing appropriately calibrated firearms such as small-caliber rifles or handguns, including the .22 rimfire, that offers a combination of efficacy and safety (NPS, 1993). Additionally, sound suppression devices would be utilized during euthanasia to reduce noise and lessen disturbances to both wildlife and visitors.

Importantly, live capture and relocation of feral swine to other areas is unlawful due to disease-control purposes; dispatched feral swine will be addressed, with detailed protocols for carcass disposition available in subsequent sections.

Shooting

Both alternatives would remove feral swine from the landscape through direct reduction (i.e., shooting). Alternative A would continue the current practice of trapping feral swine and dispatching them via headshots from the ground. In contrast, Alternative B not only retains this approach but also introduces two additional scenarios: night shooting without prior trapping and aerial gunning from a helicopter, both of which are detailed further below.

Final Disposition

Both alternatives propose measures concerning the management of carcasses. In Alternative A, carcasses would be transported exclusively to an off-site facility for incineration, as this approach aligns with the current management strategy outlined in the 2021 Categorical Exclusion. Alternative B offers a broader range of options developed in consultation with the Animal and Plant Health Inspection Service (APHIS). While off-site disposal remains a possibility, this alternative emphasizes leaving carcasses in situ to facilitate natural decomposition processes.

Monitoring

Both alternatives incorporate monitoring strategies; however, they differ in their approaches. Alternative A employs an ad hoc monitoring framework, primarily emphasizing disease surveillance and offering less focus on tracking feral swine behavior and invasion rates. In contrast, Alternative B presents a more comprehensive monitoring plan that includes disease assessment while also documenting feral swine locations, population abundance, and any new activities or invasions following removal efforts. Additionally, Alternative B includes an evaluation of installed barriers to assess their effectiveness and identify any necessary repairs.

Alternative A: No Action

Under the no action alternative, monitoring of feral swine disturbance and populations would continue on an ad hoc basis by PAIS staff at various locations as determined necessary. PAIS would continue park-led operations or an interagency agreement with the USDA Wildlife Services to conduct limited feral swine management activities, including baiting and trapping, ground shooting, and monitoring for disease. Personnel would remove pig carcasses from the field and transport them to an off-site incineration facility.

Trapping

Trapping of feral swine would be as described in Actions Common to Both Alternatives. However, in Alternative A these actions would occur on the existing ad hoc basis rather than a comprehensive approach.

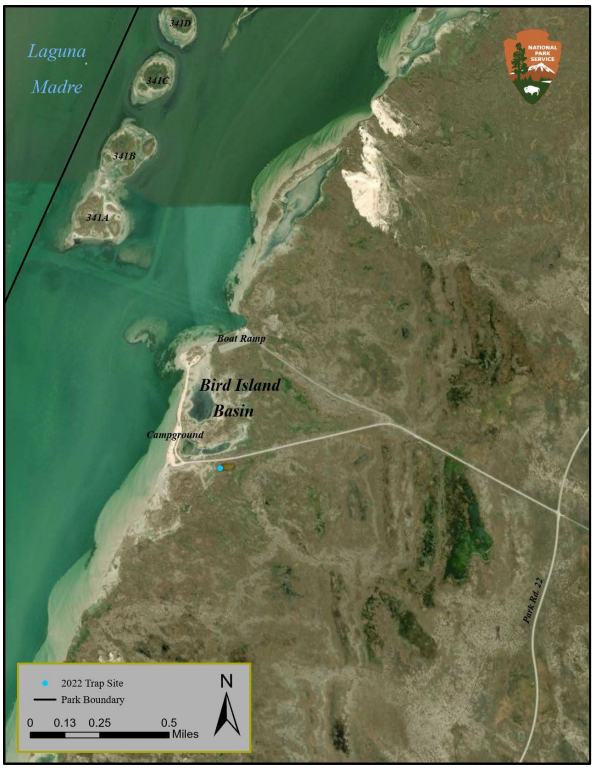

FIGURE 4: LOCATION OF TRAP FROM 2022 REMOVAL OPERATIONS NEAR BIRD ISLAND BASIN

Shooting

Under this alternative, shooting activities would be conducted in accordance with the existing management strategy and would occur exclusively from the ground after animals have been baited and trapped. These activities would be sustained over an indefinite timeframe, adapting to fluctuations in the feral swine population. All shooting operations would be managed by National Park Service (NPS) personnel or authorized representatives, including agents from USDA Wildlife Services.

To comply with the NPS's "Get the Lead Out" initiative, only non-lead ammunition will be utilized in these efforts. In accordance with NPS requirements, all personnel involved in shooting must complete NPS-approved wildlife control and firearms training, which includes a semi-annual qualification program similar to that of Great Smoky Mountains National Park (NPS, 1993). Specific firearm safety guidelines for Padre Island National Seashore (PAIS) are outlined in the Job Hazard Analysis (JHA), which is periodically reviewed and updated.

Firearm selection for this management initiative will include rifles and shotguns of appropriate calibers. PAIS will adhere to recommendations from Cumberland Island National Seashore, as well as guidelines established by Great Smoky Mountains National Park (NPS, 2011). Centerfire rifles in the .270 and .30 caliber range are commonly employed in feral swine management due to their effective ballistics and energy transfer, facilitating quick, humane kills (Hoffman, 2009). A variety of lead-free centerfire rifle ammunition is available, with bullet weights between 150 to 180 grains being preferred for feral swine control.

Final Disposition

Carcasses would be removed from the seashore and sent to an off-site facility for incineration.

Monitoring

Monitoring of feral swine would align with the existing management strategy. Currently, responses to invasions are based on reports from staff or visitors, with subsequent trapping conducted in those areas on an ad hoc basis. Post-removal monitoring would similarly rely on reports from staff or visitors. Additionally, disease monitoring through the collection of samples from carcasses would continue under this alternative.

Alternative B: (Proposed Action and Preferred Alternative)

Under this alternative, a comprehensive and sustained feral exotic invasive management plan would be implemented with the goal of reducing natural and cultural resource impacts associated with feral swine and nilgai and reducing risks to human health and safety throughout the Seashore (Figure 2). Management activities would involve a sustained trapping and shooting program. The exclusion of feral swine from selected areas using fencing or curtain barriers may also be implemented in some cases to protect highly sensitive resources such as special status species or National Register listed or eligible sites at imminent risk of damage, e.g., rooting under foundation. Site-specific maps related to Alternative B are included in Appendix A.

Trapping

Under this alternative, the proposed actions for trapping feral swine would be consistent with those outlined in the Actions Common to Both Alternatives. However, in Alternative B, trapping would likely serve as a secondary measure, primarily targeting any feral swine that were not captured during aerial gunning operations.

Shooting

Direct reduction of feral swine by shooting is a critical management component to this alternative and is proposed as the primary means of feral swine reduction within PAIS. Shooting in this alternative would include both aerial and ground shooting, and would not be conducted outside of park boundaries, but PAIS staff may coordinate actions with nearby landowners for the most comprehensive reduction activities. Opportunistic shooting of nilgai would also occur if they are found in the areas where feral swine operations are occurring. Shooting would occur on a sustained basis over an indefinite timeframe, with efforts adapted based on fluctuations in the feral swine population. Increased efforts will coincide with higher populations, more visible disturbances, or greater success rates in culling.

Shooting activities would be managed by NPS personnel or authorized representatives, such as USDA Wildlife Services agents, and could occur with qualified volunteers in addition to NPS and USDA staff. Methods include ground shooting, including using ground blinds, and aerial shooting from helicopters during reconnaissance surveys. Ground blinds would remain in place for a few days before being relocated or removed if not in use. In remote areas, management personnel may establish low-impact campsites, ensuring no human-made materials are left in the field. Aerial shooting would be accompanied by ground crews—utilizing trucks, utility task vehicles (UTV)s, airboats, or outboard

boats—to enhance animal recovery and ensure safety. Baiting may be used to attract feral swine to blinds, employing sour corn mash, shell corn, or other appropriate baits.

To comply with the NPS's "Get the Lead Out" initiative, only non-lead ammunition will be utilized. As per NPS requirements, all personnel involved in shooting must complete NPS-approved wildlife control and firearms training, following a semi-annual qualification program akin to that of Great Smoky Mountains National Park (NPS, 1993). Specific firearm safety guidelines for PAIS are contained in the Jobs Hazard Analysis (JHA) which is reviewed and refined periodically.

Certain areas with higher visitor likelihood will be excluded from shooting operations, or visitor use areas may be temporarily closed for safety. It is expected that area closures would be approximately 6-8 hours per helicopter mission. The designated feral swine program officer will coordinate closely with law enforcement and park personnel to ensure safe operations. Notices regarding management activities and closure areas will be disseminated through the park's website, social media, and posted signage at visitor centers and in the field. Any wounded animals will be pursued and dispatched quickly; if an animal cannot be located immediately, follow-up searches will occur as necessary.

Shooting could take place throughout the park, adhering to safety constraints described below. Helicopters will not operate on the beach. Should feral swine or nilgai invade the beaches, a separate NEPA analysis would be conducted for beach operations. Focused shooting efforts may be concentrated in sensitive areas showing considerable feral swine signs or where populations are known to be high, such as around Bird Island Basin and freshwater grasslands.

Firearm choices for this management initiative would include rifles and shotguns of appropriate caliber. PAIS will adhere to recommendations from Cumberland Island National Seashore and guidelines established by Great Smoky Mountains National Park (NPS, 2011). Centerfire rifles in the .270 and 30 caliber range are commonly used for feral swine management due to the ballistics and energy transfer making for quick humane kills (Hoffman, 2009). There is a wide variety of bullet designs and weights available for lead-free centerfire rifle ammunition, with the 150 to 180 grain weights being the preferred range for feral swine work.

Shooting operations would occur during both day and night, contingent on feral swine behavior, effectiveness, and safety concerns, primarily outside main visitation periods—early in the morning, late in the evening, and at night. Night-vision goggles, infrared sights, and spotlights may be used as necessary. Sound suppression devices would be used to minimize noise and reduce spooking of feral swine and disruption to park visitors. Carcasses would be moved away from visitor areas and surface waters and left in situ; further details regarding carcass disposition are provided under a separate heading (see Final Disposition).

Detailed records of shooting activities would be maintained, capturing critical data such as area of operation, shooting dates and times, total active hours, types of shooting conducted, firearms used, personnel involved, distance covered, habitat types, and biological data on each killed feral swine. This information would inform ongoing management and adaptive strategies moving forward.

Barriers

Barriers would be used in several possible circumstances. Different types of barriers (protective fencing, large area fencing, and curtain barriers) are described below. For any barriers that are installed, periodic inspection of effectiveness would take place by staff and any repairs or reinforcement of the barrier would be executed.

Protective Fencing

Protective fencing can serve as an effective measure in selected small areas to safeguard highly sensitive resources that are at imminent risk of damage from feral swine. These sensitive resources include special status species and cultural sites that are either listed or eligible for inclusion in the National Register. The use of protective fencing would be reserved for instances where potential impacts from feral swine could lead to irreversible damage or loss of a resource, and where it can be reasonably expected to provide effective protection. Additionally, the installation would be limited to locations where the environmental impact of the installation of the fencing is less detrimental than the damage caused by feral swine.

In certain situations, a small number of fencing exclosures may also be employed for research and monitoring purposes. These data could be pivotal in informing decisions on feral swine management and addressing other critical resource management needs. By exclosing an area to feral swine, staff would be able to compare uninvaded landscape to invaded landscapes and better understand feral swine impacts. Efforts would be made to ensure that any fencing aimed at protecting sensitive resources remains as unobtrusive as possible, minimizing visibility for park visitors.

The fences would be constructed from dark green, black, or tan vinyl-coated galvanized chain-link material supported by metal posts. The choice of darker or lighter colors is intentional to help the fencing blend seamlessly into the natural surroundings. To further minimize disturbance, fence posts would either be buried or driven into the ground with minimal use of cement. Posts could be hand dug or dug using a tractor with an auger attachment, or a skid steer with a fence pounder attachment. In locations where hand dug is feasible and machinery could impact vegetation or other resources, then hand tools would be used. The fence height would be set up to 36 inches to deter feral swine from entering, while still permitting the passage of native white-tailed deer. Additionally, the bottom of the fence would be buried to prevent feral swine from rooting underneath, or the material could be extended outward from the base of the stationary fence to create a "skirt" effect. Park staff would choose the installation method that minimizes disturbance to the environment while effectively excluding feral swine.

Fencing would not be placed in areas where surface water flow could be impeded or where hydrologic alterations are likely to occur, and fencing would not be constructed in locations that would potentially compromise cultural resources.

NPS staff or authorized personnel would conduct regular inspections and perform necessary maintenance and repair of fencing periodically, as well as after severe storms or flood events. In instances where fencing is no longer necessary for resource protection, proves ineffective, or cannot be maintained through consistent inspections and repairs, it would be dismantled and removed from the field.

Large Area Fencing

The Seashore has water on three sides which makes it infeasible to fence the entire park. However, the northern boundary is on land and would be feasible to add a northern area fence as a deterrence from invasion from the north. While this method is not the most effective, it is considered part of the comprehensive alternative as an additional strategy toward eradication and prevention from future invasions.

Protective Curtain Barriers

Protective curtain barriers offer an alternative approach for managing feral swine, similar to the protective fencing utilized at Haleakala National Park in Hawaii. Unlike traditional fencing, curtain barriers can be deployed in areas prone to channelized flow or flooding, where fencing would be unsuitable. These barriers consist of heavy plastic sheets suspended from cables attached to posts, creating both a visual and physical barrier that effectively prevents feral swine from traversing watercourses.

To optimize their effectiveness, the design incorporates enough material so that the plastic lies flat on the ground or water surface during low water periods, extending "downstream" from the upright sections of the barriers. When flooding or high water occurs, the plastic adjusts to the water level, allowing flow and debris to pass without obstruction. As water levels recede, the plastic sheet settles back into its original position.

The chosen material for these barriers would be dark or tan-colored (such as dark green, dark brown, or black) to ensure that the barriers blend into the surrounding environment. In addition to their suitability for areas with channelized flow, the use of curtain barriers would adhere to the same specifications and restrictions outlined for protective fencing, ensuring consistency in their application across different contexts.

Final Disposition

Feral swine or nilgai that are killed would be left in the field to decompose on the ground without burial or transported off-site for disposal, which corresponds with practices nationwide (USDA, 2015). Strict adherence to established health and safety protocols will be maintained during the handling of deceased feral swine to minimize exposure to body fluids and ensure the safety of personnel.

Any killed feral swine or nilgai left to decompose would be moved would be out of view from visitor use areas such as hiking trails, boardwalks, day use or camping areas, parking areas, and the visitor center. Moved feral swine would be moved at least 200 feet away from the banks of relatively permanent surface waters such as Laguna Madre.

Carcasses may also be transported to an authorized off-site location for incineration or landfill disposal.

Coordination with Adjacent and Nearby Landowners/Users

Coordination with adjacent and nearby landowners and users would be conducted to:

1. inform of feral swine management goals and activities at PAIS;
2. exchange information on feral swine abundance, movement patterns, levels of disturbance, and feral swine management;
3. encourage the removal of feral swine from adjacent lands; and
4. discourage activities that could result in feral swine introductions to the park (escaped livestock, etc.). Coordination with adjacent landowners and users may extend beyond immediately adjacent properties to include coordination and information exchange with other land management agencies in the area.

Coordination would be accomplished through the use of social media, newspaper releases, and activity notices distributed at the park, or meetings as necessary.

Public Information and Education

Promoting public awareness of the feral exotic invasive management program is an important objective that would also be pursued as part of the comprehensive and interagency plan. NPS personnel would engage with community leaders to foster effective communication and swiftly address any issues that may arise. Information regarding the feral exotic invasive species management program would be shared with park visitors through interpretive materials developed by PAIS staff.

All educational materials presented by the park would concentrate on the impacts of feral swine disturbances, with a conscious effort to avoid glorifying the removal of these animals. Any presentations would be delivered with sensitivity to ensure that they resonate positively with the audience.

To effectively communicate the threats posed by invasive feral swine and their effects on native ecosystems, a variety of activities could be employed, including posters, news bulletins, bulletin board flyers, exhibits, signs, brochures, and PowerPoint or video presentations. Staff would periodically and proactively seek opportunities to present information to diverse audiences, such as the general public, universities, schools, hunting clubs, conservation groups, and other interested parties.

Press opportunities would also be utilized to circulate factual information about invasive feral swine and the management program to the public. Additionally, presentations or trainings on pig biology, the impacts of invasion, and the management strategies would be provided to park employees, ensuring that knowledge and understanding remain consistent across the organization.

Research and Monitoring

Research and monitoring may be used as part of the comprehensive mix of strategies. Researchers or qualified volunteers may also collect biological data from feral swine or nilgai carcasses (blood samples, tissue samples, gut contents, etc.). Since the research and monitoring activities have little impact on the issues related to resource protection, the protocols are not outlined as part of this Environmental Assessment, but some additional information is in Appendix D for researchers, practitioners, and the public.

Drones, or uncrewed aircraft systems (UAS), may be deployed as a form of reconnaissance for locating or assessing damage from feral swine or nilgai. UAS would be deployed to scout for sounders while ground units are searching for feral swine. The UAS pilot would radio the location of individuals and sounders to the ground crew who respond to the location given to dispatch the animals. These UAS flights would likely occur off Pan Am and Yarbrough roads. This would likely occur days or less than a month after helicopter gunning operations to ensure any animals that may have been missed by the helicopter crews. This could occur once or twice after a helicopter operation and as needed based on sightings from camera trap bait stations. The NPS has specific requirements in Reference Manual 60 for deploying UAS over park land and waivers would be obtained as a separate process when needed. Analysis of impacts will include drone overflights reconnaissance as part of the comprehensive alternative.

Radio-tracking may be used in conjunction with shooting and trapping activities or for research and monitoring purposes. Trapping would be used to capture feral swine to fit with radio collars. A small number of radio-collared feral swine could be released and tracked to assist in locating remote feral swine aggregation areas where shooting or trapping would take place. Radio-collars and tracking may be used for research and monitoring purposes, to investigate feral swine movement patterns, habitat preferences, home range sizes, and to calculate population estimates in support of the feral swine

management program. The number of radio-collared feral swine would be limited to the number needed to provide adequate statistical replication to address the research or monitoring question(s) being addressed.

Feral swine could also be temporarily captured for the "Judas" technique. The "Judas" technique, originally developed to eradicate goats at Hawaii Volcanoes National Park, involves capturing a feral swine, equipping it with a telemetry collar, and releasing it back into the wild to locate other members of its group (Taylor and Katahira, 1988). This technique has been shown to enhance eradication efforts, particularly in scenarios where small remnants of a population are left (Wilcox et al., 2004).

Feral swine would be fitted with radio collars which would require that they be restrained and immobilized using a fast, safe, effective, and humane method. Administering sedation and immobilization drugs, such as Telazol, which is a prescription sedative, and associated equipment would be performed by NPS employees or their authorized representatives responsible for feral swine management (USDA wildlife agents or veterinarians working in coordination with the NPS). NPS employees would be required to complete a Wildlife Immobilization Practitioner Course and follow all use and storage guidelines specified by the U.S. Drug Enforcement Administration (DEA). A DEA license will be acquired as necessary for personnel performing sedation by law and consulting veterinarian will be consulted. Sedation and immobilization drugs would be stored in a locked safe. Records would be maintained to include the date, amount, purpose, and signatures for each withdrawal of these materials.

Alternatives Considered but Dismissed from Detailed Analysis

The following alternatives were considered but eliminated from detailed analysis following NPS NEPA guidance.

Park-wide Fencing

Fencing the perimeter of PAIS to conduct fenced-zone removal of feral swine and to prevent or reduce movement of feral swine into the park was eliminated from further analysis due to the potential visual impacts to visitor experience in a previous contiguous grassland; potential alterations that fencing could have on the natural movement of water, sediments, flood debris, native biota, etc. within and through the park; the frequent and severe damage that storm activity could cause to fences; and the cost of installation and maintenance.

Snares

Snares and trapping methods other than live capture traps were eliminated from further analysis due to the concern that native non-target wildlife could be negatively affected by these methods and because animal welfare concerns.

Live Capture and Relocation

Live capture and relocation of feral swine from PAIS was eliminated from further analysis. Live capture and relocation of feral swine is illegal within the state of Texas. Also, swine brucellosis and pseudorabies could be in feral swine populations at PAIS and the surrounding area. Movement and relocation of live animals could result in infection of other feral populations and livestock. The USDA would strongly object and prohibit the relocation of nonnative feral swine.

Poisoning/Toxicants

Use of poisoning agents or toxicants was eliminated from further analysis due to the concern that native non-target wildlife could be negatively affected. Although research into species-specific delivery methods is being conducted, no species-specific delivery method has been found and no toxicants are currently registered for use with feral ungulates in the United States. If poisons/toxicants and species-specific delivery technologies for controlling nonnative feral swine are developed in the future, this alternative could be re-evaluated.

Contraceptives or Sterilization

Contraceptives or sterilization could be a low impact means to reduce nonnative feral swine populations; however, no effective or feasible means of sterilization or contraception are currently available for non-native feral swine. Therefore, this alternative was eliminated from further analysis. If sterilization and contraceptive technologies for controlling non-native feral swine are developed in the future, this alternative could be re-evaluated.

Public Recreational Hunting on NPS Property

Public, recreational hunting on NPS property was eliminated from further consideration because public hunting is prohibited by the establishing legislation for the park (PL 87-712) and by applicable federal regulations (36 CFR 2.2).

In addition, public hunting is unlikely to contribute substantially to feral swine management efforts within the park. Recreational hunting can achieve reduction of animals with relatively low reproductive potential. However, animals with very high reproductive potential, such as feral swine, are much more difficult to control and require a well-focused, comprehensive, and sustained effort by wildlife reduction professionals. The substantial effort which would be required to manage public hunting at the park would be cost prohibitive and public hunting would be incompatible with other visitor uses currently established at the park.

While recreational hunting by the public is dismissed, some qualified volunteer groups may assist NPS or USDA staff in the shooting efforts for feral swine and nilgai as part of the comprehensive, interagency feral exotic invasive species management plan proposed alternative (see above).

Biological Controls

Biological controls, such as the reintroduction of predators like jaguars (*Panthera onca*), were excluded from further analysis in managing feral swine PAIS. The feasibility of reintroduction is challenged by logistical concerns, including habitat suitability, prey availability, and potential human-wildlife conflicts. Establishing a viable predator population within the park is considered unlikely, and it is assumed that predation pressure would be insufficient to effectively control feral swine, which reproduce rapidly and thrive in varied environments. More specifically, establishing a viable jaguar population within the park is considered unlikely, particularly given their near-threatened status and declining habitats. Furthermore, it is assumed that the predation pressure from a limited number of reintroduced jaguars would be insufficient to effectively control the rapidly reproducing feral swine (de Rosa 2017).

Additionally, the complexities related to regulatory frameworks and the potential for increased human-wildlife conflicts could disrupt park operations and visitor safety. Lastly, the significant resources

needed for implementing such biological controls, including funding and ongoing monitoring, further justify the focus on more immediate and practical management strategies like trapping and culling to address the risks posed by feral swine.

Consumptive Harvest

Feral swine carcasses would not be donated for human consumption. Under the Federal Meat Inspection Act (FMIA; public law 90-201), all feral swine must be inspected prior to entering any establishment in which they are to be slaughtered. Inspections are carried out under the Food Safety and Inspection Services (FSIS) under the USDA. The FSIS has ruled that all feral swine are included in the FMIA and would require a taxpayer-funded federal inspection to be in commerce for consumption. This would entail examining the animal alive, at rest and in motion from both sides before passing the animal for slaughter. In most instances, it would be difficult to determine fitness for human consumption due to the potential for feral swine to carry disease (Wyckoff et al. 2009). Transporting live feral swine to slaughter facilities also increases the potential for spreading disease to domestic swine at facilities where swine are being held prior to slaughter. Therefore, feral swine would not be donated to food banks or by any other means for human consumption.

Use of Dogs

Systematic tracking using trained dogs was eliminated from further analysis. While some research shows that the use of dogs trained to track and bay feral swine can be effective as the feral swine population is reduced (Mayer et al. 2009) and there is a precedent for using dogs to track feral swine within NPS units (Katahira et al. 1993, NPS 2002, McCann and Garcelon-2008), the potential for resource damage would potentially be too high when compared to the benefits.

PAIS has a healthy population of white-tailed deer, but dogs can very easily spook them as well as coyotes and other wildlife. Given the large breadth of effective strategies already contained in Alternative B, staff decided to protect the Seashore's vulnerable natural resources and dismiss the use of dogs.

Mitigation Measures and Best Management Practices

Mitigation measures are included for implementation under the preferred alternative to avoid, reduce, rectify, or compensate for project-specific impacts identified during the NEPA review process. Best Management Practices (BMPs) are existing policies, practices, and measures required by law, regulation, or NPS policy that reduce the environmental impacts of designated activities, functions, or processes. The mitigation measures and BMPs that would be implemented under the preferred alternative are presented in Appendix B.

Chapter 3: Affected Environment & Environmental Consequences

This chapter describes the affected environment (existing conditions or baseline conditions) and expected future conditions, including trends and planned actions, and analyzes the potential environmental consequences (effects or impacts) that could occur as a result of implementing the alternatives.

Methodologies in Determining Impacts

The National Park Service based the impact analyses and conclusions on the review of existing literature; park studies; information provided by experts in the park, other NPS personnel, and other agencies; professional judgment; and public input.

NEPA reviews must take a “hard look” at impacts that alternatives under consideration would have on the human environment if implemented. This means considering how the condition of a resource would change, either negatively or positively, as a result of implementing each alternative under consideration. The analysis is to focus on significant issues or those retained for detailed analysis.

The CEQ regulations that implement NEPA require the assessment of three types of effects in the decision-making process for federal projects—direct, indirect, and cumulative (1508.1(gi)(1-3)). Direct and indirect impacts are considered together.

- **Direct impacts/effects** are those effects that happen which are caused by the federal action and occur at the same time and place and at the same time as the federal action.
- **Indirect impacts/effects** are those that which are caused by the federal action and happen later in time or are farther removed from the area of the federal action.
- **Cumulative impacts/effects** are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from actions with individually minor but collectively significant actions effects taking place over a period of time. “Incremental” refers to change happening gradually, in a series of small amounts.

If none of the considerations above apply to an issue or impact topic, it was dismissed from detailed analysis (see Appendix C).

Cumulative Impact Scenario

The CEQ regulations that implement NEPA require an assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts, as defined by 40 CFR 1508.1(i)(3), are "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from actions with individually minor but collectively significant effects taking place over a period of time." Cumulative impacts are considered for the no action and action alternatives.

In determining cumulative impacts this document examines past, present, and reasonably foreseeable future actions at PAIS. The influences of past actions are reflected in baseline resource conditions. The following specific past, present, and reasonably foreseeable actions were identified:

- Replacement of water and wastewater infrastructure.
- The removal or abandonment of all oil and gas infrastructure within the park boundary.
- Prescriptive wildland fire burning.
- Beach nourishment from USACE dredging of Port Mansfield channel.
- Rehabilitation and upgrades to Bird Island boat launch.
- Construction of a second Laguna Madre causeway.

The geographic area of analysis for cumulative impacts varies, as described under each resource below. These analysis areas do not extend beyond the park boundaries for any resource.

Special Status Wildlife Species

Affected Environment

Threatened and Endangered Sea Turtles

Five species of sea turtles are known to nest at PAIS: the leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), hawksbill (*Eretmochelys imbricata*), and loggerhead (*Caretta caretta*). All of these species are federally listed as either threatened or endangered, indicating a need for protection (NPS 2012). The waters surrounding PAIS also serve as crucial habitats for these turtles.

Sea turtles are considered keystone species, meaning they play a vital role in their ecosystem, with an influence that is greater than what their numbers would suggest (Mills et al. 1993). However, they face predation threats, especially during nesting. While predation rates decrease as turtles grow, nest depredation remains an issue. The main predators of turtle eggs and hatchlings on PAIS beaches include raccoons, coyotes, skunks, badgers, ghost crabs, and ants (NMFS and USFWS 1991; NMFS, USFWS, and SEMARNAT 2011).

Furthermore, feral swine have been documented preying on sea turtle nests in other NPS sites, including Cape Canaveral National Seashore and Cumberland Island National Seashore (Figure 5) and, if feral swine are left unchecked, predation of sea turtle nest by feral swine in PAIS is expected to occur and have an upward trend due to feral swine's opportunistic feeding patterns.

The proposed actions are not expected to affect this species as each action is aimed toward preventing further invasion of feral swine and their establishment on the beaches.

FIGURE 5: DAMAGE FROM FERAL SWINE PREDATION OF SEA TURTLE NESTS AT CUMBERLAND ISLAND NATIONAL SEASHORE. NPS/DOUG HOFFMAN

Threatened, Endangered, or Migratory Birds

Migratory birds are important ecological indicators, as disturbances affecting their habitats—such as stopover, wintering, or breeding areas—can lead to population declines and decreased reproductive success (Hilty and Merenlender 2000; Zöckler 2005). In the PAIS area, grassland degradation poses a concern, with less than 1% of the original coastal grasslands along the Texas coast remaining in pristine condition (Smeins et al. 1991). Notably, a substantial portion of the remaining pristine Texas coastal grasslands is found within PAIS (Lawson 2009).

Although PAIS in not currently in drought, feral swine can create localized drought-like conditions with wallowing muddy and freshwater areas. Drought conditions can diminish available forage, such as insects and plants, potentially leading to starvation for breeding birds in the park (Smith 1982). Moreover, drought may disrupt or alter the migratory patterns of these species (Zeng 2003; Dai et al. 2004; Gordo 2007).

The threatened and endangered migratory piping plover (*Charadrius melodus*) exemplifies the impact of these ecological changes. More than half of the piping plovers overwinter along the Texas coast, with nearly three-quarters foraging on islands, including PAIS. Studies by Drake (1999) and Drake et al. (2001) reveal that their home ranges and movement patterns vary seasonally, with algal flats heavily utilized during spring and fall, and exposed sandflats favored in winter. On May 19, 2009, the critical habitat for wintering piping plovers was updated to include 18 units across Texas, including Laguna Madre and PAIS (74 FR 23476-23600). Major threats to piping plover populations include human disturbance, predation by feral cats, gulls, crows, raccoons, and foxes, habitat loss, severe storms, and rising sea levels (BirdLife International 2017b; NFWF 2015; USFWS 1996, 2009). Future trends affecting this species could include predation if feral swine populations are not managed.

Coastal habitats used by threatened rufa red knots (*Calidris canutus rufa*) during migration and wintering are generally characterized by marine and estuarine environments rich in exposed intertidal sediments. These birds rely on diverse habitats, from high-energy oceanfront areas to more sheltered tidal flats. As long-distance migrants, rufa red knots must access abundant food resources at stopover sites to build fat reserves for their arduous flights. Primary threats to this species include habitat loss, human interference, and reduced prey availability (Bird Life International 2017c). Common predators of red knot eggs and chicks include great black-backed gulls and other large gulls, while migration areas may expose them to threats from red foxes and feral cats, although direct mortality rates are generally low (USFWS 2015a). Future trends affecting this species could include predation if feral swine populations are not managed.

Additionally, the threatened eastern black rail (*Laterallus jamaicensis* ssp.), listed as 'Threatened,' faces numerous challenges, including habitat loss, sea level rise, and increased tidal flooding due to more frequent and intense storms. These birds require dense vegetative cover that facilitates movement beneath the canopy. They occupy various salt, brackish, and freshwater marsh habitats, where plant structure—rather than species composition—is crucial for predicting habitat suitability (Flores and Eddleman 1995). Future trends affecting this species could include predation and habitat loss if feral swine populations are not managed.

West Indian Manatees

The threatened West Indian manatee (*Trichechus manatus*) is rare in Texas, although historical records indicate its presence in the Laguna Madre, which borders Padre Island. Recently, in July 2019, the Texas Parks and Wildlife Department confirmed sightings of what was believed to be a single manatee at South Padre Island in Corpus Christi Bay.

Listed as a threatened species by the state of Texas and the U.S. Fish & Wildlife Service (USFWS), these gentle giants have earned the nickname "sea cows" due to their herbivorous diet, which primarily consists of seagrass and other aquatic plants. However, the health and survival of the West Indian manatee are under threat from various human-related impacts. These include collisions with boats, habitat loss—particularly the loss of food sources and warm-water refuges—entanglements in fishing gear and marine debris, as well as entrapments caused by heavy rainfall events. Additionally, they face risks from natural occurrences such as cold snaps and harmful algal blooms, like red tide. Future trends affecting this species could include decimation of foraging areas if feral swine populations are not managed.

Impacts of Alternative A: No Action

Direct and Indirect Impacts. Under the No Action Alternative, comprehensive planning to manage feral exotic invasive species would not be implemented, and current ad hoc operations would persist as feral swine are identified within the park. This approach may result in localized impacts on specific areas, particularly as feral swine could expand into beach ecosystems and prey on vulnerable sea turtle eggs (Engeman et al., 2019). While individual nesting sites may experience substantial predation, it is plausible that the overall feral swine population could remain stable in the absence of active management interventions. However, if feral swine establish a consistent presence on the beaches, particularly during nesting seasons, the cumulative effects could lead to substantial declines in sea turtle nesting success, thereby impacting the broader ecological balance.

Feral swine have the potential to swim across the Laguna Madre undetected, thereby disrupting foraging areas critical to the West Indian manatee and green sea turtles, both of which rely on this

habitat for sustenance. The intensity of the impact may vary depending on the size of the swine invasion and the number of individuals involved. A significant influx of feral swine could lead to substantial depletion of the available food sources for these species, potentially affecting local populations. Conversely, if the invasion is limited in scope, impacts may be restricted to individual foraging sites, allowing overall populations of manatees and sea turtles to remain stable. Additionally, feral swine could contaminate the waters and shorelines, posing further risks to migratory birds such as redhead ducks and overwintering pintails.

Undetected feral swine invasions and persistence could also lead to destruction of key habitat for the endangered species that use the grasslands and surrounding vegetation for nesting.

That said, proposed actions under this alternative are not expected to impact these species as trapping and shooting would not occur on beaches or in the Laguna Madre.

Cumulative Impacts. Under the No Action Alternative, although other past, present, and reasonably foreseeable future actions have affected, or could have the potential to affect, special status wildlife species in the project area, the No Action Alternative would have no new impacts, and therefore, there would be no cumulative impacts.

Impacts of Alternative B: Proposed Action

Direct and Indirect Impacts. Under the Proposed Action, helicopters could be used for direct reduction which would also require supporting ground crews to include UTVs, airboats, or outboard boats. The presence of helicopters could impact nesting and migratory birds due to the associated noise levels. Specifically, the disturbance from helicopter noise may lead to nest abandonment, as adult birds may vacate their nests in response to perceived threats. This abandonment can result in the loss of eggs or fledglings, ultimately affecting reproductive success. Furthermore, repeated disturbances could instill a heightened sense of wariness in birds, which may cause them to avoid the area in the future, potentially leading to long-term habitat abandonment. This avoidance behavior could disrupt migratory patterns and reduce the overall population stability of affected species within the seashore. However, operations are to be avoided to the extent practicable during peak nesting season (see Appendix B) and adverse impacts are not expected.

Similarly, the presence of outboard or airboats could impact foraging green sea turtles or West Indian manatees primarily through noise disturbances and the physical dangers associated with boat operations. The noise generated by these vessels can disrupt the natural behavior of these marine species, leading to avoidance of foraging areas and potentially hindering their feeding and reproductive activities. Additionally, the direct impact of outboard motors can result in serious injury or even mortality for turtles and manatees, particularly if they are struck by a moving boat. To address these impacts, BMPs will be implemented, including vigilant monitoring for wildlife during boat operations. This monitoring will help minimize disturbances and potential collisions with these vulnerable species. Furthermore, when feasible, airboats will be favored over traditional outboard motorboats due to their quieter operation and reduced risk of injuring special-status wildlife since airboats have less depth than outboard motorboats.

Sea turtle nests still have the potential for predation from feral swine under either alternative, but with comprehensive management and targeted use of game cameras with a thorough monitoring approach, it is expected that nest predation would not occur under vigilant implementation of this alternative.

Other proposed actions (baiting, trapping, ground shooting, carcass disposal, barrier installation, and monitoring are not expected to impact these species. Baiting and trapping are focused on invasive species, with BMPs in place to minimize non-target captures. Ground shooting is proposed to be conducted with strict safety protocols to limit disturbances to non-target wildlife with BMPs in place for noise reduction. In situ carcass disposal aims to prevent disease spread by not moving the deceased feral swine or disrupting foraging or nesting activities. Barrier installations, when strategically placed, can protect vital habitats, indirectly benefiting native species. Lastly, monitoring activities are non-invasive and enhance management strategies without causing harm.

Cumulative Impacts. The cumulative impacts analysis area for special status wildlife species is wherever they are present: land, the estuary, or the beaches. Under the Alternative B, although other past, present, and reasonably foreseeable future actions have affected, or could have the potential to affect, special status wildlife species in the project area, Alternative B would have no new impacts, and therefore, there would be no cumulative impacts.

TABLE 2: SUMMARY OF IMPACTS TO SPECIAL STATUS WILDLIFE SPECIES

Issue	Alternative A: No Action	Alternative B: Proposed Action
Sea turtles	Individual feral swine could discover and predate nests and introduce other swine to the food source.	Aerial gunning from helicopter could result in disturbance to nesting turtles because of noise and vibration. Boating in the Laguna could impact juvenile green sea turtles and their foraging areas.
Birds	Feral swine exist in same habitat as the eastern black rail. Eggs, fledglings, and molting adults could be predated.	Aerial gunning from helicopter could result in disturbance to black rail because of noise and vibration.
Manatees	Feral swine are seen along the Laguna Madre coast and are known to swim in the bay. Encounters with manatees could result in harm.	Aerial gunning from helicopter could result in disturbance to manatees because of noise and vibration. Boating in the Laguna could impact manatees and foraging areas.

Wildlife

Affected Environment

Multiple wildlife taxa, alongside the aforementioned species of special concern, are vulnerable to negative impacts from feral swine and nilgai. Furthermore, certain proposed actions within each alternative may also have implications for these taxonomic groups. The following sections delineate and categorize each group accordingly.

Resident Birds

The current resident bird population at PAIS faces several threats, primarily stemming from human activities, invasive and non-native species, predation, and drought. Human disturbance is particularly concerning, with activities such as oil and gas exploration and habitat alteration contributing to the degradation of vital habitats. Drought emerges as a major threat, especially as it can lead to lowered water levels in areas heavily used by resident birds like Bird Island Basin and the freshwater ponds throughout the park. This reduction in water availability can adversely affect not only the birds but also the prevailing prey and forage species essential for their survival (Smith 1982). While PAIS is not currently experiencing drought, feral swine can wallow and root in freshwater areas and impact them enough to simulate localized drought conditions if the populations are left unmanaged.

The freshwater ponds at PAIS play an important role in supporting substantial wintering populations of pintail ducks (*Anas acuta*), while the Laguna Madre is vital for a portion of the global population of

redhead ducks (*Aythya americana*), which numbers between 30,000 and 40,000 individuals. Given these dynamics, the interplay between environmental stressors and habitat quality underscores the need for targeted conservation strategies to protect the resident bird population and their habitats.

Colonial Birds

PAIS has two distinctive coastal ecosystems that serve as important habitat for the park's waterbirds, particularly those that live in colonies. Among the threats faced by nesting colonial waterbirds, predation by native mammalian species is particularly concerning, with coyotes (*Canis latrans*) and raccoons (*Procyon lotor*) identified as the primary predators of nesting colonies. These predators often access nesting islands by swimming or wading across from either the Texas mainland or adjacent barrier islands (Coste and Skoruppa 1989).

Islands that provide nesting sites for colonial waterbirds are especially vulnerable to these predators when situated close to large landmasses or the mainland of Texas. Future trends indicate a loss of nesting sites if feral swine invade these areas. Additionally, lower water levels can further facilitate predator access to these vital colonies (Coste and Skoruppa 1989). Moreover, reports from the APHIS indicate the presence of feral swine on spoil islands within Laguna Madre. APHIS has taken action to manage and control the population of feral swine on these islands, recognizing the potential impact of these invasive species on the local bird populations.

Coyotes

Coyotes (*Canis latrans*) are highly adaptive, top-level predators that inhabit various ecosystems throughout the continental United States (Bekoff and Gese 2003). In Texas, they are particularly prevalent and have been documented as the most common native large carnivore in the southeastern region of the state (Schmidly 2004). While coyotes play an essential role in the ecosystem as predators, their population in PAIS faces challenges, particularly from drought conditions.

Periods of drought can diminish water availability, which in turn adversely affects the availability of prey items. This reduction in resources can lead to increased competition among coyotes, as well as heightened rates of starvation during declines in prey populations. Consequently, food scarcity may emerge as a substantial mortality factor for coyotes across their range (Bekoff and Gese 2003). Although PAIS is not presently experiencing drought conditions, feral swine can create localized effects that mimic those conditions. Their foraging behavior can diminish food resources, thereby indirectly affecting the availability of these sources for native predators, such as coyotes, which rely on the same food supply.

Small Mammals

PAIS is home to a diverse population of terrestrial mammals, with 24 species identified within the park (NPS 2012a, GULN 2010). The majority of these mammals are rodents, although the small mammal community also includes rabbits, moles, bats, opossums, and armadillos (NPS 2012a). These species primarily inhabit three key habitats: grasslands, vegetated dune communities, and wetlands or semi-permanent ponds (NPS 2012b).

Rodents, as a component of this small mammal population, play a crucial role in the food web, serving as primary prey for avian predators, reptiles, and larger mammals such as coyotes (*Canis latrans*), gray foxes (*Urocyon cinereoargenteus*), and badgers (Sieg 1987). However, the small mammals of PAIS face challenges from invasive species, which can disrupt local ecosystems by competing for resources such as food and shelter. Invasive species often lack natural predators in their introduced environments,

allowing them to dominate native mammals and, in some cases, predate on them as well (Pimentel et al. 2005).

Drought conditions further stress the small mammal populations on the island, as precipitation is a vital source of freshwater input on barrier islands. There are only a few persistent freshwater ponds within PAIS which provide not only essential drinking water but also a food source, as these ponds support aquatic life on which small mammals may prey (Gilbert et al. 2012). Feral swine are expected to reduce the populations of small mammals through predation and localized, simulated drought conditions if their invasion is left unchecked.

Macroinvertebrates

Macroinvertebrates serve as valuable biological indicators for assessing the overall health of aquatic ecosystems (EPA 2012). Along the Texas coast, these organisms play a crucial role as a food source for various species, including shorebirds, fish, and other wildlife (Withers and Tunnell 1988; Rocha 1995). Recent site visits in 2024 conducted by personnel from the APHIS WS, Texas A&M University, and the NPS have confirmed that crayfish residing in wetlands are a food resource for feral swine. Observations noted instances of wallowing and rooting behavior associated with these feral swine in the wetlands, highlighting the impact of feral animals on the macroinvertebrate population within this habitat.

Reptiles

PAIS provides habitat for a diverse array of reptiles, including snakes, lizards, and turtles. These reptiles play an important role in the food chain, functioning as both predator and prey species (ESI 2011). Additionally, reptiles may contribute to ecological processes such as seed dispersal and pollination for various plant species (TPWD 2012).

Natural stressors affecting reptile populations include drought, predation, and disease. Ponds serve as crucial microhabitats, allowing reptiles to cool down during high temperatures. Certain species are particularly reliant on both ephemeral and permanent ponds, making them vulnerable to stress during drought conditions. While reptiles that inhabit PAIS appear to be better adapted to these environmental challenges, they remain susceptible to the effects of prolonged drought, which can negatively impact their survival and reproductive success.

Amphibians

PAIS offers suitable habitat for a limited variety of amphibians, likely because the Laguna Madre serves as a barrier to the mainland. Amphibians are recognized as key indicator species, particularly due to their sensitivity to ecological changes linked to their permeable skin (Smith and Keinath 2007). These organisms require access to freshwater throughout all life stages, making wet seasons critical for the survival of many species within PAIS (Schmidly et al. 1996). Most amphibian species in PAIS have been observed near ephemeral ponds, which are essential for their life cycles (Cooper et al. 2005).

Adequate water sources are vital for successful reproduction, as a lack of freshwater may lead amphibians to go years without a successful breeding event (Dayton 2005). Natural stressors impacting amphibians include drought, predation, and disease. Given their reliance on freshwater, the small number of pools in PAIS poses a risk during drought conditions, as these sources could dry up, increasing the vulnerability of the island's amphibian populations.

Impacts of Alternative A: No Action

Direct and Indirect Impacts. Under the No Action Alternative, only ad hoc operations would continue. Under this alternative, it is possible the feral swine population would increase and spread to other locations in the Seashore. Feral swine could continue to increase their predation on crayfish, snakes, and reptile nests.

Undetected feral swine invasions and persistence could also lead to destruction of key habitat for the small mammals that use the grasslands and surrounding vegetation for burrows and nesting.

The proposed trapping action may unintentionally capture non-target species, such as coyotes or other wildlife. However, as outlined in Chapter 2, each trap would be equipped with camera monitoring and would be routinely inspected to facilitate the swift release of any unintended captures.

Cumulative Impacts. The cumulative impact analysis area for wildlife is wherever they could occur either on land, the estuary, or the beaches. Past, present, and reasonably foreseeable future actions and trends with the potential to impact wildlife under Alternative A include prescriptive wildland fire burning. Feral swine cause destruction to grasslands and other habitats for wildlife species and prescriptive burning also denudes some habitat areas. Overall, when actions under Alternative A are combined with other past, present, and reasonably foreseeable future actions and trends, there would be adverse cumulative impacts to wildlife. However, cumulative impacts would be beneficial in the long-term should feral swine removal efforts prove successful and prescriptive burning resumes beneficial fire regimes.

Impacts of Alternative B: Proposed Action

Direct and Indirect Impacts. Under the Proposed Action, helicopters could be used for direct reduction which would also require supporting ground crews to include UTVs, airboats, or outboard motorboats. The presence of helicopters could impact birds due to the noise. However, operations are to be avoided to the extent practicable during peak nesting season (see Appendix B) and adverse impacts are not expected. Similarly, the use of UTVs could impact small mammals, reptiles, and amphibians (e.g., driving on Pan Am Road after a rain event when narrow mouth toads are out), but BMPs include vigilant monitoring for wildlife as to not adversely impact these or other species during UTV operations.

Reptiles and any reptile or bird nests still have the potential for predation and small mammals and spadefoot toads still have potential for habitat destruction from wallows and rooting from feral swine under either alternative, but with comprehensive management and targeted use of game cameras with a thorough monitoring approach, it is expected that nest predation and habitat destruction would not occur under vigilant implementation of this alternative.

Under this alternative, the installation of fencing is expected to have minimal direct or indirect impacts on wildlife, including resident birds, colonial birds, coyotes, small mammals, macroinvertebrates, reptiles, and amphibians. The primary purpose of the fencing is to manage and contain feral swine populations, which can pose a threat to the habitats and nesting sites of these species. While there may be initial disturbances during the installation process, which could temporarily affect small mammals or nesting birds in the immediate vicinity, long-term benefits from reduced predation and habitat destruction by feral swine are anticipated.

Cumulative Impacts. The cumulative impacts analysis area for wildlife is wherever they are present: land, the estuary, or the beaches. Past, present, and reasonably foreseeable future actions and trends with the potential to impact wildlife under Alternative B include prescriptive wildland fire burning. Feral swine cause destruction to grasslands and other habitats for wildlife species and prescriptive burning also denudes some habitat areas. Overall, when actions under Alternative B are combined with other past, present, and reasonably foreseeable future actions and trends, there would be adverse cumulative impacts to wildlife. However, cumulative impacts would be beneficial in the long-term should feral swine removal efforts prove successful and prescriptive burning provides beneficial fire regimes.

TABLE 3: SUMMARY OF IMPACTS TO WILDLIFE

Issue	Alternative A: No Action	Alternative B: Proposed Action
Resident birds	Feral swine could predate nests, fledglings, and molting adults of many species.	Aerial gunning from helicopter could result in disturbance to resident birds because of noise and vibration.
Colonial birds	Feral swine could predate nests, fledglings, and molting adults of many species.	Aerial gunning from helicopter could result in disturbance to colonial birds because of noise and vibration.
Coyotes	Coyotes are currently the apex predator on the island. Invasions of feral swine increase competition.	Aerial gunning from helicopter could result in temporary disturbance of coyotes because of noise and vibration.
Small mammals	Feral swine could root burrowing and nesting locations.	Aerial gunning from helicopter could result in disturbance to black rail because of noise and vibration.
Macroinvertebrates	Crayfish have been observed to be a steady food source for feral swine. Swine root up wetland areas and devour crayfish and the roots of wetland vegetation.	With increased reduction of feral swine, crayfish and other macroinvertebrates would likely be positively impacted through less predation and habitat destruction.
Reptiles	Feral swine could predate on snakes and snake eggs.	Aerial gunning from helicopter would not likely disturb terrestrial reptiles. Sea turtles are susceptible to vibration and noise.
Amphibians	Feral swine could destroy habitat for amphibians and their young.	UTV and other vehicles driving after rains could impact amphibians since they are more likely to come out of burrows when it is wet.

Human Health and Safety

Affected Environment

The alternatives outlined in this document may increase threats to human health and safety, particularly in relation to the lethal removal of feral swine using firearms. The use of firearms introduces potential hazards such as accidental discharge, which can result in serious injuries or fatalities to workers, contractors, or individuals nearby during these activities. Furthermore, the presence of feral swine poses additional public health concerns due to their potentially aggressive behavior toward humans and their role in the transmission of diseases, including swine brucellosis and leptospirosis (Mayer, 2023). Recognizing these risks, it is essential to incorporate thorough safety protocols and training for all personnel involved in firearm use to mitigate these threats. Given these issues, public health and safety are addressed as an impact topic.

The presence of these animals poses health risks from various diseases, notably swine brucellosis and pseudorabies, which can be transmitted to livestock and, in the case of brucellosis, even to humans as undulant fever. Additionally, the recent alert regarding African Swine Fever (ASF) underscores the urgency of addressing feral swine populations, as this devastating disease poses a risk to both domestic and wild swine, further complicating public health and agricultural safety concerns (USDA, 2023).

Given the multitude of threats posed by feral swine to both natural resources and public health, the implementation of a comprehensive management plan for controlling feral swine within the Seashore is essential.

Feral swine can act as reservoirs for various infectious and parasitic diseases that may spread to domestic livestock and humans. Notable diseases associated with feral swine include hog cholera, brucellosis, trichinosis, hoof and mouth disease, African swine fever, giardia, and pseudorabies (Peine and Farmer 1990). Pseudorabies is of particular concern as it can infect multiple non-swine species, and all scavenging mammals that consume infected carcasses are at risk of infection, resulting in nearly 100% mortality rates. Feral swine are the only known natural reservoirs for this virus (Pedersen et al. 2013); therefore, the potential health risks posed to domestic livestock and humans by feral swine necessitate a comprehensive evaluation of management strategies to mitigate impacts on public safety.

Impacts of Alternative A: No Action

Direct and Indirect Impacts. Under the No Action Alternative, no comprehensive planning would take place to reduce feral exotic invasive species. The current management ad hoc operations would continue as feral swine are noticed in the park. Under this alternative, it is more possible the feral swine invasion spreads throughout the park, including the beaches. With a larger population of feral swine, visitors would be at higher risk for disease exposure and aggressive encounters.

Visitor and staff safety could be jeopardized during trapping and shooting operations due to several specific risks. These include the potential for accidental firearm discharges, which could result in injury or fatality; the risk of mishandling traps, leading to unintended injuries to personnel or bystanders; and the possibility of feral swine exhibiting aggressive behaviors when cornered or captured, posing a risk to anyone in proximity. To address these concerns, strict adherence to the Job Hazard Analyses (JHAs) will be enforced, incorporating comprehensive safety protocols and training to minimize these risks to an acceptable level for safe operation.

Cumulative Impacts. The cumulative impact analysis area for health and human safety is wherever visitors, researchers, or staff may be present in the Seashore. Past, present, and reasonably foreseeable future actions and trends with the potential to impact wildlife under Alternative A include prescriptive wildland fire burning. Prescriptive burns can produce smoke that impacts human health. These burns also have the potential to escape control lines and threaten park infrastructure and visitors. When the effects of Alternative A are combined with other past, present, and reasonably foreseeable future impacts, the total cumulative impacts on human health and safety resource would be adverse.

Impacts of Alternative B: Proposed Action

Direct and Indirect Impacts. Under the Proposed Action, helicopters could be used for direct reduction which would also require supporting ground crews to include UTVs, airboats, or outboard motorboats. The use of helicopters (in lieu of trap and shoot only operations) could reduce the risks to visitors and staff given the areas would be closed during operations. JHAs would still be adhered to and ground support crews would follow all BMPs.

Visitors still have the potential for disease exposure and aggressive encounters from feral swine under either alternative, but with comprehensive management and targeted use of game cameras with a thorough monitoring approach, it is expected that risks to visitor health and safety would be extremely rare under vigilant implementation of this alternative.

Cumulative Impacts. The cumulative impacts analysis area for health and human safety is wherever visitors and staff are present. There are several past, present, or reasonably foreseeable future actions in this analysis area. Past, present, and reasonably foreseeable future actions and trends with the potential to impact wildlife under Alternative B include prescriptive wildland fire burning. Prescriptive burns can produce smoke that impacts human health. These burns also have the potential to escape control lines and threaten park infrastructure and visitors. When the effects of Alternative B are combined with other past, present, and reasonably foreseeable future impacts, the total cumulative impacts on human health and safety resource would be adverse.

TABLE 4: SUMMARY OF IMPACTS TO HUMAN HEALTH AND SAFETY

Issue	Alternative A: No Action	Alternative B: Proposed Action
Human health and safety	Visitor-swine encounters would likely be reduced with ad hoc feral swine reduction, but without comprehensive removal efforts visitors would still have risks throughout the Seashore. Possibility of accidental misfiring of guns, mishandling of traps, or aggressive swine.	Higher likelihood of reduced visitor-swine encounters with this alternative. Possibility of accidental misfiring of guns, mishandling of traps, or aggressive swine.

Recreation and Visitor Use

Affected Environment

Recreation and visitor use at PAIS are essential aspects of the park's appeal, offering activities such as boating, watersports, camping, and hiking along trails like the grasslands trail. However, the presence of feral swine can negatively impact these recreational experiences. Feral swine have been known to damage recreational structures, like boat ramps and picnic areas, and if their invasion grows, this trend would grow at PAIS. Their foraging behavior can disturb habitats important for recreational activities, thereby affecting overall visitor enjoyment.

The physical and visual degradation caused by feral swine substantially impacts the visitor experience, particularly when feral swine trails and wallows disrupt vegetated areas. Recreational resources such as campsites, parking areas, and boat ramps may also be compromised, creating safety risks for park visitors due to the potentially aggressive behavior of feral swine (Mayer, 2013).

Viewsheds

Recreation and visitor use at PAIS benefit greatly from the park's scenic landscapes, particularly along trails and coastal areas. However, the presence of feral swine impacts the viewshed, particularly in grassland regions where their rooting and wallowing behavior can lead to extensive soil disturbance (Figure 6). Such degradation creates bare patches that detract from the natural aesthetics sought by visitors, diminishing the visual appeal of the park.

FIGURE 6: EXAMPLE OF ROOTING DEVASTATION FROM FERAL SWINE AT PAIS IN 2024. NPS PHOTO

Additionally, current management actions, such as the installation of traps and game cameras, introduces visual clutter into the landscape. The presence of these devices can be perceived as intrusions into the natural landscape impacting the serene environment that enhances recreational activities. Consequently, the overall visual quality of the park suffers, affecting how visitors perceive and enjoy the natural beauty of PAIS.

Commercial Recreation

The presence of feral swine at PAIS poses challenges for commercial recreational activities, which are vital to the local economy and to visitors' experiences. Feral swine have regularly been seen in proximity to the WorldWinds water sports concession. Activities such as guided tours, fishing charters, and eco-tours may be directly affected by feral swine interactions with recreational infrastructure. If swine continue to invade PAIS, their damage to boat ramps and picnic areas from feral swine can limit access for commercial operations, hindering their ability to provide services to visitors.

Additionally, concerns over public health and safety may deter potential customers from engaging in commercial recreational activities, as populations may associate feral swine with aggressive behavior and disease transmission if the feral swine invasion continues to grow. This negative perception can reduce participation levels, impacting the economic viability of local businesses dependent on recreational tourism.

Impacts of Alternative A: No Action

Direct and Indirect Impacts. Under the No Action Alternative, current management ad hoc operations would continue as feral swine are noticed in the park. Under this alternative, it is more possible for the feral swine invasion to spread to popular visitor locations, like the beaches, the spoil islands, and campgrounds. The presence of feral swine could force closures in the area due to feral swine activity until such time removal operations could resume.

Current management actions aimed at reducing the feral swine population may result in temporary closures of certain areas within the park. These closures disrupt visitors' access to popular recreational

opportunities, leading to a less favorable experience while visiting PAIS. Thus, the interface of feral swine presence and management strategies must be considered to understand their potential impacts on visitor use and overall recreational enjoyment in the park.

Furthermore, the current management actions aimed at reducing the feral swine population involve temporary closures of certain areas, disrupting the operations of commercial recreation providers. Such closures limit opportunities for guided tours and other activities, leading to a temporarily diminished visitor experience and economic repercussions for businesses within and around the park.

Undetected feral swine invasions and persistence could also lead to continued destruction of habitat and leave trailing, wallowing, and rooting scars on the viewshed.

Cumulative Impacts. The cumulative impact analysis area for recreation and visitor use is wherever visitors are present at the Seashore. Some of the infrastructure projects (e.g., boat ramp rehabilitation) are in the same areas as known feral swine presence and some coordination efforts would need to occur. Under the No Action Alternative, although other past, present, and reasonably foreseeable future actions have affected, or could have the potential to affect, recreation and visitor use in the project area, the No Action Alternative would have no new impacts, and therefore, there would be no cumulative impacts.

Impacts of Alternative B: Proposed Action

Direct and Indirect Impacts. Under the Proposed Action, helicopters could be used for direct reduction which would also require supporting ground crews to include UTVs, airboats, and outboard motorboats. The presence of helicopters would impact recreation and visitor use due to area closures during operations. However, helicopters are expected to be at PAIS for no more than 16 hours over a two-week period, so these impacts are considered very short-term. Similarly, some areas may be closed for ground operations or night shooting, like the fishing areas at the end of Yarborough pass, but those would also only be during active operations and not expected to be longer than a week at a time.

Viewsheds still have the potential for adverse impacts from feral swine under either alternative, but with comprehensive management and targeted use of game cameras with a thorough monitoring approach, it is expected that viewshed impacts would be minimal and short-term. Visitors may see an increased number of infrastructure (e.g., fencing and game cameras) over Alternative A but the colors and locations are strategically mitigated to reduce these impacts (see Appendix B).

Cumulative Impacts. The cumulative impact analysis area for recreation and visitor use is wherever visitors are present at the Seashore. There are several past, present, or reasonably foreseeable future actions in this analysis area and many would require area closures to visitors. Some of the infrastructure projects (e.g., boat ramp rehabilitation) are in the same areas as known feral swine presence. When the effects of Alternative B are combined with other past, present, and reasonably foreseeable future impacts, the total cumulative impacts on recreation and visitor use resource would be adverse.

TABLE 5: SUMMARY OF IMPACTS TO RECREATION AND VISITOR USE

Issue	Alternative A: No Action	Alternative B: Proposed Action
Recreation and visitor use	Camping at Bird Island Basin could be impacted by feral swine that become tolerant of humans. Interactions could be dangerous.	Short-term (6-8 hours_ negative impacts expected due to closures that may be necessary in some areas of the seashore. Positive long-term impacts as visitors would not be deterred to recreation for fear of feral swine encounters.

Issue	Alternative A: No Action	Alternative B: Proposed Action
Viewshed	Trailing, wallowing and over grazing by feral exotic invasive species could impact the visual landscape and degrade the aesthetic quality enjoyed by visitors.	Positive impacts of protecting the viewshed against these damaging activities would result from implementation of the proposed action.
Commercial Recreation	Feral swine have regularly been seen in proximity to the WorldWinds water sports concession.	Neutral impact in concessioner if feral swine are eliminated since the areas would safe from feral swine interactions and visitors would not be deterred.

Soils

Affected Environment

According to the National Park Service's Management Policies 2006, the NPS will actively seek to understand and preserve the soil resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil or its contamination of other resources.

Feral swine exhibit rooting behavior that disturbs soil resources, leading to increased erosion and degradation of the soil structure (Figure 7). This disturbance results in the removal of organic material and the disruption of nutrient cycles, which are vital for maintaining healthy ecosystems. The resulting soil compaction and sediment displacement further inhibits plant growth and affects overall habitat quality for various species.

FIGURE 7: EXAMPLE OF WALLOW AND HABITAT DESTRUCTION. PHOTO CREDIT: USDA/AHPIS/WS NATIONAL WILDLIFE RESEARCH CENTER ARCHIVE

Additionally, current proposed management activities aimed at reducing the feral swine population also disturb soils within the park. Actions such as trapping and monitoring can lead to localized soil disruption, further complicating the preservation of soil resources.

Feral swine exhibit specific wallowing behaviors in wet, muddy areas to regulate their body temperature in hot, humid conditions. This behavior, like rooting, causes damage to both plant life and soil. If the wallows are located near water bodies, they can lead to water quality degradation through increased

levels of silt and coliform bacteria. The wind tidal flats of PAIS, in particular, are at risk from this behavior, as they take decades to recover from such disturbances.

Coastal Dunes

The current state of coastal dunes at PAIS is integral to the park's unique geological and ecological landscape. Barrier islands, including those at PAIS, consist of a complex array of geological formations, characterized by both stabilized and active blowout dunes (KellerLynn 2010). The beach and dune zones not only provide essential habitat for various animal species but also offer recreational opportunities for visitors.

In PAIS, back-island dunes are located behind the prominent fore-island dune ridge. These back-island dunes are generally lower in height and feature a considerably higher density of vegetation cover (USGS 2013). This vegetative cover is vital for maintaining the stability and integrity of the fore-island dune ridge, which serves as the first line of defense against storm surges from hurricanes and tropical storms. A well-developed and stabilized vegetated fore-island dune ridge is crucial for dissipating wave energy and protecting the mainland from inundation and destruction. The loss of vegetation in these areas compromises this protective function and can impact coastal resilience (Weise and White 1980, USGS 2013).

The presence of feral swine poses an additional challenge to the health of coastal dunes. Their rooting and foraging behavior can lead to the destruction of dune vegetation, further destabilizing the dunes and promoting erosion. Additionally, grazing by nilgai antelope could denude dunes. McAtee and Drawe (1981) documented damage to beach and fore-island dune vegetation on North Padre Island and within PAIS, attributing some of this degradation to recreational traffic, including both pedestrian and vehicle access. Such traffic not only destroys dune vegetation but also impacts soil quality, leading to changes in species composition and creating harsher microenvironments for remaining plants.

Research indicates that traffic can reduce aboveground and root production, as well as overall plant cover and diversity, with the extent of these reductions correlating to the intensity and type of traffic (McAtee and Drawe 1981). Areas heavily impacted by traffic typically host plant communities in earlier successional stages compared to similar undisturbed areas (McAtee and Drawe 1981). Therefore, the combination of feral swine activity and recreational traffic necessitates a multifaceted approach to managing coastal dune health in PAIS to preserve its unique ecosystems and maintain the integrity of its geological features.

Wind Tidal Flats (mudflats)

The wind tidal flats at PAIS represent a distinctive habitat uniquely shaped by wind processes rather than tidal actions. These areas experience cyclic flooding and exposure, creating a dynamic ecosystem that is essential to the park's overall biodiversity (Withers and Tunnell 1998). Covering approximately 21.7% of the park’s land—equivalent to 11,447 hectares (28,287 acres)—the wind tidal flats ecosystem is the second largest within PAIS (NPS 2013).

The algal communities found in these flats are particularly fragile and static, exhibiting slow recovery rates following disturbances. Thus, maintaining the integrity of these ecosystems is crucial for preserving the diverse array of organisms that depend on them. However, the health of algal mats, which play a critical role in the ecosystem, can be negatively affected by poor water quality. Elevated levels of nitrogen and phosphorus can lead to harmful conditions for aquatic organisms, including macroinvertebrates that inhabit these mats (USGS 2013).

The presence of feral swine poses a threat to the stability of these wind tidal flats. Their foraging behavior disrupts the algal mats and disturbs the fragile substrate, leading to potential erosion and habitat degradation. This disturbance not only impacts the algal communities but also the diverse organisms relying on this habitat for survival.

Impacts of Alternative A: No Action

Direct and Indirect Impacts. Under the No Action Alternative, the current management ad hoc operations would continue as feral swine are noticed in the park. Under this alternative, it is more possible the feral swine invasion spreads along the dunes and mudflats. Any trailing or tracks on the dunes is expected to be eroded via wind in a matter of days, but mudflats tracks could scar the area for decades.

Feral swine would likely be able to swim across the Laguna Madre undetected and impact foraging areas, including the seagrass communities. Depending on the size of the invasion and number of individuals, the feral swine would likely decimate this estuary shore plant community.

Cumulative Impacts. The cumulative impact analysis area for soil is on land in the seashore. Construction of a second Laguna Madre causeway and prescriptive burning are the only reasonably foreseeable future actions in the analysis area for the no action alternative. Prescriptive burning could scar soils and leave the area denuded. Under the No Action Alternative, although other past, present, and reasonably foreseeable future actions have affected, or could have the potential to affect, soils in the project area, the No Action Alternative would have no new impacts, and therefore, there would be no cumulative impacts.

Impacts of Alternative B: Proposed Action

Direct and Indirect Impacts. Under the Proposed Action, helicopters could be used for direct reduction which would also require supporting ground crews to include UTVs. While UTVs have the potential for leaving tracks, the Seashore's BMPs including a mitigation to restrict driving to the vegetation line to ensure minimal impact to soils. No operations are planned in the sensitive wind tidal flats and no impacts to this ecosystem are expected.

Under the Proposed Action, the installation of fencing and barriers is not expected to impact coastal dunes or wind tidal flats, as these structures will not be placed in those sensitive areas. The fencing is strategically designed to be installed in locations that avoid disrupting these ecosystems, thereby preventing any potential soil impacts associated with their installation.

Soils still have the potential for adverse impact from feral swine under either alternative, but with comprehensive management and targeted use of game cameras with a thorough monitoring approach, it is expected that soil damage would either not occur or be as minimal as possible with vigilant implementation of this alternative.

Cumulative Impacts. The cumulative impact analysis area for soil is on land in the seashore. Construction of a second Laguna Madre causeway and prescriptive burning are the only reasonably foreseeable future actions in this analysis area for Alternative B. Prescriptive burning could scar soils and leave the area denuded When the effects of Alternative B are combined with other past, present, and reasonably foreseeable future impacts, the total cumulative impacts on the soil resource would be adverse.

TABLE 6: SUMMARY OF IMPACTS TO SOILS

Issue	Alternative A: No Action	Alternative B: Proposed Action
Coastal dunes	Coastal dunes are fairly resilient, although feral swine wallowing could impact swales and grazing by nilgai antelope could denude dunes.	Culling operations are likely to occur in open grassland as the feral species (grazing animals) are more present in this biome than in the dune or interdunal areas.
Wind tidal flats	Feral species could leave trails across the flats which like vehicle tracks could change surface micro hydrology.	No operations are planned in the sensitive wind tidal flats and no impacts should be expected.

Water Resources

Affected Environment

NPS policies require protection of water quality consistent with the mandates of the Clean Water Act, including the provisions of Section 404 of the Act governing wetlands. Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid, where possible, adversely impacting wetlands. Feral swine can impact water quality and wetlands, as well as proposed feral swine management actions.

Water Quality

Good water quality is essential for maintaining a healthy aquatic ecosystem, as numerous organisms, including plant communities and various animal species, rely on balanced and stable water quality measures for survival (NPS 2012a). PAIS is uniquely positioned between the Gulf of Mexico to the east and the Laguna Madre to the west, which serves as a boundary separating the barrier islands from the mainland of Texas. The Laguna Madre, a hypersaline lagoon, exhibits salinity levels that can be one and a half to three times saltier than the ocean, making it a highly sensitive and ecologically important area (NPS 2012b).

PAIS is home to several freshwater ponds located in the northern part of the park. These ponds generally retain water throughout the year, except during particularly dry periods, and play a vital role in supporting local biodiversity. High water quality is crucial for the health of these freshwater ecosystems, as it directly affects the variety of species that inhabit them.

Another threat to the park's water quality arises from elevated levels of E. coli and fecal coliform bacteria, particularly following heavy rainfall events. Such runoff can introduce harmful microorganisms into aquatic systems, posing risks not only to ecological health but also to public health.

Feral swine present an additional challenge to water quality in PAIS. Their presence exacerbates issues related to water pollution through rooting activities that disrupt soil and vegetation, potentially increasing sedimentation, and nutrient runoff into nearby water bodies (Figure 8).

FIGURE 8:EXAMPLE OF DAMAGE FERAL SWINE CREATE IN SOILS AND NEAR WATER. NPS PHOTO/CRAIG MCINTYRE

Wetlands

The inland areas of PAIS, situated between the Gulf dunes and Laguna Madre beaches, are home to important wetlands and freshwater ponds that play a crucial role in supporting the island's wildlife. These habitats provide essential resources for aquatic invertebrates, fish, amphibians, and waterfowl, serving as vital water sources for various birds and mammals (NPS 1996, White et al. 2006). In barrier islands like Padre Island, wetlands and ponds typically form in flat areas left behind by migrating dunes. These low-lying regions, often referred to as deflation flats or troughs, are shaped by wind and sand (Hunter et al. 1972, as cited in Weise and White 1980).

Wetlands and ponds are more prevalent in the northern and central portions of PAIS, where higher precipitation levels facilitate the retention of water throughout much of the year (Weise and White 1980, NRCS 2007). Additionally, the health of seagrass communities in these ecosystems is ecologically important, as they provide food and shelter for marine mammals, birds, fish, and invertebrates, including redhead ducks, red drum (Sciaenops ocellatus), and green sea turtles (Chelonia mydas) (Handley et al. 2007).

Seagrass communities also serve as indicators of estuarine water quality due to their sensitivity to environmental changes, such as nutrient loading and eutrophication (Blair and White, 1997). The presence of bare areas within the lagoon can create a negative feedback loop; non-vegetated zones are unstable and prone to sediment resuspension caused by wind-driven waves. This instability can lead to a decline in seagrass coverage, further inhibiting growth in those areas and impacting the overall health of the ecosystem (Onuf 1994, as cited by Teeter 2002).

Impacts of Alternative A: No Action

Direct and Indirect Impacts. Under the No Action Alternative, no comprehensive planning would take place to reduce feral exotic invasive species. The current management ad hoc operations would continue as feral swine are noticed in the park. Under this alternative, it is more possible the feral swine invasion wreaks havoc on water resources through fouling.

Undetected feral swine invasions and persistence could also lead to increased turbidity in watered areas and destruction of species that depend on light, like seagrass beds.

Cumulative Impacts. The cumulative impact analysis area for water resources includes Laguna Madre, ephemeral wetlands, and freshwater areas. Rehabilitation of the Bird Island Basin boat ramp and prescriptive burning are the only reasonably foreseeable future actions in this analysis area. Under the No Action Alternative, although other past, present, and reasonably foreseeable future actions have affected, or could have the potential to affect, water resources in the project area, the No Action Alternative would have no new impacts, and therefore, there would be no cumulative impacts.

Impacts of Alternative B: Proposed Action

Direct and Indirect Impacts. Under the Proposed Action, a comprehensive and fast-acting approach would be taken to reduce the presence of feral swine which may decrease the amount of fouling in water resources compared with Alternative A.

Helicopters could be used for direct reduction which would also require supporting ground crews to include boats. Boating could impact water resources with fuel or unintentional oil discharge, but BMPs require prechecks for all boating vehicles to ensure no leaks are present and this impact is expected to be minimal to none.

If an entire sounder were to be culled in a wetland temporary impact from the decomposition of carcasses could occur.

Cumulative Impacts. The cumulative impact analysis area for water resources includes Laguna Madre, ephemeral wetlands, and freshwater areas. Rehabilitation of the Bird Island Basin boat ramp and prescriptive burning are the only reasonably foreseeable future actions in this analysis area. Under Alternative B, although other past, present, and reasonably foreseeable future actions have affected, or could have the potential to affect, water resources in the project area, the Alternative B would have no new impacts, and therefore, there would be no cumulative impacts.

TABLE 7: SUMMARY OF IMPACTS TO WATER RESOURCES

Issue	Alternative A: No Action	Alternative B: Proposed Action
Water quality	Freshwater ponds which are wintering grounds to many thousands of ducks could be fouled by feral swine.	Boating could impact water resources with fuel or unintentional oil discharge.
Wetlands	PAIS wetlands are known to be habitat for crayfish which are a food source for feral swine. Trailing, burrowing, and wallowing can impact water flow and riparian vegetation.	Aerial gunning is likely to occur above and in wetlands as feral swine are known to use such areas. If an entire sounder were to be culled in a wetland temporary impact from the decomposition of carcasses could occur.

Cultural Resources

Affected Environment

The National Historic Preservation Act (NHPA), as amended in 1992 (16 U.S.C. 470 et seq.); the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.); the National Park Service's Director's Order #28, Cultural Resource Management Guideline (1997, in the process of updating as of 2014); NPS Management Policies 2006; and Director's Order #12, Conservation Planning, Environmental Impact Analysis, and Decision Making (2011) require the consideration of impacts on cultural resources (i.e., archeological resources, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections) listed or eligible for listing on the NRHP.

The area in and around PAIS has been inhabited by humans for thousands of years, and various archeological sites are located within park boundaries. In addition, researchers in the park have identified a number of historic structures, nine of which have been listed in the NRHP. Feral swine activity, especially rooting, can impact archeological and historic sites. Surface or shallow subsurface archeological sites and historic earthen-work structures (levees and cattle mounds) are particularly at risk.

Cultural resources are at risk as well, as the rooting and wallowing behaviors can damage in-situ archaeological artifacts, disrupting their original provenance and potentially causing direct damage to the artifacts themselves. Historic buildings at the Novillo Camp Cultural Landscape are particularly vulnerable to rooting. The visual character of the cultural landscape could also be adversely affected by trailing, rooting and other changes in vegetation which may degrade the integrity of the site.

Proposed feral swine management actions may result in minor disturbance to these resources (although in most cases, management actions in the vicinity of known cultural sites would be implemented to protect the resource).

Historical Structures/Districts/Cultural Landscapes

The Dunn Ranch Novillo Line Camp is an historic cattle ranching line camp located a few miles within the entrance of the national seashore (Figure 9). The line camp was used by cowboys as a place of shelter and a site to corral cattle. Novillo Line Camp was the northernmost line camp used by the Dunn Cattle Ranch company in the late nineteenth and twentieth centuries, with other camps, Black Hill Line Camp and Green Hill Line Camp, being located further south.

Today, Novillo Line Camp is one of the last historic structures still standing within the national seashore, reflecting an early human use and occupation of Padre Island. These preserved structures such as the bunk house, cattle fences, and even the table and eating area, provide us a unique window of how life on the island would have looked for many of the ranch workers and inhabitants.

The historic property, because of its significance to Texas State history, was listed on the NRHP in Oct. 1974.

FIGURE 9: MAP SHOWING LOCATION OF NOVILLO LINE CAMP

Archeological Resources/Districts

During World War 2 Padre Island National Seashore was a bombing range utilized by Naval and Marine aviator trainees. Ground based strafing and bombing targets were placed on the landscape. These artifacts have been recorded and are possibly eligible contributing features to a larger undefined, unevaluated military historical district.

Impacts of Alternative A: No Action

Direct and Indirect Impacts. Under the No Action Alternative, no comprehensive planning would take place to reduce feral exotic invasive species. Current management in the form of ad hoc operations would continue as feral swine are noticed in the park. Under this alternative, the feral swine invasion could spread to cultural resources and they could use structures as scratching posts or root near these resources causing instability.

These exist today and will be avoided. No landing of the helicopter nor baiting, trapping sites will be permitted proximal to these artifacts.

Feral species could root up, trample, or otherwise disturb sensitive cultural resources. For example, feral swine could burrow under historic military strafing targets and cause adverse effects.

Cumulative Impacts. The cumulative impact analysis area for cultural resources includes Novillo Line Camp (Figure 9) and the area surrounding existing World War II artifacts wherever they occur either on land, the estuary, or the beaches. There are no foreseeable future actions in this analysis area and thus no cumulative impacts under this alternative.

Impacts of Alternative B: Proposed Action

Direct and Indirect Impacts. Under the Proposed Action, protective fencing or curtain barriers could be used to protect any cultural resources in the event of a larger or increased feral swine invasion. It is expected that these barriers would have positive impacts to the cultural resources until such time the feral swine are eradicated; however once barriers are designed for specific locations concurrence on no adverse effect to the historic structure would be needed from the State Historic Preservation Office and, thus, additional compliance would need to be completed. As per the mitigations, no helicopter or removal operations would take place in these districts.

Cumulative Impacts. The cumulative impact analysis area for cultural resources includes Novillo Line Camp (Figure 9) and the area surrounding existing World War II artifacts wherever they occur either on land, the estuary, or the beaches. Under the Alternative B, although other past, present, and reasonably foreseeable future actions have affected, or could have the potential to affect, cultural resources in the project area, the No Action Alternative would have no new impacts, and therefore, there would be no cumulative impacts.

TABLE 8: SUMMARY OF IMPACTS TO CULTURAL RESOURCES

Issue	Alternative A: No Action	Alternative B: Proposed Action
Historical structures/districts/cultural landscapes	Feral swine and nilgai could root up or over graze the Novillo Camp cultural landscape. Both animals could take shelter in the shade of structures. Feral swine could potentially burrow underneath buildings and other features causing structural instability.	Feral swine and nilgai could root up or over graze the Novillo Camp cultural landscape. Both animals could take shelter in the shade of structures. Feral swine could potentially burrow underneath buildings and other features causing structural instability. None of the sub actions of the proposed action would take place within the boundaries of the National Register listed properties. If feral species begin to impact historic properties some activities could take place in these areas may require additional compliance (e.g., fence installation). Impacts should not be expected in cultural sites.
Archeological resources/districts	Feral species could root up, trample, or otherwise disturb sensitive cultural resources. For example, feral swine could burrow under historic military strafing targets and cause adverse effects.	Feral species could root up, trample, or otherwise disturb sensitive cultural resources. For example, feral swine could burrow under historic military strafing targets and cause adverse effects. Proposed action operations would avoid known recorded archaeological and historical sites. Impacts are not expected in cultural sites.

Chapter 4: Consultation and Coordination

This chapter describes public involvement process and the tribal and agency consultation during the preparation of the environmental assessment. Consultation and coordination with federal, state, and local agencies, as well as Tribes, were conducted to identify issues and concerns related to park and Tribal resources.

Internal Scoping, Interagency Coordination, and Public Involvement

Scoping is "an early and open process… for to determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action for analysis…including identifying the important issues and eliminating from further study unimportant issues" (15011502.74). The scoping process is focused on determining the extent and nature of issues and alternatives that should be considered during a NEPA review. The scoping process includes both internal efforts within the National Park Service and external efforts with the public, as described below.

Internal Scoping

Internal scoping refers to the use of NPS staff to accomplish the outcomes discussed above. An interdisciplinary team that is familiar with the issues and affected resources is used to ensure expertise in all relevant topics.

Internal scoping was conducted by an interdisciplinary team of professionals from PAIS and the Intermountain Regional Office. Team members met multiple times from 2023 through 2024 to discuss the purpose and need for the project, various alternatives, potential environmental impacts, reasonably foreseeable actions that may have cumulative effects, and mitigation measures. Over the course of the project, team members have conducted numerous site visits to view and evaluate the project area.

Interagency Coordination

Through an interagency agreement, PAIS coordinated much of the proposed actions with USDA APHIS over a series of meetings in spring 2024. Through a separate agreement, PAIS also informally consulted feral swine experts in spring 2024 at Texas A&M as part of their ongoing work to coordinate feral swine removal with all NPS sites within Texas.

Civic Engagement

The NPS conducted civic engagement for this project from July 22, 2024 to August 4, 2024. During this time, the NPS encouraged public input on the purpose and need for the project, the proposed action, and the scope of the analysis, as well as provided an opportunity to identify any issues and concerns and provide recommendations. The NPS issued a press release and posted a fact sheet on the project using the Planning, Environment, and Public Comment (PEPC) website. No public meetings were held during the civic engagement period.

A total of 63 correspondences were received during civic engagement. Correspondence was received from 5 different states (Texas, Wyoming, Utah, New Jersey, and Florida) with 94% submitted by individuals in Texas.

Commenters were asked to share any ideas, questions, concerns, suggestions, and potential topics for consideration and two optional prompts:

1. What suggestions do you have for us to consider when planning for the management of feral exotic invasive species at Padre Island National Seashore?
2. What suggestions do you have for us to consider when planning for the management of feral exotic invasive species at Padre Island National Seashore?

Endangered Species Act

The NPS submitted a technical assistance request to the USFWS on July 18, 2024 to determine the level of consultation needed to protect these species under the ESA.

During Civic Engagement, the FWS responded to the topic questions and sent several preliminary recommendations.

To protect nesting birds, USFWS recommended avoiding bird nesting season during management activities where practicable and noted peak nesting season in this area is March 15 through September 15.

The FWS also recommended adding BMPs to minimize introduction of non-native invasive plants, such as non-native grass species and Brazilian peppertree (*Schinus terebinthifolia*) in addition to the proposed management strategies for the feral exotic invasive mammals listed in the PEA. While the focus of the PEA is solely to reduce mammalian invasions through interagency agreement with APHIS, PAIS recognizes the need to minimize invasions of all invasive plant species and has included those BMPs in Appendix B. For Brazilian peppertree, in particular, which is best destroyed by fire, PAIS has a separate Fire Management Plan for prescribed burns which addresses the BMPs suggested by the Service.

The FWS suggested that PAIS identify high priority areas with the specific suggestion to focus on the spoil islands and BMPs for colonial waterbirds. PAIS identified those areas in Chapter 3: Affected Environment & Environmental Consequences with some site-specific maps and information in Appendix A.

The FWS recommended the PAIS PEA provide details on: predator control methods; the impacts of these methods to birds, sea turtles, plants, and small mammals, including impacts from noise; strategic fencing to prevent future invasions with particular attention to minimizing invasive plant spread, any impacts to animal movements, and considerations of fragmentation of coastal prairie; specific firearms proposed and the use of non-lead ammunition; carcass disposal; and monitoring surveys. Each of these topics are presented in previous chapters.

The FWS also recommended coordination with Aransas National Wildlife Refuge for lessons learned and BMPs from feral swine removal from Matagorda Island which is part of the outreach in the plan as identified in Alternative B: Implement Comprehensive Feral Exotic Invasive Management Plan (Proposed Action and Environmentally Preferred Alternative).

National Historic Preservation Act

As required by Section 106 of the NHPA, the NPS initiated consultations on March 27, 2024, with the office of the Texas Historical Commission (THC) and requested concurrence on the Area of Potential Effect (APE) and a finding of No Historic Properties affected for the proposed action. On May 3, 2024, the Chief Deputy State Historic Preservation Officer (SHPO) responded with concurrence on the NPS finding. Consultations under Section 106 are completed but may be revised or updated as appropriate during project implementation.

Tribal Consultation

The NPS initiated tribal consultation with the seven following affiliated tribes on April 23, 2024. Consultations included the chairpersons for the:

- Alabama-Coushatta Tribe of Texas
- Apache Tribe of Oklahoma
- Ft. Sill Apache Tribe
- Kickapoo Traditional Tribe of Texas
- Kiowa Indian Tribe
- Mescalero Apache Tribe
- Tonkawa Tribe of Indians of Oklahoma

During Civic Engagement, the Tribal Historic Preservation Officer (THPO) for the Alabama-Coushatta Tribe of Texas responded with a general interest in the project and requested continued consultation on the development of the plan and implementation.

Also during Civic Engagement, the Kickapoo Traditional Tribe of Texas responded noting that they do not own any land along the Texas coastal islands and the Tribe does not think there is any impact of this undertaking on their cultural, historical, or sacred sites. The Tribe would continue to welcome any additional questions or concerns with the plan as it develops.

The park will continue Tribal consultation with each area Tribe as appropriate during project implementation and copies of this PEA will be forwarded to the Tribal Governments.

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Appendix A:
Site Specific Details

Appendix A contains a series of maps for either Alternative A, Alternative B, or both where site-specific analysis was done during the assessments in Chapter 3: Affected Environment & Environmental Consequences. The intent of this Appendix is to streamline any future cultural or environmental compliance needs in the removal of feral swine, nilgai, or other feral exotic invasive species as described in Chapter 2. This Plan is intended to be a document that can withstand several decades of implementation given that resource conditions remain substantially unchanged. By incorporating site-specific analysis in this Appendix, the hope is to alleviate workload and expedite future needs of exotic invasive removals.

FIGURE 10: MAP OF CAMERA LOCATIONS USED IN SUMMER 2024 OPERATIONS THAT COULD BE USED IN ALTERNATIVE A OR B UNDER THE PLAN

The following locations could be used for a variety of activities including staging, trapping, night operations, or support for helicopters.

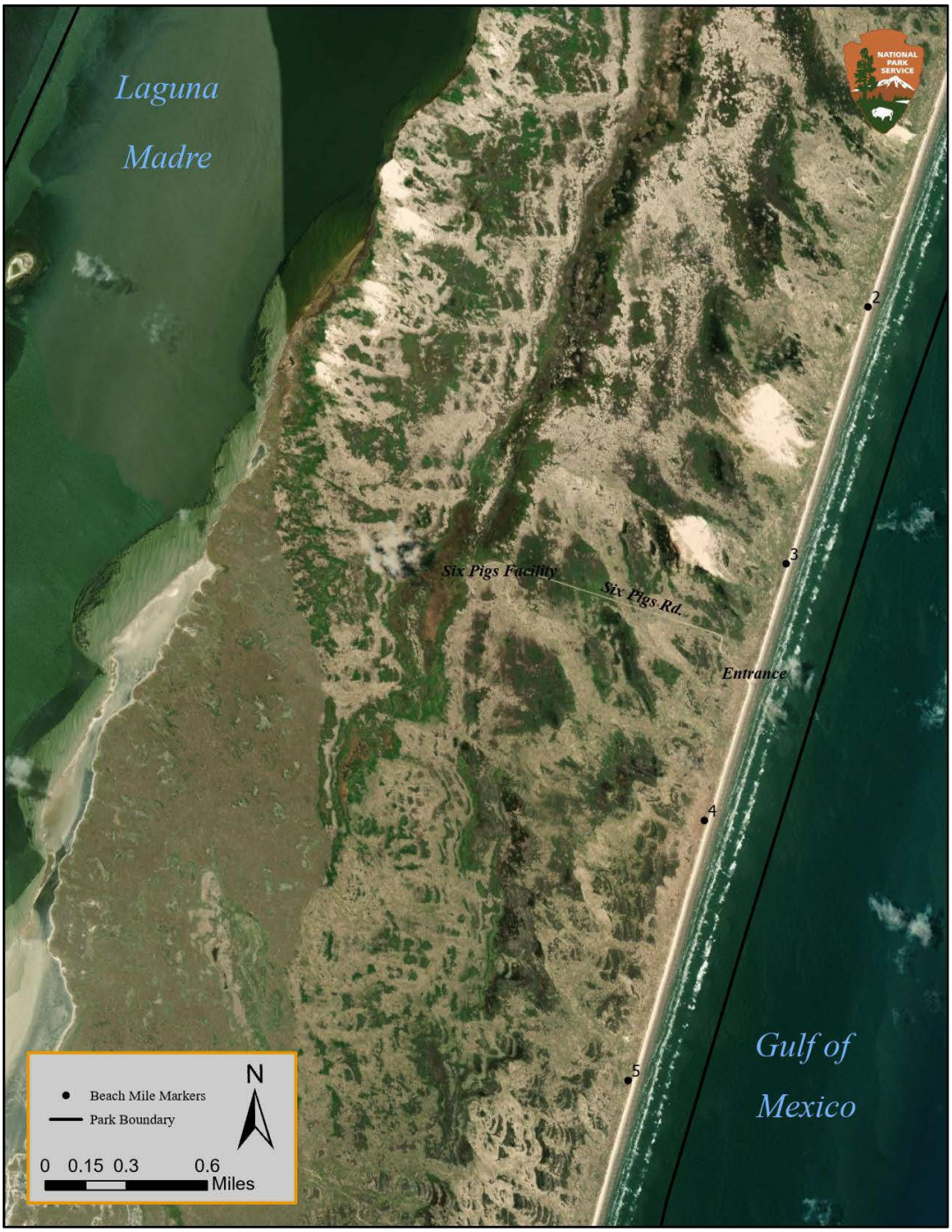

FIGURE 11: SIX PIGS ROAD AND FACILITY

FIGURE 12: PAN AM ROAD AND PEACH PAD

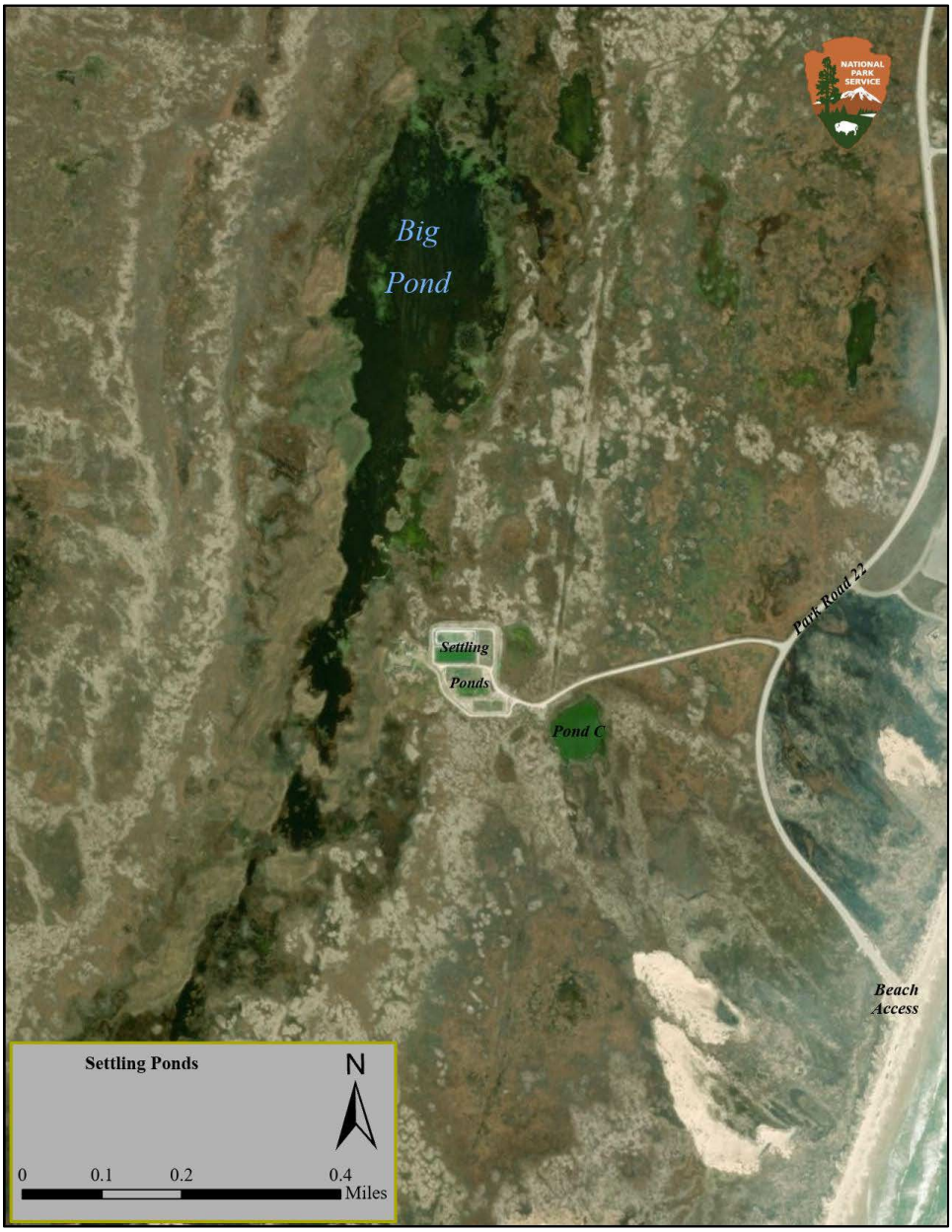

FIGURE 13: SETTLING PONDS

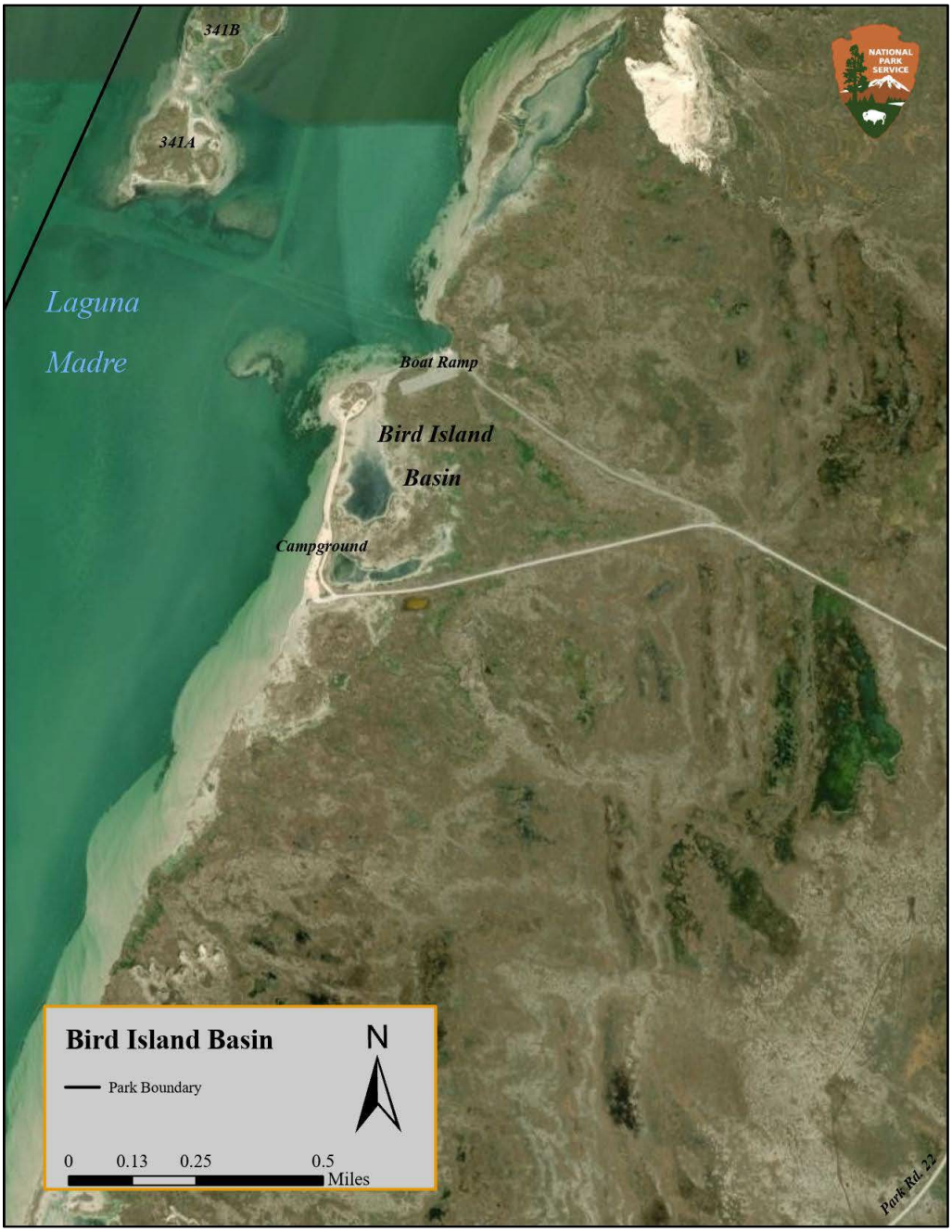

FIGURE 14: BIRD ISLAND BASIN

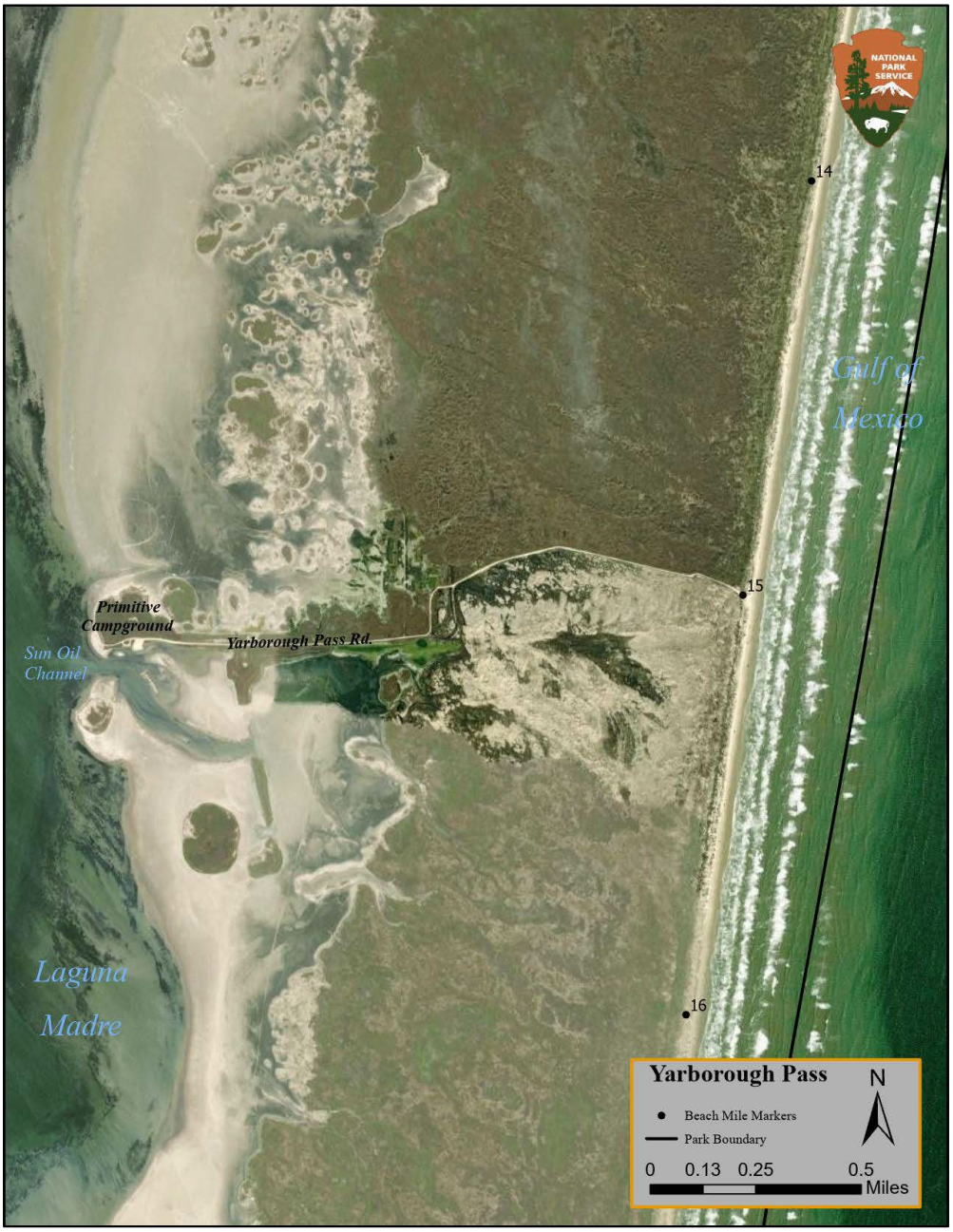

FIGURE 15: YARBOROUGH PASS

Appendix B:
Mitigation Measures and Best Management Practices

Mitigation Measures

Mitigation ID	Special Status Wildlife Species
SSW-1	The Migratory Bird Treaty Act of 1918 prohibits the removal of all listed species or their parts (feathers, eggs, nests, etc.) from such property. However, in extreme circumstances, a federal permit might be obtained for the relocation of listed species (in some states a state permit is required in addition to a federal permit). Pursuant to the spirit of the treaty, it is not trivial to obtain a permit; the applicant must meet a certain criterion as outlined in Title 50, Code of Federal Regulations, 21.27, Special Purpose Permits.
SSW-2	Prior to project work and daily thereafter while work is ongoing, areas that are potential habitat for listed wildlife species or species of concern will be surveyed. If listed species are found in the vicinity of work sites, activities will be limited to ones that are unobtrusive or to times of the year when the listed species are not present or are less affected by disturbance. Of particular concern is the Endangered Aplomado Falcon and Threatened Eastern Black Rail. Helicopter work should not occur during nesting/ fledgling season.
SSW-3	Helicopter operations should occur outside the sea turtle nesting season (May 1 to Oct 1) to prevent vibration and noise from disturbing nesting turtles.
SSW-4	Operations should be avoided to the extent practicable during peak bird nesting season (March 15 through September 15).
SSW-5	When feasible, airboats (instead of outboard motorboats) would be used to reduce impacts to special status wildlife species and seagrass habitat.
Mitigation ID	**Wildlife**
WLD-1	Care shall be taken not to disturb any wildlife species (reptiles, migratory birds, raptors, or bats) found nesting, hibernating, estivating, or otherwise living in, or immediately nearby, worksites.
WLD-2	Personnel will avoid or bypass wildlife areas, especially in areas of active denning, nesting, spawning, migration, or feeding. Where interaction with wildlife is unavoidable, minimize the sights, sounds and duration of operations to the maximum extent feasible.
WLD-3	Only non-lead ammunition will be utilized for culling operations.
Mitigation ID	**Human Health and Safety**
HHS-1	Ensure proper personal protective equipment is utilized during predation management activities.
HHS-2	Ensure only personnel with proper training and experience conduct feral exotic invasive species management activities.
HHS-3	Notify supervisor, night shift personnel, or law enforcement personnel when feral exotic invasive species management activities commence and end.
HHS-4	When necessary, utilize NPS visitor use staff to notify visitors of certain operations and educate them on the details in a manner that will reduce potential safety hazards.
HHS-5	Implement employee time management protocol for staff subject to working night hours to avoid fatigue and increased potential for accidents.
HHS-6	Trap devices and related equipment will be stored safely in a locked building when not in use. Traps can be stored in a locked container in NPS vehicle during trapping operations if staff feel it necessary to prevent public from potentially accessing the devices. Otherwise, traps can be transported open in a vehicle. Traps will be transported in an unset condition and set on site just prior to being put out for capture. Cautionary signage may be utilized for traps transported in a vehicle or stored to warn of possible danger to people unfamiliar with their use.
HHS-7	Any qualified volunteers used during operations would follow the same mitigations and best practices as NPS or USDA staff.

Mitigation ID	Recreation and Visitor Use
RVU-1	Helicopters would not be used for aerial gunning over the beach.
RVU-2	Some areas may be closed to visitors during operations. PAIS staff will notify visitors as appropriate through signs, social media, or news releases.
Mitigation ID	**Soils**
SOL-1	UTVs would drive along the vegetation lines.
Mitigation ID	**Water Resources**
WTR-1	Fencing would not be placed in areas where surface water flow could be impeded or where hydrologic alterations are likely to occur.
WTR-2	Airboats would be used before outboard motorboats whenever possible.
Mitigation ID	**Cultural Resources**
CUL-1	Per consultation with THC (SHPO) the Mansfield Cut Underwater Archeological District and Dunn Ranch Novillo Line camp will be off limits to helicopter operations. This is to prevent vibration and down wash from the rotor craft from adversely affecting structures.
CUL-2	Camera, bait, and trap stations will not be placed proximal to known, recorded archeological sites.
CUL-3	No fencing or game camera installations would be constructed in locations that could compromise cultural resources

Best Management Practices

Best Management Practices
GENERAL MEASURES
All equipment used on the project would be maintained in a clean and well-functioning state to avoid or reduce contamination from automotive fluids. All equipment would be inspected daily.
All potential contaminants (rubbish or debris, introduction of nonnative species, etc.) would be excluded or removed from the environment.
Fuel containment would be required for all fuel caches.
Equipment would be free of any fluid leaks (fuel, oil, hydraulic fluid, etc.) upon arrival to the work site and would be inspected at the beginning of each shift for leaks. Leaking equipment would be removed off-site for necessary repairs before the commencement of work.
All work would be restricted to the pre-approved areas.
Any workers onboard boats or UTVs will remain vigilant for plants and animals, (e.g., manatees when boating in the laguna).
ARCHEOLOGICAL RESOURCES
If human remains are discovered during operations, all work on the project would stop and the park cultural resources staff would be contacted immediately. As required by law, the coroner would be notified first. All provisions outlined in the NAGPRA (1990) would be followed.
All workers would be informed of the criminal penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers would also be informed of the correct procedures should previously unknown resources be uncovered during construction activities.
The limits of the area(s) surveyed for archeological resources would be identified at the kick-off meeting and, if needed, clearly flagged in the field. PAIS would ensure that all contractors and subcontractors are informed of the criminal penalties for illegally collecting artifacts or intentionally damaging archeological sites, historic buildings and structures, or elements of the cultural landscape. Workers would also be informed of the correct procedures should previously unknown resources be uncovered during plan implementation activities.
VEGETATION
All vehicles, equipment, and tools would be cleaned (i.e., pressure washed to remove mud, debris, and plant material) prior to entering the park to prevent the spread of nonnative plant material. Before entering the park, equipment would be inspected by PAIS staff for compliance.
BMPs would be implemented to prevent the spread or introduction of invasive plants, such as ensuring that construction-related equipment arrives at the site free of mud and seed-bearing materials and certifying that any seeds or straw material are weed free. Tools and machinery would be thoroughly cleaned when moving from an area heavily covered with invasive plants to an area without invasive vegetation.
VISITOR USE AND EXPERIENCE
Information on upcoming closures, including closure dates and arrangements of alternative access points, would be posted on the park website, distributed at other visitor centers in the park, and posted at the project site. When closures are necessary, information on alternative opportunities for visitor use would be publicized on the park website and on signs at the access points.
The Public Information Officer would be provided with the project schedule three weeks in advance and would provide periodic updates of project work.
A public information program to warn of temporary closures, delays, and road hazards would be implemented. This program would help convey appropriate messages to the public and aid in mitigating potential impacts on visitor expectations and experiences. The public information program would ensure that this project is communicated to affected staff and visitors.
Temporary full closure of areas near plan implementation activities may be necessary on limited occasions. Such full closures would be for the minimal time required to complete the work activity.
WETLANDS
Where wetlands occur near plan implementation activities, work limits would be clearly communicated in the kick-off meeting and, if needed, demarked with staking or other visual and physical barrier.
WILDLIFE
BMPs would be implemented to reduce the potential for wildlife to scavenge food from humans. Wildlife-proof garbage containers would be required at all workstations and sites, including UTVs.

Appendix C:
Impact Topics Dismissed from Further Analysis

Impact Topic	Reason for Dismissal
Air Quality	PAIS is defined as a Class II airshed. Feral swine are not known to directly impact air quality. Likewise, proposed feral swine management actions do not have the potential for affecting air quality. Therefore, air quality was dismissed as an impact topic.
Biological–introduction nonnative or exotic species	Staff and contractors would follow all stipulations and best management practices (see Chapter 2, "Stipulations and Mitigations") to minimize the potential for invasive species to be introduced to the project area, including the park's invasive species inspection procedures. High temperatures and water salinity would minimize the potential survival of many nonnative or exotic species. Analyzing these impacts are not necessary to make a reasoned choice between alternatives. For these reasons, nonnative or exotic species are dismissed from further analysis
Biological–plant species of special concern	Threatened and endangered plant species are not present in PAIS. No milkweed is present at or close to proposed operational sites. These species are dismissed from further analysis because none of these habitats exist in or close to the project area.
Cultural–ethnographic resources	No ethnographic sites are known to be present at or close to proposed operational sites. This impact topic is dismissed from further analysis because none of these resources exist in or close to the project area.
Floodplains	PAIS is in a floodplain but the impacts of feral swine, nilgai, and other feral exotic invasive species and the proposed strategies for removal would not impact or alter the floodplains.
Lightscapes	PAIS is located on the southern Texas coast and is affected by light pollution from nearby cities, most notably Corpus Christi, Texas (primarily in northern PAIS); and Brownsville, Texas (the southern reach of PAIS) (NPS 2012b). While some proposed actions are planned for night operations, these would be very limited duration (a few nights a year) and would not impact dark skies beyond existing levels from Corpus Christi, Brownsville, visitor automobiles, or nearby fishing activities Therefore, lightscapes were dismissed as an impact topic.
Paleontological resources	No paleontological resources are present at or close to proposed operational sites. This impact topic is dismissed from further analysis because none of these resources exist in or close to the project area.
Socioeconomics	Implementation of the proposed action would likely have.no effect on the area's overall population, income, and employment base. Therefore, the socioeconomic environment was dismissed as an impact topic.
Soundscapes	Noise is defined as unwanted sound. Use of firearms and helicopters during the proposed feral swine management activities could create loud sound bursts of short duration. However, the proposed action includes the use of sound-suppressed rifles or other firearm sound-suppression devices which will eliminate or severely limit noise disturbance. Therefore, firearm noise will not substantially interfere with human activities or with wildlife behavior in the park. The use of helicopters would be no more than 16 hours over a two-week period per eradication effort and the short-term impacts to visitors and wildlife did not rise to the levels needed for an impact topic. The solitude and tranquility associated with the park will be unchanged. Therefore, this impact topic is eliminated from further analysis in this PEA.
Vegetation	Vegetation was dismissed as its own impact topic since vegetation types are covered throughout the special status species, wildlife, soils, and water resources impact topics. Furthermore, a Drawe study showed vegetation in PAIS rebounds within 90 days and fully returns to its original state18-24 months of adverse impact and is considered short-term relative to the proposed actions.
Wilderness	No lands at PAIS have been designated wilderness or potential wilderness by Congress.

Appendix D: Research and Monitoring Strategies

Information to be recorded for each pig collected could include:

- an identification/tracking number
- collection date and time
- GPS location
- estimated level of feral swine disturbance in the area
- collection method (trap, trap and shot, shot, other)
- life stage (determined using pattern of tooth eruption and replacement (Matschke I 967, Clarke et al. 1992, Choquenot and Saunders 1993) and, to age adult feral swine, molar wear (Mayer 2002))
- physical condition of animal (poor, fair, good, excellent)
- sex (male, female, unknown)
- actual or estimated weight coat color and pattern (black, reddish brown, black with white shoulder-band, etc.)
- animal appearance (long-term feral/hybrid, short-term feral, domestic escapee)
- reproductive state for females (pregnant and number of fetuses/embryos measured the length of each fetus from the crown of the skull to the base of the tail (crown rump length) to the nearest 1 mm to use as an estimate of time of conception and projected parturition (Henry 1968), lactating, unknown, n/a)
- any other special or significant markings or attributes
- number, size range, and markings of any other feral swine encountered with collected animal
- disposition of animal (killed, radio-collared and released, etc.)
- description of samples taken (blood, tissue, etc.)

In addition, blood samples could be taken from a sufficient number of collected animals during the first year of the management effort and forwarded to USDA labs to be tested for swine brucellosis and pseudorabies per current protocols chosen by APHIS WS personnel at the time of collection. Following the first year of the feral swine management program, disease monitoring would be repeated annually. NPS employees or their authorized representatives involved in blood sample collection would be trained in safe collection procedures.

Independent researchers wishing to make use of dispatched animals for research and monitoring purposes could collect additional information or samples from carcasses for research and monitoring purposes (blood samples, tissue samples, hair samples, gut contents, body measurements, etc.) through the research permitting process.

A feral swine monitoring protocol would be developed and implemented to support the feral exotic invasive management program at PAIS. The objectives of the monitoring protocol would be: 1) to document baseline levels of invasive species activity and vegetation/soil disturbance prior to feral swine management at the park, 2) to provide a means for periodically evaluating the effectiveness of feral swine management activities at reducing vegetation/soil disturbance within the Park, 3) to provide key information to support adaptive adjustments to the feral swine management program over time. Monitoring would be based on a feral swine disturbance index or indices based on recognizable feral swine field sign such as rooting, tracks, game trails, wallows, etc. Monitoring would consist of a series of

simple walking transects that may include segments of existing hiking trails, unimproved roads, and other targeted habitats or special resource sites as needed. A draft protocol would be developed and tested in the field during an initial baseline data collection event. Following the field testing and initial data collection, a written protocol would be finalized, and park staff would be field trained in the application of the protocol. Specific details concerning the length and number of transects, monitoring frequency, and whether transects would be fixed and repeated or randomly selected for each monitoring interval would be determined during protocol development. A mix of approaches could also be prescribed to meet the needs of the park and the feral swine management program.

Other research and monitoring efforts conducted in support of the feral swine management program could include the following: feral swine population estimates and monitoring, feral swine natural history studies, radio-tracking studies, habitat studies, food availability studies, studies on alternative or refined feral swine management techniques, monitoring of feral swine disturbance or other impacts on native ecosystems and species, etc. Methods to efficiently estimate and monitor feral swine population dynamics, and studies on feral swine disturbance or impacts focusing on native vegetation, soils, and aquatic habitats such as small creeks could be particularly valuable.