National Park Service
U.S. Department of the Interior

CLIMATE*Friendly* PARKS

Castillo de San Marcos National Monument and Fort Matanzas National Monument

Climate Action Plan

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

This document came together through the vision and work of a number of park staff including Brian Dietz, Steve Roberts, Joe Graff, Matt Zoeller, James Crutchfield, Jimmy Hooker, and Tina Spengler.

THE CHALLENGE OF CLIMATE CHANGE

The effects of climate change are already impacting the physical and natural systems that sustain the American people. These changes present significant challenges to the National Park Service (NPS) and specifically the Castillo de San Marcos and Fort Matanzas National Monuments. National Park Service Director Jarvis testified before Congress in 2009, stating "Climate change is fundamentally the greatest threat to the integrity of our national parks that we have ever experienced."

Evidence of climate changes abounds, from a number of sources including but not limited to coral, tree rings, speleothems, ice, and monitoring equipment. Average global temperatures on the Earth's surface have already increased about 1.5°F since the late 19th century, and the 10 warmest years of the 20th century all occurred in the last 15 years. [1] However, climate change is more than just temperature increase, there are a variety of effects including potentially more intense and frequent storms. These changes mean that there could be an increasing number of climate disasters. [2] This map summarizes the number of weather and climate disasters over the past 30 years that have resulted in more than a billion dollars in damages (http://www.ncdc.noaa.gov/billions/Population Distribution and Change: 2000 to 2010, 6 summary statistics).

These changes are caused by the buildup of greenhouse gases (GHGs) in the atmosphere which trap heat that otherwise would be released into space. The greenhouse effect is a natural one, making earth warm enough to be livable. However, human emissions of GHGs are increasing and accelerating the warming beyond natural levels.

With the rate of GHG emissions still increasing, average global temperature continues to rise. It is hard to predict the total magnitude of the expected change but the climate trends that are already emerging are expected to continue and to intensify as GHGs continue to be emitted. The Intergovernmental Panel on Climate Change has estimated that a global average warming of 5-10°F by the year 2100 is considered likely.[3]

The projected temperature increase would change the length and character of the seasons so that spring arrives earlier and summer lasts longer and is generally hotter, both in terms of its average and peak temperatures. Rising global temperatures would change weather patterns and result in more extreme events ranging from extreme hot days to more intense and frequent storm events. These changes will affect all aspects of the water cycle, including snow cover, mountain glaciers, spring runoff, water temperature, and sea level.

---

[1] Federal Advisory Committee. "Draft Climate Assessment Report Released for Public Review." Draft Climate Assessment Report Released for Public Review. U.S. Global Change Research Program, 14 Jan. 2013. Web. 18 Feb. 2013. <http://ncadac.globalchange.gov/>.

[2] http://ncadac.globalchange.gov/download/NCAJan11-2013-publicreviewdraft-chap17-southeast.pdf

[3] IPCC 2007. Climate Change 2007: The Physical Science Basis. Intergovernmental Panel on Climate Change, Geneva, Switzerland. Available online at http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm

In addition, heat waves and warm spells will likely be more frequent, more intense, and longer (IPCC 2012), potentially changing plant and animal habitats. Climate change is also expected to affect human health, infrastructure, water resources, agriculture, energy, and many other features of our natural and managed environments. These impacts can already be seen both on an international and local scale.

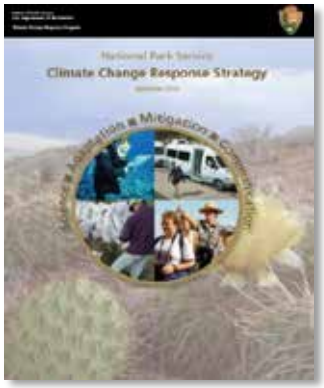
Though the general global climate effects might be the same, climate change is expected to impact different bioregions in different ways. At the University of Florida's Center for Landscape Conservation Planning, research indicates that Florida's low land topography makes it vulnerable to sea level rise. Global sea level is expected to rise as the ocean water heats up, and glacial melt continues. Historic structures and built infrastructure are at risk due to potential increase in flooding, storm surge, erosion, and sea level rise. The past is no longer an indicator for the future; climate events that were once rare or unusual will be common.

CONTEXT FOR ACTION

Sustainability is at the cornerstone of the National Park Service (NPS). In fact, the 1916 NPS Organic Act outlines our foundational objective "…to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Additionally, the Wilderness Act of 1964 established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as wilderness areas, to be administered in such a manner that will leave them *unimpaired* for future use and enjoyment as wilderness.

The NPS acknowledges that climate change may threaten the very cultural and natural resources we strive to preserve. Our response to a changing climate must include the many federal and NPS-specific directives and guidelines that have been developed to encourage action around adaptation and mitigation to climate change. These directives and guidelines include the Federal Executive Order (EO) 13693, Planning for Federal Sustainability in the Next Decade and the Department of the Interior (DOI) and NPS policies, plans, and strategies such as the 2012-2014 Climate Change Action Plan, Green Parks Plan and Climate Change Response Strategy. The guidance from these documents has been integrated into this Climate Action Plan and the schematic in Figure 1 illustrates some of the NPS documents that influence the Climate Action Plan.

Figure 1. NPS Climate Change Response Program Planning documents



EO 13693 sets broad agency requirements for strengthening the sustainable practices of previous EOs. Specific elements of this EO include:

- Reduce fleet-wide per-mile greenhouse gas emissions 30% by 2025 using a 2014 baseline.
- Plan for zero emissions vehicles plug-in hybrid vehicles to compose 20% of new acquisitions by 2020, and 50% by 2025.
- Reduce energy intensity in buildings annually 2.5% through 2025 using a FY 2015 baseline.
- Ensure that 30% of total building electricity comes from renewable energy by 2025.
- Reduce water consumption 36% by FY 2025 using a FY 2007 baseline
- Construction of Federal buildings are designed to achieve energy net-zero, and where feasible, water or waste net-zero by FY 2030.
- Expand green procurement & electronic management
- Reduce the use of chemicals and toxic materials and find alternatives

The Green Parks Plan (GPP) is the NPS's strategic sustainability performance plan. The GPP is intended to synthesize implementation objectives under multiple mandates into a single point of focus. The plan includes nine strategic goals and over 34 performance objectives addressing a range of topics in the key categories of sustainability and climate change to address climate change from a facilities standpoint. This includes:

- Continuously Improve Environmental Performance: The NPS will meet and exceed the requirements of all applicable environmental laws.
- Be Climate Friendly and Climate Ready: The NPS will reduce GHG emissions and adapt facilities at risk from climate change.
- Be Energy Smart: The NPS will improve facility energy performance and increase reliance on renewable energy.
- Be Water Wise: The NPS will improve facility water use efficiency.
- Green Our Rides: The NPS will transform our fleet and adopt greener transportation methods.
- Buy Green and Reduce, Reuse, and Recycle: The NPS will purchase environmentally friendly products and increase waste diversion and recycling.
- Preserve Outdoor Values: The NPS will minimize the impact of facility operations on the external environment.
- Adopt Best Practices: The NPS will adopt sustainable best practices in all facility operations.
- Foster Sustainability Beyond Our Boundaries: The NPS will engage visitors about sustainability and invite their participation.

NPS Climate Change Action Plan (2012-2014) outlines the high-priority, no-regrets actions NPS will undertake to address climate change. This document is intended to serve as a guidance to help prioritize decisions so that actions are focused and integrated across NPS.

- Near Term Priorities
    - Enhance Workforce Climate Literacy
    - Engage Youth & Their Families
    - Develop Effective Planning Frameworks & Guidance
    - Provide Climate Change Science to Parks
    - Implement the Green Parks Plan
    - Foster Robust Partnerships
    - Apply Appropriate Adaptation Tools & Options
    - Strengthen Communication
- Preparing for New Challenges and Opportunities
    - Incorporate New Technology and Climate Science

Understanding Climate Change at Castillo de San Marcos National Monument and Fort Matanzas National Monument

The following provides an overview of Castillo de San Marcos National Monument's and Fort Matanzas National Monument's greenhouse gas emissions inventories and shares emissions reduction goals and strategies the parks have established as members of the CFP Program.

OVERVIEW OF THE PARK

Castillo de San Marcos National Monument (NM) and Fort Matanzas NM are sister parks located in the Southeast region of the National Park Service in the historic area of St. Augustine, Florida. Castillo de San Marcos is the larger of the two Monuments and is located directly in St. Augustine. Fort Matanzas is located approximately fourteen miles south of the city. The Monument sites, although small, embody nearly 450 years of American history, culture, and craftsmanship. Despite their small size, Castillo de San Marcos and Fort Matanzas attract over 1 million visitors annually. As a result, the parks' actions on sustainability and climate change have the potential to extend beyond the borders of the park to help preserve natural and cultural resources now and into the future.

CASTILLO DE SAN MARCOS NATIONAL MONUMENT AND FORT MATANZAS NATIONAL MONUMENT BECOME CLIMATE FRIENDLY PARKS

As a participant in the Climate Friendly Parks program, Castillo de San Marcos NM and Fort Matanzas NM belongs to a network of parks nationwide that are putting climate friendly behavior at the forefront of planning. As part of this program, Castillo de San Marcos NM and Fort Matanzas NM has conducted a combined GHG emission inventory, held a workshop, and set a GHG emission reduction goal. These efforts have led to the development of this Climate Action Plan that includes, among other items, actions to be taken to mitigate and adapt to climate change. Through this Action Plan and a commitment to educate park staff, visitors, and community members about climate change, Castillo de San Marcos NM and Fort Matanzas NM provides a model for climate friendly behavior within the NPS.[4]

NPS staff, partners, and sustainability/climate change experts gathered to hold a Climate Friendly Parks Workshop from April 28th through 30th, 2015 to better understand and discuss overall sustainability concepts, the implications of climate change for both Castillo de San Marcos NM and Fort Matanzas NM, and to start implementing new actions. Strategies and action plan items were developed by work groups at the Climate Friendly Parks Workshop.[5]

This Climate Action Plan incorporates the strategies that were brainstormed at the workshop and identifies steps that Castillo de San Marcos National Monument is taking to reduce GHG emissions to mitigate its impact on climate change. The plan presents Castillo de San Marcos NM's and Fort Matanzas NA's emission reduction goals, and associated reduction actions to achieve the Park's goals. To the extent possible, the park created goals that are Specific, Measurable, Attainable, Realistic, and Timely (SMART). Having structured SMART goals will ensure that Castillo de San Marcos NM and Fort Matanzas NM can iteratively monitor progress against the emission reduction goals and identify areas for improvement.

While the plan provides a framework needed to meet the park's emission reduction, it is not intended to provide detailed instructions on how to implement each of the proposed measures. These actions will

[4] More information about the Climate Friendly Park program http://www.nps.gov/climatefriendlyparks/

[5] Original notes from these workshops, including detailed action items not presented in the final plan have been archived by Park and are available upon request.

be primarily carried out by the park's Environmental Management System (EMS) Team and documented in the EMS plan. The EMS plan will further describe priorities and details to implement these actions.

Castillo de San Marcos NM and Fort Matanzas NM have identified the following goals to reduce its GHG emissions produced by park operations as follows:

- Energy consumption emissions to 35**%** below 2014 levels by 2025
- Waste emissions to 35**%** below 2014 levels by 2025
- Fleet fuel emissions to 20**%** below 2014 levels by 2025
- Refrigeration emissions to 10% below 2014 levels by 2025
- Cumulatively, this will result in a GHG emissions reduction of 27**%** below 2014 levels by 2025.

To meet these goals, Castillo de San Marcos NM and Fort Matanzas NM will implement strategies proposed in this plan that relate to the parks' current and future emission inventories. Specifically, the plan recommends three strategies:

Strategy 1: Identify and implement mitigation actions that the parks can take to reduce GHG emissions resulting from park activities.

Strategy 2: Increase climate change education and outreach efforts.

Strategy 3: Identify and implement actions to adapt to a changing climate.

As part of this, Castillo de San Marcos NM and Fort Matanzas NM will continue to monitor progress with respect to reducing emissions and identify areas for improvement.

CASTILLO DE SAN MARCOS NM AND FORT MATANZAS NM GREENHOUSE GAS EMISSION INVENTORY

Naturally occurring GHGs include CO_2, CH_4, and N_2O. Human activities (e.g., fuel combustion and waste generation) have led to increased concentrations of these gases in the atmosphere.

Greenhouse Gas Emissions

GHG emissions result from the combustion of fossil fuels for transportation and energy (e.g., boilers, electricity generation), the decomposition of waste and other organic matter, and the release of gases from various other sources (e.g., fertilizers and refrigerants).

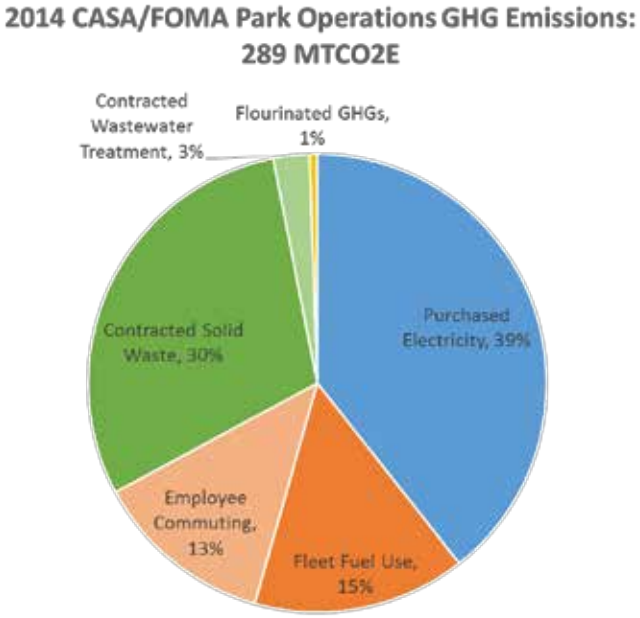
In 2014, combined GHG emissions from Castillo de San Marcos NM and Fort Matanzas NM operations totaled 289 metric tons of carbon dioxide equivalent ($MTCO_2E$). Carbon dioxide equivalent takes into account that some gases have a greater potential to warm the earth's atmosphere than others. Visitors to the two National Monuments do not have a large carbon footprint while at the parks because there are no significant roadways within these parks; however, an average visitor likely has a personal GHG footprint of about 14 tons of CO_2 emissions per year.

To help with analyzing the GHG inventory, Figure 2 presents total GHG emissions associated with Castillo de San Marcos NM's and Fort Matanzas NM's operations. The breakdown in Figure 2 represents what Castillo de San Marcos NM and Fort Matanzas NM have influence over relative to what is in their direct control. These distinctions help inform the relative impact a strategy and action can have and help inform how actions should be targeted.

As shown in Figure 2, the largest emission sector for combined GHG inventory is purchased electricity, totaling 114 $MTCO_2E$, representing 39**%** of the total calculated emissions. Emissions associated with waste (30%), fleet fuel use (15%) and employee commuting (13%) represent the next largest sources.

FIGURE 2

Total GHG Emissions (Park Operations only) by Sector for 2014



Castillo de San Marcos NM and Fort Matanzas NM Responds to Climate Change

The following actions were developed during the Climate Friendly Parks Workshop on April 28th through 30th, 2015 in order to meet Castillo de San Marcos NM's and Fort Matanzas NM's climate change mitigation and adaptation goals.

STRATEGY 1: IDENTIFY AND IMPLEMENT MITIGATION ACTIONS THAT THE PARK CAN TAKE TO REDUCE GHG EMISSIONS RESULTING FROM PARK ACTIVITIES

Castillo de San Marcos NM and Fort Matanzas NM have developed a set of actions that demonstrate that they are committed to reducing emissions from activities within and by them. These strategies have been prioritized based on a qualitative assessment of a set of criteria including: emission reduction potential, cost-effectiveness, feasibility, co-benefits, regional impact, and ability to rapidly implement. Actions that Castillo de San Marcos NM and Fort Matanzas NM will take have been presented below in order from highest to lowest priority within each sub-category. Finally, a cross-cutting strategy for evaluating progress and identifying areas for improvement is outlined.

Energy Use Management

Emission Reduction Goal: Reduce Castillo de San Marcos and Fort Matanzas operations' energy use emissions to 35 percent below 2014 levels by 2025.

Improving energy efficiency and implementing alternative energy sources reduces operation-based fuel use, lowers GHG emissions, decreases electricity consumption, and offers monetary benefits for the park. Emissions inventory results indicate that 39 percent of Castillo de San Marcos and Fort Matanzas NM's GHG emissions from park operations are from energy consumption. Consequently, Castillo de San Marcos NM and Fort Matanzas NM identified actions it will take to reduce energy-related emissions. Presented below are the actions that are currently under way and which comprise progress to date, as well as those actions they will pursue.

Progress to Date

- ✓ Conversion of flood lighting at the Fort from Sodium Halide to LED.
- ✓ Replacement of A/C units to higher SEER units as the A/C's come to the end of their service lives.
- ✓ Conversion of exterior lighting to LED lights.
- ✓ Upgrade insulation package at The Johnson House
- ✓ Installing Light Tubes at the FOMA Maintenance Storage Building.

Be Energy Smart Planned Actions

1 Complete the transition to LED lighting for landscape night lighting

2 Continue to educate park staff about the need to turn off lights and other conservation measures

3 Install skylights and/or light tubes.

Transportation Management

Emission Reduction Goal: Reduce Castillo de San Marcos NM and Fort Matanzas NM operations transportation emissions to 9 percent below 2014 levels by 2025.

Reducing vehicle miles traveled, improving vehicle efficiency, and using alternative fuels can significantly reduce Castillo de San Marcos NM and Fort Matanzas NM GHG emissions. As the inventory results indicate, GHG emissions from transportation comprise 28 percent of Castillo de San Marcos NM and Fort Matanzas NM combined overall emissions (not including visitors or concessioners). Presented below are the actions that are currently under way and which comprise Castillo de San Marcos NM and Fort Matanzas NM progress to date, as well as those actions that the parks will pursue.

Progress to Date

- ✓ Upgraded the insulation package at the Johnson House – June 2015
- ✓ Replaced A/C at Headquarters Computer Server Room with 18 8SEER Split system – July 2015
- ✓ Replaced A/C at the Maintenance Office with 18 SEER split system – October 2015Conversion of flood lighting at the Fort from Sodium Halide to LED.

Green Our Rides Planned Actions

1 Retire 1 law enforcement vehicle

2 Replace motors on the Ferry with higher efficiency alternatives

3 Replace fleet vehicles wisely when appropriate

4 Prepare a Mowing Reduction Plan

Waste Management

Emission Reduction Goal: Reduce waste emissions from Castillo de San Marcos NM and Fort Matanzas NM operations 30 percent below 2014 levels by 2025 through waste diversion and reduction.

The connection between waste and GHG emissions may not be obvious. However, waste management—in the form of source and solid waste reduction—can dramatically reduce the Castillo de San Marcos NM's and Fort Matanzas NM's GHG emissions. Landfills are the largest human-generated source of methane (CH_4) emissions in the United States. Reducing the amount of waste sent to landfills reduces CH_4 emissions caused by decomposition as well as the GHGs emitted from the transportation of waste. The less Castillo de San Marcos NM and Fort Matanzas NM and its visitors consume in terms of products and packaging, the more they reuse and recycle, the fewer GHGs are emitted.

Waste disposal at Castillo de San Marcos NM and Fort Matanzas NM accounted for 30 percent of the park's GHG emissions in 2014. Diverting or reducing Castillo de San Marcos NM's and Fort Matanzas NM's waste stream through increased recycling efforts and waste management will also reduce the amount of waste sent to landfills and resulting emissions. Presented below are the actions that are currently in progress and which comprise Castillo de San Marcos NM's and Fort Matanzas NM's progress to date as well as those actions that the park will pursue.

Progress to Date

- ✓ Removed trash cans from the Main and Entrance parking lots
- ✓ Stopped the practice of placing trash cans out on the Fort Greens during City held events
- ✓ Improved waste container monitoring

Buy Green and Reduce, Reuse, Recycle Planned Actions

1 Determine how to handle waste management

2 Work with Eastern National to eliminate bottled-water sales

3 Work with schools and through Social Media to educate visitors about programs to eliminate or minimize waste

4 Increase or change signage

STRATEGY 2: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Climate change is a complex and integral issue that is already impacting everything from cultural and natural resources to the visitors themselves. Castillo de San Marcos NM and Fort Matanzas NM can play an integral role in communicating about climate change to visitors.

A better understanding of the challenges and benefits of reducing GHG emissions and adapting to climate change can motivate staff, visitors, and community members to incorporate climate friendly actions into their own lives.

Castillo de San Marcos NM and Fort Matanzas NM recognize that the greatest potential impact the park can have on mitigating climate change is through public education. Thus, Castillo de San Marcos NM and Fort Matanzas NM sees public education as an end goal of any climate initiative. From increasing the efficiency of public transportation to developing a green purchasing program, the actions Castillo de San Marcos NM and Fort Matanzas NM takes to address climate change serve as opportunities for increasing the public's awareness of climate change. Presented below are the actions that are currently under way and which comprise the park's progress to date, and those actions that Castillo de San Marcos NM and Fort Matanzas NM will pursue.

Progress to Date

- ✓ Added climate change education to the summer camp curriculum.

Park Staff

Developing a climate change education program for park staff is vital to increasing awareness about climate change and fostering a sense of collective responsibility among staff to help reduce park emissions. By incorporating climate change education into staff development programs, Castillo de San Marcos NM and Fort Matanzas NM will enable staff to demonstrate their commitment through leading by example, and showing visitors the tools and resources needed to reduce GHG emissions in the park and in their own communities. Potential actions include:

1 Continue to educate park staff about the need to turn off lights and other conservation measures.

Visitor Outreach

Understanding climate change and its consequences is essential to initiating individual behavioral change. Castillo de San Marcos NM and Fort Matanzas NM realizes it has a unique opportunity to educate the public. By using existing materials, developing specific materials, highlighting what the park is currently doing about climate change, identifying the ongoing impacts of climate change on natural and cultural resources, and encouraging visitors to reduce emissions. Castillo de San Marcos NM and Fort Matanzas NM can play an important role in educating the public about climate change.

Castillo de San Marcos NM and Fort Matanzas NM staff recognize the many different audiences that visit the Castillo de San Marcos NM and Fort Matanzas NM, including recreational and non-recreational visitors, “virtual visitors” who visit Castillo de San Marcos NM and Fort Matanzas NM online, school-aged visitors, local and out of town visitors, local tribes, and external audiences. Reaching these various audiences with climate change information and engaging them in Castillo de San Marcos NM’s and Fort Matanzas NM’s efforts require appropriately focused messaging. Castillo de San Marcos NM and Fort Matanzas NM has developed education and outreach actions to reach visitors, including:

1 Engage youth on climate change primarily through electronic media.

STRATEGY 3: ACTIONS FOR ADAPTING TO A CHANGING CLIMATE

Climate change threatens the cultural and natural resources that Castillo de San Marcos NM and Fort Matanzas NM is known for and so the park has considered actions to take to adapt to climate change. In the context of climate change, adaptation is an adjustment in natural or human systems that moderates harm or seeks out beneficial opportunities in response to change. Adaptation may include a variety of social, economic, or ecological responses such as adapting the location, structure, or function of Castillo de San Marcos NM and Fort Matanzas NM facilities in anticipation of climate change. Given the potential impact from climate change, it is important to closely monitor cultural and natural resources and identify those that are most at risk. From this identification, Castillo de San Marcos NM and Fort Matanzas NM can work towards reducing the risk or documenting the resources to try and

keep a record of them. Presented below are the actions that are currently under way and which comprise Castillo de San Marcos NM's and Fort Matanzas NM's progress to date, and those actions that Castillo de San Marcos NM and Fort Matanzas NM will pursue.

Progress to Date

- ✓ Created a Non-Facility Project to develop a Historic Structures Report at Fort Matanzas. Project awarded December 2015).

Adaptation

- ✓ Participated in a Climate Change Vulnerability and Facility Adaptation Assessment as part of the Climate Friendly Parks Program. Findings will be assessed and addressed in the future.

Evaluate Progress and Identify Areas for Improvement

By taking the actions established in the goals above, Castillo de San Marcos NM and Fort Matanzas NM plan to reduce their emissions to the specified goals. Achieving these goals will require an ongoing commitment by the parks, which may include subsequent emission inventories, additional mitigation and adaptation actions, reevaluation of goals, and continually monitoring progress using an EMS.

CONCLUSION

Castillo de San Marcos NM and Fort Matanzas NM have a unique opportunity to serve as a model for over 1 million visitors annually. This report summarized the actions Castillo de San Marcos NM and Fort Matanzas NM commit to undertake to address climate change. In particular, Castillo de San Marcos NM and Fort Matanzas NM realize their ability to educate the public and serve as a valuable model for citizens. By seriously addressing GHG emissions within the park and sharing its successes with visitors, Castillo de San Marcos NM and Fort Matanzas NM will help mitigate climate change far beyond the park's boundaries.

The National Park Service as a whole faces an uncertain future due to the possible effects of climate change. However, by adapting to climate change impacts and reducing emissions, Castillo de San Marcos NM and Fort Matanzas NM will preserve their resources; reduce their contribution to the problem while setting an example for park visitors. The strategies presented in this Climate Action Plan present an aggressive first step towards moving Castillo de San Marcos NM and Fort Matanzas NM to the forefront of Climate Friendly Parks.