



Big Cypress National Preserve

Climate Action Plan

TABLE OF CONTENTS

The Challenge of Climate Change	1
Context for Action	2
Big Cypress National Preserve Becomes a Climate Friendly Park	5
Big Cypress National Preserve Greenhouse Gas Emission Inventory	7
STRATEGY 1: Identify and Implement Mitigation Actions that the Park Can Take to Reduce GHG	
Emissions Resulting from Park Activities	9
Energy Use Management	9
Transportation Management	. 10
Waste Management	. 10
STRATEGY 2: Increase Climate Change Education and Outreach.	. 11
Park Staff	. 11
Visitor Outreach	. 11
STRATEGY 3: Actions for Adapting to a Changing Climate	. 13
Adaptation	. 13
Evaluate Progress and Identify Areas for Improvement	. 13
Conclusion	. 14

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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 Big Cypress National Preserve (NP). National Park Service Director Jon 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

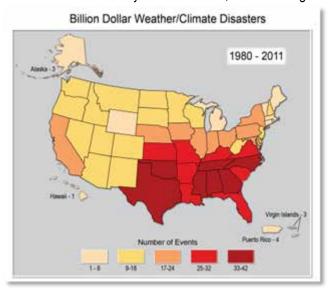
more than just temperature increase; there are a variety of effects including potentially more intense and frequent storms. These changes mean that there could be an increasing number of climate disasters. ² This map summarizes the number of weather and climate disasters over the past 30 years that have 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 2012⁴, 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.

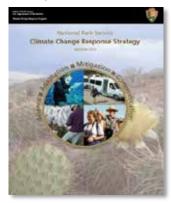
CONTEXT FOR ACTION

Sustainability is at the cornerstone of the 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(54 U.S.C. 100301)." 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







⁴ IPCC 2012. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Available online at http://ipcc-wg2.gov/SREX/report/full-report/



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.
- Construct federal buildings designed to achieve energy net-zero, and where feasible, water or waste net-zero by FY 2030.
- Expand green procurement and 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.

The 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 and Their Families
 - Develop Effective Planning Frameworks and Guidance
 - Provide Climate Change Science to Parks
 - o Implement the Green Parks Plan
 - Foster Robust Partnerships
 - Apply Appropriate Adaptation Tools and Options
 - Strengthen Communication
- Preparing for New Challenges and Opportunities
 - Incorporate New Technology and Climate Science



Understanding Climate Change at Big Cypress National Preserve

The following provides an overview of Big Cypress National Preserve's greenhouse gas emissions inventory and shares emissions reduction goals and strategies the Preserve has established as a member of the CFP Program.

OVERVIEW OF THE PRESERVE

Big Cypress NP is located in southern Florida and in the Southeast Region of the NPS. Big Cypress NP attracts close to 1 million visitors annually and provides a freshwater swamp that is essential to the health of the neighboring Everglades National Park as well as the rich marine estuaries along Florida's southwest coast ⁵

BIG CYPRESS NATIONAL PRESERVE BECOMES A CLIMATE FRIENDLY PARK

As a participant in the Climate Friendly Parks program, Big Cypress NP belongs to a network of parks nationwide that are putting climate-friendly behavior at the forefront of planning. As part of this program, Big Cypress NP has conducted a 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 Preserve staff, visitors, and community members about climate change, Big Cypress NP provides a model for climate friendly behavior within the NPS.⁶



NPS staff, partners, and sustainability/climate change experts gathered to hold a Climate Friendly Parks Workshop from June 9th through 11th, 2015 to better understand and discuss overall sustainability concepts, the implications of climate change for Big Cypress NP, and to start implementing new actions. Strategies and action plan items were developed by work groups at the Climate Friendly Parks Workshop.⁷

This Climate Action Plan incorporates the strategies that were brainstormed at the workshop and identifies steps that Big Cypress NP is taking to reduce GHG emissions to mitigate its impact on climate change. The plan presents Big Cypress NP's emission reduction goals and associated reduction actions to achieve these goals. To the extent possible, the Preserve created goals that are Specific, Measurable, Attainable, Realistic, and Timely (SMART). Having structured SMART goals will ensure that Big Cypress NP can iteratively monitor progress against the emission reduction goals and identify areas for improvement.

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

Big Cypress NP has identified the following goals to reduce its GHG emissions produced by the Preserve's operations as follows:

⁷ 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.



⁵ http://www.nps.gov/bicy/learn/historyculture/index.htm

⁶ More information about the Climate Friendly Park program http://www.nps.gov/climatefriendlyparks/

- Purchased electricity (energy) emissions to 10% below 2014 levels by 2025
- Stationary combustion (energy) emissions to 20% below 2014 levels by 2025
- Fleet fuel emissions to 14% below 2014 levels by 2025
- Employee commuting emissions to 15% below 2014 levels by 2025
- Landfilled waste emissions to 10% below 2014 levels by 2025
- Cumulatively, this will result in a GHG emissions reduction of 12% below 2014 levels by 2025.

To meet these goals, Big Cypress NP will implement strategies proposed in this plan that relate to the Preserve's current and future emission inventories. Specifically, the plan recommends three strategies:

Strategy 1: Identify and implement mitigation actions that the Preserve can take to reduce GHG emissions resulting from Preserve 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, Big Cypress NP will continue to monitor progress with respect to reducing emissions and identify areas for improvement.



BIG CYPRESS NATIONAL PRESERVE GREENHOUSE GAS EMISSION INVENTORY

Naturally occurring GHGs include CO₂, CH₄, and N₂O. 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).

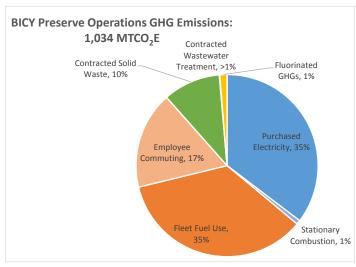
In 2014, GHG emissions for Big Cypress NP totaled 35,387 metric tons of carbon dioxide equivalent (MTCO₂E). Carbon dioxide equivalent takes into account that some gases have a greater potential to warm the earth's atmosphere than others. Visitors to Big Cypress NP account for approximately 46 percent of total emissions through vehicle travel on roadways within the Preserve, while other permitted activities (e.g., oil and gas extraction) account for approximately 51 percent of total emissions. At 1,034 MTCO₂E, emissions from Preserve buildings, fleet and other operations activities account for approximately 3 percent of total emissions.

To help with analyzing the GHG inventory, Figure 2 presents total GHG emissions associated with Big Cypress NP's operations. The breakdown in Figure 2 represents what Big Cypress NP has influence over relative to what is in the Preserve's 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 sectors for Big Cypress NP are purchased electricity and fleet fuel use, each representing 35% of the total calculated emissions. Purchased electricity is slightly larger than fleet fuel use, totaling 365 MTCO₂E compared to 363 MTCO₂E. Emissions associated with employee commuting (17%) and waste (10%) represent the next largest sources.

FIGURE 2







Big Cypress National Preserve Responds to Climate Change

The following actions were developed during the Climate Friendly Parks Workshop on June 9th through 11th, 2015 in order to meet Big Cypress National Preserve's climate change mitigation and adaptation goals.

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

Big Cypress NP staff has developed a set of actions that demonstrate a commitment to reducing emissions from activities within and by the Preserve. 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 Big Cypress NP will take are presented below by category.

Energy Use Management

Emission Reduction Goal: Reduce Big Cypress NP's purchased electricity emissions by 10 percent and stationary combustion emissions by 20 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 Preserve. Emissions inventory results indicate that 36 percent of Big Cypress NP's GHG emissions from Preserve operations are from energy consumption (stationary combustion and purchased electricity). Consequently, Big Cypress NP 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

- ✓ Installed a 6 kW net metering system at the Welcome Center
- ✓ Installing LED lighting indoors and outside
- ✓ Retrofitted lighting in all facilities with T8 technology
- ✓ The new storage facility is using LEDs
- ✓ Using WaterSense fixtures
- ✓ Installed new ENERGY STAR-rated windows throughout every facility
- ✓ Applied spray foam insulation in Headquarters building, Welcome Center
- ✓ Using a catalyst in refrigeration systems to make them more efficient (SER project)
- ✓ Installed LED street lighting in parking lots
- ✓ Installed efficient HVAC systems
- ✓ Installing 3 different domestic hot water systems
- ✓ Appliances for housing are ENERGY STAR-rated
- ✓ Using recycled water at the car wash



Be Energy Smart Planned Actions

- 1 Change lock system for office doors that open to outside to conserve building air conditioning
- 2 Continue to conduct training for effective use of smart/programmable thermostats in common areas
- 3 Continue to provide educational materials to accompany thermostats that notifies staff of the benefits of conservation
- 4 Continue to install solar water heating systems at several key locations throughout the Preserve

Transportation Management

Emission Reduction Goal: Reduce Big Cypress NP operations transportation emissions to 14 percent below 2014 levels by 2025.

Reducing vehicle miles traveled, improving vehicle efficiency, and using alternative fuels can significantly reduce Big Cypress NP's emissions. As the inventory results indicate, GHG emissions from transportation (including aviation fuel) comprise 35 percent of Big Cypress NP's overall emissions (not including visitors). Presented below are the actions that are currently under way and which comprise Big Cypress NP's progress to date, as well as those actions that the Preserve will pursue.

Green Our Rides Planned Actions

- 1 Identify alternative fuel options to optimize the vehicle fleet
- 2 Provide internal education to encourage driving best management practices

Waste Management

Emission Reduction Goal: Reduce waste emissions from Big Cypress NP operations 10 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 Big Cypress NP's GHG emissions. Landfills are the largest human-generated source of methane (CH₄) emissions in the United States. Reducing the amount of waste sent to landfills reduces CH₄ emissions caused by decomposition as well as the GHGs emitted from the transportation of waste. The less Big Cypress NP and its visitors consume in terms of products and packaging and the more they reuse and recycle, the fewer GHGs are emitted.

Waste disposal at Big Cypress NP accounted for 10 percent of the Preserve's GHG emissions in 2014. Diverting or reducing Big Cypress NP'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 under way and which comprise Big Cypress NP's progress to date as well as those actions that the Preserve will pursue.



Progress to Date

✓ Purchased and installed cardboard baler. The baler will assist in increasing cardboard recycling volume

Buy Green and Reduce, Reuse, and Recycle Planned Actions

1 Set up specific days for waste collection at in-holding camp areas of non-normal waste using swamp buggies

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. Big Cypress National Preserve 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.

Big Cypress NP recognizes that the greatest potential impact the Preserve can have on mitigating climate change is through public education. Thus, Big Cypress NP 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 Big Cypress NP 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 Preserve's progress to date, and those actions that Big Cypress NP will pursue.

Preserve Staff

Developing a climate change education program for Preserve staff is vital to increasing awareness about climate change and fostering a sense of collective responsibility among staff to help reduce Preserve emissions. By incorporating climate change education into staff development programs, Big Cypress NP 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 Preserve and in their own communities.

Visitor Outreach

Understanding climate change and its consequences is essential to initiating individual behavioral change. Big Cypress NP staff realize they have a unique opportunity to educate the public. By using existing materials, developing specific materials, highlighting what the Preserve is currently doing about climate change, identifying the ongoing impacts of climate change on natural and cultural resources, and encouraging visitors to reduce emissions. Big Cypress NP can play an important role in educating the public about climate change. Potential actions include:



 Operate educational outreach programs through local public schools to offer students hands-on experience through swamp field trips and classroom participation. These experiences provide students exposure to unique wetland habitat and opportunities to learn of actions being taken by Preserve staff to positively affect climate change.



STRATEGY 3: ACTIONS FOR ADAPTING TO A CHANGING CLIMATE

Climate change threatens the cultural and natural resources that Big Cypress NP is known for, and so the Preserve 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 Big Cypress NP 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, Big Cypress NP 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 Big Cypress NP's progress to date, and those actions that Big Cypress NP will pursue.

Progress to Date

- ✓ The Preserve incorporates the guidance provided in EO 13514 in all NEPA analysis to address greenhouse gases and climate change, and in accordance with NPS Management Policies baseline climatological data is made available for reference.
- ✓ Observations made through decades of hydrologic monitoring have supported funding justifications to reclaim wetlands and restore natural drainage regimes disturbed from past land use, to provide the best defense against sea level rise.
- ✓ In 2015, a *Climate Change Trends and Vulnerabilities* report was prepared for Big Cypress NP characterizing historical average temperature, historical impacts and future vulnerabilities to the Everglades region.

Adaptation

- Recognizing the sea level rise as a result of climate change as imminent, the Preserve seeks to
 manage its natural areas to be as resilient as possible under those circumstances. The
 adaptation to the natural system most prominent within the Preserve landscape is the efforts to
 restore the headwaters of the most vulnerable drainage areas. To that end, the Preserve has
 undertaken the first phase of a canal and levee restoration project by restoring a wetland area
 that had previously been converted to agricultural use, and return flow into areas where it had
 been cut off by elevated berms, irrigation ditches, and an elevated road bed. The objective of
 this project will be to protect the upstream watershed that delivers freshwater flow into the
 downstream estuarine arm of Everglades National Park.
- With regard to adaptation to cultural resources, the Preserve is home to over 450 archeological sites, some of which over time could be vulnerable to sea level rise, subject to increased probability of being burned over during wildfires, or subject to unauthorized investigation if vegetative changes render them more exposed to discovery by recreational users. Prescribed fires, designed to favor native vegetation in the upland areas where these sites exist, are contemplated in fire management plans and annual burn plans for the Preserve.

Evaluate Progress and Identify Areas for Improvement

By taking the actions established in the goals above, Big Cypress NP plans to reduce its emissions to the specified goals. Achieving these goals will require an ongoing commitment by the Preserve, which may include subsequent emission inventories, additional mitigation and adaptation actions, reevaluation of goals, and continually monitoring progress using an EMS.



CONCLUSION

Big Cypress NP has a unique opportunity to serve as a model for nearly 1 million visitors annually. This report summarized the actions Big Cypress NP commits to undertake to address climate change. In particular, Big Cypress NP realizes its ability to educate the public and serve as a valuable model for citizens. By seriously addressing GHG emissions within the Preserve and sharing its successes with visitors, Big Cypress NP will help mitigate climate change far beyond the Preserve's boundaries.

The NPS 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, Big Cypress NP will preserve its resources and reduce its contribution to the problem while setting an example for its visitors. The strategies presented in this Climate Action Plan present an aggressive first step towards moving Big Cypress NP to the forefront of Climate Friendly Parks.

