National Park Service U.S. Department of the Interior







PRINCE WILLIAM FOREST PARK

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Introduction

PRINCE WILLIAM FOREST PARK

Prince William Forest Park was created as a Recreation Demonstration Area, a program established by President Franklin D. Roosevelt to provide an outdoor experience for inner city youth and to teach job skills to the unemployed. Work began in 1935 to build cabins and establish what was then known as Chopawamsic Recreation Demonstration Area. In 1948, the name was changed to Prince William Forest Park.

Prince William Forest Park covers over 15,000 acres of land, and includes cabins, campgrounds, an RV park, a 12-mile scenic loop, 37 miles of hiking trails, and onand off-road bike routes. Over the last few years between 215,000 and 250,000 people have visited the park annually.



PARK CLIMATE ACTION COMMITMENT

As the steward of the nation's most valued public lands, the National Park Service (NPS) has an obligation and an opportunity to be a leader in protecting the environment. As a participant in the Climate Friendly Parks (CFP) program, Prince William Forest Park belongs to a network of national parks that are at the forefront of sustainability planning. By developing an emissions inventory, setting an emissions reduction target, developing this climate action plan, and committing to educate park staff and the public about climate change and Prince William Forest Park mitigation efforts, the park is leading by example. In so doing, the park commits to reducing GHG emissions from park operations by 20% below 2008 levels by 2016 through the following actions:

- 1. Reduce energy consumption of park buildings.
- 2. Explore the use of renewable energy technology and alternative energy.
- 3. Encourage energy saving behavior among staff and visitors.
- 4. Reduce transportation emissions from park operations.
- 5. Reduce transportation emissions from visitor vehicles in the park.
- 6. Divert solid waste from the landfill by increasing recycling capacity and educating staff and visitors.
- Decrease the amount of solid waste sent to the landfill by revamping the "Trash Free" program.
- 8. Educate park employees and visitors about climate change and how to reduce GHG emissions.

Prince William Forest Park's climate action plan serves to support and enhance existing initiatives, such as the park's environmental management system (EMS) and the National Capitol Region's



(NCR) EMS. The park's EMS is a comprehensive management system that addresses all environmental programs at the park and provides the context for actions that reduce park emissions. The NCR EMS addresses the energy- and climate-related goals for all parks in the region and aligns with Executive Orders 13423 and 13514. This climate action plan will be incorporated into the park's EMS, and it complements *A Call to Action*, which was issued by the NPS Director on August 25, 2011. The purpose of this climate action plan is to reduce park greenhouse gas emissions and is not intended to address park adaptation to climate change impacts. Additionally, this plan is based on the park's initial action plan that was developed in 2008. The plan has been revised and updated to include input from all park staff who participated in the Climate Friendly Parks workshop in 2011.

THE CHALLENGE OF CLIMATE CHANGE

The atmosphere has a natural supply of gases that trap heat and keep the temperature of the Earth warm enough for life to survive. Such gases are known as greenhouse gases, or GHGs. However, the release of certain GHGs, through industrial processes, including carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), has disturbed the natural balance. These gases, which can stay in the atmosphere from at least 50 years to as long as several centuries, are accumulating in the atmosphere faster than natural processes are able to remove them—in effect, creating an extra-thick "heat blanket" around the Earth. The increase in GHGs is causing an overall warming of the planet, commonly referred to as global warming. The term climate change describes the variable consequences of global warming over time.

According to the Intergovernmental Panel on Climate Change (IPCC), the leading international organization for the assessment of climate change, "continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century."¹ Rising global temperatures will further raise sea level and affect all aspects of the water cycle, including snow cover, mountain glaciers, timing of spring runoff, water temperature, ocean currents and upwelling, salinity levels of inland coastal waters, and aquatic life. Climate change is also expected to affect human health, alter crop production and animal habitats, and impact many other features of our natural and managed environments.

PRINCE WILLIAM FOREST PARK AND CLIMATE CHANGE

Climate change presents significant risks and challenges to the National Park Service. In the mid-Atlantic region, which includes Virginia, sea level is rising one to two inches per decade. Furthermore, climate change is expected to double that rate, causing sea level to rise 15 to 40

¹ Intergovernmental Panel on Climate Change. *Climate Change 2007: Synthesis Report*. Valencia: IPCC, 2007. 45. www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.



inches by 2100.² In addition, due to sediment compaction processes that cause land in the mid-Atlantic to sink, sea level rise in the region is currently significantly greater than global sea level rise.³

At Prince William Forest Park, increased temperatures and hydraulic changes will alter the natural and manmade landscape of the park, impacting the wide variety of ecological, cultural, and recreational features the park currently provides. The following potential climate change impacts were considered while the park staff developed this climate action plan:

- Change in growing seasons, which will affect vegetation;
- Increased opportunity for invasive species establishment; and
- Shifts in visitor trends related to park temperature changes.

By measuring and reducing GHG emissions from park-related activities, Prince William Forest Park intends to minimize its contribution to climate change and the resulting detrimental impacts.

INVENTORY PROCESS

The park's GHG emissions inventory was completed by gathering data from park staff and concessioners, then entering this data into the Climate Leadership in Parks (CLIP) tool. The CLIP tool was developed by the NPS CFP program in association with the U.S. Environmental Protection Agency (EPA) to account for GHG emissions specific to national parks. The tool is designed to:

- Convert energy and resource use data into metric tons of CO₂ equivalent (MTCO₂e);
- Educate park employees about the emissions inventory process through data gathering;
- Assist with identifying strategies for each park to reduce emissions during an education workshop
- Enable park personnel to track current and future progress toward emissions reduction goals.

Prince William Forest Park staff gathered annual usage data (e.g., gallons of fuel used in a year) related to park operations, concession operations, and visitor travel within park boundaries for a baseline inventory in fiscal year (FY) 2008. Concession operations at PRWI consist only of Prince William Forest RV Campground (PWFRVCG), formerly known as Travel Trailer Village. Park staff performed a second inventory by gathering data in FY 2009. Employee commuting data was collected from a survey in 2011 and included in the 2009 inventory as proxy data. Data categories include stationary combustion, mobile combustion, purchased electricity, waste, fertilizer, refrigeration, and wastewater. These categories can be divided into direct and indirect emissions. Scope 1 emissions, or direct emissions, are emissions from sources owned and operated by the park. This includes emissions produced when fuel is burned within park boundaries—such as emissions from heating a park facility, powering a park generator, or fueling a park vehicle—and fugitive emissions released from refrigeration and fertilizer use. Scope 2 emissions are indirect

³ U.S. Climate Change Science Program. *Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid Atlantic Region*. Synthesis and Assessment Product 4.1. Washington: CCSP, 2009. 19. www.epa.gov/climatechange/effects/coastal/pdfs/SAP_4-1_SynthesisandAssessmentProduct.pdf



² U.S. Environmental Protection Agency. *How Will Climate Change Affect the Mid-Atlantic Region?* (EPA/903/F-00/002). Philadelphia: EPA Region 3, 2001. http://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=4011

emissions generated by sources not owned or operated by the park, but produced as a result of park activities. These are emissions generated to produce electricity, heat, or steam that is purchased by the park. Scope 3 emissions are all other indirect emissions, such as emissions from concessioner operations, visitor vehicles, employee commuting, offsite wastewater treatment and offsite waste disposal.

The CLIP tool automatically converts the park's data into $MTCO_2e$, a single unit that normalizes CO_2 , N_2O , and CH_4 . The conversion of a GHG to $MTCO_2e$ is based on the potential of that GHG to contribute to the greenhouse effect, known as its global warming potential (GWP), relative to the potential of CO_2 , which is given the GWP of 1. CH_4 's GWP is 21 and N_2O 's GWP is 310, meaning that an equivalent amount of CH_4 has 21 times the potential of CO_2 , and N_2O has 310 times the potential of CO_2 , to contribute to global warming. The output of the CLIP tool is the park's emissions profile, which was used to prioritize GHG emission reduction strategies.

Park Emissions Profile

The Prince William Forest Park GHG inventories from 2008 and 2009 include emissions from park operations, concession operations, and visitors. Visitor emissions are estimated from visitor vehicle transportation within park property, based on annual visitation numbers. This should be noted when comparing inventories from each year. A summary of each inventory is detailed below.

2008 PRINCE WILLIAM FOREST PARK GHG INVENTORY

Total GHG emissions from park operations, concessions, and visitors for FY 2008 was 1,562 MTCO2e. To put this number in perspective, a typical single family home in the U.S. produces 12 MTCO2e per year.⁴ Thus, the combined emissions from park operations, concession operations, and visitor activities within the park was roughly equivalent to the emissions from the energy use of 130 households. Approximately 596 MTCO2e, or 38 percent of total emissions, were from park operations. Visitor mobile emissions produced 815 MTCO2e, or approximately 52 percent of total emissions. Approximately 10 percent (151 MTCO2e) of total emissions were from the concession operations. Visitor vehicle emissions contributed the greatest percentage to the total emissions from Prince William Forest Park. See Figure 1 below for the 2008 total park GHG emissions profile; Figure 2 is a breakdown of emissions from park operations.

⁴U.S. Environmental Protection Agency. "Greenhouse Gases Equivalencies Calculators." Clean Energy Resources.EPA, 2011. Web. http://www.epa.gov/cleanenergy/energy-resources/calculator.html.



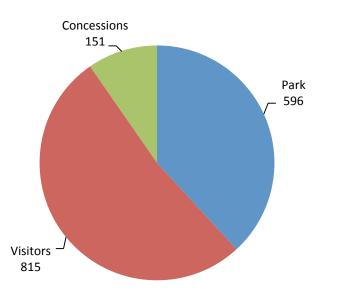


FIGURE 1: 2008 PRINCE WILLIAM FOREST PARK GHG EMISSIONS – 1,562 MTCO2E

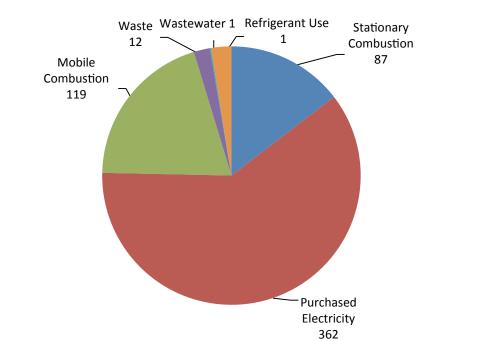


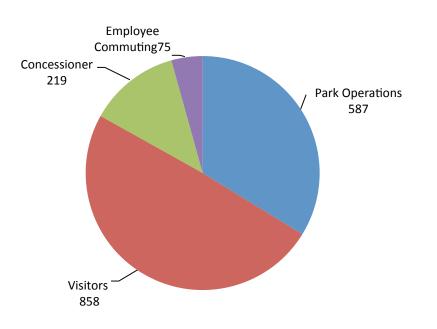
FIGURE 2: 2008 PARK OPERATIONS TOTAL GHG EMISSIONS BY SOURCE - 596 MTCO2E



2009 PRINCE WILLIAM FOREST PARK GHG INVENTORY

Total GHG emissions from park operations, employee commuting, concession operations, and visitors for FY 2009 were estimated to be 1,739 MTCO₂e. Approximately 662 MTCO₂e, which was 34 percent of total emissions, were from park operations. Approximately 50 percent (587 MTCO₂e) of total emissions were from visitor mobile emissions, and 219 MTCO₂e, or approximately 13 percent of total emissions, were from concession operations. The 2009 inventory also included 75 MTCO₂e from employee commuting, representing four percent of total emissions. Visitor vehicle emissions contributed the greatest percentage to the total emissions from Prince William Forest Park. See Figure 3 below for the 2009 total park GHG emissions profile in MTCO₂e. For a comparison of 2008 and 2009, see Figure 6.





In order to target emissions reduction efforts, the park assessed park operations emissions by source, not including employee commuting. At 364 MTCO₂e, or 62 percent of total park operations emissions, purchased electricity is by far the largest contributor of GHG emissions from park operations. At 102 MTCO2e, or 17 percent of total park operations emissions, stationary combustion is the second largest contributor. See Figure 4 for a breakdown of sources and Figure 5 for total percent contribution by source for 2009.



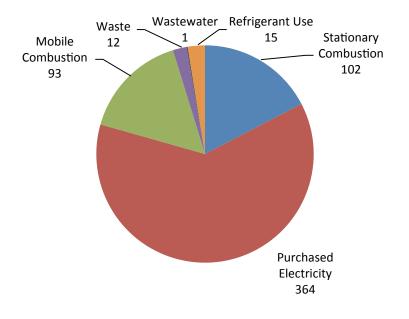
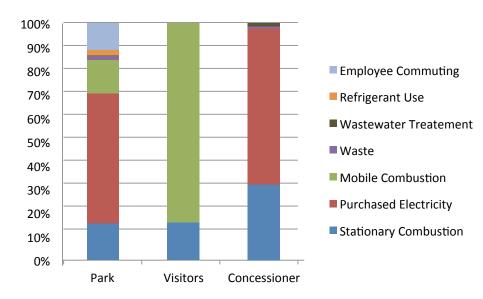


FIGURE 4: 2009 PARK OPERATIONS TOTAL GHG EMISSIONS BY SOURCE - 587 MTCO2E







Between 2008 and 2009, the largest change was in transportation emissions. There was a decrease of over 125 MTCO2e from mobile combustion of park operated vehicles. This can be attributed to the reduction in driving park vehicles with inefficient fuel use and the acquisition of multiple hybrid vehicles. A significant increase in MTCO2e from stationary combustion occurred between the two years, in large part due to an anomaly in the propane use of the concessioner. The gallons of propane reported as being used almost doubled between 2008 and 2009, while nearly all other park contributions to stationary combustion remained comparable. The 81 MTCO2e increase in stationary combustion may be due to a combination of factors still being investigated. Overall, 2009 gross emissions of Prince William Forest Park increased by 102 MTCO2e from 2008, approximately a 7 percent increase, not including the additional source of employee commuting. Accordingly, Prince William Forest Park will set high reduction goals, incorporate all staff members into reduction plans, and work hard to achieve reduced park-based emissions. See figure 6 below for a comparison from 2008 and 2009 inventories. Employee commuting numbers are not included.

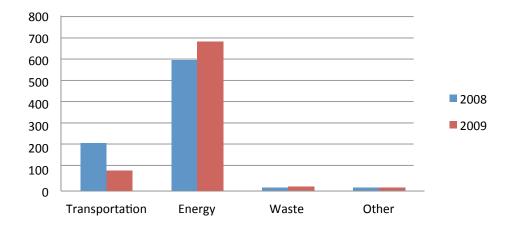


FIGURE 6: PRINCE WILLIAM FOREST PARK GHG EMISSIONS 2008 AND 2009 MTCO2E

Strategies for Reducing Emissions

Prince William Forest Park developed GHG reduction strategies and actions during the park's CFP action planning workshop held October 20, 2011 at Prince William Forest Park. Strategies focus on reducing energy consumption, transportation emissions, water use, waste generation, and increasing climate change educational efforts. Developing and implementing a comprehensive action plan will allow for better informed decision-making. Prince William Forest Park strategies to reduce emissions are based on emission reduction potential, cost-effectiveness, feasibility, co-benefits, local impact, and implementation timeframe. The 2008 baseline inventory serves as the basis for the following reduction actions.



STRATEGY 1: REDUCE GHG EMISSIONS FROM PARK ENERGY USE BY 12 PERCENT BELOW 2008 LEVELS BY 2016

By far the most significant contributor of GHGs from park operations is energy use from purchased electricity and stationary combustion. Together, these contributed 449 MTCO₂e to the park's GHG inventory. Therefore, Prince William Forest Park will focus on reducing energy use and, more specifically, on reducing electricity use in buildings. In addition to reducing GHG emissions, reducing purchased electricity use will provide the park with cost savings.

Progress to Date, as of 2011:

- Purchased ENERGY STAR appliances, including seven refrigerators and four instantaneous tankless water heaters. The park considers ENERGY STAR appliances first when purchasing new appliances.
- Installed energy efficient lighting beginning in 2006, as incandescent bulbs went out. Only
 compact fluorescent light bulbs are purchased in the park. As they burn out, T-12 bulbs are
 replaced with more efficient T-8 bulbs.
- Installed motion sensors in non-historic comfort station bathrooms in 2007.
- Over the last two years, installed solar tubes in non-historic comfort stations to increase natural lighting.
- Installed demand reduction devices on electric water heaters.
- Installed solar flood lights on the Oak Ridge Campground amphitheater.
- Installed programmable thermostats in Cabin Camp 5 dorms and set to a low, but comfortable temperature.

Prince William Forest Park commits to the following actions in order to reduce park energy use:

- 1. Reduce energy consumption of park buildings:
 - Install insta-hot systems for hot water use in park kitchens and baths.
 - Turn off pilot lights to cabin camp stoves and ovens during winter.
 - Install weather stripping on doors and windows.
 - Upgrade refrigeration units at cabin camps and turn off refrigerators when not in use.
 - Evaluate the opportunity for wood burning at Headquarters, Resource Management, or Maintenance building.
 - Replace magnetic ballasts with electronic ballasts in overhead lights and switch from T-12 fixtures to T-8 fixtures.
 - Upgrade heat pumps.
 - Purchase only ENERGY STAR appliances where applicable
 - Turn off vending machine lights, except in public areas.
 - Remove baseboard heating systems and update to more efficient heating systems.
 - Participate in environmental, energy, and climate workshops, webinars, and other educational venues.
- 2. Explore the use of renewable energy technology and alternative energy:



- Conduct a geothermal feasibility study to evaluate the potential for using geothermal energy on site.
- Install micro hydropower turbines on dams.
- Install solar lighting in parking areas and at the Entrance Station.
- Conduct a feasibility study for installing skylights/solar tubes on non-historic buildings to increase natural day lighting.
- Conduct a feasibility study to identify areas in which photovoltaic technology can be used to supplement park energy needs or be fed back into the energy grid.
- 3. Encourage energy-saving behavior:
 - Evaluate the potential to burn used oil for fuel.
 - Revise standard operating procedure to monitor program building temperature settings.
 - Prohibit the use of space heaters.
 - Program thermostats in camps to adjust for times when they are unoccupied.
 - Use power strips to turn off printers and other electronics when not in use.

STRATEGY 2: REDUCE GHG EMISSIONS FROM TRANSPORTATION BY 50 PERCENT BELOW 2008 LEVELS BY 2016

Transportation from park operations and visitors contributes 796 MTCO₂e to the park's GHG inventory. Transportation is Prince William Forest Park's largest source of GHGs when visitor vehicle emissions are included and the second largest source behind energy emissions when only park operations are considered. Therefore, improving transportation options and reducing vehicle emissions could significantly reduce the park's total emissions.

Progress to Date, as of 2011:

- Increased the use of utility vehicles instead of using four-wheel drive vehicles for staff transportation around the park.
- Implemented a telecommuting policy for park employees.
- Encouraged staff to combine trips while traveling in the park.
- Implemented a no-idling policy in 2009.
- Established a program to replace the least efficient vehicles with hybrids and electric vehicles.
- Instituted standard operating procedures for vehicle maintenance to ensure that park vehicles are in top mechanical condition.

Prince William Forest Park Commits to the following Actions to Reduce Park Emissions from Transportation:

- 1. Reduce transportation emissions from park employees:
 - Optimize driving by employees within the park through carpooling and reduced driving.
 - Establish a policy to match appropriate vehicles for the job.
 - Prioritize the type of new vehicles to be purchased.



- Use green, yellow, and red key chains to note fuel efficiency for vehicles and inform vehicle choice.
- Include signs on electric vehicles to educate staff and visitors about the park's efforts to reduce vehicle emissions.
- Where possible, replace tires with Energy Saver tires, which can increase fuel efficiency by two miles per gallon
- 2. Reduce transportation emissions from visitor vehicles in the park:
 - Use the park brochure, website, social media, and other methods to educate visitors on how to reduce driving within the park.
 - Add information about trails to the park brochure to encourage low-emission visitor use.
 - Consider offering rental bikes with electric assist.
 - Increase capacity for bike usage by providing more bike racks.
 - Provide priority parking for green visitor vehicles.
 - Continue to encourage Potomac and Rappahannock Transportation Commission to begin a "Heritage and Tourism" route that connects Leesylvania, Marine Corps Museum, Prince William Forest Park, Rippon Lodge and Potomac Mills; create a weekends-only route to promote public access to public lands.
 - Install "No idling" signs at the Visitor Center circle and Turkey Run Education Center parking areas.
 - Convert to biodiesel fuel where appropriate for park vehicles.

STRATEGY 3: REDUCE GHG EMISSIONS FROM SOLID WASTE BY 21 PERCENT BELOW 2008 LEVELS BY 2016

Waste contributes 12 MTCO₂e to the park's GHG inventory. Prince William Forest Park currently has a number of waste reduction procedures in place. The park commits to improving the current recycling program and revamping its "Trash Free" program.

Progress to Date, as of 2011:

- Implemented composting in 2010, including the purchase of electronic composters to encourage employees to compost; installed a tumbler-style unit at Camp 5.
- Installed battery recycling receptacles in each park department.
- Recycled fluorescent bulbs.
- Purchased only recycled carpet for renovation projects.
- Recycled construction materials such as concrete, steel, wood, and asphalt.
- Partnered with Prince William County Public Works in 2006 to install a recycling trailer at Cabin Camp 5 for glass, plastics, metals, and mixed paper.
- Acquired a portable sawmill for use in cabin camp restoration projects, to reduce waste and shipment of materials.
- Collected proceeds from recycled metal to support park environmental management goals.
- Implemented a "Leave No Trace" ethic for visitors; removed trash cans and dumpsters from Pine Grove Picnic Area and Turkey Run Education Center in 2010.
- Began plastic bag recycling pilot program at Park Headquarters and Camp 5.
- Conducted emissions inspections on required vehicles.



- Planted 200 trees per year from 2008 through 2012 to support a no net-loss tree policy.
- Purchased rechargeable batteries.
- Installed thermal double-paned windows at Cabin Camp 5 dormitories.
- Used recycled oil for chainsaw use.

Prince William Forest Park commits to the following actions to reduce park emissions from waste generation:

- 1. Improve current recycling program by increasing recycling capacity and educating staff and visitors:
 - Co-locate trash and recycling containers to make recycling easier.
 - Increase staff buy-in with recycling by designating "recycling champions" in each department and developing incentives for employees to recycle.
 - Update recycling procedures for the park by determining what can be accepted for recycling and educating employees about what can be recycled.
 - Expand recycling for visitors by adding more recycling containers
 - Create a competition to collect bottle caps for recycling.
 - Continue participation in the Metropolitan Washington Council of Government to increase park staff knowledge and participation in region-wide recycling programs.
 - Expand plastic bag recycling program.
 - Install tumbler-style composing unit at Camp 1.
 - Stipulate in the new trash and recycling contract for FY12 the inclusion of improved messaging/signage on recycling containers.
 - Explore expansion of partnership with Prince William County to add additional recycling trailers at other park sites.
 - Always choose recycled materials for building and office supplies where possible (i.e., carpets, wheat board desks, countertops, bathroom partitions, ceramic tiles, ceiling tiles, bathroom tissue, paper towels, trash bags, etc.).
 - Include items with limited packaging in purchasing policies as well as low- or no-VOC insulation, carpets, paints, and adhesives.
 - Purchase only locally produced products whenever possible for building supplies, renovations, office supplies, etc.(suggest a 300-mile limit)
- Decrease the amount of solid waste sent to the landfill by revamping the "Trash Free" program:
 - Identify which locations are best suited to be "Trash Free"; consider the cabin camps and tent campgrounds.
 - Identify a solid waste baseline by estimating the amount of solid waste generated at the park by the end of FY 2012; inventory solid waste containers for office and visitor use.
 - Train 100 percent of staff in 2012 on the "Trash Free" park program.
 - Include a description of the "Trash Free" program in the park employee handbook and staff training.
 - Reach 6,000 visitors in FY2012 to educate the public about "Trash Free" goals. Use signs in bathrooms, Facebook updates, and podcasts.
 - Rebrand "Trash Free" program to be more in line with "Leave No Trace" ethics.



STRATEGY 4: INCREASE CLIMATE CHANGE EDUCATION AND OUTREACH

Prince William Forest Park is visited by almost 250,000 people annually. This presents an opportunity to educate the public about climate change and GHG emissions reductions. There are also opportunities to educate park staff and members of the surrounding community.

Prince William Forest Park commits to the following actions to increase climate change education for park staff, visitors, and the local community:

- 1. Educate park employees about how to reduce GHG emissions:
 - Host competitions to reduce personal energy use.
 - Encourage the use of paper to-go, compostable, recyclable, and reusable containers over Styrofoam and other disposable single-use products.
 - Install better signage for recycling, including photos.
 - Develop a plan for the procurement of environmentally friendly products.
 - Include awareness at all employee meetings, workshops, brown bag lunch programs, etc.
- 2. Educate visitors about opportunities to reduce GHG emissions:
 - Outline low-emission recreational opportunities on the "Plan Your Visit" webpage, including opportunities for hiking and biking around the park and ways to reduce emissions while visiting the park.
 - Host a rain barrel workshop.
 - Create a "Bike with a Ranger" program.
 - Develop and disseminate information about reducing GHG emissions using podcasts, video, brochures, posters, website, and social media.
 - Create partnerships with other educational organizations.
 - Create an energy efficiency logo and slogan.
 - Host a "Sustainability in the Park" contest.
 - Incorporate climate change awareness into existing visitor education programs.
 - Advertise successes, such as emissions reductions and the methods used at park events to achieve emissions reduction.
 - Develop a "Talking Trash" program to educate visitors on GHGs associated with waste disposal.

Conclusion

Prince William Forest Park has a unique opportunity to educate and set an example for reducing GHG emissions. This plan summarizes the actions to which the park commits in order to reduce its GHG emissions. By addressing emissions in a targeted, prioritized manner, the park can efficiently and effectively reduce its GHG emissions. Additionally, by sharing these strategies with park visitors, concession operations, and partners, Prince William Forest Park will promote an awareness of climate change as well as actions to reduce GHG emissions on a broader scale.

