

National Park Service
Policy Memorandum 11-03 Disposable Plastic Water Bottle Recycling and Reduction
Analysis Protocol for Determining Environmental Benefits

I. Background

On December 14, 2011, NPS Director Jonathan Jarvis issued [Policy Memo \(PM\) 11-03, “Recycling and Reduction of Disposable Plastic Bottles in Parks.”](#) The policy allows parks to voluntarily establish disposable plastic water bottle sales elimination programs (DPWB SEPs) that aim to reduce the disposal of plastic water bottles in national parks.

The policy requires the NPS to monitor the outcomes of the DPWB SEPs. Specifically, PM 11-03 states that NPS will monitor the “park and servicewide environmental impact, visitor welfare, acceptance, and support, and effects on concessioners and cooperating associations.”

II. Purpose

This protocol was developed to analyze data from parks that received formal approval by NPS regional directors to implement the PM 11-03 policy. It focuses on capturing and analyzing the environmental benefits and outcomes from the policy.

Overview of the Environmental Benefits Protocol

This protocol uses data points related to the usage of water bottle filling stations (from parks that installed stations as part of implementation of PM 11-03) to measure source reduction of DPWBs¹ and the resulting environmental benefits. Of specific interest is verified usage data from park filling stations equipped with digital counters that record the number of fills via quantity of dispensed water; this produces a one (1) to one (1) correlation to determine the total number of DPWBs prevented. Data from individual filling stations are recorded at the park-level, and then tabulated across all parks resulting in a cumulative impact of the total number of DPWBs prevented within the NPS. Preventing the use of DPWBs also equates to other measurable environmental benefits, including:

- Pounds of polyethylene terephthalate (PET) prevented – Measurement of plastic prevented from manufacture (source reduction).
- Energy savings – Savings from avoided PET bottle production and transport (source reduction) and avoided disposal (landfilling or recycling).
- Emissions savings (MTCO₂) – Savings from avoided PET bottle production and transport (source reduction) and avoided disposal (landfilling or recycling).
- Landfill space savings – Savings from avoided landfilling of DPWBs.

¹ In general, waste management companies and parks do not measure the weight of waste generated nor do they measure or weigh the subcomponents (e.g., DPWBs).

III. Types of Data and Data Collection

On September 28, 2016, the NPS developed a baseline data set for the network of water bottle filling stations that exist within the confines of the parks with regionally approved DPWB SEPs. As of November 2016, 23 parks have approved programs. NPS collected the following information from each park:

1. A location description of the water bottle filling station (such as the nearest building to the installation).
2. The approximate date the filling station was put into service (month and year).
3. The type of filling station with a note if a digital counter is included in the filling station fixture. Types may be custom-built filling stations or commercial brand indoor or outdoor fixtures. If the filling station is a commercial fixture, the NPS requested information on the brand and model.
4. For filling stations with digital counters, a current reading from the digital counter and the date of reading.
5. For filling stations without digital counters, any other estimates of usage, such as metered volume dispensed or usage survey results (e.g., number of fills per day from surveys or observations).

The NPS Sustainable Operations and Climate Change (SOCC) Branch uses the Environmental Benefits Calculator Tool (Tool), an Excel workbook, to determine the environmental impacts of preventing the use of DPWBs. Data collected from the September 2016 and future data calls and calculations are maintained in the Excel-based Tool.

To date, the data demonstrates that any amount of DPWBs eliminated from the park's waste stream provides a net positive environmental benefit across the entire lifecycle of a DPWB. The NPS SOCC Branch will maintain the Tool, along with all associated documentation and data collected from the parks. For step-by-step instructions on Tool use, please refer to the Instructions tab in the Tool.

IV. 2016 Data and Calculation Specifics

Out of the 110 filling stations reported by the 23 parks, 79% (86 filling stations) provided digital counter filling station or estimated usage data. Filling and usage data for these stations was summed across 12 months to result in annual bottles/year values. The average annual fill rate was then extrapolated from this known data set of 86 filling stations by dividing the annual bottles/year values by the average annual visitation figures for each park (based on the installation dates of each filling station) to arrive at an average annual fill rate (fills/visitor/year) for each of the 86 filling stations. These 86 fills/visitor/year rates were then averaged resulting in a known population estimated fills/visitor/year rate.

For the remaining 21% (24 filling stations), the estimated data values of annual bottles/year were determined by multiplying each park's average visitation figures for the time period over which each filling station was in operation by the known population [estimated fills/visitor/year rate](#).

The cumulative number of fills for all 110 filling stations, representing the entire data set for the 23 approved parks, underwent a standard statistical analysis to validate the bottles/year estimates. The statistical analytical validation involved calculating a mean, standard deviation, and 95% confidence interval (with a lower and upper boundary) for the 110 filling stations.

For step-by-step instructions on these specific calculation used in the Tool use, please refer to the Instructions tab in the Tool.

V. Review Process

To instill confidence in this protocol, the NPS will continue to evolve and improve the methodology on a recurring basis. A thorough review of the protocol and the accompanying Excel workbook Tool will occur at least annually or more frequently as new resources and tools become available.